

Leadership in companies that acknowledge complexity – an integrative framework for complexity-centric leadership in robust pioneer organisations

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II Abstract

The researcher's experience of working in rigid hierarchical organisations raises the question of the actual role of leadership and the usefulness of hierarchy for controlling organisational complexity. Since most corporate organisational structures represent an unrealistic image of a complex organisational living system, this research aims to analyse how leadership evolves in organisations that do not rely on traditional hierarchical set-ups. Consequently, the thesis investigates conditions under which complexity-centric leadership emerges and what kind of activities are regarded as leadership roles in existing organisations, that successfully incorporate complexity principles within their organisational structure.

Theoretical and methodological research approach:

Underlying concepts of organisational complexity theory and complexity leadership theory (CLT) were synthesised within the literature review. Gaps were identified referring to the embeddedness of structural conditions as well as the emergence and roles of leadership in complex organisational systems. Literature states the significance for investigating organisations as complex living systems with implications for leadership practice and acknowledges that contingencies have not yet been explored in the field of application in existing companies. Thus, the methodological selection was to study real organisations that do not try to manage or control complexity but instead incorporate complexity and its derived principles within their organisation. These robust pioneer organisations were explored within a qualitative exploratory and interpretative approach via conducting interviews. In contrast, previous research was mostly performed via quantitative models that imitated organisational complex adaptive systems (CAS). Semi-structured interviews were regarded to facilitate most appropriately exploring organisational patterns and how leadership emerges as real-life phenomena in such organisations. Hence this method was the perfect option to discuss the identified gaps from the literature with complexity-centric leadership experts who could draw on their practical experience during the 19 undertaken interviews.

The findings:

In the analysed robust pioneer organisations, leadership is without power to directly control or influence organisational outcomes. Taking decisions and being responsible for

subordinated organisational members are not anymore associated as central leadership roles. A pivotal function of the investigated complexity-centric leadership is to create an environment where people feel that it is safe to take risks. Evidence suggest that this is most likely achieved by promoting a dedicated mindset through the entire organisation. Based on certain structural patterns and conditions that impact members' collaboration, complexity-centric leadership is regarded to distribute responsibility and decisions across any organisational member. Through integrating the findings within a framework for complexity-centric leadership organisations, this research contributes to knowledge and practice. It establishes a causal link between the sources of leadership emergence and leadership behaviour while incorporating the underlying structure of an organisation. Therewith it provides a valuable tool for academics and researchers. This identified emergence consequence implies the main contribution to knowledge from this study. The framework also contributes to practice by offering guidance for leadership practitioners and companies that want to become a robust pioneer organisation while willing to advance their leadership approach towards a complexity-centric leadership.

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VII Copyright declaration

This work has not previously been submitted for any degree at any university. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person. The thesis is the result of my own investigations except where due reference is made.

I therefore submit this thesis as my own work.

Name: Elena Kohler

Signature:

A handwritten signature in blue ink that reads "Elena Kohler". The signature is written in a cursive style with a light blue background behind the text.

Date: 24-January-2023

Chapter 1: Introduction

1 Introduction

1.1 Personal motivation and problem statement

The former writer and Pulitzer Prize winner Annie Dillard once said: "How we spend our days is, of course, how we spend our lives".

After university graduation I was highly motivated to contribute within my work to the success of a great organisation. I wanted to be part of a solution that is offered by the organisation and that in the end will improve end customers' lives. Accordingly, I wanted to spend my days in an innovative and productive environment. Consequently, in 2014 I have joined an IT-consultancy company that is supporting IT-projects in the financial industry. Therefore, the final clients where I was executing projects were huge corporate organisations in the financial industry that are also ranked among the top employers in Germany.

Soon after joining this professional work environment, I had doubts about the usefulness and the actual sense of most of my daily job activities. Within my work I was missing contributions to solutions as well as their potential improvements that the companies are offering to end customers and society. I realised that I was spending my days in management boards surrounded by ineffective organisational processes. This was definitely not what I had been looking for. I felt far away from actual work because of the reactive approach towards receiving tasks and executing decisions that were taken somewhere far away up in the hierarchy. All this raised personal demotivation. I love to spend my days proactive; I do not need a manager since I am already successfully managing my personal life by myself, hence I would like to use this approach for my work, too. My company has hired me, among others due to my proactive attitude - so why is this organisation controlling and steering its employees afterwards? However, I have learned and continually developed to apply logical thinking during my studies and work experiences. Why should I now, in a professional work environment, do not rely on my intellectual competencies but instead follow partially surd processes only because they are defined like this? Just following because everyone does or because it has always been like this without (understanding the) reason is completely against my underlying nature and accordingly how I like to spend my days and life.

To refer to the management pioneer Peter Drucker (2001): Organisations, which are treating employees as fix-cost figures that need to be kept as low as possible and controlled – instead of a solid investment that is appreciated due to its ability of contributing to the company's performance – these companies may not expect their employees to surpass their selves. I truly believe that monitoring or controlling anyone either in inter-personal relationships or in an employer – employee relationship will only contribute to fraudulent behaviour. Moreover, I truly believe that within a certain level of autonomy any relationship is likely to benefit since decisions and activities are based on intrinsic motivation instead of requirements provided by someone else.

I started discussing this context with peers also working in global organisations and they were sharing the same experiences. The contents of the talks were centred about two main aspects. The role(s) of leadership versus management were discussed. Additionally, we questioned the functionality of a hierarchy in organisations regarding the reality of how people are really interacting at work as well as how dynamic mechanisms within such organisations are working. However, corporate reality shows that a major part of the workforce is engaged with the organisation's internal self-administration, the fulfilment and conformity of project plans and budgets, independently from the real-life organisational complexity. This is in harsh contrast to characteristics inherent to a social system made up of human beings which is any corporate organisation. These personal impressions and thoughts are underpinned by the findings and beliefs of the management visionary Peter Drucker (1959) who has quantified about 90% of management being value destructive. Therefore, and due to my personal experience, I am not interested in exploring management but leadership instead.

Considering that the prominent organisational form in place is the one where most people involved are not pleased with, was the reason for me in 2018 to start reading about structures and underlying mechanisms in corporations that reflect the reality while acknowledging complexity. In 2019, subsequently I started to research on organisations that operationalise leadership in a non-traditional way with the intent to develop a framework for complexity-centric leadership organisations. These are organisations that acknowledge complexity and thus characteristics inherent to a social system made up of human beings.

This is probably more likely positively contributing to the wellbeing and motivation of their employees than a rigid hierarchical set-up. Additionally, such organisations are capable to adjust measurements and procedures more rapidly to changing requirements of the external environment due to their flexible structure. Therefore, such organisations are referred to as robust pioneer organisations.

1.2 Framing the current problem in corporate practice

Past and current literature agrees on the organisational structure of a company as likely being responsible for the employees' disengagement and disconnectedness (Cross et al., 2016; Laloux, 2015; Herzberg, 2003; Handy, 1978; McGregor, 1960; Drucker 1959).

Additionally, it was researched that certain organisational structures are likely to inhibit superior performance of organisational members collaborating in a company (Reeves 2016; Zeuch, 2015; Pfläging, 2014). Hamel and Zanini (2014) assert that traditional hierarchical corporations are organised for enhancing efficiency usually within repetitive activities. They further argue that the traditional organisational model of the majority of companies around the globe is still based on a tayloristic approach with hierarchies, command and control principles and the separation between thinking (by management) and executing (by workers) in order to enhance efficiency. Supporting this attempt, Reeves (2016) a strategist from the Boston Consulting Group found out that companies with the lack of adaptability in their organisation are more likely to fail, than their competitors with adaptable capabilities. Therefore, his findings state that efficiency is a viable option for the short term within less complex and predictable systems only. This argument is confirmed by Davenport (2017) and Lowe (2017).

However, the tayloristic approach was designed for a world about 100 years ago. Hence it is not able to sustain the changes in society and therefore is no longer applicable (Reeves, 2016; Pfläging, 2014). Davenport (2017), Hagel et al. (2017), Reckwitz (2017), Foster (2016), Pfläging (2014), Pink (2011) and Drucker (1992) describe the following underlying conditions and circumstances as the main reasons for traditional management approaches being outdated and hence the need for a fundamental transformation of the organisational structure and accompanied leadership:

The economy: Rapid advancements in technology and digitalisation on the one hand lower market entry barriers, facilitate companies to easily enter the market and on the other hand enable customer to choose and compare offers globally. These lead to higher competition and unpredictable demand (Reckwitz, 2017; Pfläging, 2014; Drucker, 1992).

The company: The circumstances in the economy contribute to more dynamic entanglement within each company. The thereof resulting intense communication and interaction paths need to be organised by means of an appropriate organisational structure (Foster, 2016; Pfläging, 2014).

The employee: In 1959, Peter Drucker introduced the “knowledge worker” concept for complex activities executed without muscle power but brain work. Since this kind of work does not follow a recipe but requires creativity, analytical skills and conceptual thinking, the command-and-control approach does not fit these requirements (Pink, 2011). High levels of self-management and autonomy were asserted as requirements for this kind of employee and leadership out to acknowledge these needs and behave correspondingly (Drucker, 1959; Pink, 2011; Davenport, 2017; Hagel et al., 2017).

Consequently, a hierarchical corporate organisation contrasts with the external complex business reality and internal behavioural patterns of employees. Therefore, due to their underlying organisational structures, most corporations present an unrealistic image of a complex organisational living system which is made up of human beings (Davenport, 2017; Lowe, 2017; Reeves 2016; Zeuch, 2015; Hamel and Zanini, 2014; Pink, 2011; Drucker, 1992).

Altogether, as presented above, current literature indicates that the hierarchical management approaches are in conflict with the challenges of the 21st century. The next section will highlight the main shortcomings of traditional leadership approaches and provide a rationale for why complexity is reasonable to supplement leadership in organisational environments.

1.3 Shortcomings of current leadership approaches and why complexity should be added to leadership

Braun et al. (2016) describe organisational complexity as unforeseen, sudden, and unpredictable circumstance that just occur within an organisation. They connect them to leadership since these factors need to be approached somehow. Due to the complexity that is inherent in any organisation and its external environment, leadership is no more capable to ensure the organisational survival by means of Tayloristic approaches that are based on a linear postulate assuming that the organisational future can be predicted and planned. Therefore, the different strategies and approaches from other research areas towards complexity are synthesised and conclusions for leadership are drawn upon these. Furthermore, complexity thinking is regarded as most appropriate to investigate leadership, since it provides viable explanations of how emergence is happening within organisations (Tourish, 2019; Marion et al., 2016) and how leadership can contribute to this emergence based on the principles of complexity theory (Leavy, 2017; Geer-Frazier, 2014; Kutz and Bamford-Wade, 2013).

Traditional leadership theories rely on the assumption that leadership can foresee the future of the organisation since organisations are alike mechanical systems and thus predictable in their behaviour (Lindberg and Schneider, 2013). By applying planning instruments based on linear cause and effect principles, and methods based on hierarchical command and control principles, traditional leadership theories aim on leading followers straight towards an organisation's target state (Davis, 2015).

Similarly, Marion et al. (2016) criticise traditional leadership theories to not incorporate the fact that many tasks are handled within groups that create value and therewith shape the organisational survival. Moreover, they raise as central shortcoming of traditional leadership perspectives that leadership is regarded as outside function and mostly superior that initiates change, apart from the actual organisational operations.

Marion and Uhl-Bien (2001) initially introduced complexity theory into leadership context arguing that leadership approaches were neglecting informal connections and their related dynamics. Instead, they are mainly focussing on the simplification of interrelations with the

aim of breaking down leadership into its single elements to plan, predict and control measurements. By applying complexity theory's principles for leadership in organisations, the organisational reality is acknowledged by incorporating non-linear interconnection of heterogenic elements and their reciprocal interdependencies which all contributes to adaptability, innovation and a more holistic approach. Moreover, it is asserted that organisational complexity theory incorporated to leadership approaches is shifting attention away from the leadership function itself towards its underlying emergent building process and hence adding real life dynamics (Hazy and Uhl-Bien, 2015).

From another perspective, the inadequacy of scientific management in acknowledging the informally emerging nature of organisations is cited as another reason for combining complexity and leadership perspectives (Lindberg and Schneider, 2013; Uhl-Bien et al., 2007; Stacey, 1995). Likewise, it is claimed that the application of complexity theory on leadership concepts is likely to contribute to a re-evaluation of the standard leadership models since leadership is usually intended to direct an organisation (Schneider and Somers, 2006; Marion and Uhl-Bien, 2001).

In addition, complexity theory is especially advantageous for the investigation of information distribution in organisations since it assumes to spread information ideally wide (Tait and Richardson, 2010). Complexity theory offers explanations for the distribution of immaterial elements such as information in the frame of a leadership function (Uhl-Bien and Marion, 2009). Furthermore, leadership research that incorporates complexity theory has the potential to provide insights on actual leadership emergence because complexity theory is not primarily focussing on the activities of individual elements in the organisation, e.g., single members, but rather aiming on explaining the underlying mechanisms that contribute to dynamic emergence of leadership (Marion et al., 2016; Kutz and Bamford-Wade, 2013).

Braun et al. (2016, p. 477) regard complexity theory as innovative underlying concept for leadership in theory as well as in practice and hence conclude that "leadership researchers [...] should take organisational complexity into account in order to contextualise leadership."

In this stance, when leadership is regarded as an organisationally embedded collective, the underlying group dynamics and their informal emergence into leadership would become the central point of attention also within research (Marion et al., 2016).

Subsequently, if complexity theory is added to leadership, it informs and enables leadership to actively contribute to a complex interactive dynamic which in return is likely to emerge and may result in adaptable behaviour in an organisation (Marion and Uhl-Bien, 2001).

In summary, a profound rationale was provided for the necessary incorporation of complexity theory into contemporary leadership concepts. The next section will follow up on this underlying conceptual approach and will present the need for contemporary research on organisations that incorporate complexity into their organisational structure and the accompanied implications on the leadership role to better meet the complexity induced challenges.

1.4 The need for research on leadership in robust pioneer organisations that acknowledge complexity

Marion and Uhl-Bien (2001) who have added complexity theory to leadership theory, asserted that social complex systems are not prescriptive, however research so far, tried to prescribe their facets. The reason for such prescriptive organisational research approaches is grounded in the belief that theory functions as a causal explication of phenomena. Thus, causality is the prominent characteristic of many theories (Bettis et al., 2014; Tsoukas, 2017). The concept of competitive positioning or the resources-based view of an organisation are prominent examples for such causal theories to prescriptively explain functioning of a corporate organisation. However, a corporate organisation is shaped by human beings that are interacting in a dynamic non-linear way, and hence often, without causality. On this aspect Pink (2011) complains that during 50 years of social science, behavioural patterns of human beings have been literally ignored within the establishment of organisational structures. Thus, the lessons of social science such as complexity in a system need to be incorporated in organisations and their leadership practices (Pink, 2011; Drucker, 1992).

To map such corresponding complexity-centric organisational settings, Tsoukas (2017, p.133) claims not to simplify but to complexify leadership related research and instead proposes “for theories to become more complex to cope with the complexity of the world”.

In this sense and for the purposes of this thesis, companies that acknowledge complexity as fact within their organisation and consequently incorporate derived complexity principles within their entire organisation are conceptualised as “robust pioneer organisations”. These complexity principles will be outlined in section 2.5.3. The drawn implications for leadership practice in such organisations are entitled as “complexity-centric leadership”.

It is argued that in volatile, dynamic, and complex environments nothing is predictable, but information needs to be retrieved from in – and outside of the complex organisational system (Leavy, 2017). Therefore, context and its continual change are necessary sources for information and ought to be considered by leadership in an intelligent way (Geer-Frazier, 2014; Kutz and Bamford-Wade, 2013).

In this stance, Kutz and Bamford-Wade (2013) argue that Newtonian based traditional leadership research is neglecting the dynamics of the natural interconnection between organisational members, leadership and their context since these concepts are mainly focussed on one of the three components and therewith do not incorporate the complexity related to their dynamic interplay. Therefore, it is supposed to extend linear leadership frameworks and account for the real-life complex dynamics that are naturally inherent in a social organisational system.

Leavy (2017), Geer-Frazier (2014) and Kutz and Bamford-Wade (2013) agree that basic information is not enough to provide valuable leadership in a complex organisational system. Leadership in such set-ups rather requires social and contextual intelligence as well as experience. On this aspect, Kutz and Bamford-Wade (2013) maintain that most leadership frameworks – even if they aim on integrating and acknowledge real life organisational complexity – fail to incorporate implicit knowledge such as subjective experience. Furthermore, they additionally fail to investigate how these experience-based empirical values are transformed into corresponding behaviours across the organisational collective.

Current investigations highlight that research on leadership is focused on capabilities and required skills of the individual leader in contrast to investigate leadership regarding its contingencies, contexts, and organisational settings (Elkington et al., 2017; Lord et al., 2017; Meuser et al., 2016; Zhu et al., 2018). Thus, it is asserted that former and current research is lacking to incorporate the fact that leading an organisation impacts human beings because too much focus is put on hierarchical influence through one formal leader (Drucker, 1954; Meuser et al. 2016; Pearce et al. 2009; Pink, 2011; Zhu, 2018). In 1954 Peter Drucker claimed that the reason for many organisational work-related problems is related to the perception of leadership as a job for one person only.

For future research, Serban and Roberts (2016) propose to switch away from traditional leadership-centric perspectives that present a formally designated leadership towards distributed forms of leadership where task and responsibilities are handled collectively. Accordingly, shared leadership structures ought to be used more commonly while complexity is increasing since work there is turning towards a multifaceted activity (Wu et al. 2018).

Overall, current literature on leadership in complex environments admits that there is no sophisticated in-depth insight into leadership contingencies with regard to complexity, while equally highlighting the necessity for comprehensive investigation in this integrated research field (Calabretta et al., 2017; Elkington et al., 2017; Hu et al., 2017; Hunter et al., 2017; Jarzabkowski and Lê, 2017; Karriker et al., 2017; Knight and Paroutis, 2017; Mehta and Mehta, 2018; Mendes et al., 2016; Smith et al., 2017; Tourish, 2018).

However, given the actual organisational structures and leadership principles within the majority of companies, the basic principles of complexity are only poorly understood and incorporated in leadership practice (Tourish, 2019) and accordingly conceptualised in current leadership research (Rosenhead et al., 2019). This presents the rationale and the necessity for sophisticated complexity-centric leadership research in robust pioneer organisations.

The upcoming section will explain the actual articulation of the theoretical problem and its derived issues in the practical business environment. This as consequence sets the foundation

for the significance and the urgency of this investigation that results into the overall research aim.

1.5 Formulation of the research aim and contribution of this study

Following up on the argumentation for the previous section, Tsoukas (2017) affirms that leadership and organisational literature often undertakes theoretical causal investigations and hence draws conclusions with only little incorporation of the interconnected and dynamic settings of a real corporate organisation. Therefore, such causality focused research mostly applied to investigate leadership activities in an organisational set-up, is missing almost everything that accounts for robust leadership – namely the interconnected dynamic context of individuals in an organisation. Hence, such causal organisational leadership theories are lacking sufficient practicability. Tsoukas (2017) directly points to the practical issue related to applied leadership in complex organisational environments and corresponding literature.

Given that employee disengagement is increasing at higher levels of hierarchical command and control structures (Davenport, 2017; Reeves, 2016) traditionally organised corporations are compelled to adjust their organisational structures to retain skilled employees (Lowe, 2017; Hamel and Zanini, 2014). Consequently, they need to shift their underlying organisational structure and future work environments towards more human-centred organisational set-ups as organisations are social complex systems (Wandeler, 2021; Pink, 2011; Drucker 1959)., and research in this field is required to acknowledge this practically induced relevance (Rosenhead et al., 2019; Tourish, 2019).

This context makes this investigation not only contemporary but also essential and of relevance for most hierarchically organised companies. Since leadership and underlying organisational structure are both supposed to serve the organisational collective and facilitate their collaborating activities (Elkington et al., 2017; Hu et al., 2017; Hunter et al., 2017; Jarzabkowski and Lê, 2017; Knight and Paroutis, 2017; Pfläging, 2014), the analysis of leadership in robust pioneer organisations to advance complexity-centric leadership theory is urgent.

Consequently, if corporate organisations are regarded as social complex systems where somehow linked individuals are interacting under certain conditions and patterns, it is essential to analyse these conditions and patterns in order to understand how leadership is emerging and what kind of roles are attributed to such complexity-centric leadership.

In this sense, the overall research aim is to analyse how complexity-centric leadership evolves in robust pioneer organisations.

The detailed objectives of this research are:

- a) To explore the conditions and patterns embedded in the organisational structure of such robust pioneer organisations
- b) To investigate how complexity-centric leadership is emerging in robust pioneer organisations
- c) To examine the roles that are emerging in the frame of complexity-centric leadership

This thesis will draw on organisational complexity theory and theories on leadership in complex environments that regard leadership as an emerging organisational phenomenon that better deals with complexity via acknowledging, accepting, and integrating its characteristics in contrast to dominating, controlling or commanding them. Within a synthesis of these underlying concepts, it is intended to finally create an integrative framework applicable for theory and practice.

Subsequently, the expected contribution of this thesis is regarded as theoretical and practical value. It will make contributions to theory by integrating the dynamics of the three mentioned research objectives of this thesis. This holistic analysis provides additional conceptual insights into the structural organisation of robust pioneer organisations that are existing and derives actual complexity-centric leadership activities in this type of organisation. The thereof derived contributions to practice are then visualised in a framework for complexity-centric leadership in robust pioneer organisations. This integrated framework will depict the interlinked factettes of behavioural and thought patterns as underlying conditions for the emergence of complexity-centric leadership. Therewith, this novel conceptualisation is addressing gaps and limitations articulated by latest literature on complexity leadership theory (CLT) (Rosenhead et al., 2019; Tourish, 2019) and as such it will differ from related

conceptualisations in this field of research (Devereux et al., 2020; Uhl-Bien and Arena, 2018; Uhl-Bien and Marion, 2009; Lichtenstein and Plowman, 2009). Consequently, this thesis' framework is dedicated to companies that want to become robust pioneer organisations and that are willing to transform their leadership approach towards a complexity-centric one that is capable of:

- empowering employees to assume responsibility and to take risks
- distributing the decision-making authority across any organisational member
- encouraging feedback and addressing tensions proactively
- creating an environment where taking risks are accepted and appreciated

and therewith attracting and retaining skilled employees instead of administrating activities that attempt to control complexity. Therewith, this thesis is dedicated to any organisation that wants to survive.

Having defined the research aim and expected contributions, the next section provides an outline on the overall structure and organisation of chapters in this thesis.

1.6 Structure of this thesis

The thesis began with sharing of the personal motivation of the researcher that set the very reason for undertaking this research. It intended to create the awareness of the need to integrate theoretically derived complexity principles into practical business application and especially leadership practice within organisation. This illustrated the essence of leadership in robust pioneer organisations. After a brief exploration of current theoretical challenges and shortcomings in actual leadership operationalisation, the research aim of this thesis and derived objectives were formulated at the end of chapter one.

Along all subsequent chapters of this thesis, the defined research aim is to function as guiding principle for the scope of this thesis. It will mark the road of this research journey from theory via practical activity in the field until disclosure of findings and their integration into the framework for complexity-centric leadership in robust pioneer organisations.

Chapter 2 reviews the current state of literature. The literature review will complete with the identification of theoretical gaps and thereof derived research questions.

Chapter 3 outlines the philosophical perspective including its methodological instruments that are regarded to most appropriately collect meaningful data to address the theoretical gaps and therewith to answer the defined RQs of this thesis.

Chapter 4 explains the data collection process followed by the analysis process executed for this thesis and sets the rational for the selected methodologies. Ethical considerations referring to this research are finally presented.

Chapter 5 follows with the analysis and discussion of the disclosed findings. Likewise, this chapter is set-up in line with the three underlying RQs that are addressed through this chapter.

Final conclusions and reflections of this thesis are outlined in the last chapter 6. The findings of this thesis are incorporated into a novel framework for complexity-centric leadership in robust pioneer organisations with contributions to knowledge and practice. This thesis ends with limitations and potential implications for further research.

Figure 1 visualises the research roadmap of this thesis by presenting the main content and related activities within the subsequent chapters.

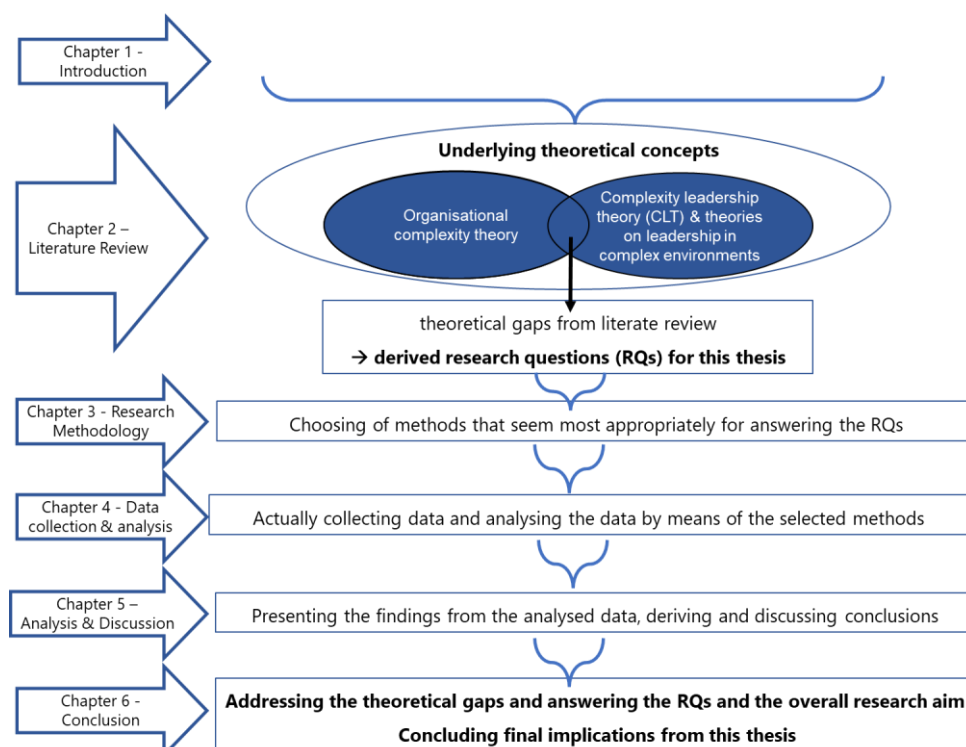


Figure 1: Research roadmap of this thesis

1.7 Introduction – chapter summary

While highlighting the personal motivation of the researcher as reason for undertaking this research project, this chapter framed the current shortcomings in corporate organisations and accompanying leadership approaches. Awareness was created for the need to integrate complexity principles into practical business application and especially leadership practices. This illustrated the essence of leadership in robust pioneer organisations. The research aim of this thesis and derived objectives were formulated. The chapter ends with the presentation of the structure for this research project by pointing to the main content relevant for each chapter. The thesis will follow up with the literature review in chapter two.

Chapter 2: Literature Review

2 Literature review

2.1 Introduction

The research context and the significance of this thesis including its overall research aim were highlighted in the introduction chapter. The first two literature review chapters 2.2 and 2.3, draw on the underpinning theories of this thesis. Then, in chapter 2.4, the selection methodology of the articles for this literature review is explained.

The main body of literature review is structured in accordance with the three particular research objectives of this thesis. Chapter 2.5 examines the current state of literature on organisational complexity theory and derived principles. Chapter 2.6 links complexity theory with contemporary leadership concepts. In chapter 2.7. the literature is reviewed with focus on the emergence of leadership in a complex organisational context. The last literature chapter 2.8 explores emerging leadership roles in a complex organisational context.

Finally, the unveiled research gaps are summarised as the results of this literature review. Thereupon the research questions for this thesis are derived in section 2.9.

2.2 Organisational theories relevant for this thesis' literature review

The focus of this thesis is to analyse leadership in organisational set-ups that acknowledge the principles of complexity. On these will be outlined in section 2.5.3 below. Hence organisational complexity theory is the most appropriate underlying organisational theory for this study because it accounts for complex real-life behaviours in social organisational systems (Hazy and Uhl-Bien, 2015) and inherent dynamic non-linear interactions of the single human beings in such social organisational system (Schneider and Somers, 2006).

(Social) human relations and the principles of (social) organisational complexity are very similar structures that maintain analogous mechanism. Therewith organisational complexity theory provides viable options to offsets the shortcomings of Newtonian based theories and linear cause and effect (reductionist) models (Davis, 2015). Ultimate reductionism and Newtonian based scientific management relies on the approach to divide a bigger system in

its smallest possible parts to understand the logic of the entire system based on the behaviours of its single parts (Taylor, 1911). Even if single parts may be identic, their inherent conditions are not. Due to non-linear random behaviour the sum of the single parts is not equal to the entire complex system (Andersen, 1999; Maguire and McKelvey, 1999; Stacey, 1995; Kauffman, 1993). Hence, it is concluded that ultimate reductionism ignores complex behaviour (Uhl-Bien, 2001; Kauffman, 1993). Accordingly, organisational theories relying on scientific management, or a Newtonian understanding are not regarded as applicable for the literature review of this thesis.

When considering the opposite theoretical spectrum of random interaction in the frame of chaos theory, it is likewise inadequate because this thesis conceptualises organisations as complex adaptive systems (CAS). Section 2.5.2 outlines on organisations as CASs in detail. In states of chaos, literature argues that CASs become dysfunctional (Tourish, 2019; Uhl-Bien and Arena, 2018; Schneider and Somers, 2006; Kauffman, 1993). Therefore, chaos theory is considered as not appropriate for this thesis and hence is not applicable in this literature review.

To study organisations and their accompanying leadership approach from a theoretical contingency perspective is suggested by Donaldson (2001), Fiedler, (1993) or Schoonhoven (1981). They advocate this theory to support explaining leaders-member relationships and organizational or situation-dependent effectiveness of certain leadership measurements in contrast to non-effectiveness in other structural, contextual, or organizational settings. Such contingencies on leadership and organisations ought to be studied when applying contingency theory. Since this thesis looks at organisations as a whole and as CASs that are made up of multiple influencing factors in contrast to studying single influencing factors, also known as contingencies, this theory is excluded. Furthermore, this study is not focused on analysing leader-member relations in dependence to certain influencing factors but on disclosing how complexity may impact organisational structures and related leadership behaviour.

Accordingly, it is advocated to apply complexity theory to organisations since the traditional models of organisational sciences are not feasible to comprehend the dynamics of today's

organisations (Tourish, 2019; Marion and Uhl-Bien, 2001). In this sense, Boal and Schultz (2007) assert that organisational complexity theory offers viable responses for successfully approaching challenges of the 21st century related to volatility, uncertainty, complexity and ambiguity (VUCA). Consequently, it provides a sound basis to draw upon in this thesis.

Confirming this note, Uhl-Bien and Arena (2018) state that contemporary literature is shifting from traditional hierarchical – bureaucratic organisational perspectives towards unconventional approaches with focus on the underlying organisational formal structure that often prevents to experiment and to try entire new approaches. It is concluded that formal structure is likely to hinder an entire organisation's innovativeness due to its underlying rigidity and a thereof resulting inability to adjust an organisation's underlying business model.

Furthermore, complexity theory emphasised the fact that corporate organisations are made up of human social relations (Davis, 2015). In sum, organisational complexity theory conceptualises patterns and explains their interaction mechanisms and a thereof potentially emerging new order (Prigogine, 1997). Therefore, complexity theory, most appropriately comprehends an organisation made up of emergent social processes instead of stable mechanisms (Porat, 2018; Marion et al., 2016; Mendes et al., 2016; Grille et al., 2015; Kutz and Bamford-Wade, 2013; Boal and Schultz, 2007).

Consequently, other organisational theories apart from organisational complexity theory are out of scope from this thesis' literature review.

2.3 Leadership related theories relevant for this thesis' literature review

In their review of leadership research during the last 25 years, Dionne et al. (2014) studied empirical and conceptual papers among 29 different leadership types. Therewith they present the multifaceted nature of leadership research and actual leadership forms.

Traditional leadership theories merely refer to leader-follower relationships where usually one formally designated leader executes power over subordinates on successive organisational levels within command, control and reporting frameworks (Tourish, 2019; Gottfredson and Aguinis, 2017; Hunter et al., 2017; Lichtenstein and Plowman, 2009).

Such functional leadership perspectives are out of scope from this literature review since these concepts see one single leader who directs followers towards goal achievement (Kempster and Gregory, 2017). Representative for all functional leadership concepts, such top-down direction from leaders presents a contrasting position towards a complexity theoretical approach and is therefore not relevant for this thesis. Transformational leadership theory is often presented as viable approach to cope with increased organisational complexity, due to its emergent nature and its person-oriented note that fosters the building of relationships which in return is likely to promote commitment in uncertain organisational environments (Dóci and Hofmans, 2015; Tyssen at al., 2014; Bryman et al., 2011). The main shortcoming of transformational leadership is its merely supplementing function to offset the insufficient personal component presented in the majority of traditional leadership concepts. As such transformational leadership is usually regarded to build up upon some existing focal leadership form and displays its full impact only within a complementing combination (Tyssen at al., 2014). Furthermore, due to its traditional follower – leader perspective as well as its focus on usually one single leader (Uhl-Bien et al., 2007), transformational leadership is not appropriate to adequately address the research aims of this thesis. Since the mitigation of leader-follower differentiation towards a collective consideration is a central element of an organisational complexity perspective (Lichtenstein and Plowman, 2009; Uhl-Bien and Marion, 2009), transformational leadership theory is out of scope from this literature review and accordingly, within this thesis it is referred to leadership rather than the individual leader.

In this stance O'Connell (2014) claims that traditional leadership approaches need an update due to the challenges referring to an increasing unpredictable organisational environment with accompanying shorter respond times which organisations are facing in the 21st century. This update needs to move away from leader centric perspectives with single assigned leader roles to common perspectives with regard towards the entire organisation (Day et al., 2014). Consequently, traditional hierarchical leadership perspectives are not in the scope of this literature review. O'Connell's (2014) review on contemporary leadership theories, highlights CLT as viable concept to adaptably master increased unpredictability and complexity inherent in corporate organisations. Since this is the focus of this thesis, theories on leadership in complex environments and in particular CLT are in scope of this literature review. Figure 2

lists the complexity related underlying theories and their sources that are defined as relevant and irrelevant for this research.

Theory	Underlying literature sources	Reason for exclusion of theory
Complexity Leadership Theory (CLT)	Hazy and Uhl-Bien , 2015 Lichtenstein and Plowman, 2009 Marion & Uhl-Bien, 2001 Osborn et al., 2002 Schneider and Somers, 2006 Uhl-Bien and Marion, 2009; Uhl-Bien et al., 2007	Not applicable
Organisational Complexity Theory	Andersen, 1999, Kauffman, 1993 Maguire and McKelvey, 1999 Schneider and Somers, 2006 Stacey, 1995 Uhl-Bien and Marion, 2009	Not applicable
Transformational leadership theory	Bryman et al., 2011	Excluded due to main focus on individual leader instead of emergence of leadership and no attention to the complex organisational environment
Traditional hierarchical leadership perspectives	Bryman et al., 2011	Excluded due to leader centric perspectives with formally designated leaders based upon a hierarchy
Scientific management / Newtonian based organisational theories and reductionist models	Prigogine, 1997 Taylor, 1911	Excluded because traditional models of organisational sciences assume linear cause and effect relationships, they do not assume complex adaptive behaviour and hence cannot comprehend the dynamics of today's organisations
Chaos theory	Kapitaniak, 2000 Letellier, 2019	Excluded because contrary to organisational complexity theory: In states of chaos, CASs become dysfunctional
Contingency theory	Donaldson, 2001 Fiedler, 1993 Schoonhoven, 1981	Excluded due to its focus on certain influencing factors or situations (contingencies) on leadership and/or organisations that ought to be studied

Figure 2: Underlying theories for this research

After having defined organisational complexity theory and CLT as theoretical basis in the two last sections, the following chapter will continue with the process of actual article selection for this thesis' literature review.

2.4 Methodology applied for article selection

The methodological approach for this literature review was inspired by Petersen et al. (2015 and 2008) because they did an extensive investigation on state-of-the-art approaches for a

systematic literature review. Figure 3 shows the derived literature selection process for this thesis.

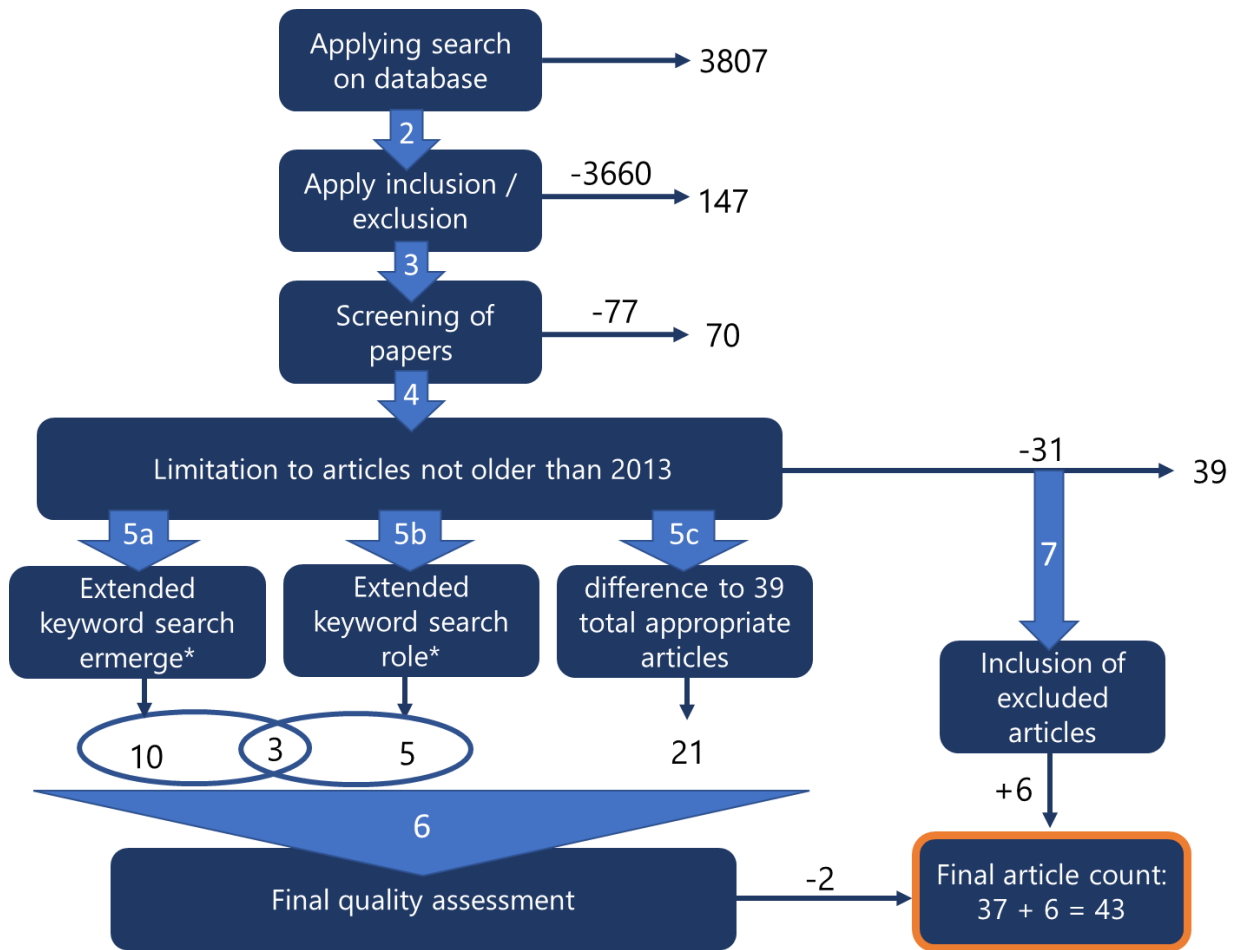


Figure 3: Systematic literature selection process for this thesis

Step 1: Applying search on database

Since the research focus and overall aim is the investigation of the research gap that is represented within the intersection of complexity theory and leadership theory, the initial search query is set for both words "complexity and leadership" to be found in all document types available in Scopus data base. Scopus is one of the biggest data bases available of peer-reviewed literature containing abstract and citation reviews from various data sources such as all major scientific journals, books, and conference proceedings among others. Scopus comprises international and wide ranged research among the major subject areas which includes business, management and social sciences and thus ensures the coverage of all comprehensive literature relevant for this literature review.

The document types available in Scopus are: Articles, Book Chapter, Review, Book, Conference Paper, Editorial, Note, Conference Review, Erratum, Letter, Short Survey, Retracted, Undefined. The initial search was conducted for the entire search period that is covered by Scopus, which is from 1921 to 2019 and revealed a result of 3.807 documents (see appendix 6: "scopus literature review results 1"). Within these results both words were found either in the document title or its abstract or as keyword.

Step 2: Apply inclusion and exclusion

Further screening of the papers was done with focus on the relevant subject areas of this thesis which were: Social Sciences, Business Management and Accounting as well as Decision Sciences. Thus, the Scopus results were limited to these three main subject areas. Figure 4 shows all subject areas including their revealed results. Social Sciences, and Business Management and Accounting as relevant subject areas of this thesis counted most papers. Decision Sciences were selected since taking decisions is traditionally referred to a leader respectively leadership and therefore relevant for the literature review of this thesis. The following subject areas were excluded from the initial result set, since they are out of scope from this business focused thesis.

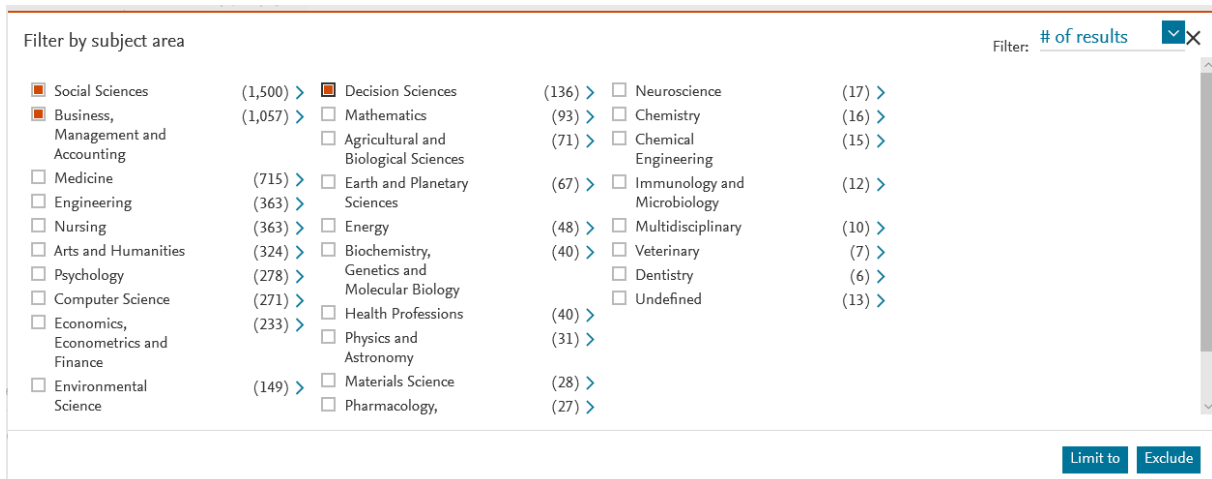


Figure 4: Scopus results according to subject area

These results were further limited to the relevant source titles. Excluded from the results were all source titles, as to say the names of the journal, book, conference proceedings, that did not contain at least "leadership" or "complexity" within their source title name. Furthermore, the following niche leadership sources were excluded from the search: developmental or educational types of leadership sources since they do not cover the classical corporate organisational content which is in focus of this investigation. Furthermore, cultural types of

leadership sources were excluded since cultural leadership and complexity related aspects are also not in scope of this thesis. Furthermore, medical, health care, environmental, engineering, public and administrative related sources were dismissed.

Especially not excluded were the following three journal sources:

- "Organisation Studies" since a corporate organisation is mainly influenced by complexity.
- "Development and Learning in Organisations" since innovative forms of governing an organisation regarding leadership and the approach to complexity are likely to be related to any kind of learning
- "Team Performance Management" since shared forms of leadership are often applied in research on team performance.

Further analysis regarding their document type led to the exclusion of editorial documents (3 results) and to the exclusion of conference papers (6 results) since the former function as introduction to special issues only and the latter are mainly related to summaries of conferences. Thus, both types do not provide profound insights into the content of literature to be reviewed in this literature review. At the end of the 2nd selection step the results were 147 (for details see appendix 7: "scopus literature review results 2").

Step 3: Screening of papers

Up to this step, the results have not yet been analysed qualitatively regarding their content. Therefore, within step 3 these 147 papers were analysed qualitatively regarding their suitability for the research aim of this thesis based on their abstract and if necessary, their introduction chapter, too. The aim of this step within the systematic literature review is to not lose any potential suitable article which would otherwise be excluded during one of the following steps. After assessing the articles' relevance for the research aim of this thesis, from the 147 documents, 70 final documents were revealed.

Not suitable or appropriate based on their abstracts were 77. This was due to not relevant research focus respectively the research direction of complexity (e.g. behavioural complexity; or areas of complexity beside organisational complexity) and / or leadership (e.g. leader's appearance or their personality, leadership education, leadership with focus on gender diversity or with leadership focus on global aspects that are not related to complexity, as well as market leadership).

Step 4: Limitation to contemporary articles not older than 2013

From the 70 remaining resources all years before 2013 were excluded to limit on a data base for further qualitative screening that is not older than 6 years. Age relevant limitation was only done within the 4th step and after an initial qualitative assessment (reading of abstracts) within step 3 due to the author's dictum on quality and richness of the sample which is also advocated in the review on systematic literature review by Peterson et al. (2015). Finally, 39 papers were remaining after this publication-age related exclusion. The 31 results that were excluded due to their age will be raised again later in step 7 "inclusion of excluded articles".

Steps 5 a & b: Extended keyword search to refine selected articles

A further and more narrowed key word search was undertaken for the 39 articles to refine and select articles appropriate for sub parts of the review. The intent was to reflect the two central research aspects of this thesis – the emergence of leadership and the roles of leadership – while drawing on complexity.

Accordingly, the search query was first extended to the keywords "TITLE-ABS-KEY(complexity and leadership and emerge*)" which revealed 10 results. Afterwards the search query of the 39 resources was extended to "TITLE-ABS-KEY(complexity and leadership and role*)" which revealed another 5 results. The intersection of both searches "complexity and leadership and emerge*" AND "complexity and leadership and role*" lead to 3 overlapping search results. According to Peterson at al. (2015) one challenge of any systematic literature review is the balancing act between generality of the overall research area and the specialty of the individual research focus which is necessary to formulate to uncover niche research. The systematic review steps developed for this research and shown in Figure 3 aim on mastering this balancing challenge.

Steps 5c: Difference to total appropriate articles

Step 5c accounts for the generality of the overall research area and hence considers the difference in numbers of articles between 10+5 from steps 5a&5b to the 39 articles already

assessed as appropriate before in step four. The difference of 21 articles consequently reflects complexity leadership research perspectives without dedicated focus on leadership emergence or roles.

Step 6: Final quality assessment

Quality assessment based on the following two criteria was the aim of the further 6th step.

- Full text download of the articles is possible. This led to the exclusion of 2 article (one with general focus, one with emergence focus)
- Articles are peer reviewed articles

The results of step 6 listed: 20 (21-1) general focused articles, 5 role focused articles, 9 (10-1) emergence focused articles and 3 emergent-role intersection articles, therefore in total 37 articles to be reviewed in depth.

Step 7: Inclusion of excluded articles

To finalise the article selection, step 7 focussed on the 31 articles that have been excluded due to their age within step 4. Since these articles would be appropriate from their content, they were reviewed again regarding their potential contribution to enhance quality and multifaceted perspectives within this literature review. Thus, the following six articles were included again corresponding to the most relevant authors according to their article count as Figure 5 shows:

Boal and Schultz (2007)

Marion and Uhl-Bien (2001)

Osborne and Hunt (2007)

Osborne et al. (2002)

Uhl-Bien and Marion (2009)

Uhl-Bien et al. (2007)

Documents by author

Compare the document counts for up to 15 authors.

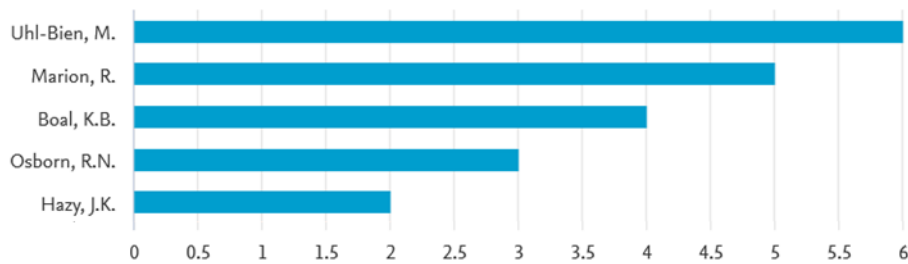


Figure 5: Scopus results according author article count

While going through these systematically selected literature as well as during writing up the final report of this research journey, other sources came up that seemed to be of significance for this research aim. To ensure a high-quality literature selection it was opted for going beyond this systematic selection approach and to include the following additional eight relevant sources in the body of the literature review:

Andersen (1999)

Devereux et al. (2020)

Kauffman (1993)

Lichtenstein and Plowman (2009)

Maguire and McKelvey (1999)

Rosenhead et al. (2019)

Schneider and Somers (2006)

Silva and Guerrini (2018)

Stacey (1995)

At the end 52 selected articles were regarded to be appropriate for this literature review.

The excel of appendix 1 lists all 52 selected literature sources. They are categorised regarding their conceptual or empirical nature as well based on their research type facet according to the classification from Petersen et al. (2008). From these reviewed articles 20 are of empirical nature and 32 of conceptual nature. From the latter ones there are 16 solution proposals and 16 philosophical papers. This presents a balanced sample to undertake a profound literature review that will be outlined in the following main part.

2.5 Literature review on organisational complexity theory and the derived conditions and patterns for application in a complex organisational context

The following section provides an overview on contemporary as well as fundamental literature on complexity theory including its derived principles for application in a complex organisational set-up of a company.

2.5.1 Origins of complexity theory

To enhance a comprehensive understanding about complexity thinking as well as its organisational incorporation, the theoretical research foundations of complexity as well as its underlying theories are stressed in the following.

Complexity theory's origin is in biology and physics with the aim of explaining complex natural phenomena. It argues that not everything can be explained with linear cause and effect (reductionist) models and thus acknowledges the environment as unstable, dynamic, non-linear interrelated, unpredictable, and emerging (Kauffman, 1993). Complexity pioneers such as Andersen (1999), Maguire and McKelvey (1999), Stacey (1995) and Kauffman (1993) have introduced complexity science by integrating it into organisational theories. Currently, complexity theory is widely applied to social sciences in the context of organisations with the aim of explaining the behaviours and interrelations of organisational elements such as leadership, members, or structural mechanisms (Marion et al., 2016). Complexity theory may offset the limitation of reductionist models and scientific management theory that are not able to comprehensively account for such non-linear mechanisms. Therefore, complexity theory is a viable concept to acknowledge real life phenomena (Tourish, 2019; Uhl-Bien and Arena, 2018; Uhl-Bien and Marion, 2009).

2.5.2 Organisations as complex adaptive systems

From a complexity theory perspective, Schulte et al. (2019) and Tourish (2019) view and investigate corporate organisations as made up of multiple single complex adaptive systems (CAS) that are emergent and self-organising. CAS are utilised to study the origin and factors that initialise emergence in the first place within the complex organisational system (Mendes et al, 2016). CAS as sub-complex systems display the equal characteristics as their focal

complex system. Accordingly, on this stance and on the behaviours that will be presented in the subsequent sections, will be drawn in this entire literature review for this thesis.

A complex system's lubricant is information because the exchange of information, is the starting point for dynamic connection (Uhl-Bien and Marion, 2009; Anderson, 1999). The very reason of any element in a system to connect dynamically are underlying needs or interdependencies (Uhl-Bien and Arena, 2018; Marion et al., 2016; Mendes et al., 2016; Lichtenstein and Plowman, 2009; Osborn and Hunt, 2007; Schneider and Somers, 2006; Stacey, 1995; Kauffman, 1993). The distribution of information in the organisational collective is regarded as central activity in a CAS and therewith in the entire complex organisation (Marion et al. 2016). Schneider and Somers (2006) present a CAS as an open system and as such it shows a non-linear behaviour when interacting with its environment for the sake of information exchange.

In contrast, very rigid and formally structured systems - mostly hierarchical ones- inhibit their situational adaptability (Marion and Uhl-Bien, 2001; Kauffman, 1993). However, entirely unstructured systems neither succeed to adapt because they do not maintain adequate structural conditions or patterns that prevent from sliding into chaos (Marion and Uhl-Bien, 2001; Kauffman, 1993). Since CASs are regarded to maintain an adequate level of stability and likewise space, they are most likely -as their name implies- to change and adapt in a self-organised emergent way (Schulte et al., 2019; Uhl-Bien et al., 2007). Such shared or distributed control that is attributed to CAS behaviours, is in sharp contrast to hierarchical structural set-ups and the centralised leadership orientation of most today's organisations that act more reactively and less adaptively within the complex external environment of the 21st century (Andrew and Bramwell, 2011).

Streatfield (2001) presents organisational hierarchies that are utilised to manage and control the interactive dynamics of a CAS. Thus, he refers to this approach as "the paradox of controls". His approach is supported by Mendes et al. (2016), Raelin (2016) and Uhl-Bien and Marion (2009) who add that often activities just emerge informally and dynamically without any formal instance being in control and hence argue that CAS are not actively manageable. Uhl-Bien and Marion (2009) argue that CAS as informal mechanisms permeate the formal

organisational structure automatically. However simultaneously, it is admitted that the formal organisational instance within its linear connections creates (often unintentionally) artificial boundaries that limit necessary interconnection.

In summary, the literature considers the CAS conceptualisation as a viable perspective for the successful navigation of organisations (Tourish, 2019; Schulte et al., 2019; Uhl-Bien et al., 2007, Schneider und Somers, 2006). To provide a profound understanding for doing so, in the following the underlying complexity and CAS related principles are outlined.

2.5.3 Principles of organisational complexity theory and their derived conditions and patterns for application in a complex organisational context

Research on complexity in human systems (organisations) agrees on the following main principles inherent of complex systems: Dynamic interaction, interdependence, balancing of order and disorder respectively adaption and emergence in a self-organised way. These characteristics are raised as contents that complexity theory aims to explain (Acton et al., 2019; Schulte et al., 2019; Tourish, 2019; Fu et al., 2018; Porat, 2018; Uhl-Bien and Arena, 2018; Braun et al., 2016; Kark et al., 2016; Marion et al., 2016; Mendes et al., 2016; Will, 2016; Davis, 2015; Hazy and Uhl-Bien, 2015; Bressers and Edelenbos, 2014; Tyssen et al., 2014; Fulop and Mark, 2013; Kutz and Bamford-Wade, 2013; Lindberg and Schneider, 2013; Lichtenstein and Plowman, 2009; Uhl-Bien and Marion, 2009; Osborn and Hunt, 2007; Schneider and Somers, 2006; Marion and Uhl-Bien, 2001; Anderson, 1999; Maguire and McKelvey, 1999; Stacey, 1995; Kauffman, 1993).

It is emphasised that organisational complexity is the interplay of its characteristics and not the description of one single aspect in an isolated way (Marion et al., 2016). To establish an understanding of the organisational complex system, it is necessary to comprehensively depict the interrelated mechanisms and characteristics of the complex system as whole (Tourish, 2019; Lichtenstein and Plowman, 2009; Uhl-Bien and Marion, 2009). The following sub sections will explore this aspect in more detail.

2.5.3.1 *Local interaction across organisational levels*

Organisational complexity is most displayed within the multiple linkages across all organisational levels via macro and micro interaction (Acton et al., 2019). The latter naturally emerge bottom up when individuals are interacting and may transcend into random as well as coordinated activities. These activities are linked between individuals and likewise the individuals are linked among each other (Schulte et al., 2019). Macro interaction then, presents the overarching structure of these micro dynamics, however the activities on the macro level are triggered from bottom-up micro interaction (Marion and Uhl-Bien, 2001; Anderson, 1999). It is furthermore argued that such interplay is representing the natural complexity that is inherent and applicable to natural sciences and therefore equally applicable for an organisation (Braun et al., 2016; Marion and Uhl-Bien, 2001).

Complexity models incorporate the linkages between the different levels within the overall complex system (on macro perspective) as well as between its sub-CASs (on meso perspective) up to the interconnection of single individuals (on micro perspective). Therefore, complexity theory indicates that CAS can be examined at a micro, meso or macro level of granularity (Anderson, 1999; Lichtenstein and Plowman, 2009; Uhl-Bien and Marion, 2009). Marion and Uhl-Bien (2001) as well as Braun et al. (2016) criticise research that ignores the interconnection among the macro level in terms of interplay on team (CAS) to team (CAS) level in contrast to interaction among individuals. They further argue such ignorance of interplay on system level to present one of the main sources for divergences that are not explainable in quantitative studies. Consequently, they advocate research to acknowledge the inter-system dynamics – for example among teams- instead of putting attention mainly on the interactions within a single team and its individual team members (Braun et al., 2016; Marion and Uhl-Bien, 2001).

Likewise, Porat (2018) regards a complex system to be made up of different influence levels. Contrarily, he defines the micro level as formal one to one influence, over a mezzo influence level with regard to teams or subgroups of the collective, up to a macro influence level that may extend across the entire organisational collective. Differently, but in accordance with the majority of complexity scholars, Schulte et al. (2019) describe that a formal hierarchical macro

structure is likely to limit the micro system's ability for adaptation. Hence they state that local informal micro systems are embedded in a focal formal macro one.

The complexity principle of local interaction as well as the permeation of interaction across different organisational levels (most defined as micro and macro levels) is confirmed by the majority of complexity scholars (Porat, 2018; Will, 2016; Lichtenstein and Plowman, 2009; Uhl-Bien and Marion, 2009; Anderson, 1999; Kauffman, 1993). It is argued that information in complex systems is only available locally and hence implicates that actors in complex environments are only capable of absorbing that limited information which is locally available at a certain time and place. Additionally, elements in a complex system do not require further (=not locally available) information of the system for their individual action and interplay. Consequently, any activity in a complex system will take place based on local and hence somehow limited information and permeates through the different levels of the complex system (Uhl-Bien and Marion, 2009; Anderson, 1999; Kauffman, 1993). However, leading scholars of complexity theorists do not agree where exactly emergence is initiated. Thus, this is explored in the scope of this thesis. Within their practical research, Schulte et al. (2019) revealed that CAS emergence occurs locally on micro level and evolves via meso- on macro-organisational level. They further argue that local interaction may be triggered by the system's environment in direction to the micro level namely a single CAS or an individual inside a CAS (Schulte et al., 2019). In contrast, Uhl-Bien and Marion, (2009) describe that emergence may be started from any interaction and anywhere in the complex system.

Schulte et al. (2019) conclude that more in-depth research is required that aims to unfold the detailed underlying mechanisms of emergence and self-organisation that both start with local interaction until entire organisational permeation. The next section will follow up on this and examine the details of interaction in complex systems and its further accompanying principles.

2.5.3.2 Non-linear exchange, feedback and emergence towards new order

The principle of local interaction which was presented in section 2.5.3.1 implies non-linear exchange of individuals that in return contributes to emergence. The next two sections

outline the complexity principles that lead to this emergence such as interdependent needs, self-organisation, feedback, and new order stability.

As described previously, dynamic exchange usually starts locally on micro-level and expands unpredictably across organisational mezzo and macro level (CAS-CAS exchange). Within the first interactions needs are identified and they are addressed within further interactions where potential solutions, new ideas and information is exchanged until an approach towards new order is identified in a self-organised way and accordingly emerges. This describes the basic process of self-organised emergent new order as well as the principle of feedback and confirms the theoretical assumptions of complexity respectively CAS theory that were introduced by the organisational complexity pioneers Kauffman (1993), Anderson (1999), Maguire and McKelvey (1999) and Marion and Uhl-Bien (2001). Likewise, it is confirmed by current research (Schulte et al, 2019; Will, 2016). Accordingly, Will (2016) describes such informally emergent bottom-up interaction, however, sets another focus. He argues that the collective is responding to environmental reality in the sense of providing feedback and based upon it the collective is interacting, either divergent or convergent. This dynamic process is defined as the emergence of a collective capability; however, he does not outline how further evolution is happening.

Complexity theory relies on the concept of feedback that implies that in case of an initial interaction further non-linear interactions will follow inside the organisational collective randomly. These dynamics cause emergence that results in new states, namely emergent new order (Anderson, 1999). Accordingly, small initial actions may cause or at least contribute to huge impacts which emerge in a non-linear and unpredictable way (Schneider and Somers, 2006; Stacey, 1995; Kauffman, 1993). A further aspect of dynamic exchange is raised by Marion et al. (2016). If exchange is not required then other aspects need to be the incubator. Therefore, the theoretical research on informal exchange cannot neglect the aspect of sympathy. Accordingly, they highlight the so far only limited examined concept of cliques within the collective of a complex organisational system. Cliques are kind of sub collectives like CASs that show higher levels of internal exchange within their group in comparison to communication levels outside this sub collective. Hence, they are sometimes associated with silos that treasure information and power. However, the opposite is likely the case since

cliques also function as incubator of growing ideas with the potential to spread across the entire organisation that have already been proven clique internally. Such cliques also facilitate the promotion of perspectives that would not have been addressed in the broader collective, due to individual personality of the people. Consequently, cliques or sub-collectives enhance profound dynamic interplay on micro as well as on macro level and therewith random emergence of unforeseen outcomes.

Braun et al. (2016) conceptualise under "emergence" their three main complexity related aspects: dynamic interaction, correlation as dynamic stability as well as random behaviour. Similarly, Schneider and Somers similarly (2006) present complexity as a theory made up of three linked categories namely non-linear interaction, adaptive evolution and in contrast to Braun et al. (2016) as third aspect they list chaos while arguing that random behaviour has no pattern. Braun et al. (2016) claim that interaction is naturally and automatically happening within a social system due to the automatic interplay of the social system's human beings and causes random behaviour. Likewise, a dynamic stability in terms of short-term predictability is occurring; they name this as "correlation" and therewith imply a kind of predictable order. They demonstrate such dynamic stability (predictability) with the example that complex organisational systems naturally create a kind of order and equally abolish planning initiatives (Braun et al., 2016). Marion et al. (2016) confirm that due to random self-organised interconnection of a CAS inside and among each other, new order emerges unpredictably which displays the main aspect of non-linear CAS behaviour. Concludingly, neither management, nor leadership nor any stakeholder is able to predict, plan or control CAS emergence (Marion et al., 2016; Uhl-Bien et al., 2007; Marion and Uhl-Bien, 2001). Likewise, Mendes et al. (2016) state that CASs usually emerge informally, non-linear, and dynamically without any formal instance being in control and hence argue that CAS are not actively manageable but instead are self-organised.

Since a complex system's lubricant is information, information flow functions as its adjusting screw (Uhl-Bien and Arena, 2018). Complexity theory further argues that based on dynamic interaction, new states are emerging in an unpredictable way. People cannot mutate into something else, however information can do so. Therefore, immaterial elements as values purpose or creativity likewise maintain the possibility to emerge into something new in the

frame of information flow that is regulated within the collective (Will, 2016). This note is confirmed by Marion et al. (2016) and Porat (2018). However, both claim that the detailed mechanisms of this information flow regulation, require an adequate in-depth investigation (Marion et al., 2016; Porat, 2018) which is explored in the scope of this thesis.

Emergence and the thereof emergent new order are main characteristics of organisational complex systems based on or derived from complexity theory. Supporting the former findings from Stacey (1995), Uhl-Bien and Arena (2018) maintain that new order emerges due to random dynamic interconnection of interdependent elements in a system respectively an organisation. However, only if organisational formal structures do not inhibit such random dynamic interconnection and accordingly emergence. They claim that emergent new order is especially triggered in case of conflicting constraints and solution broadening. The former is regarded as the challenge to overcome and work through differing arguments. The confrontation with a conflicting constraint without predefined outcomes implies an inherent tension in the argumentation and because of the need to work it through to align on any result, it likely enables the emergence of novelty in terms of new emerging order. According to Uhl-Bien and Arena (2018) solution broadening implies spreading of potential solutions (which are regarded as emergent new order). They further maintain that only if new approaches or ideas are distributed wide-ranging enough, the new idea may matter and gain momentum to really become or contribute to new emerging order.

2.5.3.3 Self-organised emergence and adaption due to interdependent needs

A further CAS capability and complexity principle is self-organisation (Marion and Uhl-Bien, 2001). Due to the underlying dynamic non-linear nature of any complex system, new order is not predictable and likewise complexity theory as a model does not rely on reductionist /scientific cause and effect explanations (Anderson, 1999; Maguire and McKelvey, 1999). Rather complexity principles offer potential explanations for how individuals or groups adapt in a self-organised way (Maguire and McKelvey 1999). Likewise, Schulte et al. (2019) explain that an informal self-organised emerging system functions like an organisational renewal default mechanism that automatically self-initiates in case of unforeseen defaults in the focal formal system.

It is argued that self-organised emergence is occurring due to interdependencies and the heterogeneity of a CAS's individuals (Marion et al., 2016; Schneider and Somers, 2006). Interdependency is the reason for actual exchanging and their heterogeneity offer non-equilibrium perspective and approaches that can be tried within the emergent process (Schneider and Somers, 2006; Anderson, 1999; Kauffman, 1993; Stacey, 1995). The results of Marion et al. (2016), Mendes et al. (2016), Lichtenstein and Plowman (2009), Uhl-Bien and Marion (2009) and Osborn and Hunt, (2007) confirm and support the above presented characteristics of CAS theory. Current scholars likewise confirm heterogeneity as main moderating factor for emergent random interconnection among team members (Wu et al. 2018; Tourish, 2019). Uhl-Bien and Marion (2009) explain that due their interdependency CASs influence each other. Furthermore, within these random dynamics the emerging actions of a CAS are steered in a self-organised way (Schneider and Somers, 2006).

In contrast, Osborn and Hunt (2007) assert that emergence happens self-organised based on the (interdependent) needs of the individuals in the CAS and hence not entirely free. They further claim that free emergent order might be possible in smaller organisational complex systems, however in huge complex corporate organisation, free order emergence is unlikely. They simultaneously argue that self-organised order is mainly dependent on the willingness of the individuals. Likewise referring to individuals, Lindberg and Schneider (2013) argue since individual's interaction is the source of emergence, the emergent process is relying on the different capabilities of these individuals and their needs. Thus, although CAS rely on the same principles, they do not maintain equal capabilities to emerge. Accordingly, it is concluded that emergence is unique for every organisational context. However, from a micro level, considering their interdependence because of common needs that often aim towards a common purpose and the influence from one history, it is likewise concluded that CASs emerge mutually (Schulte et al., 2019; Marion et al., 2016).

A further point, originally presented by Kauffman (1993), asserts that self-organised emergence is most successful and best enabled in states that are far from equilibrium since such volatile and uncertain organisational settings inaugurate testing innovative approaches far from equilibrium (Kauffman, 1993). Accordingly, Schneider and Somers (2006) confirm that self-organised emergence is mainly determined by the degree of disorder or instability;

respectively in sum by the proximity of the complex system towards chaos. Additionally, according to Kauffman (1993) the effectiveness of self-organised emergence is mainly determined by the number of sub-systems inside the focal system. Consequently, it is concluded that in Kauffman's concepts the overall number of sub-entities (e.g., CASs) inside a social organisational system is limited (Marion and Uhl-Bien, 2001). Moreover, they claim that the number of individuals within a system needs to be critically limited due to their conflicting needs since they trigger random interaction. In case of too many needs, alignment and consequently emergent order will not be possible.

Schneider and Somers (2006, p. 355) summarise that CASs are "most adaptive when near the edge of chaos". This is confirmed by a majority of former and current research (Tourish, 2019; Uhl-Bien and Arena, 2018; Kark et al., 2016; Marion et al., 2016; Mendes et al, 2016; Hazy and Uhl-Bien, 2015; Osborn and Hunt, 2007; Stacey, 1995; Kauffman, 1993). However, there is no overall alignment on conditions or requirements beside interdependent needs that best facilitate self-organised emergence towards new order in a complex system, neither has it been clarified where the edge of chaos is likely located. Hence this is explored in the scope of this thesis. Follow on from this, the next section will outline on the complex system's boundary towards chaos.

2.5.3.4 A complex system's boundary towards chaos

Stacey (1995) described the spectrum in which emergent order, for them regarded as adaptability, is enabled. It is enabled by the contrasting influences of chaotic instability on the one side that alone would let the system drift into chaos and on the other side by formal order that alone would inhibit any change. However, in combination both act upon a complex system with their contrasting forces and thereby trigger emergent (new) order.

Before, Kauffman (1993) highlighted as central capability of a complex system to adapt dynamically, randomly, and unpredictably as basis for the system's productivity at a constant level that is capable of absorbing high volatilities from inside and outside the system. This behaviour is defined as robust stability. Such robust stability is related to the central complexity element edge of chaos because such stable behaviour occurs within an unstable complex system and in non-equilibrium states until the edge of chaos. Although, complexity

theory and chaos theory are both based on non-linear dynamic behavioural principles, the former is more stable and hence predictable in comparison to chaos theory since complex systems best operate in a status that is close at the edge of chaos and therefore integrate chaotic and stable behavioural principles (Schneider and Somers, 2006). It is concluded that complex systems are emerging in a chaotic pattern and not in a random way because random cannot be considered as a pattern. Thus, in a complex system a paradox behaviour of initial chaotic behaviour that is emerging as a pattern due to the influence of stable patterns can be observed (Schneider and Somers, 2006).

Kutz and Bamford-Wade (2013) argue contrarily that chaos is likewise patterned due to their sole random behaviour. They argue that the theory of chaos goes beyond the linear Newtonian and reductionist models and shows that there are behaviours and relationships that cannot be predicted regarding their occurrence and not from their result. Chaos implies indiscriminate endeavours that occur and evolve by change (Kutz and Bamford-Wade, 2013).

Different complexity theory scholars agree that complex systems, despite their characteristics, maintain their functioning in terms of productivity in a stable way (=the state of robust stability) and hence striving for survival in a self-organised way. However, proper complex system function is limited up to extremes on both sides of deadlock and chaos, only in between these extremes the complex system is able to operate in the state of robust stability (Schulte et al., 2019; Tourish, 2019; Uhl-Bien and Arena, 2018; Kark et al., 2016; Marion et al., 2016; Mendes et al, 2016; Oeij et al., 2016; Will, 2016; Hazy and Uhl-Bien, 2015; Bressers and Edelenbos, 2014; Tyssen at al., 2014; Fulop and Mark, 2013; Lichtenstein and Plowman, 2009; Uhl-Bien and Marion, 2009; Boal and Schultz, 2007; Osborn and Hunt, 2007; Uhl-Bien et al., 2007; Schneider and Somers, 2006; Kauffman, 1993).

When moving towards one edge (deadlock or chaos) a complex system will become instable because of either too little information exchange that makes information processing redundant and leads to downtime or too much information that cannot be processed anymore via adjusting information flows which ends up in chaos (Uhl-Bien and Arena, 2018). Accordingly, complexity theory argues that a CAS is not viable in a state of deadlock due to the lack of self-organised dynamic interconnection (Marion et al. 2016). Kauffman (1993)

argues that high levels of organisational productivity are very likely if information distribution is balanced in the middle between edge of chaos and deadlock. This implies that a complex system likely maintains higher levels of adaption and innovation if there is any kind of structure and any form of organisation than with a fixed structure or in contrast without structure at all. On this aspect later, Marion et al. (2016) reveal a non-linear relationship between the speed of information processing and productivity. Rapid information sharing among the entire organisational collective significantly increases if informal CAS building and their dissolution is enabled and embedded successfully in an organisation. However, rapid information distribution does not contribute to a significant increase of organisational productivity (Marion et al., 2016). These findings extend the findings of Kauffman (1993) who regard the edge of chaos at far lower levels of information volatility that the collective can cope with. However, there is no overall definition up to which limit edge of chaos is regarded and where exactly chaos begins. Hence, it is essential to explore the states of a CAS between its extreme poles of predictable stability and the edge of chaos. During such non-equilibrium set-ups complexity theory argues that individuals and groups are dynamically interconnecting and creating new emergent order.

Accordingly, the detailed facets of non-equilibrium settings, accompanying non-linear interconnection and the emergence of new order is regarded as focus for further in-depth research (Uhl-Bien et al., 2007) which is explored in the scope of this thesis.

2.5.4 Summary on organisational complexity theory and the derived conditions and patterns for application in a complex organisational context

In summary, it is argued that organisations are complex systems where a number of individual human beings or sub groups regarded as CAS are interacting interdependently, unpredictably, usually in a non-linear manner and therefore emerging and adapting by means of self-organisation (Schulte et al., 2019; Tourish, 2019; Uhl-Bien and Arena, 2018; Kark et al., 2016; Marion et al., 2016; Mendes et al, 2016; Oeij et al., 2016; Will, 2016; Hazy and Uhl-Bien, 2015; Bressers and Edelenbos, 2014; Tyssen at al., 2014; Fulop and Mark, 2013: Lichtenstein and Plowman, 2009; Uhl-Bien and Marion, 2009; Boal and Schultz, 2007; Osborn and Hunt, 2007; Uhl-Bien et al., 2007; Schneider and Somers, 2006; Kauffmann, 1993).

The majority of complexity scholars agree and confirm an advantageous application of complexity principles in the organisational context (Tourish, 2019; Müller et al., 2018; Marion et al., 2016; Mendes et al., 2016; Davis, 2015; Dóci and Hofmans, 2015; Hazy and Uhl-Bien, 2015; Bressers and Edelenbos, 2014; Geer-Frazier, 2014; Lindberg and Schneider, 2013; Lichtenstein and Plowman, 2009; Osborn and Hunt, 2007; Uhl-Bien et al., 2007). After this review on the main theoretical features inherent to complex systems and to ensure a comprehensive understanding of leadership theory accordingly, the following chapter 2.5.4 will outline on theoretical leadership concepts while considering their application within a complex environment. This section functions as transition to the two leadership review sections on the emergence and the roles of leadership in chapters 2.7 and 2.8.

2.6 Literature review on organisational complexity theory and their application to contemporary leadership concepts

The aim of this transition review section is to explain why a complexity perspective makes sense to be integrated into contemporary leadership concepts while referring to the basics of complexity-centric leadership referring to CLT.

According to Hazy and Uhl-Bien (2015), after publishing of the special leadership quarterly issue on the application of complexity to leadership in 2010, research has advanced notably in this field. In this stance, the following two section will enlarge on current leadership perspectives and concepts on leadership in complex environments that offset the presented traditional leadership theories' deficits and aim on adequately accounting for organisational real-life complexity. Both sections are intended to bridge the gap from the review on organisational complexity towards the review on complexity leadership by means of outlining on literature that adds complexity to leadership. Firstly, section 2.6.1 lists definitions for current complexity-centric leadership perspectives in order to provide an overview for how literature that added complexity to leadership understands the function of leadership in complexity-centric organisations. Secondly, section 2.6.2 in more detail explains how CLT facilitate the handling of real-life complexity in organisational environments.

2.6.1 Complexity-centric leadership perspectives and definitions

This section presents a list of definitions for how leadership is conceptualised by current literature that added complexity to leadership. It intends to create a basic understanding for the theoretical perception of complexity—centric leadership in robust pioneer organisations as assumed for this research.

“Leadership is an informal, collectivist behaviour that enhances information flow” (Marion et al., 2016, p. 243).

“Leadership as a construct” (Hazy and Uhl-Bien, 2015, p. 80).

“Leadership is often as much an art as a science” (Fraher and Grint, 2018, p. 395).

“Leadership is a negotiation that occurs within groups of people” (Porat, 2018, p. 300).

Hasel and Grover (2017, p. 861) argue that leadership is partially made up of “trial and error”.

Leadership implies coping with “a potpourri mix of such aspects such as personal ambition, feelings of (in-) security, allegiances and friendships, degree of commitment with organisational purpose, political interests and conflicts, relational tensions, moral identity and moral rationalisations.” (Kempster and Gregory, 2017, p. 510).

From another perspective, it is acknowledged that concepts that add complexity to leadership provide approaches that aim on integrating the entire range from rigid organisational contexts up to the edge of chaos environments. Likewise, it is claimed that the conditional patterns of the individual organisational context and mechanisms that explain and lead to a certain behaviour were not yet investigated in adequate depth (Dóci and Hofmans, 2015).

The majority of articles that were systematically selected for the literature review of this thesis refers to leadership as a social process that is inherent in the organisational collective (Acton

et al., 2019; Fu et al., 2018; Porat, 2018; Wu et al., 2018; Kutz and Bamford-Wade, 2013; Uhl-Bien and Marion, 2009; Osborn et al., 2002).

Accordingly, Osborn et al. (2002, p.798) define leadership as “socially constructed in and from a context”.

Acton et al. (2019, p. 151) regard leadership as “a socially constructed process that is situationally embedded and occurs across multiple levels”.

Uhl-Bien and Marion (2009, p. 631) define leadership is “multi-level, processual, contextual, and interactive”.

Similarly, Porat (2018) states that the organisational collective is influencing and shaping how leadership is executed in an organisation and therefore the author argues that leadership is defined by the organisational members and leadership accordingly reflects the organisational context.

This list of theoretical complexity-centric leadership perspectives clearly highlights that CLT does not rely on a common definition for complexity leadership. Thus, there is no uniform understanding for complexity-centric leadership. The concepts are formulated vaguely and without concrete measures inherent to a complexity-centric leadership role. The majority of definitions puts its focus on the organisational frame conditions or circumstances in an organisation in contrast to personality characteristics necessary for a leadership that is allowing complexity instead of controlling it. Therewith they automatically indicate that leadership is not related to one individual person only but rather shared.

The next section builds up on this broad impression and examines how CLT conceptualises complexity-centric leadership approaches in complex organisational environments.

2.6.2 Complexity leadership theory and other complexity-centric leadership concepts applicable for complex environments

As defined in section 2.3, theories on leadership in complex environments and in particular CLT are in scope of this literature review. CLT is adding complexity to leadership theory (Tourish, 2019; Mendes et al., 2016; Hazy and Uhl-Bien, 2015; Lichtenstein and Plowman, 2009; Uhl-Bien and Marion, 2009).

CLT assumes that creativity and effective organisational structures will emerge more likely via autonomous interaction due to the wisdom of the collective rather than based on a single leader's limited knowledge (Marion and Uhl-Bien, 2001). This describes the very principle of CLT and any form of shared or distributed leadership and rationalises its successful application (Wu et al., 2018; Hazy and Uhl-Bien, 2015). Accordingly, in their complexity leadership framework, Uhl-Bien and Arena (2018, p. 96) define "leadership for organisational adaptability as enabling an organisation to operate as a complex adaptive system by leveraging networked dynamics and structures." In this sense, it is argued that more people need to be involved into organisational leadership activities since it is quite unlikely that one individual alone maintains all necessary capabilities to adequately hold all relevant leadership roles to cope with the increased level of organisational complexity (Fu et al., 2018; Wu et al., 2018; Dóci and Hofmans, 2015; Kutz and Bamford-Wade, 2013).

A further reason for the inevitable shift from a single leader approach to distributed forms of leadership is presented by O'Connell (2014) who assert that team members often rely on a similar educational background, and they are equipped with equal capabilities which makes it not reasonable to formally designate one leader (O'Connell, 2014). Correspondingly, it is maintained that organisations increasingly do not control anymore but instead acknowledge complexity within their structure and hence reframe their self-perspective and aim for building a CAS organisation (Silva and Guerrini, 2018; Serban and Roberts, 2016; Geer-Frazier, 2014). Geer-Frazier (2014) revealed that such organisations start their endeavours in areas with already decentralised leadership set-ups and where autonomy principles are at least (semi-)integrated.

In summary, the majority of contemporary CLT conclude that leadership is a social process that is inherent in the organisational collective (Acton et al., 2019; Fu et al., 2018; Porat, 2018; Wu et al., 2018; Dóci and Hofmans, 2015; Kutz and Bamford-Wade, 2013; Uhl-Bien and Marion, 2009; Osborn et al., 2002). Therewith they imply a shared nature of complexity-centric leadership, which is explored in the following section of this thesis.

2.6.3 Facets of collective leadership forms

During the recent two decades shared forms of leadership were analysed from different scholars that called them shared leadership (Müller et al., 2018; Wu et al., 2018; Zhu et al., 2018; Serban and Roberts, 2016; Grille et al., 2015), distributed leadership (Fu et al. (2018), plural leadership (Porat, 2018), adaptable leadership (Uhl-Bien and Arena, 2018), complexity leadership (Tourish, 2019; Mendes et al., 2016; Hazy and Uhl-Bien, 2015; Geer-Frazier, 2014; Lindberg and Schneider, 2013; Uhl-Bien et al., 2007), leadership of emergence (Acton et al., 2019; Lichtenstein und Plowman, 2009), flock leadership (Will, 2016), collective leadership (Osborn et al., 2002).

Marion et al. (2016) summarise the entire spectrum of shared leadership specifications as collective forms of leadership. However, Fu et al. (2018) differentiate between shared and distributed leadership. As the main difference they present the underlying origin of designation. While shared forms usually have one single formally designated leader who appoints or involves others to participate in leadership activities, in contrast distributed leadership is not relying on any formal leader. Through informal emergence individuals participate in distributed leadership, which is constantly changing due to their contribution intensity, the activities of followers as well as their organisational context. In contrast, Wu et al. (2018) regard shared leadership as synonym for distributed or collective forms of leadership. To simplify the wording, this approach is likewise applied for this thesis.

Zhu et al. (2018, p. 834) who did an extensive review on shared leadership concepts in complex environments, define these as "... emergent team phenomenon whereby leadership roles and influence are distributed among team members." They present the following three characteristics as main aspects inherent in different shared leadership concepts (Zhu et al., 2018, p. 836): Lateral influence among peers, the emergent team phenomenon and

leadership roles that are dispersed across team members. Therewith they are recognising the underlying complexity features of random interconnectivity among many actors as well as the ability of emergence and self-organisation in a CAS.

In the frame of the review on leadership approaches required to meet the challenges of the 21st century, O'Connell (2014, p.188) summarises shared leadership concepts and defines them as "dynamic and interactive influence process operating upward, downward, and laterally in the spaces between individuals and groups in organisations to achieve goals and effect concertive action". Similarly, Müller et al. (2018) describe members of a group in an organisation to perform leadership activities simultaneously or sequentially, based on a dynamic process in order to archive a group or / and an overall organisational goal. Therewith, leadership roles and responsibilities are shared by at least two people de-centrally.

Moreover, shared leadership implies that information is distributed across the organisational collective because organisational members that voluntarily assume leadership activities understand the importance of sharing skills, capabilities and information and are likewise eager to do so (Müller et al., 2018). Contributing to this aspect, Will, (2016) regards non-linear dynamic interaction of individuals inside a focal system as collective behaviour. Therefore, they advocate to not regard collectives simple as a group of individuals but to focus on the underlying transmitting element that is information. It is automatically processed within any interaction among individuals as well as among groups.

This stance is confirmed by Marion et al. (2016) who investigate how shared leadership does impact organisational outcomes. In their study they regard leadership as an informally emerging collective construct and organisational outcomes as the results of (successful) information processing within and directed by this collective. However, they simultaneously claim that the research so far has missed to investigate in depth how shared forms of leadership influence the organisation and its members by means of processing information. Likewise, in both reviews on leadership theories, Lord et al. (2017) and Acton et al. (2019) furthermore add the time perspective within shared forms of leadership since they state that the roles of both followers as well as leaders are changing over time depending on the

required skills for a certain scope or area. Therewith they incorporate the adaptive dimension over time of complex systems within leadership.

Overall, contemporary studies on collective leadership forms have revealed quantitatively as well as qualitatively their advantageous aspects (Fu et al.; 2018, Müller et al., 2018; Tourish, 2019; Wu et al., 2018; Zhu et al., 2018; Lord et al., 2017; Serban and Roberts, 2016; Grille et al., 2015; Kohles et al., 2013; Lichtenstein and Plowman, 2009). Among others, shared leadership is likely to positively influence the outcome on team level (Wu et al., 2018), to prevent mistakes due to the heterogenous spectrum of capabilities that are combined (Müller et al., 2018; Lord et al., 2017) and to accelerate information and knowledge sharing which in return enhances the organisation's ability for innovation (Fu et al., 2018).

In their research on leadership in complex systems, Lichtenstein and Plowman (2009, p. 618) see leadership independent of specific individuals and as broader organisational instance and therefore define leadership "...as the capacity to influence others [that] can be enacted within every interaction between members." Refining this note, current research calls for a more comprehensive incorporation of complex dynamics within leadership theories by arguing "leadership cannot be understood so long as it is envisaged as a means whereby powerful actors exercise more or less unidirectional influence on others" (Tourish, 2019, p.15).

Due to the reviewed advantages of shared leadership forms especially in complex environments, this thesis examines underlying organisational conditions and patterns that lead to the emergence of distributed complexity-centric leadership in the complex environments of existing robust pioneer companies. The next two sections represent the main body of this thesis' literature review. Chapter 2.7, examines the emergence of complexity-centric leadership; its accompanying roles are outlined in chapter 2.8.

2.7 Literature review on the emergence of leadership in a complex organisational context

This section explores the perspectives of current complexity leadership literature on the conditions and patterns relevant for the emergence of complexity-centric leadership in robust pioneer organisations.

The majority of complexity leadership scholars agree on a leadership that is emerging within a dynamic multi-level influence process (Acton et al., 2019; Schulte et al. 2019; Fu et al., 2018; Uhl-Bien and Arena, 2018; Porat, 2018; Lord et al., 2017; Marion et al., 2016; Mendes et al., 2016; Will, 2016; Hazy and Uhl-Bien, 2015; O'Connell, 2014; Lindberg and Schneider, 2013; Lichtenstein and Plowman, 2009; Uhl-Bien et al., 2007; Schneider and Somers, 2006; Anderson, 1999; Maguire and McKelvey, 1999).

Porat (2018, p. 297) regards "leadership as an influence action of many. These influence exchanges result in an emergent influence pattern or a leadership configuration." Supporting this note, Hazy and Uhl-Bien (2015) add that leadership in 21st century-organisations is emerging via dynamic interactions among organisational members. These interactions are mainly influenced by considering interests and expectation between individuals and the collective. Acton et al. (2019) aim on gaining in-depth insights into the entire evolutionary process of leadership emergence. They argue that there are three basic underlying factors that influence the emergent process: First and most important the multi-levelled nature of any organisation. Consequently, after initial emergence on micro level, emergence is somehow evolving across wider collective levels which Schneider and Somers (2006) are confirming. Second "somehow evolving" implies the detailed flows of interexchange across organisational levels. They are non-linear and hence difficult to describe as well as not general applicable for any organisational leadership emergence (Acton et al., 2019). As third factor Acton et al. (2019) present the time during which emergence is occurring and leadership participation is changing in order to overcome underlying challenges. The changing nature of collective leadership is likewise highlighted by Lord et al. (2017) and Mendes et al. (2016). If the underlying issue that needs to be addressed changes or if a new issue to be solved appears, via organisational member's self-organised exchange regarding this new aspect, a different leadership instance will emerge again automatically, however only in case of appropriate organisational frame conditions (Mendes et al., 2016).

Such emergent process was already described before similarly by Lichtenstein and Plowman (2009) who in depth examined the process of leadership emergence. Both reveal a leadership emergence process to occur through and across different organisational levels. While

Lichtenstein and Plowman (2009) describe these as successive levels Acton et al. (2019) in contrast presents emergence via meso levels and therewith implying a more dynamic and random nature. Furthermore, Acton et al. (2019) claim that there are parallel leadership emerging processes on the different organisational levels that have the potential to become incorporated into one organisational leadership emergence process with specifications related to situational leadership emergence and structurally embedded leadership emergence. Therewith indicating that over time there may be one patterned leadership emergence process, however with single exemptions to account for the underlying rational of required leadership functions.

In contrast, before Lichtenstein and Plowman (2009) found four preconditions that are essential for leadership emergence. First and most important, a status of moderately sustained tension is a necessary condition to trigger sufficient CAS interaction. This is confirmed by leading scholars (Schulte et al., 2019; Uhl-Bien and Arena, 2018; Marion et al., 2016). Second Lichtenstein and Plowman (2009) state that these interactions need to evolve in broader levels successively (e.g., from inside a CAS on micro level, across CAS on mezzo level, up to macro level through the entire organisation). This was revealed to create organisational learning and potential innovation. Third, this evolution occurs in a self-organised way (Lichtenstein and Plowman, 2009). Bien and Arena (2018), Lord et al. (2017) and Stacey (1995) are confirming a self-organised nature and the accompanying learning contribution. Bien and Arena (2018) argue that from a complexity perspective leadership per se is an emerging phenomenon on all organisational levels based on group or network dynamics in a self-organised way and not an activity related to a single person only relevant on higher levels. Furthermore, leadership as emerging phenomenon automatically contributes to information and knowledge distribution because of its networked dynamic nature. Finally, as forth emergence precondition, Lichtenstein and Plowman, (2009) draw on the concept of feedback that was outlined before in section 3.1.2.2 of this literature review. These two last preconditions are also confirmed by leading former and current complexity scholars (Schulte et al., 2019; Uhl-Bien and Arena, 2018; Marion et al. 2016; Anderson, 1999; Maguire and McKelvey, 1999).

In summary, theoretical complexity principles are confirmed by latest practical research that describe leadership emergence as non-linear dynamic interconnection process among individuals across all organisational levels (Acton et al., 2019; Schulte et al, 2019; Porat, 2018; Uhl-Bien and Arena, 2018, Braun et al., 2016; Marion et al., 2016; Mendes et al., 2016; Will, 2016; Tyssen et al., 2014; Lichtenstein and Plowman, 2009; Schneider and Somers, 2006; Marion and Uhl-Bien, 2001; Anderson, 1999; Maguire and McKelvey, 1999; Stacey, 1995; Kauffman, 1993). However, the conditions and patterns of such emergent leadership process are not coherent. Therefore, the following sections of this thesis' literature review enlarge on the spectrum of underlying conditions and patterns in detail that lead to leadership emergence.

2.7.1 Leadership emergence versus leader-follower

Acton et al. (2019) noted that even though leadership emergence is regarded as self-organised bottom-up process of the organisational collective, only a small number of studies in this field is actively refusing a leader – follower relationship. Accordingly, from the 52 articles that were selected for this literature review, the majority namely 32 do not draw on leader-follower relationships which is indicating that leader-member antinomy is an outdated thought pattern for scholars that examine leadership in a complex organisational environment. It is worth notable that from the 11 articles with a dedicated focus on leadership emergence in complex organisational set-ups (see appendix1) only 2 papers still express and make use of the leader-follower relationship. The majority, 9 papers, did not use a follower or followership expression which displays the general discrepancy between leadership emergence and a leader-follower stance. Will (2016) actively highlight that leadership is not about follower direction and Lichtenstein and Plowman (2009) even argue that most of the interaction occurs between peers in an organisation and hence they deny a general leader-follower perspective.

However contrarily, Kohles et al. (2013) explicitly set their focus on the integration of leader and follower perspectives since they investigate concepts that might synthesise both roles. Likewise, Lord et al. (2017) in depth investigate shared leadership forms during their emergence however maintain a separation between the roles of leaders and followers.

Porat (2018) propose to dissolve the leader-member antinomy by acknowledging leadership as a social process of mutual influence. This highlights that leadership is influenced and shaped by its organisational members and vice versa, consequently the entire organisational structure is informally emerging in this way since tasks, goals and initiatives are defined collectively. The innovation of an emerging leadership is the relation between leadership and followership that is regarded with many to many. In contrast traditional and even some non-traditional leadership concepts define the interaction with one to one or one to many (Porat, 2018).

An entirely different aspect is presented by Tomkins and Simpson (2015) who investigate leadership from the perspective of the philosopher Heidegger, who regards leadership as an entity that takes care of the organisation and its complex social dynamics. Although taking care in this concept implies intervention by a leadership instance, this kind of intervention is different from traditional subordinate or superordinate concepts. This leadership concept calls for more anticipation (as strategical perspective without supervising or controlling function), autonomy of the individual one (but without independence of the individual) and advocacy in the sense of backing up the subordinate. Likewise caring in the Heidegger sense is not related to kindness or a nice leader because followers are taken up in their promise in the frame of leadership empowerment. In summary, it shows a clear division of follower and leader in a supervising role. Despite such separate leadership-followership view they regard empowerment of follower's individual potentials and approaching their necessities as central aspect with the overall goal to transform into a leader. While simultaneously lining up goals and purpose among the overarching organisational levels, which is again in contrast to complexity theory.

Despite a collective leadership emergence process that is described by the majority of the reviewed articles (Schulte et al, 2019; Porat, 2018; Uhl-Bien and Arena, 2018; Wu et al., 2018; Braun et al., 2016; Marion et al., 2016; Mendes et al., 2016; Will, 2016; Davis, 2015; Hazy and Uhl-Bien, 2015; Bressers and Edelenbos, 2014; Geer-Frazier, 2014; Tyssen et al., 2014; Lindberg and Schneider, 2013) 20 articles (see appendix 1) still rely on a traditional leader-follower perspective which is incompatible with an emergent sense for leadership out of the

organisational collective since all organisational members may potentially contribute to leadership.

Accordingly, Tourish (2019, p. 15) summarises that contemporary complexity leadership approaches are still too much based on "...functionalist mind-sets that are in fundamental contradiction to how complexity manifests itself in leader–follower relationships within organisations." Therefore, such leader-follower versus emergent leadership perspectives are aspects to be investigated in more depth inside real organisations that rely on complexity principles and apply complexity-centric leadership.

2.7.2 Leadership emergence relying on autonomy and self-organisation

Fu et al. (2018) claim that leadership emergence is most likely enabled by means of organisational members that experience higher levels of autonomy. They argue for more autonomous set-ups that informal exchange is accelerated which in return facilitates conditions under which a leadership function can be encountered by any organisational member and accordingly displays informal organisational structures. Likewise, self-organised team structures that come to life in case of the absence of hierarchical structures which can be regarded as higher level of autonomy is fostering leadership emergence. Self-organisation mainly triggers the emergence of a natural leader out of a group.

Likewise, sufficient space and the promotion of autonomy was revealed by Schulte et al. (2019) to enhance leadership emergence referring to organisational members to proactively participate into leadership activities and vice versa the support of the collective towards such informally defined leadership. They further admit that more autonomy is not just given; it requires trust, an appropriate culture regarding failures and experimentation that in return affects the entire organisational macro structure. These aspects are confirmed by Grille et al. (2015) who further propose to accelerate autonomy via shifting decision making through transparent information access away from hierarchical formal authorities towards organisational members or sub-groups. Moreover, they support experimenting and learning based on trial and error in combination with transparent feedback.

In their research Lindberg and Schneider (2013) report that complexity-centric leadership after its initial informal and self-organised emergence has led to positive results that were spread organisation wide. In return the informal communication about these results created a tipping point that facilitated and empowered the organisational embeddedness of emergent self-organisation. A contrasting position is presented by Maguire and McKelvey (1999) who claim that any kind of leadership is to naturally maintain top-down aspects and therefore inhibit or at least limit individual capacity and in sum the entire organisation's possible capacity to emerge in a self-organised way.

Altogether, leadership emergence is facilitated in more autonomous organisational set-ups, however a wide spectrum of various potential approaches that encourage autonomy is proposed by contemporary scholars. Accordingly, this thesis aims to verify such approaches and to refine them in more detail by means of data that will be collected in robust pioneer leadership organisations that exist and apply complexity-centric leadership.

2.7.3 Relevance of formal structures that contribute to leadership emergence

Schneider and Somers (2006) and Acton et al. (2019) highlight the existence of formal structures as necessary condition for leadership emergence. The former assert that leadership will emerge if organisational members are interconnecting non-linearly and randomly, however, wider evolution up to its embeddedness as an organisational instance that exerts leadership functions requires the presence of formal conditional patterns in the organisational structure. This note is confirmed by Acton et al. (2019). Based on their empirical review they present two main emergence contributing mechanisms as a rationale for individual's interaction on micro level and as the basis for higher level evolution: firstly, structures that are related to behaviours of individuals that are followed by accompanying exchanges on the micro level and secondly structures that are related to contextual organisational settings and that are embedded in the organisation (organisational conditional patterns). They argue that the former is primarily determining actual leader emergence.

In contrast, Porat (2018), Grille et al. (2015) and Uhl-Bien et al. (2007) could not identify a positively contributing impact of formal leadership on informal respectively shared leadership

emergence. Uhl-Bien et al. (2007) argue that leadership is emerging without formal superior instance but due to dynamic interaction of single human beings in the system. Porat (2018) confirms this note and add that accordingly it is fully up to every single organisational member to decide up to which extent they are willing to invest effort to successfully fulfil leadership tasks or expectations. Porat (2018) and Uhl-Bien et al. (2007) critique and emphasise a further sharp distinction to most other informal leadership concepts that advocate for a semi-emergence of leadership that implies the requirement of any formal instance. Hence, both further claim that truly emergent leadership does not have formal requirements for any exchange since underlying complexity theory says that interaction will naturally take place and evolve based on the single member's conviction that alignment has relevance or simply due to other reasons such as compassion or interdependent needs.

Accordingly, Grille et al. (2015) raised the expectations towards leadership of the organisational members as reasons for the informal emergence of leadership. They assert if leadership did not meet certain expectations, the willingness of organisational members to contribute was decreased. This relationship indicates that organisational members that do not support formal leadership behaviour because their expectation towards formal leadership behaviour were not fulfilled, are not likely to participate in distributed leadership activities. As a consequence, Grille et al. (2015) propose that the overall organisational purpose ought to be translated and to be aligned within organisational measurements since this is likely to enhance the general engagement of the collective to participate to shared leadership.

From another perspective, Uhl-Bien and Arena (2018) explain that formal organisational structures that aim on equilibrium and control are embedded in an organisation often for decades. They function efficiently to push back potential emergence of new order. Therefore, they present this as the main challenge and threat for the emergence of complexity-centric leadership. However, and simultaneously they admit that particularly informal initiatives need backup from formal ones, e.g., a sponsor. The rationale for this contrary but likewise required aspect is related to the temporary focus of organisational initiatives. Formal optimisation initiatives often aim on the short term to ensure quick wins. In contrast, shaping the underlying mindset implies the imagination of a potential prosperous big long-term picture but equally potential short-term declines which is not advantageous for any initiative.

Especially, in case of initial short-term declines formal backup is critical to maintain longer-termed endeavours (Uhl-Bien and Arena, 2018).

In contrast, Schulte et al. (2019) who investigated the embeddedness of local informal systems inside focal formal ones, argue that administrative formal leadership ought to acknowledge the importance of self-organised informal emergence for the entire organisation followed by its nurturing and aiming on its integration. Therewith they claim that it is part of the formal leadership function to promote informal emergence. Again differently, Acton et al. (2019) highlight that emerging leadership out of the organisational collective implies that each organisational member is confronted with his/her self-perception related to own personality, capabilities, and willingness for participation into leadership activities (leadership self-perception factors) and vice versa on the own's expectation towards leadership (follower perception factors). In this frame leadership emergence is likely to happen if leadership self-perception factors are greater than follower perception factors. Both perception perspectives are forming a third dimension, the social one which is determining the perception of the other collective members. This third dimension is especially relevant for emergence on a higher organisational level since leadership emergence there is mainly influenced from the collective's expectation towards leadership while the individual perception retracts (Acton et al. 2019).

Overall, emergent leadership is evaluated by most articles from two perspectives. First, regarding a single person that naturally emerges as a leader in a group, often at the first glance. This perspective is quite outdated since a single person is not equipped with all the leadership capabilities required to successfully face today's organisational complexity (Porat, 2018). This is confirmed by a broad range of scholars (Geer-Frazier, 2014; Kark et al., 2016; Fulop and Mark, 2013). It is compensated within the second perspective that assumes leadership as emerging due to dynamic interaction inside a group or collective. Since this aspect of leadership emergence is happening during a longer time frame, this form of leadership is backed up by the collective due to its sole informal natural emergence without formal legitimation from above. Under such conditions everyone can participate into leadership or at least to take part in its selection process (Porat, 2018).

Consequently, these different perspectives provide evidence that there is a need to investigate in more depth how formal structure contributes or hinders informal leadership emergence in robust pioneer organisations that apply complexity-centric leadership.

2.7.4 Immaterial elements that foster leadership emergence

Interdependencies, reciprocal needs, or a joint purpose are summarised as immaterial collective elements (Uhl-Bien and Marion, 2009). Accordingly, in their research on the reciprocal effects of shared leadership and organisational members, Serban and Roberts (2016) revealed the equal chance to speak as well as to listen to each other as enabling conditions for shared leadership participation and in return leadership emergence. They list a common purpose within a socially supportive environment, as an underlying enabling condition for effective shared leadership and especially emphasise that the socially supportive environment had a stimulating effect on "shared sense of responsibility for goal accomplishment" (Serban and Roberts, 2016, p.195).

Similarly, Fu et al. (2018) found connectedness and sharing of information as factor that facilitates the emergence of leadership, the latter however only to a small extent. Furthermore, they present collective leadership forms as mechanism with significant influence on an organisation's informal structure in terms of how values and goals are communicated and consequently shape information processing. Grille et al. (2015) reveal a positive relationship between one individual's likelihood to participate to shared leadership and intrinsic aspects regarding perceived own empowerment in the sense of being supported to be able to do this task as well as extrinsic aspects referring to own expectations towards fair monetary and non-monetary compensation. Therefore, they conclude and suppose intrinsic and extrinsic stimulation by means of fair compensation and appreciation by leadership as well as the entire collective.

Schneider and Sommers (2006) highlight a different perspective. They assert organisational identity as moderating factor that leadership might shape to indirectly enhance CAS dynamic and therewith CAS emergence including the emergence of leadership itself. Organisational identity in their perspective is regarded as common organisational sense for achievement or purpose and belonging together which leadership can mainly influence by in- or decreasing

of the intensity that is put on emphasising joint organisational values and shared beliefs. In this stance Boal and Schultz (2007) likewise argue that the creation of interdependent needs is leveraging the individual organisational member's focus towards an entire organisational perspective and might contribute to assume leadership responsibility for individual tasks of single organisational members. Marion and Uhl-Bien (2001) further maintain that this can only thrive based on a certain mindset and leadership's acknowledging of the linkages between informal interconnection across the organisational collective in a CAS and its emergent unpredictable outcomes.

In their in-depth study on shared leadership factors, Wu et al. (2018) identified heterogeneity as main contributing factor for the emergence of shared leadership. Serban and Roberts (2016) confirm the importance of heterogeneity, however, describe in detail that a positive team environment significantly facilitates the emergence of leadership. They explain that teams that share similarities in their understanding on how and why working (together) in combination with exhibiting heterogeneity referring to knowledge or personalities are likely to foster such positive team environment. (Serban and Roberts, 2016). Based on their findings they propose that organisations should set-up such similarity – heterogeneity conditions especially related to team structure and to foster task interdependence to enable leadership emergence. Wu et al. (2018) however assert that it is not part of the shared leadership role to set-up such organisational leadership conditions or patterns. Organisations should therefore carefully analyse specific team conditions to assure interdependence among tasks within each team, while taking steps to promote a cooperative climate wherein group members have an adequate opportunity to interact positively, build trust, and work toward common objectives." (Wu et al. 2018, p. 13). Unfortunately, they do not investigate who exactly in an organisation oversees building such positive climate and task interdependence.

Consequently, there is a need to explore in more detail how immaterial elements contribute to the emergence of complexity-centric leadership, which is in scope of this study.

2.7.5 Summary – leadership emergence

Various contemporary scholars have investigated in-depth on the underlying conditions, behavioural pattern and other necessary factors that trigger leadership emergence (Acton et

al., 2019; Schulte et al. 2019; Fu et al., 2018; Uhl-Bien and Arena, 2018; Porat, 2018; Lord et al., 2017; Marion et al., 2016; Mendes et al., 2016; Will, 2016; Hazy and Uhl-Bien, 2015). The emergent process of the leadership emergence was studied and described by Action et al. (2019) and Lichtenstein and Plowman (2009).

Altogether, it was revealed that the reviewed articles are in line with the theoretical complexity principles that foster leadership emergence from section 2.5.3. Beside its self-organised nature, leadership emergence is described as a dynamic, non-linear multi-level influence process that is evolving over time and may be embedded in the entire organisation (Action et al., 2019; Schulte et al. 2019; Fu et al., 2018; Uhl-Bien and Arena, 2018; Porat, 2018; Lord et al., 2017; Marion et al., 2016; Mendes et al., 2016; Will, 2016; Hazy and Uhl-Bien, 2015).

However, there is no general understanding on how in detail such emergent process is triggered especially not about organisations that exist in reality. Moreover, it is open to what extent autonomy and formal structure as well as other elements such as heterogeneity or common understanding have an impact. This note is confirmed by Tourish (2019, p.15) who summarise the status of the theoretical synthesis of complexity and leadership theory in research by stating that "complexity theory has not been applied consistently to explore how leadership itself emerges as an organisational phenomenon."

While most scholars argue to dissolve the traditional leader-member antinomy (Acton et al., 2019; Porat, 2018; Will, 2016; Lichtenstein and Plowman, 2009), other scholars do not regard the differentiation between leadership and followership as an outdated approach (Lord et al., 2017; Kohles et al., 2013; Tomkins and Simpson, 2015). Especially within shared leadership concepts, leader and follower roles are changing over time (Acton et al, 2019; Lord et al. 2017; Mendes et al., 2016). Accordingly, the role of leadership from this emergent stance needs to be studied in more depth.

Likewise, it is not yet comprehensively investigated if it is part of the leadership role to proactively foster the revealed conditions and patterns that contribute to informal leadership emergence or if they need to be embedded within the formal organisational structure first since organisational structures might form the frame in which leadership is allowed to

emerge informally (Acton et al., 2019, Schulte et a., 2019). Subsequently, in the following section emerging leadership roles from a CLT perspective will be explored.

2.8 Literature review on emerging leadership roles in a complex organisational context

After the outline on the facets and underlying conditions relevant for the emergence of complexity-centric leadership, the following section reviews literature perspectives on emerging leadership roles in robust pioneer organisations.

To do so, the first two sections examine dedicated leadership roles in the field of tension between chaos and equilibrium states (2.8.1) as well as between formal and informal instance (2.8.2). Section 2.8.3 is focused on a complexity leadership role that provides sense and meaning. Section 2.8.4 analyses leadership roles with regard to structural conditions and patterns and finally the indirect nature of such complexity leadership role is examined in section 2.8.5.

On actual roles and activities assumed for complexity leadership Tourish (2019) claims that organisations need to acknowledge that leadership is neither able to predict nor to plan the future, consequently panning and foreseeing to steer and control organisations, cannot be part of a complexity-centric leadership role. This corresponds to what was outlined so far in the chapters 2.5, 2.6 and 2.7.

2.8.1 The balancing role of complexity-centric leadership between states of equilibrium and chaos

Complexity theory argues that organisational emergence and adaption is likely to happen in environments that operate far from equilibrium; in contrast stable equilibrium states foster organisational operation as planned and aim on mitigating even little deviations (Uhl-Bien and Arena, 2018). Environments far from equilibrium are usually found in informally emerging organisations in contrast to bureaucratic ones (Uhl-Bien and Marion, 2009). Considering this spectrum between downturn and chaos, including all other implication from complexity theory (as outlined in section 2.5.3), successful complexity leadership ought to trigger organisational instability towards chaos, however, only up to a certain level (Marion and Uhl-

Bien, 2001; Kauffmann, 1993) because at the same time it is part of the leadership role to somehow prevent slipping behind the edge of chaos (Fu et al., 2018; Tyssen et al., 2014). This field of tension has limits on both sides, chaos and downturn, and is confirmed by former and contemporary research on CLT and organisational complexity (Schulte et al., 2019; Tourish, 2019; Kark et al., 2016; Marion et al., 2016; Mendes et al., 2016; Oeij et al., 2016; Uhl-Bien and Arena, 2018; Will, 2016; Hazy and Uhl-Bien, 2015; Bressers and Edelenbos, 2014; Tyssen et al., 2014; Fulop and Mark, 2013; Lichtenstein and Plowman, 2009; Uhl-Bien and Marion, 2009; Boal and Schultz, 2007; Osborn and Hunt, 2007; Uhl-Bien et al., 2007; Schneider and Somers, 2006; Kauffmann, 1993). Furthermore, they all admit that there is only a positive relationship between an increase of relative stability and moving more far away from equilibrium to the edge of chaos.

Another perspective is presented by Fu et al. (2018) and Tyssen et al. (2014). Fu et al. (2018) who investigate in depth the antecedents of distributed leadership. They present as one leadership task the definition of targets and motivational initiatives which at the first glance is in sharp contrast to emergent adaptability as a main complexity principle (Uhl-Bien and Arena, 2018). However, therewith Fu et al. (2018) emphasise the leadership function that is contributing to a certain level of stability and order. Confirming this point, Tyssen et al. (2014) argue that in case of high uncertainty, leadership is expected to mitigate this uncertainty and risks by setting clear targets and providing a structure.

Differently, but referring to the same result, Marion et al. (2016) advocate that the role of complexity-centric leadership is to foster activities far from equilibrium because only in non-equilibrium states, the organisational dynamic collective generates a kind of stability. Furthermore, this so-called emergent stability that is fostered by leadership via dynamic interplay of individuals and groups as to say, of the collective, is regarded as a status perfect for information distribution (Marion et al., 2016). In the context of information distribution, Mendes et al. (2016) advocate complexity leadership to proactively share information across all relevant elements and levels, in order prevent slipping into chaos. Therewith they also confirm the complexity leadership's role of balancing the tension between chaos and deadlock while aiming for non-equilibrium states.

In their review on conceptual and empirical complexity leadership studies, Hazy and Uhl-Bien (2015) identified five main roles for complexity leadership. Two roles are assumed to operate on both extremes of non-equilibrium and equilibrium states. The former aims on experimenting and adapting while the latter aims on order and is supposed to ensure standardised operation. Interestingly, they do not define any role as balancing function, which contrasts with the majority of CLT concepts. The remaining three functions are foreseen to first promote organisational immaterial elements such as purpose and trust and to make them alive in daily business; second to collect information and third to use and distribute knowledge. Due to their findings, Hazy and Uhl-Bien (2015) propose organisational incorporation of the five leadership functions as requirement if organisations intend to acknowledge complexity and to advance their structural set-up towards a CAS.

Uhl-Bien and Arena (2018) and Oeij et al. (2016) propose a so-called semi-structure with corresponding formal and informal leadership roles to approach activities on both sides of the spectrum. Uhl-Bien and Arena (2018) argue that it is part of the leader role to balance this administrative-adaptive tensions in the frame of such semi-structure that is regarded as a composition of formal and informal structure. Accordingly, Oeij et al. (2016) assert that it is the central role of leadership to embed approaches for both stability as well as adaptability within this semi-structure. Based on their research on high reliable organisations (nuclear power plants for example) Oeij et al. (2016) admit that the key elements that ought to be established as part of the leadership role are mainly informal measurements such as trust and relation building across the organisational collective. In such highly complex environments issues are severe and usually unexpected, therefore organisational members cannot be prepared for such events. Instead, they need to be prepared for adaptability and to stay calm while taking rapid decisions without formal process in case of an emergency. Hence, Oeij et al. (2016) assume complexity leadership to build and train these capabilities to ensure comprehensive and joint understanding for such situations. Since reliability and trust can only be truly structurally embedded upon a joint understanding, it is regarded as critical underlying condition to be created in the role of leadership in any type of complexity acknowledging organisation (Hasel and Grover, 2017; Oeij et al., 2016). However, it is noted that there is minimal existing research when looking into the detailed activities that leadership should engage on both sides. Braun et al. (2016) who draw conclusions from CLT

for leadership application, revealed that the lessons from this theory are only seldom applied and contextualised to general leadership discussions, although complexity theory provides applicable insights for leadership in organisations.

Kark et al. (2016) argue that the main leadership challenge is to incorporate both extremes on what is required and appropriate for the organisation. Accordingly, Fulop and Mark (2013) who link leadership concepts to decision making models from predictable environments up to the edge of chaos and confirm – independent from the organisational structural context – that leadership is required to examine any individual case and approach it applicably. They admit that only few individual leaders are equipped with the capabilities to successfully navigate in different structural settings and to adaptably behave in correspondence to the underlying context. Fulop and Mark, (2013) further maintain that different structures from standardised formal up to flexible informal may coexist in parallel inside one organisation. It is highlighted if an organisation aims on adaptability, more than one structure should be nurtured proactively (Fulop and Mark, 2013). Likewise, Geer-Frazier (2014) propose to apply such paradox point of view because it encourages conditions far from equilibrium. Acknowledging paradoxes furthermore enables to regard that there is not the need for an “either- or” but the option for “and”.

Different theoretical insights were reviewed on how the contradicting poles of equilibrium and chaos are likely to be balanced successfully as part of a complexity-centric leadership role. However, there is no comprehensive understanding yet about appropriate non-equilibrium states that might positively influence CAS emergence and the needed roles and activities of complexity-centric leadership in this context. Therefore, further research is necessary to investigate reasonable leadership endeavours that successfully balance the states of equilibrium and chaos.

2.8.2 The balancing-enabling role of complexity leadership between formal and informal instances

The majority of scholars agrees that CLT is consisting of three main functions: adaptive leadership, that focuses on fostering informal emergent self-organisation, its counterpart administrative leadership that aims on ensuring formal organisational compliance regarding

any organisational activity and their mediating force, enabling leadership that is required to somehow incorporate and mitigate their contradictions (Schulte et al., 2019; Uhl-Bien and Arena, 2018; Mendes et al, 2016; Tyssen et al., 2014; Uhl-Bien and Marion, 2009; Boal and Schultz, 2007; Uhl-Bien et al., 2007; Boal and Schultz, (2007) Lichtenstein and Plowman, 2009). In this stance Bressers and Edelenbos (2014, p. 96) conclude that "enabling leadership is not easy to perform and needs daring, risk-taking and above all skills to really bring this into practice."

Osborn and Hunt (2007) confirm the trinity function of CLT, however conclude that it is very unlikely to truly combine both poles of formal and informal structure within one single leadership approach however partial integration with regard to single aspects might be possible if desired informal order is transparent. Rather they propose an organisational decomposition to determine on suitable leadership approaches since this provides the opportunity to honestly address the fact that leadership does not hold the wisdom necessary to adequately evaluate all organisational areas.

Schulte et al. (2019) have recently investigated on the roles of enabling leadership in more detail and give answer to the question of how an enabling leadership function might create awareness for informal CAS emergence by formal leadership. In their study they identified story or issue telling and selling in the form of direct communication as most effective form to break down the walls between informal and formal structure, however only to get the first foot into the door. Furthermore, Schulte et al. (2019) argue that enabling leadership is likely to start its initiatives with the overall aim on enabling self-organisation via providing immaterial elements such as trust and autonomy as well as material elements that at least partially come from the administrative function. Boal and Schultz, (2007) connect both aspects and propose storytelling, since stories that are distributed by leadership and regarded as information flows are likewise to foster self-organised adaption and emergent evolution.

Uhl-Bien and Arena (2018) regard enabling leadership as a mediation instance and connect mediation to the aim of mitigating formal-informal contradictions and therewith facilitating adaptability. This is supported and extended by Schulte et al. (2019): For further successful

mediation between formal and informal leadership in the longer term, Schulte et al. (2019, p. 22) found that leadership ought to be able to substitute both poles and intentionally switch between the schemas of formal versus informal leadership. "Adjustment of schemas [...] seems to be a central mechanism as, without it, there seems to be no reason for administrative leaders to change their leadership practices. Therewith they enlarge and contribute to CLT. Similarly, O'Connell (2014) confirms having a sense from the formal management perspective as necessary capability for leadership to navigate such tension.

Although formal and informal systems maintain contrary requirements and contribute to tension when interfering, complexity theory advocates for their potential of reciprocal supplementing each other. It is asserted that their tension – among others – triggers emergence and likely facilitates adaption (Uhl-Bien and Marion, 2009). Accordingly, they confirm that moderately sustaining such tension is part of the (enabling) leadership role and a critical principle for bottom-up adaptability.

Tensions that arise from structure and disorder are also confirmed by Boal and Schultz (2007) who propose leadership to balance these tensions via encouraging self-organised adaptability across the organisational collective. Boal and Schultz (2007) leave open how exactly leadership is supposed to do this. However, Uhl-Bien and Marion (2009) and Grille et al. (2015) suggest for this adaptability enhancing target that one common goal as well as derived sub-goals are likely to indicate a direction for collaboration which in return fosters self-organisation through autonomy. Kark et al. (2016) also admit that due to certain organisational circumstances paradoxes often define each other. For example, high levels of flexibility and adaptability are partially relying on certain clear communicated principles that mark a fix limitation and the frame of the overall organisational flexibility. As to say act as flexible as possible, however in a certain range. To empower and structurally embed high adaptability, clear boundaries that limit individual flexibility are equally required as empowering the individual in order to take flexible and rapid decisions.

However, Schulte et al. (2019) argue that formal leadership is in charge there because material as immaterial resources are required for nurturing anything inside an organisation from a practical perspective. According to Marion and Uhl-Bien (2001) formal conditions are

basis to further unconditional emergence and it is part of the leadership role to co-build them. They propose leadership to set up of initial conditions via bottom-up initiatives and then to retreat into the background since self-organised emergence is empowered initially and afterwards leadership's role is only to stimulate or moderate in case of constraints. A similar approach is raised by Grille et al. (2015) who revealed that shared forms of leadership are not likely to replace formal leadership. Instead, they suggest developing formal leadership to first initialise and promote the integration of both leadership concepts and second to organisationally embed both concept across the entire organisation.

Bressers and Edelenbos (2014) researched on ways for how formal planning initiatives could become more adaptive to account for the varying requirements of the complex environment and therewith connect formal with informal requirements. It needs to be noted that their research does not focus on an organisational environment but on endeavours in the urban context. They practically revealed that leadership obtains the power to integrate formal with adaptive requirements. This may be achieved via the creation of space for the informal instance to emerge while simultaneously assuring conformity requirements by means of integrating the formal instance. In conclusion it was confirmed that the leadership role implies the potential to facilitate the embeddedness of self-organised emergence into a focal top-down structure. Accordingly, Lindberg and Schneider (2013, p.239) claim, that "there has been relatively little investigation of how the process of leadership, and the many tensions leaders must negotiate, unfolds to influence self-organisation."

In this field, Schulte et al. (2019) research on self-organised groups inside of hierarchical systems which mirrors the tension between an informal sub-structure and its overarching formal one. It was found that even inside a hierarchical system, self-organised subgroups can potentially emerge and therewith enhance information distribution and local adaptivity. However, they also revealed that the formal hierarchical macro structure limits the sub systems ability for free emergence. Confirming this aspect, Bressers and Edelenbos (2014) further claim that the formal organisational instance is probably not only to suppress emergent informal endeavours but also to stop their wider expansion in case of non-compliance with formal requirements. Schulte et al. (2019) present contradicting insights research on self-organised groups inside of hierarchical systems namely that an informal sub

system emerges independent from the formal one and is resistant to the formal's interference. In contrast, it is also likely that informal sub systems are actively used by the formal one as information distribution or knowledge hub. This is supported by Uhl-Bien and Arena (2018), who simultaneously admit that both equally maintain the power to overwhelm the "counterpart". Either the formal instance could suppress emergent self-organisation or informal instance might revolutionise towards chaos with both options being counterproductive for the survival of the entire organisation. Such enhanced risk for an entire destabilisation is confirmed by (Uhl-Bien and Arena, 2018; Nite and Bopp, 2017; Kark et al., 2016; Will, 2016; (Bressers and Edelenbos, 2014; Uhl-Bien and Marion, 2009; Uhl-Bien et al., 2007; Schneider and Somers, 2006; Fulop and Mark 2013). They all likewise emphasise that balancing this tension as well as maintaining it, are both critical leadership roles to prevent mutually overwhelming. In contrast Lichtenstein and Plowman, (2009) argue that informal emergence in a hierarchical formal set-up takes place usually in change initiatives with successive steps which is led by leadership and as such no steady leadership activity that continuously sustains moderate tension. In summary, Schulte et al. (2019) conclude that current CLT scholars have not yet adequately studied on the dualities of dynamic interplay and its resulting complexity regarding required leadership activities when an informal system is emerging inside a focal formal one.

Considering the wide spectrum of arguments of CLT scholars that intent to balance or mitigate the tensions that arise from the formal administrative and the informal adaptive structure by means of so called enabling (complexity) leadership. The minimum consensus of contemporary CLT scholars is on fostering adaptability while maintaining certain stability. However, there is no overall agreement on most reasonable actual complexity-centric leadership activities. Therefore, further in-depth investigation about actual measurements related to the enabling leadership role is required.

2.8.3 Providing sense and a joint purpose

Establishing a sense and a joint purpose in a complex organisational context is presented by different scholars as important leadership role in order to provide meaning for organisational endeavours (Acton et al., 2019; Lord et al., 2017; Braun et al., 2016; Mendes et al., 2016; Davis,

2015; Grille et al. 2015; Steinbauer et al., 2015; Fulop and Mark, 2013; Kohles et al., 2013; Lichtenstein and Plowman, 2009; Uhl-Bien and Marion, 2009; Boal and Schultz, 2007).

Acton et al. (2019) regard leadership sense making as main activity that implies a social collective perspective and hence cannot be attribute to a single person, however they regard it as main role of complexity-centric leadership. Likewise, Boal and Schultz, (2007) see leadership in a CAS in a role that provides orientation and sense. Accordingly, they admit that sense making in the form of providing a purpose for organisational measures is likely to foster emergence in a CAS. Supporting this stance Lord et al. (2017) add that providing a sense is facilitated more likely within an emerging bottom-up set-up than in a top-down command and control environment. To provide meaning and a sense into organisational endeavours is likewise highlighted as important activity to provide viable leadership by Kohles et al. (2013). They explain that it is very critical for leadership to have the buy in from the organisational collective. Hence to successfully integrate the organisational collective they propose bi-directional communication (rather than top-down) during sense definition, its integration and while applying derived activities within the daily doing. Such actual measurements ought to be safe to try, understandable and reasonable in order to improve daily doing for all organisational members. On a practical application level, it is concluded to interweave organisational sense making into daily and specially tailored behaviours that are applicable for all organisational members rather than pinning it on paper. Special focus workshops are listed as examples to organise such interweaving collectively (Kohles et al., 2013).

Contrarily, in their research Steinbauer et al. (2015) propose a dual model of sense making that provides all organisational members (including leadership) a comprehensive understanding for the underlying dynamics of the complex system they are working in. Sense making is regarded as an unconscious cognitive process with a constructivist perspective which they integrate with the conscious cognitive process of decision making. While integrating sense making as a constructivist and unconscious function into relevant leadership roles, they aim on constituting the facets of leadership more realistic since unconscious activities are relying on comparing akin schematics and habits with outside information.

As a further different perspective, Acton et al. (2019, P.153) define a combination of sense making (regarded as individual development of leadership understanding) and sense giving (regarded as development of the leadership understanding of other organisational members) as "process by which individuals develop a shared reality of leadership." As such sense making and giving is perceived as processual mechanism that is structurally embedded in an organisation and hence critical for the evolution of leadership emergence across organisational levels. Moreover, leadership sense making as a critical underlying factor is aimed on embedding informal structure within formal organisational structure (Acton et al., 2019).

Communication by means of storytelling, arguments, speeches, and discussions are regarded as a viable leadership activity to provide sense for activities (Fulop and Mark, 2013; Lichtenstein and Plowman, 2009). Via such a joint creation of a common understanding for organisational endeavours a sense may be implied into these endeavours (Fulop and Mark (2013). On this aspect, Davis (2015) assert that organisational members are more likely stick to known approaches than participate to unfamiliar initiatives, irrelevant of the organisational level. Consequently, it is argued that it is the central requirement from the leadership role to imply a sense and meaning into especially future organisational initiatives (Braun et al., 2016; Mendes et al., 2016; Davis, 2015). This is supported by Mendes et al. (2016) who advocate, that organisational members need to be able to extract a sense of the information that is exchanged to voluntarily participate to any measurement. Fulop and Mark (2013) present leadership sense making as main activity in their practical leadership framework and admit that reality is always harder to explain than a framework can ever depict. They note that this is especially true for leadership within a sense making role because this is supposed to aim on contributing towards an impact for organisational member's. However, aiming on changing people's awareness, necessarily requires social mechanisms to be triggered in practice.

In summary, the reviewed literature agrees on providing sense, meaning and a common purpose as important part of a complexity-centric leadership role, however the actual activities ascribed to such leadership role are divergent. Consequently, further investigation is

needed to analyse the most reasonable approaches for how sense and a joint purpose can be established across the organisational collective in the frame of a complexity-centric leadership role.

2.8.4 Leadership roles related to conditions and patterns in a complex organisational context

The point to contextualise leadership from an organisational behavioural perspective is raised by current complexity leadership scholars. Organisational context thereby is defined as general conditions, frame, circumstances, and patterns among others in an organisation that mainly influence the behaviour of the elements respectively human beings inside this organisation and hence likewise leadership. The central discussion on leadership contextualisation is if leadership actively shapes organisational conditions and the context in the frame of leadership activities (Schulte et al., 2019; Tourish, 2019; Uhl-Bien and Arena, 2018; Wu et al., 2018; Mendes et al., 2016; Oeij et al., 2016; Will, 2016; Hazy and Uhl-Bien, 2015; Geer-Frazier, 2014; Fulop and Mark, 2013; Lindberg and Schneider, 2013; Lichtenstein and Plowman, 2009; Uhl-Bien and Marion, 2009; Uhl-Bien et al., 2007; Schneider and Somers, 2006; Marion and Uhl-Bien, 2001,) or the other way around, if leadership roles are formed by the organisational context (Kempster and Gregory, 2017; Nite and Bopp, 2017; Braun et al., 2016; Serban and Roberts, 2016; Bressers and Edelenbos, 2014; Thyssen et al., 2014; Osborn et al., 2002, Kutz and Bamford- Wade, 2013; Uhl-Bien and Marion, 2009; Osborn et al., 2002).

Based on their review of different organisational contexts, Kutz and Bamford-Wade, (2013) claim that the individual organisational context mainly shapes different leadership roles. Likewise, Nite and Bopp (2017) in the sport context, equally investigate the leadership role with the focus on the trade-offs between the formal institutional requirements and a rather informal approach to leadership. They found that the underlying organisational context mainly forms leadership behaviour and what is comprehended as leadership. Upon their empirical case research, Kempster and Gregory (2017) study the evolution of practical leadership and argue that the leadership roles are mainly influenced from context-activity and outcomes. Therefore, they described leadership roles referring to the underlying organisational context and revealed that leadership roles are emerging within actual activities that are derived from the underlying context and that target towards a desired future order.

Accordingly, Osborn et al. (2002) investigated the influence of four contextual types in an organisation (stability, crisis, dynamic equilibrium, and edge of chaos) on the type of leadership. They disclosed the organisational context as main factor that influences the shape of leadership in an organisational system. This is confirmed by Uhl-Bien and Marion (2009, p. 632) who state, "complexity leadership theory is a contextual theory of leadership" and as such it needs to be shaped according to and integrated into the certain organisational context". Braun et al. (2016) likewise maintain that it is a fact that culture which represents organisational context determines actual leadership roles as well as the effectiveness of distinct leadership types. This perspective is further supported from Bressers and Edelenbos (2014). Accordingly, Thyssen et al. (2014) and Kutz and Bamford-Wade (2013) conclude that a profound evaluation of leadership can only take place regarding its individual organisational context.

From the contrary perspective, Geer-Frazier (2014) argues that leadership mainly forms the organisational context since they regard it as main leadership role to shape organisational structure, its culture and other contextual factors. Likewise, Fulop and Mark (2013) argue that leadership is mainly shaping the context in an organisation via successfully or not successfully creating space between formal and informal instances for emergent new order. In both cases a structural context is crafted. Simultaneously they admit that leadership critically requires appropriate situational intelligence to identify appropriateness. From their collective flock leadership perspective, this is supported by Will (2016). They argue that so called norm configuration which is regarded a major part of the leadership role, mainly implies to form structural frame conditions which in return empower the capacity of the organisational collective. Likewise, Uhl-Bien et al. (2007, p. 309) regard state that "leadership enables effective CAS dynamics by fostering enabling conditions that catalyse adaptive leadership and allow for emergence." And correspondingly, Lindberg and Schneider (2013) confirm the key complexity principles (as outlined in section 2.5.3) as necessary for emergent self-organisation in a CAS and hence regarded it as leadership role to craft these principles and to ensure their functioning. However, Will (2016) criticise that besides sole listing "enabling conditions", it likewise needs to be researched on their nuanced intensity and priority in the frame of the complexity leadership role, this however, is neglected by Uhl-Bien et al. (2007).

Oeij et al. (2016) who have investigated leadership in organisational contexts with high complexity regarding their field of operation and a zero-failure tolerance, revealed that leadership maintains the power to cope with such an extreme context and not vice versa. They identified enhancing reliability based on open communication and transparent information sharing as viable leadership approach to successfully and proactively navigate in highly complex organisational environments.

Given the argumentation reviewed above, most scholars regard complexity-centric leadership and its roles as proactively forming certain organisational conditions and patterns in organisations that acknowledge complexity. However, there is no clear understanding about actual activities in the frame of this complexity-centric leadership role as well as which conditions and behavioural patterns are most important to be established in a CAS and any robust pioneer organisation. Therefore, the following two subsections of this literature review will further outline on required conditions in a CAS.

2.8.4.1 Conditions and patterns that foster information exchange and hence self-organisation and CAS emergence

Complexity scholars agree that CAS naturally maintain the capacity to emerge dynamically and self-organised in non-equilibrium states, without external instance (Wu et al., 2018; Braun et al., 2016; Marion et al., 2016; Will, 2016; Lindberg and Schneider, 2013; Uhl-Bien and Marion, 2009; Boal and Schultz, 2007; Osborn and Hunt, 2007; Schneider and Somers, 2006; Marion and Uhl-Bien, 2001). Consequently, they investigate the need of leadership roles in and outside a CAS and confirm that leadership has a legitimation in a self-organised CAS.

As reviewed in section 2.8.3, establishing of structural conditions and behavioural patterns is regarded as pivotal leadership role by the majority of CLT scholars. Therefore, the following, will enlarge on the forming of conditions and structural patterns that are required to empower self-organisation in CASs.

The paradox aspect for the need of leadership and its role in a self-organised set-up is addressed by Lindberg and Schneider (2013) who confirm that leadership maintains the power to empower self-organisation. And according to Osborn and Hunt (2007), the role of

leadership in a self-organised CAS is to facilitate adequate space for self-organised emergence to occur dynamically. In this stance it is argued that due to its individuals, any organisational complex system holds different information. And based on common needs of the individuals, their information is exchanged in a self-organised way (Mendes et al., 2016; Lichtenstein and Plowman, 2009). In line with complexity theory, Schulte et al. (2019) revealed that no outside initiative is required for such emergent self-organised exchange, a joint need is sufficient. Thus, they conclude the creation of reciprocal needs and interdependencies as the core part of the leadership role in a CAS (Schulte et al., 2019; Uhl-Bien and Arena, 2018; Uhl-Bien and Marion, 2009). Marion and Uhl-Bien (2001) support this argument while stating that for any single human being, needs or -if more feeble- desires, are the fundamental motivation for any interaction and hence for emergence. Schneider and Somers (2006) confirm the concept of interdependence or need, however refer it slightly different to the reciprocal achievement of two or more organisational elements which is advantageous for both. In their shared leadership study Wu et al. (2018) revealed that interdependency is referring to a shared need when working on a task, positively influenced team outcomes.

Marion and Uhl-Bien (2001) further claim that alignment of especially conflicting needs on micro level or on macro level contributes to short term predictability respectively correlation and finally may result into emergence. This alignment within an organisational setup without outside interference but rather due to self-organisation is challenging the fitness of the system. It is proposed that leadership here first eliminates the physical barriers as an invisible instance and only afterwards may function as an outside catalyst with suggestions from an outside point of view. This practical leadership implication is coherent with the underlying CLT that likewise regards leadership as relevant from a micro as well as a macro perspective (Braun et al., 2016). Additionally, leadership intervention on a higher plane ought to aim on the integration of collective wisdom to enable the collective to self-organisation of their own structures based on certain conditions provided by leadership. In this context, the risk to slide into chaos in case of too loose frame conditions is highlighted by current and former complexity leadership literature (Schulte et al., 2019; Tourish, 2019; Marion and Uhl-Bien, 2001; Maguire and McKelvey, 1999). Differently, Marion et al. (2016) argue if leadership fails to facilitate CAS dynamics, interconnection dwindles continually until ending up in deadlock. They further reveal a positive relationship between the levels of leadership empowered

dynamic interconnectivity and maintaining stability within a CAS. Indicating that organisations that allow high levels of dynamic, random, unpredictable interplay are better equipped to cope with high information flow volatilities in a more stable way (Marion et al. 2016). However, Marion et al. (2016) equally admit that their perspective is not yet investigated sufficiently. Nonetheless, their argument is supported by Tourish (2019) who maintain that organisations that are regarded as self-organising and emergent are likely to have a dedicated understanding of leadership as being important and in charge of enabling such emergent self-organisation.

Hazy and Uhl-Bien (2015) ascribe nurturing and enhancing of the underlying emergence mechanisms, on that it was enlarged already in the section 2.7, as a central role of complexity-centric leadership. They argue that leadership ought to shape conditions and an organisational structure that facilitate information exchange among all organisational members. As consequence CAS and leadership emergence is likely to become effective (Hazy and Uhl-Bien, 2015). Likewise, Kutz and Bamford-Wade (2013) argue that information functions as an organisation's lubricant, accordingly leadership oversees facilitating the information flow via appropriate tools and autonomous conditions that stimulate self-organisation. Similarly, Marion et al., (2016) assert, that collective leadership forms are dispersed among many individual and informal emergent leaders therefore the facilitation and distribution of information is regarded as main function of distributed leadership.

Kempster and Gregory (2017), Marion et al. (2016) and Boal and Schultz (2007) all investigate the emergence of leadership inside a CAS and identified the maintenance of dynamic information flow as central role of complexity-centric leadership. Accordingly, Kempster and Gregory (2017) claim that the primary leadership role is to facilitate and nurture an emergent, dynamic continual process flow of information which is seen as core of any organisation. Marion and Uhl-Bien (2001) argue that in contrast to predicting and controlling of the organisational future, leadership can be regarded as successful if conditions are created that facilitate collective dynamic interaction in a way that the organisational collective in return is empowered to address issues in a self-organised way.

A further aspect is raised by Marion et al. (2016): They suggest real-life leadership to acknowledge the importance of cliques and to support clique building and their evolutionary forces with resources and appropriate venues, e.g., in the frame of task forces. They advocate to actively stimulate informal leadership emergence as well as the interexchange among cliques by creating underlying dependencies among groups and their processes (Marion et al., 2016). In this context, Tourish (2019) as well as Wu et al. (2018) admit that outcomes are increased within interdisciplinary teams therefore they suppose leadership to shape heterogenous teams. Likewise, Lindberg and Schneider (2013) present heterogeneity, release of existing (hierarchical) power structures and the existence of both, stability and space for adaptability as key conditions enabling emergent self-organisation in organisations that admit complexity. Accordingly, it is regarded as complexity-centric leadership role to craft these principles and ensure their functioning (Lindberg and Schneider, 2013).

2.8.4.2 Conditions and patterns that foster the emergence of leadership

Lichtenstein and Plowman (2009) see the fostering of conditions that trigger the emergence of leadership inherent in the role of leadership. Based on their empirical study they state to proactively unfold and stress the ambiguities that come along with the tension of formal and informal approaches. Thereby ambiguities are likely to be addressed collectively and openly which may disrupt existing behavioural patterns and lead to non-equilibrium states.

Supporting this point Uhl-Bien and Arena (2018) argue that the ability of an organisation to adapt is the most critical aspect due to the increasing environmental dynamic and the related complexity in an organisational system as described in section 2.5.4. Therefore, they propose conflicting and connecting leadership activities that both aim on fostering the entire organisational adaptability. As main challenge for such conflicting and connecting leadership they assert the combat against traditional pro equilibrium forces and balancing of their resulting tensions. Similarly, Fulop and Mark (2013) suggest leadership to proactively encourage disorder in the sense of raising any potential problem since without such disorder many arguments would have not come up. This is confirming complexity theory's non-linearity principle arguing that any single triggered interaction may lead to an unexpected outcome that would otherwise have never emerged (Uhl-Bien and Arena (2018; Geer-Frazier, 2014; Schneider and Somers, 2006). Accordingly, it is part of the leadership role to take away

the fear of such paradoxical options and its accompanying ambiguity by comprehending it as an advantageous abundance of possibilities and correspondingly and transparently promoting this across the organisational collective (Geer-Frazier, 2014).

Hasel and Grover (2017) investigate trust related to the leadership function in a complex environment. They confirm that trust is an important factor inherent in the leadership role, however, simultaneously note that research has not yet sufficiently researched on the underlying mechanisms of trust that are implied in the leadership role and its impact on organisational facets. They furthermore assert that leadership and trust are not considerable entirely separately. Hasel and Grover (2017) propose leadership to focus on building deeper relationships that organisational members can trust on. Trust based relationships are likely to foster the willingness to contribute and engage within an organisation also in the frame of leadership activities. They revealed this for organisational environments of stability as well as ambiguity.

Finally, Maguire and McKelvey (1999) present organisational self-organisation as an emergent phenomenon. And from a current perspective Schulte et al. (2019) emphasise that more in-depth research is required that aims on enfolding the detailed underlying mechanisms and conditions about relevant leadership roles that enable emergent self-organisation and therewith leadership in an organisational complex system. Hence, this research explores conditions and patterns that trigger exchange and in return CAS and leadership emergence that ought to be created as part of a complexity-centric leadership role.

2.8.5 A rather indirect nature of complexity- centric leadership roles

Lichtenstein and Plowman (2009), state that it is part of the leadership role to embed conditions that contribute to emergent new order in a continually way. Simultaneously, they emphasise that is not part of the leadership role to foster an organisational outcome actively and directly. Their assumption of complexity-centric leadership is rather to form organisational conditions and patterns that enhance CAS activities such as frequent interconnections that potentially lead to overall positive outcomes.

Having this in mind, it is argued that leadership is one element in a CAS or the organisation besides any individual member. Therefore, it does not obtain the power to control neither directly influence organisational outcomes (Will, 2016; Marion and Uhl-Bien, 2001). Will (2016, p. 275) claim that complexity-centric leadership is “focused on problem-solving, but it does not position the leader as problem-solver” since wisdom is not related to any leader but to the collective. This furthermore implies that it is not part of the leadership role to actively interfere in the collective capacity but rather to indirectly shape the structural frame and its conditions to adequately equip the collective with necessary material as well as immaterial resources. This is likely to empower the collective’s capacity to emerge in a self-organised way. In this sense, Marion and Uhl-Bien (2001) argue that information flows are directed dynamically, unpredictably and randomly, by the collective – not by leadership. However, leadership is facilitating the self-organisation capability of the collective and therewith directing information flow, however indirectly only. This is underpinned by the findings of Marion et al. (2016). They measured higher volatilities in the information flow processing for leadership that is actively engaging into the collection and distribution of information, instead if emerging randomly. This is indicating that direct leadership engagement leads to the destabilisation within a CAS (Marion et al., 2016).

Wu et al. (2018) are supporting such indirect perspective of the complexity-centric leadership role from their investigation on leadership roles related to CAS behaviour. Wu et al. (2018) have identified enabling of self-organisation that is likely to contribute to the emergent adaption of the entire CAS as most important role. In contrast, Schneider and Somers (2006) admit that leadership participating in a CAS still maintains a directing or guiding function, however the leadership establishing phase is different since in a CAS leadership is informally emerging rather than formally designated. Therefore, they claim that emergent leadership to maintain different capabilities and often contrary positions to formally designated leadership.

In this context, Will (2016) criticises leadership concepts that are regarded to maintain the power to actively exert influence on actual emergent behaviours of the organisational members. In contrast flock leadership likewise aims on encouraging collective emergence through leadership influence, however solely via shaping the organisational system’s conditions – not behaviours of the organisational members. Therefore, Will (2016). presents

the flock leadership concept as a leadership that facilitates contextual emergence. Similarly, Marion and Uhl-Bien (2001) and Kauffman (1993) have also argued from this perspective. Kauffman (1993) regards the linkages of the rational capabilities of the people involved in the system as adjusting screw and maintains that these linkages are not subject to be directly steered by leadership, but they may be indirectly empowered by leadership. Accordantly, Braun et al. (2016) conclude that leadership is not able to control a complex organisational system, but it may have the power to empower the system itself.

Since only minor number of CLT literature highlighted the indirect nature of complexity-centric leadership roles, further research is needed to investigate complexity leadership roles in more detail which will be approached in the frame of this thesis.

2.8.6 Summary – leadership roles

Current scholars agree on mitigating and integrating the tensions arising from formal and informal organisational structure as well as from the extreme poles of equilibrium and chaos as ultimate complexity-centric leadership roles. As such leadership ought to ensure formal stability, however and simultaneously enforce informal and self-organised adaptability. This enabling or balancing complexity leadership role is most likely to facilitate the emergence of a CAS (Schulte et al., 2019 Uhl-Bien and Arena, 2018; Kark et al., 2016; Marion et al., 2016; Mendes et al, 2016; Oeij et al., 2016; Hazy and Uhl-Bien, 2015; Grille et al., 2015; O'Connell, 2014; Bressers and Edelenbos, 2014; Geer-Frazier, 2014; Tyssen at al., 2014; Fulop and Mark, 2013; Lindberg and Schneider, 2013; Lichtenstein and Plowman, 2009; Uhl-Bien and Marion, 2009; Boal and Schultz, 2007; Uhl-Bien et al., 2007; Osborn and Hunt, 2007; Schneider and Somers, 2006).

Nevertheless, a wide spectrum is presented in this field about the actual activities and accompanying roles of leadership. Leadership as enabler of a CAS's self-organised capacity for interconnection and emergence (Schulte et al., 2019; Porat, 2018; Uhl-Bien and Arena, 2018; Wu et al., 2018; Braun et al., 2016; Marion et al., 2016; Will, 2016; Lindberg and Schneider, 2013; Lichtenstein and Plowman, 2009) that provides sense and meaning for organisational endeavours (Wu et al. 2018; Lord et al., 2017; Marion et al. 2016; Steinbauer et al., 2015; Kohles et al., 2013; Uhl-Bien et al., 2007) via creating of interdependent needs that

lead to the overall desired dynamic interaction (Marion et al., 2016; Mendes et al., 2016; Lichtenstein and Plowman, 2009; Uhl-Bien and Marion, 2009; Osborn and Hunt, 2007; Schneider and Somers, 2006; Anderson, 1999; Stacey, 1995; Kauffman, 1993).

Furthermore, structural conditions and behavioural patterns in the CAS and its focal complex system are to be formed within various leadership roles (Mendes et al., 2016; Tyssen et al., 2014; Bressers and Edelenbos, 2014; Lichtenstein and Plowman, 2009; Uhl-Bien and Marion, 2009; Boal and Schultz, 2007; Uhl-Bien et al., 2007; Marion and Uhl-Bien, 2001).

One main argument referring to complexity-centric leadership roles is on the capacity and power inherent to the various leadership roles. There is no overall agreement on how complexity leadership ought to form conditions and patterns (Wu et al., 2018; Oeij et al., 2016; Hazy and Uhl-Bien, 2015; Geer-Frazier, 2014; Fulop and Mark, 2013; Lindberg and Schneider, 2013; Marion and Uhl-Bien, 2001). Likewise unclear is to what extent actual leadership roles are influenced from the underlying organisational context and conditions and patterns inherent in organisations that acknowledge complexity (Kempster and Gregory, 2017; Nite and Bopp, 2017; Braun et al., 2016; Serban and Roberts, 2016; Bressers and Edelenbos, 2014; Thyssen et al., 2014; Osborn et al., 2002; Kutz and Bamford-Wade, 2013; Uhl-Bien and Marion, 2009; Osborn et al., 2002).

The reviewed literature indicates a rather indirect overall nature of complexity-centric leadership while advocating to indirectly shape the structural frame and its conditions aiming on adequate empowerment of the organisational collective (Wu et al., 2018; Marion et al., 2016; Will, 2016; Lichtenstein and Plowman, 2009; Boal and Schultz, Schneider and Somers, 2006; Marion and Uhl-Bien, 2001). However, since there is no clear understanding about complexity-centric leadership roles in detail and corresponding activities, this thesis will analyse this research field.

2.9 Disclosed gaps and derived research questions

As result of this literature review, gaps and important aspects were identified in each review chapter that require further investigation. These are conceptualised in figure 6.

Reviewed literature area	Important topic / gap identified during the literature review	Literature review chapters	Underlying literature sources	Derived research question (RQ)
Conditions and patterns embedded in the organizational structure of robust pioneer organisations	▪ Fundamental conditions for working together in the CAS	2.6.2 & 2.6.3	Devereux et al., 2020; Porat, 2018; Marion et al., 2016; Will, 2016	RQ1 : What are the conditions and patterns necessary for complexity-centric leadership?
	▪ Interconnection among the macro level	2.5.3.1 & 2.5.3.2	Marion and Uhl-Bien, 2001; Braun et al., 2016	
	▪ Underlying reason for not mandatory exchange → Dependency, needs, heterogeneity and subjective clique building	2.5.3.2 & 2.5.3.3	Tourish, 2019; Wu et al. 2018; Marion et al., 2016; Mendes et al., 2016; Lichtenstein and Plowman, 2009; Uhl-Bien and Marion, 2009; Osborn and Hunt, 2007; Schneider and Somers, 2006; Anderson, 1999; Stacey, 1995; Kauffman, 1993	
	▪ Formal and informal instance in "complexity-centric leadership organisations"	2.5.2 & 2.7.3	Schulte et al., 2019; Uhl-Bien and Arena, 2018; Uhl-Bien and Marion, 2009; Osborn and Hunt, 2007; Marion and Uhl-Bien, 2001; Kauffman, 1993	
	▪ Limitations of emergence – equilibrium and edge of chaos	2.5.3.4	Fu et al., 2018; Marion et al., 2016; Tyssen et al., 2014; Osborn and Hunt, 2007; Marion and Uhl-Bien, 2001;	
How complexity-centric leadership is emerging in robust pioneer organizations	▪ Which patterns and conditions facilitate the emergence of leadership	2.6.2 & 2.7.3	Acton et al, 2019; Schulte et al., 2019; Fu et al., 2018; Porat, 2018; Wu et al., 2018; Lord et al. 2017; Braun et al., 2016; Kark et al., 2016; Marion et al., 2016; Mendes et al., 2016; Serban and Roberts, 2016; Will, 2016; Grille et al., 2015; Geer-Frazier, 2014; Fulop and Mark, 2013; Lindberg and Schneider, 2013; Lichtenstein and Plowman, 2009; Uhl-Bien and Marion, 2009; Boal and Schultz, 2007	RQ2: What patters facilitate the emergence of complexity-centric leadership?
	▪ Relevance of immaterial elements	2.7.2 & 2.7.4		
	▪ Differentiation between leadership and followership	2.7.1		
Roles that are emerging in the frame of complexity-centric leadership	▪ Actual existence of distinct complexity-centric leadership functions and roles in real life organisations	2.8.4 & 2.8.5	Hazy and Uhl-Bien, 2015; Wu et al., 2018 Braun et al., 2016; Marion et al., 2016; Will, 2016; Marion and Uhl-Bien, 2001	RQ3: Which leadership roles are emerging in complexity-centric leadership organisations?
	▪ Indirectly fostering adaptability as well as stability	2.8.1 & 2.8.2	Marion et al., 2016; Will, 2016; Hazy and Uhl-Bien, 2015; Marion and Uhl-Bien, 2001	
	▪ Due to trust, relation building and relying on leadership backup	2.8.3		
	▪ Enabling leadership that mediates and integrates the formal-informal tension → measurements ascribed to the enabling leadership roles	2.8.2	Schulte et al., 2019; Uhl-Bien and Arena, 2018; Bressers and Edelenbos, 2014; Tyssen et al., 2014; Lichtenstein and Plowman, 2009; Uhl-Bien and Marion, 2009; Boal and Schultz, 2007; Uhl-Bien et al., 2007; Schneider and Somers, 2006	

Figure 6: Conceptual framework based on the literature review

Based on these gaps and their relation to the reviewed research areas of this thesis, three corresponding research questions (RQ) were derived. The subsequent sections on each of these RQs will summarise the disclosed gaps and important aspects that will be analysed in the frame of this thesis.

2.9.1 RQ 1 – What are the conditions and patterns necessary for complexity-centric leadership?

Beside interdependent needs, there is no overall alignment on conditions, requirements or behavioural patterns that best facilitate self-organised emergence in a CAS and the emergence of leadership accordingly in a complex system. If exchange is not required formally, there are other reasons for voluntary connection among individuals. The majority presents interdependence due to underlying needs as rational for exchange (Marion et al., 2016; Mendes et al., 2016; Lichtenstein and Plowman, 2009; Uhl-Bien and Marion, 2009; Osborn and Hunt, 2007; Schneider and Somers, 2006; Anderson, 1999; Kauffman, 1993; Stacey, 1995). However, also non-rational aspects such as heterogeneity (Wu et al. 2018;

Tourish, 2019) or subjective clique building are presented (Marion et al., 2016) in the literature review as potential reasons for not mandatory exchange. Therefore, these aspects require further analysis.

The CAS was described as informally emergent and self-organised (Schulte et al., 2019; Tourish, 2019; Fu et al., 2018; Marion et al., 2016; Davis, 2015; Uhl-Bien and Marion, 2009). However, there are different perspectives referring to regulation and maintenance of information flow and information distribution inside a CAS: There is a lack of understanding how the distribution of information is fostered and who in a collective is involved in this process (Porat, 2018; Marion et al., 2016; Will, 2016). Additionally, it is unclear which patterns and conditions enhance information exchange in the CAS. Current research seems to neglect the required conditions and patterns of macro interaction (inter team organisation) in contrast to interaction among individuals (Braun et al., 2016; Marion and Uhl-Bien, 2001). This was revealed as main sources for divergences that are not explainable in quantitative studies so far.

A further point necessary to be investigated in more depth is the initialisation of an informally emerging and self-organised CAS. From one perspective it is maintained that emergence occurs locally on micro level and due to any interaction in the complex system (Schulte et al., 2019). From another perspective, it is argued that the formal instance is required to formally launch and set up an informal CAS as well as to encourage its self-organised emergence (Grille et al., 2015; Bressers and Edelenbos, 2014; Lindberg and Schneider, 2013; Uhl-Bien and Marion, 2009; Boal and Schultz, 2007). In this stance likewise unclear is the actual necessity and influence of formal instances such as formal leadership in general within an emergent CAS (Schulte et al., 2019; Uhl-Bien and Arena, 2018). Overall, literature agrees that formal leadership and structures as well as informal ones, both maintain some legitimation in a self-organised emerging CAS, however contemporary research argues controversially. The majority agrees that in absence of any stable overall frame as to say no orientation in term of vision, or formal stability at all, an organisation is likely to slide beyond the edge of chaos (Acton et al., 2019; Kohles et al., 2013; Schneider and Somers, 2006).

Accordingly, some scholars agree that the formal instance ought to enable as well as enhance informally emerging forces (Schulte et al., 2019; Uhl-Bien and Arena, 2018;). However, it is likewise claimed that formal structure is likely to limit the system's ability of emergence and adaptation (Schulte et al., 2019; Uhl-Bien and Arena, 2018; Grille et al., 2015; Lichtenstein and Plowman, 2009). And from the opposite perspective it is advocated that emergence does not require any formal instance at all (Porat, 2018; Uhl-Bien et al., 2007). Leading scholars of complexity theorists do not agree where and by whom exactly emergence is initiated as well as how emergence evolves (Schulte et al., 2019; Braun et al., 2016; Will, 2016; Uhl-Bien and Marion, 2009; Marion and Uhl-Bien, 2001). Therefore, the necessity and influence of formal structure for the emergence of informal structure and leadership accordingly is a further point for more in-depth investigation. Consequently, this thesis will address how informal self-organisation is most likely encouraged inside a formal structure as well as how free is such self-organised emergence is.

Related to this aspect is the following final gap that was disclosed: Overall, it is confirmed that emergence is most effective in states that are close to the edge of chaos as to say in states of disequilibrium. Furthermore, such emergent behaviour is limited up to extremes on both sides, namely deadlock and chaos. In between these extremes the complex system is most likely able to informally emerge and adapt in a self-organised way. In states of deadlock emergence is not happening due to the lack of informal dynamic exchange (Schulte et al., 2019; Tourish, 2019; Uhl-Bien and Arena, 2018; Kark et al., 2016; Marion et al., 2016; Mendes et al, 2016; Oeij et al., 2016; Will, 2016; Hazy and Uhl-Bien, 2015; Bressers and Edelenbos, 2014; Tyssen et al., 2014; Fulop and Mark, 2013; Lichtenstein and Plowman, 2009; Uhl-Bien and Marion, 2009; Boal and Schultz, 2007; Osborn and Hunt, 2007; Uhl-Bien et al., 2007; Schneider and Somers, 2006; Stacey, 1995; Kauffmann, 1993). However, it is unclear where the edge of chaos is likely located and there is neither an overall agreement about the boundaries of self-organised emergence. Consequently, both gaps will be addressed in the frame of this research.

2.9.2 RQ 2 – What patterns facilitate the emergence of complexity-centric leadership?

Research on organisational complexity applied to leadership describe leadership emergence as non-linear dynamic interconnection process among individuals across all organisational

levels (Acton et al., 2019; Schulte et al., 2019; Porat, 2018; Uhl-Bien and Arena, 2018, Braun et al., 2016; Marion et al., 2016; Mendes et al., 2016; Will, 2016; Tyssen et al., 2014; Lichtenstein and Plowman, 2009; Schneider and Somers, 2006; Marion and Uhl-Bien, 2001; Anderson, 1999; Maguire and McKelvey, 1999; Stacey, 1995; Kauffman, 1993). However, the conditions and patterns of such emergent leadership process are not coherent. Acton et al. (2019), Tourish (2019), Porat (2018), Will (2016) and Lichtenstein and Plowman (2009) presented complexity leadership as social many to many processes which is indicating that a leader-follower perspective is an outdated approach from a complexity-centric leadership perspective. Similarly, leadership was conceptualised as equal CAS member by Braun et al. (2016), Marion et al. (2016) and Boal and Schultz (2007). Since there is no clear understanding about actual leader-member antinomy, worth to investigate the state-of-art approach referring to this gap in a practical organisational environment which is envisaged within this research.

A spectrum of immaterial elements is presented as beneficial for fostering leadership emergence: Reciprocal values and a joint purpose (Uhl-Bien and Marion, 2009) a socially supportive environment where organisational members maintain the equal chance to speak as well as to listen (Serban and Roberts, 2016), heterogeneity (Serban and Roberts, 2016; Uhl-Bien and Marion, 2009) and shaping organisational identity in order to influence CAS and leadership emergence (Boal and Schultz, 2007; Schneider and Somers, 2006) are highlighted. Therefore, this thesis will also verify how and which immaterial elements impact leadership emergence in real organisations in the frame of underlying conditions and patterns that influence leadership emergence.

2.9.3 RQ 3 – Which leadership roles are emerging in complexity-centric leadership organisations?

As a pivotal leadership role, literature concludes on the integration of formal with informal structure (Uhl-Bien and Arena, 2018; Nite and Bopp, 2017; Kark et al., 2016; Will, 2016; Bressers and Edelenbos, 2014; Uhl-Bien and Marion, 2009; Uhl-Bien et al., 2007; Schneider and Somers, 2006; Fulop and Mark 2013). So-called enabling leadership is claimed to be most appropriate to mitigate and integrate formal administrative with informal adaptive tensions which is advocated by the majority of CLT scholars (Schulte et al., 2019; Uhl-Bien and Arena,

2018; Mendes et al, 2016; Bressers and Edelenbos, 2014; Tyssen et al., 2014; Uhl-Bien and Marion, 2009; Boal and Schultz, 2007; Uhl-Bien et al., 2007; Lichtenstein and Plowman, 2009). However, the spectrum of actual measurements that is presented by these scholars is wide and does not agree how such integration can be achieved. The minimum consensus of contemporary CLT scholars is on fostering adaptability while maintaining certain stability. However, there is no overall agreement on most reasonable actual complexity-centric leadership activities. Consequently, further in-depth investigation about actual measurements related to the enabling leadership role is intended within this thesis.

Braun et al. (2016), Marion et al. (2016), Mendes et al. (2016), Osborn and Hunt (2007) and Uhl-Bien et al. (2007) agree that a CAS is not actively manageable due to its inherent self-organisation capability and hence is able to adapt within a natural stability towards new emergent order. CLT from a practical perspective holds the position that leadership somehow shapes the frame to enable self-organised emergence (Uhl-Bien and Marion, 2009). Therefore, further research is needed to address vital conditions and patterns that trigger exchange and in return CAS and leadership emergence as part of a complexity-centric leadership role. Providing sense and meaning for organisational endeavours as well as a joint purpose is highlighted as another core role of leadership in various complexity-centric leadership concepts (Acton et al., 2019; Lord et al., 2017; Braun et al., 2016; Mendes et al., 2016; Davis, 2015; Grille et al. 2015; Steinbauer et al., 2015; Fulop and Mark, 2013; Kohles et al., 2013; Lichtenstein and Plowman, 2009; Uhl-Bien and Marion, 2009). However, simultaneously a heterogeneous spectrum for how leadership is supposed to provide meaning and sense is presented. From a practical perspective and regarding actual implications only Kohles et al. (2013) so far has proposed to interweave organisational sense making into daily and specially tailored behaviours that are applicable for all organisational members. Fulop and Mark (2013) recommend leadership to apply special communication activities such as storytelling to provide sense. Therefore, also on this aspect, additional examination is required.

A more indirect understanding of a complexity-centric leadership role referring to its power to actively shape structural frame settings is presented by leading CLT scholars (Wu et al., 2018; Braun et al., 2016; Marion et al., 2016; Will, 2016). However, only a minor number of

complexity leadership literature highlighted such indirect nature ascribed to CLT roles. This is Therefore, this is explored in the scope of this thesis.

2.10 Literature review – chapter summary

The undertaken literature review in chapter two introduced the theoretical background of the two important research areas for this thesis – organisational complexity theory and CLT. The theoretical concepts were integrated and reviewed in correspondence to the research aim of this thesis and its three derived research objectives.

Section 2.5 explored organisational complexity theory and the derived conditions and patterns for application in a complex organisational context akin to research objective a) to explore the conditions and patterns embedded in the organisational structure of robust pioneer organisations that foster complexity-centric leadership

In section 2.6.2.5.4 organisational complexity theory was integrated to apply to contemporary leadership concepts. Chapter 2.7 investigated perspectives on the emergence of leadership in a complex organisational context which relates to research objective b) how complexity-centric leadership is emerging in this type of organisations

The last section 2.8 of this literature review examined perspectives on emerging leadership roles in a complex organisational context which relates to research objective c) roles that are emerging in the frame of complexity-centric leadership.

As result of this literature review, research gaps were disclosed corresponding to the underlying three research objectives. Based on these gaps, the following three research questions were derived, which are listed in Figure 6.

RQ 1: What are the conditions and patterns necessary for complexity-centric leadership?

RQ 2: What patters facilitate the emergence of complexity-centric leadership?

RQ 3: Which leadership roles are emerging in complexity-centric leadership organisations?

To address these revealed research gaps and to answer the derived RQs, an appropriate philosophical research position including adequate methodological research instruments need to be applied. These are enlarged in the following chapter of the thesis.

Chapter 3: Research Methodology

3 Research Methodology

The overall aim of this chapter is to present the methods that are most appropriate to collect data and to retrieve valuable insights. Therewith, it is intended to close the gaps of the reviewed literature while answering the research questions of this thesis.

3.1 Introduction

This chapter presents the methodological considerations for addressing the research aim of this thesis. Having this in mind, the research philosophy in section 3.2 first explains the philosophical underpinnings of this research. The ontological and epistemological assumptions together substantiate the fundamental methodological aspects of this thesis. The subsequent research strategy section 3.3 presents the selection of methods that are regarded to facilitate data collection and analysis most appropriately to answer the RQs.

3.2 Research philosophy

This section will describe the ontological as well as the epistemological philosophical research paradigms of the thesis. The axiological discussion in the sense of the author's reflections towards the research philosophy is explained in the section 6.6.

A well formulated philosophical research axiom regarding the research field of interest is emphasised as important referring to coherence and credibility of the underlying investigation (Crotty, 1998; Easterby-Smith et al., 2002). The latter even state that the "failure to think through philosophical issues [...] can seriously affect the quality of research." (Easterby-Smith et al., 2002, p. 27). The ontological as well as the epistemological philosophy research perspective - also called research or inquiry paradigms - shape what lies inside and outside of the actual research inquiry. As such they constitute to legitimate the investigation (Saunders et al., 2016; Burrell and Morgan, 2005; Auerbach and Silverstein, 2003; Crotty, 1998; Guba and Lincoln, 1994). Ontology defines how the researcher perceives the world and epistemology determines the researcher's beliefs how knowledge can be constructed. Therefore, these both perspectives influence how methodology can be addressed most practically given the underlying field of research (Guba and Lincoln, 1994).

In the following two sections, these philosophical research paradigms will be reflected. First from a general viewpoint and afterwards referring to the thematical background of this thesis.

3.2.1 Ontological research paradigm

Guba and Lincoln (1994, p.108) define the following as central ontological question that ought to be addressed by considering the researcher's beliefs and the underlying research field: "What is the form and nature of reality and, therefore, what is there that can be known about it?"

In brief words, the ontological perspective determines how the researcher sees the world.

There are two competing ontological viewpoints. One perspective regards reality as actions of society which are just given and as such can be aggregated to the whole (Burell and Morgan, 2005). Likewise, Guba and Lincoln (1994) represent reality from a so-called naive realism stance as only one reality that can be investigated. Ning (2019) pictures reality within a social world that is made up of clearly defined structures that are not exposed to change. This perspective is also called positivism (Auerbach and Silverstein, 2003; Guba and Lincoln, 1994).

From another perspective it is believed that reality is not just given but the collection of individuals or the product of individual's knowledge (Burell and Morgan, 2005). Reality is assumed to be compound, heterogenous and may even be made up of conflicting impressions that change over time. The individual reality of any research subject is informed by education, family training, travel, or employment experiences as well as religion and many other influencing factors (Burell and Morgan, 2005). Since these aspects differ for all respondents, the research is informed by "multiple realities". This stance is supported by Guba and Lincoln (1994) and Grbich (2013, p. 7) who claims that "multiple realities are presumed, with different people experiencing these differently." From this perspective the world is regarded to be construed and interpretive – therefore it is also called constructivism (Guba and Lincoln, 1994).

For the ontological paradigm of this thesis, the researcher assumes a constructionist perspective that sees the world, society and hence reality as made up of individuals that all behave differently. Although a certain type of organisation is the focus of this investigation, the unit of analysis that is explored in this thesis is individual people. The researcher is interested in exploring the experiences and insights from single people (within a defined type of organisation) because of the underlying belief that overall behaviour of an organisation and reality is determined by one's individual behaviours and perceptions. This research approach is supported by Crotty (1998) who argue that reality is not just discovered but constructed via conscious interaction among individuals and the integration of social context.

It needs to be highlighted that these individuals are not sharing their reality they are sharing data which the author will use to construct knowledge of in order to answer the research questions of this study (Guba and Lincoln, 1994). However, this collected data may be of subjective or objective nature which contributes to the epistemological philosophical research paradigm on that is outlined in the next sections.

3.2.2 Epistemological research paradigm

Guba and Lincoln (1994, p.108) define the following as central epistemological question that ought to be addressed by the researcher considering her beliefs and the underlying research field: "What is the nature of the relationship between the knower or would-be knower and what can be known?"

In brief words, the epistemology perspective determines the researcher's beliefs of how knowledge can be constructed.

This philosophical paradigm is also based on competing viewpoints, on the one side assuming the nature of knowledge to be objective and solid made of definite material that can be obtained (Burrell and Morgan, 2005). According to Ning (2019) this implies that the relationship between researcher and knowledge is independent and hence the researcher can only examine the objective knowledge of how mechanisms work. To obtain knowledge, solely quantitative experiments are legitimated to validate the drawn hypotheses. Such controlled experimenting aims on disclosing objective knowledge (Edmonds and Kennedy, 2017).

On the contrary side, knowledge is regarded as subjective and based upon distinct personal meaning that can only be experienced (Burrell and Morgan, 2005). This subjective knowledge-based stance – also called constructivist or interpretative perspective – assumes a transactional world, in which researcher and the knowledge to be disclosed may interact and may be mutually dependent (Robert, 2019). As such constructivism perceives knowledge as a result or consequence of human's social interaction (Robert, 2019). According to Guba (1990, p.26) "knowledge is a human construction never certifiable as ultimately true but problematic and ever changing". Consequently, within a research investigation process, knowledge is assumed to be created qualitatively during the process of interaction between researcher and respondent since both are interrelated and not independent objects (Robert, 2019). All perceived feelings and even unspoken sentiments between the lines that are collected during this process, are regarded as adequate data and hence as valuable potential knowledge even if they are "only" subjective perceptions (Guba and Lincoln, 1994). Likewise, Saunders et al. (2016) and Grbich (2013), confirm opinions and their expressing within narratives as data of good quality upon which knowledge can be drawn.

Given these both directions, the epistemological paradigm for this thesis is regarded to be of subjective nature because the researcher believes that human being's nature is not based upon simplistic, linear, and objective assumptions but instead is diverse and of multiple insights (Saunders et al. 2016). Hence, knowledge in this thesis is assumed to be of sole subjective nature and adequate insights and information are collected based on individual perceptions (Grbich, 2013). Consequently, the aim for this study is to collect single subjective meanings upon which knowledge will be constructed of. This approach is supported by Lee and Aslam (2019) who highly appreciate such subjective perceptions that are likely to appear during an investigation conducted by a human being researcher.

Leadership emergence and its roles within complex organisational systems (= potential knowledge to be disclosed) will probably vary in several contexts and single organisations because the understanding of leadership and its roles are aspects that are mainly depending on individual perceptions. Hence, for the collection of the data for this study the researcher expects that the collected insights from individuals may vary depending on the studied context, special challenging circumstances or even the mood of the individual research

participant. As such, data will be collected about dynamic interactions of human beings which are perceived as an unpredictable and continually changing process which is emergent (Schneider and Somers, 2006). This nonlinearly nature of the process respectively its underlying complex system implies that simple changes may cause one or even more huge impact(s) in the system (Cilliers, 1998). Therefore, researching nonlinearity and ergo “complexity does not lend itself well to approaches based on scientific laws, which state that for any given initial condition a particular cause will necessarily produce a certain, predictable effect” (Uhl-Bien and Marion, 2009, p.637 adapted form Elster, 1998). Subsequently, more appropriate methods are based on qualitative research approaches, that support the collection of subjective insights as data to derive knowledge thereupon and to finally draw conclusions.

3.3 Research strategy

The research strategy is the plan for how it is envisaged to answer the research questions. This implies how relevant data can be collected and analysed most appropriately (Denzin and Lincoln 2011).

This selection of methods and the entire analytical approach is determined by the philosophical paradigms that were defined in section 3.2. The differentiation between the nature of reality – namely how the world is perceived and the nature of knowledge – namely how knowledge can be constructed – are the most distinct considerations regarding any research (Burrell and Morgan, 2005). Since for this research reality is regarded as socially constructed based on multiple experiences by individuals and knowledge is assumed to be made up of subjective perceptions and interpretations, this thesis follows a constructivist or also called interpretative research strategy (Saunders et al., 2016; Auerbach and Silverstein, 2003; Guba and Lincoln, 1994). Consequently, for this study, the constructivist perspective will function as a prominent setting of the course for the entire research (Auerbach and Silverstein, 2003).

3.3.1 Interpretative research approach applied for this study

In contrast to the constructivist or interpretative research stance that is applied for this thesis, there is the positivist perspective that assumes only one given reality (Guba and Lincoln,

1994). To uncover one objective reality, the most promising methodological approach from a positivist perspective is to validate drawn hypotheses via gathering measurable facts usually within an experimental set-up (Ning, 2019; Edmonds and Kennedy, 2017). Accordingly, questions that tend to unfold subjective perceptions, feelings or moral considerations are not appropriate from such positivist standpoint (Ning, 2019). Likewise, a positivist approach would regard an organisation as rigid construct with only less variables (Ning, 2019). This perspective is inappropriate for this research aim and its accompanying research questions, consequently a constructivist perspective allows the researcher to collect a spectrum of experiences when exploring complexity-centric leadership (Fachin and Langley, 2019; Tourish, 2019). This is underpinned since constructivism was developed originally as a criticism of the positivist stance in order to highlight that human being's nature is not based upon linear and objective assumptions but is instead made up of subjective perceptions (Saunders et al. 2016).

From a constructivist perspective, corporate organisations are regarded as made up of dynamic constantly moving processes that are all interconnected (Fachin and Langley, 2019). Hence, Saunders et al. (2016) argue that a constructivist stance is especially reasonable for organisational research because constructivism reflects the social dimension of an organisation that is related to language, common internal behaviours, and the instability within organisational processes. This spectrum of social human interactions accounts for the diverse organisational realities. Therewith, it facilitates a constructive interpretation of such complex and unique settings that are often encountered in this field of research. Emphasising this viewpoint, Tourish (2019) highlights that it is very likely that human beings that are engaging collaboratively in an organisation will change their subjective perspective to what they regard as good and bad and consequently what they perceive as reality at a certain point of time. In this sense, Guba (1990, p.26) states "if realities only exist in respondents' minds, subjective interaction seems to be the only way to access them". Furthermore, subjective interaction as a social construction implies the need for interpretation

A further aspect of distinction is the time horizon that is aimed to be investigated (Guba and Lincoln, 1994). Basically, there are two different approaches. First, there is the longitudinal one that collects data during a certain period which may also focus on the change or

development over time. Second, there is the snapshot one which is focused on the collection and investigation of a particular setting at one time. It is also called cross-sectional research. Since this study will disclose interconnections and relationships that contribute to certain conditions or organisational patterns and therewith influence the roles of leadership, a snapshot perspective is more applicable for this research objective. Accordingly, qualitative data will be collected in different case organisation applying a cross-sectional time horizon (Saunders et al., 2016). Consequently, a methodology that makes use of subjective interactions at a certain time is the most reasonable way to disclose what is regarded as knowledge in this research (Guba and Lincoln, 1994) – namely all expressions, subjective perceptions, perceived feelings, and even unspoken sentiments between the lines on that was outlined in the philosophical sections before.

In summary, constructivist methods account for and mirror the social dynamic interaction of human beings that are influenced by certain organisational conditions at a certain point of time (Fachin and Langley, 2019; Tourish, 2019; Guba and Lincoln, 1994; Guba; 1990). Since this is the subject of this study, interpretivist respectively constructivist methods are regarded as most appropriate for this investigation. The following section will outline on the actual methods associated with a constructivist research approach.

3.3.2 Qualitative exploratory and inductive research approach

Denzin and Lincoln (2011) relate a qualitative research approach to a constructivist research philosophy, because following a constructivist perspective requires to insightfully interpret the data base that was often collected in natural real-life settings. The study of real-life phenomena is usually more related to qualitative than quantitative data. Solely, because collecting real-life data implies the trust of the research participant to share information and to grant data access. Building a relationship that allows gathering one own's experiences and personal opinions is more likely within a qualitative than in a quantitative research approach (Edmonds and Kennedy, 2017; Smith et al., 2017; Saunders et al., 2016; Auerbach and Silverstein, 2003).

Exploratory research is a methodological research approach that goes beyond description and aims to discover and disclose what is happening beneath the surface (Saunders et al.,

2016; Yin, 2014,). Likewise, the researcher strives to advance existing theory via the analysis of specific patterns which is supported within an exploratory research approach (Jupp, 2011; Locke, 2001). Therewith, exploratory research contrasts with verification of isolated factors when using a quantitative research approach where findings are statistically generalised and confirmed (Yin, 2014). A quantitative approach is adequate for already know research fields with the aim on verifying of the built hypothesis (Given, 2008). Hence, such quantitative approach is not applicable for this research field because the aim is on the exploration and interpretation of collected insights to answers the RQs (Locke, 2001). Consequently, the building of hypothesis is waived for this study (Given, 2008).

Due to its flexibility during application, exploratory research facilitates to reveal new aspects in terms of findings disclosed only during the data analysis (Saunders et al., 2016). Such emergence of findings during the actual process of data analysis is so called inductive reasoning (Denzin and Lincoln, 2011). Collected qualitative data is possible to be analysed in an inductive or deductive way. The latter one is based on logically reasoning form a set of assumptions by means of building hypotheses. Therewith, it focuses on falsifying or verifying new theoretical aspects of existing literature (Denzin and Lincoln, 2011). In contrast, and more appropriate for this underlying research field, is the inductive research approach that aims on integrating new or more detailed aspects into existing theory and therewith leveraging existing theory (Denzin and Lincoln, 2011). Locke (2001) associates an inductive data analysis with the exploration of patterns and conditions that may contribute to the building of a theoretical integrative framework. This is pursued for this research. Grbich (2013) emphasises that the analysis of data, that is based upon experiences and individual impressions, is most appropriate to be done within an inductive approach. These aspects substantiate the selection to analyse data inductively.

Independent from this genal suitability of a qualitative exploratory and inductive research approach, the investigation of complexity-centric leadership itself calls for a qualitative and interpretivist research approach (Breugst et al., 2018; Smith et al., 2017; Morrison, 2012; Tait and Richardson, 2010; Osborn et al., 2002). Considering that the underlying research focus is on leadership, Hunter et al. (2017) call for more inductive and problem-oriented investigations that account for the real-life requirements of leadership in today's

organisations. From a complexity focus, Benner and Tushman (2015) support this point in their investigation on paradoxes in complex settings since they did not find a theoretical framework adequately representing organisational complexity. The calls of both are further confirmed by Tourish (2018) and Osborn et al. (2002) who argue that an exploratory inductive approach is suitable for this field of investigation since it is likely to foster the generation of in-depth insights in the understudied area of applied leadership in existing complex organisations. Osborn et al. (2002) add that only by means of such qualitative exploratory research, patterns and conditions that enable complexity thinking and leadership emergence are likely to be studied. A final aspect is highlighted by Morrison (2012). Due to the dynamic interconnected nature of CAS, most influencing factors are expected to be interdependent among one another. This contextual setting in terms of interactions and linkages needs to be acknowledged within the underlying research methodology that is applied (Morrison, 2012; Eisenhardt, 1989). An exploratory research approach conducted in an inductive way facilitates an in-depth examination and interpretation of such interconnected dynamics and hence provides a holistic perspective while paying attention to individual relationships (Saunders et al., 2016).

Given the current limited understanding of the emergence of leadership and its roles within complex organisational systems, a qualitative research approach that collects data under real-life settings and facilitates exploring organisational patterns, is regarded as most appropriate for this research field (Tourish, 2019; Smith et al., 2017; Braun et al., 2016; Marion et al., 2016; Will, 2016; Morrison, 2012; Uhl-Bien and Marion, 2009; Schneider and Somers, 2006). Therefore, this research will follow a qualitative exploratory and inductive research approach.

3.3.3 Methodology – Qualitative data collection

This section will present the methods selected to collect the data regarding the research aim of this thesis. The most prominent data collection methods that support qualitative research and that would be appropriate to answer the RQs of this thesis are observations, focus groups and interviews (Saunders et al., 2016). The underlying rationale for selecting one method over another followed the guideline of the consolidated criteria for reporting qualitative research (COREQ) (Tong et al. 2007). These support to verify the methods and actual process for data collection in a transparent, systematic, and precise way.

Observations, which are also called field research, require the researcher to access the real world of the research participant to collect the data in terms of behavioural patterns and procedures (Fetterman, 1998). The main advantage is that the data is collected on site in the natural environment of the participant while it is happening in contrast to gathering certain aspects that were selected by the researcher. Observations are suitable to in-depth explore also only less studied phenomena (McKechni, 2012). However, the main downside is the difficulty to establish on-site access to the desired organisations for executing such field research. According to McKechni (2012), this method is most suited for exploring a processual development over time. Since this is not the focus of this thesis, this method is waived.

Focus groups are a further adequate option to qualitatively collect the desired data for this research. The benefit of focus groups is that rich and in-depth data from different expert's perspectives can be gathered simultaneously, however this likewise presents its disadvantage. Since the data and its collection mainly relies on a discussion of selected participants, it implies that different experts need to be available at one location during a certain time. Given that access and consent to participate is established, if dedicated experts are required to discuss a certain research area, it is very difficult in practice to align on a common place and time (Morgan, 1997). Even if organisational challenges are overcome, this data collection method is highly dependent on the moderator's facilitation skills as well as participants' statements and their influence on each other. Moreover, if replicated it will probably not produce an identical data collection result (Stewart and Shamdasani, 2015).

Overall, the organisational challenges related to aligning access and willingness of leadership experts from different organisations and to share in-depth experiences externally were regarded as a too high risk for gathering sufficient and rich data. Therefore, focus groups were not considered as best method to answer the research questions of this study.

Interviews are the third suitable way to collect qualitative data for this study. In contrast to focus groups, they require the alignment with only one participant and as such are likely to reveal more in-depth information from one participant or one organisation (Morgan, 1997). Since the researcher seeks to disclose meaningful details about one individual case organisation, instead of collecting different perspectives, interviews with single participants

are regarded as most appropriate method for data collection that is likely to answer this study's research questions.

3.3.3.1 Semi-structured interviews for data collection

There are three basic structures available when undertaking interviews: unstructured, semi-structured or structured formats (Morgan, 1997).

The main advantage of structured interviews is its very structured procedure with a defined list of questions to be asked successively. On the one hand this prohibits the interviewer to spontaneously enquire additional and more in-depth information in case of particular interest on a topic: On the other hand, this eliminates the incorporation of the interviewer's feedback and personal intervention from the beginning. Since the data collected via structured interviews is most appropriate to become transformed into quantitative data, structured interviews are regarded as not appropriate for this research (Fowler, 2011).

The contrary approach is applied when using an unstructured interview. Within an unstructured interview, the interviewer maintains almost unlimited room for manoeuvre referring to topic, sequence or wording when asking usually open-ended questions. The interviewer is also free to deep dive into certain directions (Fontana, 2011). Apart from the general research area that is usually given, there is no detailed format that an interviewer has to stick to. Hence this might beg the risk to lose focus and to not cover originally desired aspects due to potential time restrictions of the interviewee (Gubrium et al., 2012). Therefore, also this approach is waived.

Semi-structured interviews are in the middle of both. Equal to unstructured interviews, the interviewer has the option to adjust sequence, wording, and to deep dive into certain aspects during the interview. This is especially appropriate to cater to the individual interviewee and to reflect on certain issues in more detail (Fontana, 2011). The main contrast to unstructured interviews lies in its requirement for some predefined questions or topics that need to be addressed during the interview. As such, semi-structured interviews combine predefined necessary requirements and flexible structure that allows the interviewer to request in case of interesting aspects and to reveal details (Ahlin, 2019). Therefore, semi-structured interviews

are regarded as perfect option to collect the data for the predefined must have topics that have been identified as gaps in the literature review of this thesis, while still maintaining a high margin of discretion when undertaking the individual interview. Additionally, semi-structured interviews are especially favorable when following an inductive research approach as done in this research project (Saunders et al., 2016 Galletta, 2013; Gummesson, 1991).

The decision to use semi-structured interviews was also determined by the following aspects inherent to this thesis:

Nature of the research questions

Especially when 'how' or 'why' questions are to be answered within current real-life settings, the semi structure of an interview ensures openness to dive into originally not intended directions while maintaining a rough plan and the coverage of certain must have contents. This allows to explore the interviewee's reasons for certain decisions or behaviours and allows the interviewee to explain opinions related to the context (Galletta, 2013). Revealing especially such personal aspects during an interview is regarded as important for the researcher in order to answer the research questions of this study.

Nature of the questions for data collection

Related to the previous point, the kind of questions that are likely to facilitate answering the RQs of this study are open ended because closed questions in contrast will likely not disclose the needed details. Thus, there needs to be enough flexibility for the interviewer related to the wording and their order. Moreover, within semi-structured interviews, complex details can be unfolded by clarifying unclear questions or re-inquiring exact expressions (Gubrium et al., 2012). Especially such clarification measurements, are regarded as important to prevent capturing fuzzy information or misunderstandings and to eliminate vagueness directly during data collection.

Due to these presented aspects, the qualitative data collection by means of semi-structured interviews was selected for this research.

3.3.3.2 Challenges related to semi-structured interviews

Despite the advantages of a semi-structured interview, it is not free of weaknesses.

Limited structure

Since only some predefined questions that cover the must have contents are required, this limited structure could impact the overall research quality. Its flexibility advantages might contribute to reliability shortages. On the interviewer as well as the interviewee side sympathy and support might arise or not, solely due to individual personality reasons or due to certain but unintentional tone or non-verbal behaviours. Such subjective perceptions bear the risk that information is held back by the interviewee. This could falsify data collection and analysis (Galletta, 2013). However, all qualitative data bear this risk. For this study, it will be mitigated by following a defined set of questions to address the “must-have-aspects”. Section 4.1.2.2 outlines this interview structure in detail. Furthermore, this shortage is offset since the structure equally allows the researcher to dig deeper in case of unclear formulations to explore complex and dynamic linkages, which is a central objective of this research (Ahlin, 2019).

Language related challenges

Language itself implies interpretation risks. As Saunders et al. (2016, p. 568) note, “since words and images may have multiple meanings as well as unclear meanings, it is necessary to explore and clarify these with great care”. Hence, German was defined as language for primary data collection to minimise cultural and language related obstacles and induced misunderstanding due to wording issues. This is also admitted by Gobo (2011). The aim is that both, the interviewer, and the interviewee, are able to express their meanings in their mother tongue to reduce understanding impediments. A further objective is to prevent that neither researcher nor any participant is a cultural in- or outsider during an interview. Since this could contribute to feeling not comfortable, especially when expressing sensitive or personal experiences, information might not be shared openly (Gubrium et al. 2012).

In summary, while considering the underlying socially constructed research field to be investigated in this thesis, the advantages that come when applying semi-structured interviews, offset and even prevail its risks. Given the underlying research aim, semi-structured interviews most likely facilitate the collection of the type of data that allows answering the RQs of this thesis.

3.3.4 Methodology – Qualitative data analysis

This section will present the methods selected to analyse the data regarding the research aim of this thesis. As equally applied for the data collection, the underlying rationale for selecting the data analysis method followed the COREQ principles (Tong et al. 2007). This supports the selection of the methods and actual process for data analysis in a transparent, systematic, and precise way.

The nature of the collected qualitative data is non-standardised. This consequently impacts how it is analysed best. To draw reasonable conclusions and meaning from the collected data, suitable interpretation techniques are required (Saunders et al. 2016). The most prominent data analysis methods that support qualitative exploratory research in an inductive way are phenomenology and thematic research (Grbich 2013; Smith Eatough, 2007; Miles and Huberman, 1994). On these methods and why one is selected over the other, will be outlined in the following:

Phenomenology focuses on interpreting detailed real-life experiences of individual people. The interpretation that is done during analysis aims on giving meaning to the shared insights of the research participants (Moran, 2000). Phenomenological interpretation is especially suitable for the investigation of social and health related issues because it facilitates sensemaking of how individuals perceive certain events or issues. This sensemaking requires a twofold interpretation. First by the research participant that shares personal perspectives and second by the researcher that derives meaning from these shared perspectives (Smith and Eatough, 2007). This qualitative data analysis method is very adaptable in its application and contrary to a routine proceeding because no rigor advice is given for how to detailly undertake a phenomenological analysis (Moran, 2000).

This flexibility of phenomenology is likewise its disadvantage since interpreting individual viewpoints bears the risk to incorporate subjective perceptions or implied prejudices (Edmonds and Kennedy, 2017; Auerbach and Silverstein, 2003). During data analysis and especially because of the twofold interpretation, the researcher is required to continually switch between the research participant's perspective and one own's to draw reasonable meanings (Smith and Eatough, 2007). Due to this interpretation weight of single events

experienced by one-person, phenomenological interpretation is more applicable for in-depth investigating social aspects or feelings related to particular issues, in contrast to conditions related to dynamic interactions in corporate organisations (Auerbach and Silverstein, 2003). Since these are explored in this study, phenomenology is waived for this data analysis.

Thematic analysis is another qualitative data analysis method that is suitable for the analysis of narrative data or experiences shared by research participants. Its main aim is to disclose the central aspects across the entire data set and to transparently transform them into meaning (King and Brooks 2018). Having this in mind, during the thematic analysis process, it is searched for themes or patterns that occur across the entire data set that was collected. This so-called coding process aims on identifying themes that might be relevant for answering the research questions.

Due to its logic step by step approach, thematic analysis is a systematic and likewise flexible technique for analysing a broad spectrum of unstructured qualitative data. Simultaneously, the analytical step by step approach is not prescribed too stringently and hence offers an adjustable application for different fields of investigations (Saunders et al., 2016). As such, thematic analysis is a more straightforward method than phenomenological interpretation and well suited for the investigation of organisational research (King and Brooks, 2018). Therefore, data analysis by means of thematic analysis was selected for this research.

3.3.4.1 Thematic analysis approach using NVivo software

Research presents different styles for the actual execution of the thematic analysis process that vary slightly within their single steps. There is thematic analysis via template (King and Brooks, 2017), thematic analysis via matrix (Miles and Huberman, 1994) and the framework thematic analysis approach (Ritchie and Spencer, 1994). In contrast to thematic analysis according to Braun and Clarke (2006) the other approaches require an initially created coding structure based on one data set for undertaking the analysis. The step-by-step approach according to Braun and Clarke (2006) is executed in a more bottom-up approach across the entire data set respectively all interviews.

There is general critique about the conduction of the thematic analysis via predefined coding due to its rigidity that might hinder creative emergence of meaning and real interpretation (Brooks et al., 2015; Atkinson, 2013; Chamberlain, 2000). Since the Braun and Clarke approach is not relying on one initially created coding frame (King and Brooks 2018) it was selected. It offers flexibility in its application steps and thus focus can be put on the actual interpretation and the deriving of meaning in contrast to other thematic analysis approaches such as template, matrix or framework thematic analysis techniques (King and Brooks, 2017; Miles and Huberman, 1994; Ritchie and Spencer, 1994).

To further operationalise thematic analysis technique by Braun and Clarke (2006), the software tool Nvivo will be used. This combination was investigated and recommended by Sepasgozar and Davis (2018), Nowell et al. (2017), Smyth (2012) or Auerbach and Silverstein (2003) because it is likely to enhance validity, credibility, and auditability of the overall analysis process. Nvivo software supports an objective and stringent thematic analysis process, which is essential to transparently handle the massive qualitative data amount from the interviews. Additionally, it facilitates effective qualitative data analysis by enabling to sort, categorise and save emerging topics in an organised and structured way (Smyth, 2012). Data analysis via thematic analysis (Braun and Clarke, 2006) supported by Nvivo further supports a cross-case analysis of the collected data. It enables to better compare collected experiences from different people of different organisations that were provided as answers on the same question (Saunders et al., 2016). In the case of deviations, this allows an in-depth exploration of the underlying circumstances as root cause of the variance (King and Brooks, 2018).

A potentially fragmented analysis result is mentioned as a further potential weakness inherent to the thematic analysis especially if interview excerpts are presented without underlying context (Silverman, 2013). Such traceability related risk is mitigated by the software application which allows to unravel interviews and to condense the captured aspects into different codes or themes without losing the original data source and context (Sepasgozar and Davis, 2018; Nowell et al., 2017).

Due to its flexibility, thematic analysis supports the inductive approach of this thesis. It allows that themes emerge out of the data set and as the analysis is progressing, it facilitates the consolidation of these themes (Braun and Clarke 2006). Simultaneously critique is raised referring to this high level of flexibility: The combination of great adaptability and the usually great amount of qualitative data might contribute to the loss of focus during the analysis process (King and Brooks, 2018). To mitigate this risk, the single steps of the thematic analysis approach according to Braun and Clarke (2006) are strictly followed. They subsequently seek to narrow the wide spectrum and the huge amount of collected data during the research process (Belotto, 2018).

Thematic analysis combines open minded analytical research within a structured approach because it allows to discover novelties inside the underlying research field, while complying with a set of data analysis measurements that transform the collected data into meaningful findings during its successive steps (King and Brooks, 2018; Saunders et al., 2016; Braun and Clarke 2006). Consequently, thematic analysis according to Braun and Clark is perceived as method with the perfect ratio between structure and flexibility and hence regarded as the most appropriate data analysis method to answer the RQs of this thesis.

3.4 Research methodology – chapter summary

The ontological perspective for this thesis regards reality as multifaceted collection of single behaviours of individuals (Ning, 2019; Edmonds and Kennedy, 2017; Burrell and Morgan, 2005; Guba and Lincoln, 1994). The epistemological perspective of this thesis assumes that knowledge is based upon soft intangible meanings that are experienced (Burrell and Morgan, 2005; Guba and Lincoln, 1994). It is believed that within contexts where human beings are interconnecting dynamically – such as organisations – knowledge can only be constructed based upon insights and experiences from individuals that are collected as underlying data (Jonsen et al, 2018).

Due to the dynamic interplay of single elements in a complex environment, it is not possible to anticipate what will happen in case of changing one single element because small changes may cause huge unpredictable impacts (Morrison, 2012; Cilliers, 1998). Thus, for the underlying research field of this thesis, the most reasonable methodology applicable is a

qualitative exploratory approach. To adequately answering the open RQs of the thesis, data is collected via semi-structured interviews with individual research participants across different case organisations. This data collection method is selected because it is regarded to best facilitate the exploration of organisational patterns related to leadership and to reveal dynamic linkages in order to disclose what is actually occurring.

An inductive research approach for data analysis is applied in this study because it facilitates theory building via codes and specific patterns that are identified and analysed from the underlying collected data (Locke, 2001). To proceed in this way, the thematic analysis approach according to Braun and Clarke (2006) supported by Nvivo software was selected as qualitative data analysis method. The next chapter will present the actual measurements undertaken by the researcher based on the chosen methods for data collection and its subsequent analysis.

Chapter 4: Data collection and analysis processes

4 Data collection and analysis processes

This chapter presents the data collection and analysis processes executed for this research project.

Section 4.1 explains how adequate data sources were identified and collected. Afterwards section 4.2 will outline the actual analysis process of the collected data in a rigor way. Section, 4.3 is dedicated to the ethical considerations referring to the research participants of this thesis that were sharing their experiences.

4.1 Data collection process of this thesis

The next section outlines how adequate sources of data were identified when compiling the sample for this research. Following in 4.1.1.1, it is explained how access to collect the target data was established and 4.1.1.2, presents how data collection via semi-structured expert interviews was performed.

4.1.1 Sampling – defining suitable case organisations

Sampling implies the definition of a subset of potential but appropriate data delivery sources from all potential data sources. Sampling is reasonable and necessary to diminish and limit the amount of data to be collected and to be analysed by considering only reasonable data with regard to the underlying research project (Saunders et al., 2016)

There is a broad spectrum on recommendations when it comes to composing a sample. Eisenhardt (1989) recommends selecting the population of the sample based on differentiating and contrasting cases that are likely to enhance richness of data and insights to be disclosed. According to Becker (1998), a viable sample should reflect the entire spectrum of the target population within a meaningfully and validly selected subgroup that can be justified. One central criterium for a workable sample is the definition of the sample's frame and its boundaries. Yin (2009) differentiates between samples of a single case and multiple cases. A single case sample is favoured if a unique set-up is in focus of the examination with the aim to gain deep insights on this individual phenomenon. In contrast,

for samples with more cases, Yin (2009) suggests creating multiple case samples with cases that are replicable.

Additionally, referring to the compilation of a multiple case sample, Eisenhardt (1989) supports the building of a heterogenous sample that furthermore is a representative one and as such allows to generalise findings. The generalisation of findings is facilitated and enhanced if the underlying sample cases are replicable in their set-ups. Moreover, multiple cases are likely to ensure more evident findings (Yin, 2014; Eisenhardt, 1989). However finally, "the selected sample must enable you to answer your research question!" (Saunders et al., 2016, p.274).

4.1.1.1 *Defining the target population and criteria for the sample*

For defining the population of this research, so-called purposive sampling is applied because it is based on a defined set of criteria that are critical for the underlying research. Figure 7 below lists the criteria that were defined for this study because case organisations that fulfil these criteria might have the potential to provide rich explanations for the research questions of this study (Tong et al., 2007). Additionally, such criteria ensure transparency of the underlying population which allows replicability of the data collection process (Tracy, 2010).

Criteria ID	Case selection criteria	Criteria definition / characteristic in real live
1	Leadership type / approach	applying any kind of so-called complexity-centric leadership rejecting traditional management style rejecting top-down driven leadership rejecting command and control
2	Approach to handle complexity	publicly announcing that employees have a high level of autonomy complexity principles are incorporated through the entire organisation including its leadership
3	Organisational structure	not traditional hierarchical or hierarchical up to 2 levels
4	Size	more than 50 employees (medium or large enterprises)
5	Interview language	German

Figure 7: Selection criteria for case companies to be potentially interviewed

As target population, organisations were selected, that apply any kind of complexity-centric leadership. This implies leadership styles that reject top-down driven command and control

approaches or traditional management. This underlying principle was detailed in the literature review section 2.6. Related to how leadership is perceived is the approach to how complexity is handled in an organisation. This conceptualisation was outlined in the literature review section 2.5. Consequently, leadership type and the approach to complexity were both defined as criteria.

Organisational structure and size were further added as selection criteria. According to organisational complexity literature, the number of elements in terms of human beings that interconnect in an organisation drives complexity (Bergman and Beehner, 2015; Anderson, 1999; Cilliers, 1998; Kauffman, 1993; McKelvey, 1997 & 1999; Damanpour, 1996). As Bergman and Beehner (2015, p. 204) state "...complexity increases with more 'parts'." Likewise, McKelvey (1999) and Kauffman (1993) both found within their simulations that an increase of interdependencies in terms of communication due to higher numbers of elements in a system contribute to negative effects in the system. Correspondingly, Damanpour (1996) revealed that an organisation's ability to flexibly evolve and adapt is negatively impacted with an increase of size and for large organisations in general. This was confirmed also by Ethiraj and Levinthal (2004) especially in case of the presence of hierarchical organisational architectures. Consequently, it was concluded that the larger the organisation and the more hierarchical, the higher the need to somehow (better) structure an organisation to handle complexity in terms of interdependencies among the single elements in an organisation. Therefore, criteria 3 and 4 are relevant for answering the RQs and hence were included as criteria for the target population of this study.

The German federal statistic office defines organisation with up to 50 employees as small enterprises (Federal statistic office, 2020). To ensure an adequate level of complexity inherent in the organisational structure and to collect meaningful data, small enterprises are excluded from the target population of this thesis. Consequently, medium-sized enterprises with 50 to 249 employees and large enterprises with more than 249 employees are considered as target population for this thesis.

It is hardly possible to exactly define a number for the target population based on these underlying criteria. The author was discussing this question with five experts on complexity-

centric leadership in robust pioneer companies. These are organisations, companies and networks that are specialised when it comes to the transformation from traditional hierarchical organisational set-ups to complexity-centric corporate organisations and their leadership. These experts are listed in Figure 8.

Experts	Expert's web site
E1	https://corporate-rebels.com
E2	http://leadermorphosis.co
E3	https://www.agile-heroes.de
E4	https://netzwerkselfstorganisation.net
E5	https://integratedagile.com

Figure 8: Experts on complexity-centric leadership in robust pioneer companies

The experts' opinions were varying but all indicated on a low level with worldwide not more than 0,5 % of medium to large sized companies that accept and integrate complexity characteristics within their organisational set-up and therewith apply any kind of complexity-centric leadership – however all experts confirmed an increasing trend.

From this overall population, the target population of such organisations in German speaking areas was calculated. German speaking was defined as one of the main characteristics to minimise language related digressions when undertaking the interviews. Therefore criteria 5 the German interview language was additionally included. The official statistical data base in Germany, in 2019, listed 90.621 companies with at least 50 employees (Statista, 2021), as shown in the graph of appendix 2. 0,5 % of these make up 453 companies that are likely to apply any kind of complexity-centric leadership. Therewith this number accounts for the target population of this thesis. Based on this target population, the sample with case organisations to be investigated was compiled. These clearly defined criteria allow to identify companies that can potentially provide meaningful data. Nonetheless, any of the case companies is still unique and therewith they represent a heterogenous sample that is likely to provide a rich and representative variety of perspectives which substantiates the aim of an exploratory research. There is no existing sample frame (a list of all potential cases in the

research's target population) for organisations that apply complexity-centric leadership and fulfil the criteria listed in Figure 7. For research set-ups where it is not possible to count the actual number of the underlying population, it is recommended to apply non-probability sampling or also called non-random sampling as a subjective but reasonable way of selecting the research's sample (Morgan, 2012).

In this research a combination of convenience sampling and snowball sampling – which are both types of non-probability sampling – was applied to identify potential participants. As its name implies, convenience sampling assumes any case that fulfils the target population criteria as convenient to be a part of the studies' sample (Morgan, 2012). Snowball sampling relies on initial cases or participants in the sample upon that further potential sample cases are identified (Saunders et al. 2016). A sample compiled by this technique is not statistically representative, however, since the identification of organisations is grounded on well-defined criteria for the target population, it is very likely to provide a rich data base and allows to gain deep insights (Tong et al., 2007). Furthermore, such well-defined target population ensures replicability among this thesis' sample, as recommended by Yin (2009) and Eisenhardt (1989) to guarantee a reliable and hence high qualitative research.

4.1.1.2 Defining the sample size

There is no general approach or rule available that outlines the appropriateness of the sample size (Boddy, 2016; Saunders et al., 2016). Saunders et al. (2016) recommend a logical approach, that determines the size of a sample in dependence of the individual research questions. According to Patton (2002) the size of the sample is not that important in comparison to how the collected data is analysed afterwards. Boddy (2016) who has examined the sample size for qualitative research, recommends ensuring a minimum size of a sample that justifies that sufficient adequate data was collected in order to answer the research questions. Saunders et al. (2016) gives rough recommendations on the number of potential samples. For data collection via semi-structured interviews, they suggest between 5-25 interviews. Given this vague advice and considering budget, time and access restrictions, for this thesis a minimum number of 15 cases was assessed to reflect empirical significance. Section 4.1.2.1 will further outline on the number of cases contacted and interviewed as well as how access was established.

4.1.2 Qualitative data collection process for this thesis

Considering the organisations that were identified based on the outlined selection criteria and in order to collect qualitative data that is prone for answering the RQs of this thesis, the following measurements for collecting the data were undertaken.

4.1.2.1 *Access to primary data - recruiting interview participants*

“The success of the researcher [...] is dependent not only on gaining physical access to participants but also building rapport and demonstrating sensitivity to gain cognitive access to their data.” (Saunders et al., 2016, p. 168). In this stance, the data collection for this investigation was a continuing process that lasted over months and will be outlined in the following.

Given the external researcher role for this study, it appeared challenging to access data from desired case organisations based on the sample criteria outlined in chapter 4.1.1. However, many of the targeted organisations openly and actively promote their non-traditional organisational set-up because they are convinced that traditional approaches to leadership are outdated and do not match with the type of people they are looking for as potential employees. Therefore, the researcher was taking part to events where desired case organisation were giving a presentation or promoting their organisational approach. Via the participation to events like fairs, corporate venues or online corporate events, the researcher proactively established initial relationships and could request for the participation of the company to this study often directly at the event. This led to five selected interviews from this approach. Additionally, also via so called “gatekeepers” – who facilitated opening the door to a desired organisation – final interviewees could be recruited. Gatekeepers were either contacts in the researcher’s private network or online network (for example LinkedIn) who work in companies that could be appropriate for data collection for this study or personal contacts that know potentially suitable interview participants. This led to further nine selected interviews.

A third and very direct way to get in contact with appropriate case organisations and final interview participants was by means of sending a direct request to participate to this research via email. The researcher sent this request either to a self-organisation expert or a leadership

expert or an agile coach of the case company, solely based on the public presentation on the case organisation's website. This was especially applicable for case organisation that are publicly known for their unconventional (complexity-centric) approach to leadership and organisational structure or just known by the researcher due to her interest in this type of organisation. This approach led to additional five selected interviews. Via these three different approaches in total 19 final interviews were arranged.

Figure 9 shows the excel that provides detailed information on the process of how access was established for any of the final 19 interview participants to this research. The original excel is embedded. With double click on the figure, excel is activated.

Process of how, when and why contact was established with whom				
WHO = final interview participant of this study				
Interview ID	Anonymisation key eg. 17M' for the 17th male interviewee	Interviewee background role / function in company	Involvement / engagement in the underlying case organisation / (organisation / (
1	1M	Co-founder / self-organisation and leadership expert	Actually working within the CAS and delivering leadership	
2	2M	Leadership expert and coach	Own perspective of leadership as coach expert, no specific case involvement	
3	3M	Founder self organisation expert	described case and CAS and own perspective of leadership as expert	

Figure 9: Process of how, when and why contact was established with whom

As listed in the excel, the researcher could recruit 19 case organisations respectively interviewees that were willing to participate to this study. The recruiting process including actual interview took place during a timeframe from March 23rd, 2019 (participation to the first event) until February 10th, 2021 (last interview was undertaken). The upcoming sections 4.1.2.2 and 4.1.2.3 will provide more details on any interview setting and the actual interview procedure.

During this timeframe of recruiting and interview collection the Covid-19 pandemic suddenly stopped all corporate events. Therefore, after March 2020 the researcher was not able to participate in onsite events but had to switch to the other two mentioned recruiting options

(Gatekeeper and direct request for participation). For detailed information on the process, see figure 9.

Establishing a relationship with the case organisation respectively the potential interviewee, providing adequate details that foster familiarising with the research background until finally identifying a potential interview candidate, in average took several months for most interview cases. The importance of this interview initiation phase where trust needs to be built, which is likewise time consuming und laborious, is also highlighted by Galletta (2013). An initial information sheet (c.f., appendix 3) was sent to any contact person – independent from the type of initial contact. This one pager was sent as PDF, after the initial contact or immediately when participation to this study was requested directly. It briefly describes the research approach and informed the participants about anonymity, confidentiality and their right-to-withdraw at any time. Since transparency, consent and confidentiality are important values for the researcher, already on this one pager, it was indicated that *“Interviews are recorded for the sake of the transcription afterwards. Interviewee and company are anonymised. Confidentiality of provided insights is ensured and participation can be withdrawn at any time. Results of and insights from the entire investigation will be provided.”*

The informed consent to participate to an interview that will be recorded was collected via email in advance of the actual interview (c.f., appendix 4). Furthermore, the ethical statement was made available via email to the interviewee also before the interview (c.f., appendix 5). With this proceeding the researcher wanted to make sure that the selected organisation really can identify with this research thematic and is able to provide rich insights on this content from its organisational reality. The 19 semi-structured interviews were conducted with leadership experts. Figure 10 lists the background information of the 19 interviewees referring to their roles in the selected case company as well as to their actual engagement in the case organisation.

Inter-view ID	Anonymisation key 1M/1F=1st male/female interviewee	Interviewee background role / function in company	Involvement / engagement in the underlying case organisation / CAS
1	1M	Co-founder / self-organisation and leadership expert	Actually working within the CAS and delivering leadership
2	2M	Leadership expert and coach	Own perspective of leadership as coach/ expert, no specific case involvement
3	3M	Founder self-organisation expert	Involvement / engagement in the described case and CAS and own perspective of leadership as expert
4	1F	Self-organisation expert and coach Founder of a self-organised CAS	Own perspective of leadership while actually working within a self organised CAS as coach and enhancing self organisation
5	4M	CAS organization expert	Own perspective of leadership while actually working within a biologically organised organisation
6	5M	Self-organisation expert and coach	Actually working within the CAS as organisational coach and facilitating leadership and self organisation
7	2F	Human resource and leadership expert	Actually working in a shared leadership position in an organisation with about 250 members in several CASs
8	6M	Shared leadership board member and leadership expert	Actually working in a shared leadership position in an organisation with about 250 members in 9 CASs
9	7M	Founder	Own perspective of leadership as founder while actually working within the autonomous focused case organisation
10	8M	Founder	Own perspective of leadership as founder while actually working within the autonomous focused case organisation
11	9M	Organisational development expert	Own perspective of leadership as organisational expert while actually working within the autonomous focused case organisation
12	10M	Agile coach Leadership and organisational development expert	Own perspective of leadership as agile and organisational expert while actually working with agile teams in the case organisation
13	11M	Expert in employee experience/ leadership and organisational development	Own perspective of leadership while actually working within a selforganised organisation with multiple CASs
14	3F	Organisation and leadership expert 20 years of experience in coaching and facilitating the transformation in organisations towards self-organisation including leadership development in self-organised organisations	Own perspective of leadership as agile and organisational expert while actually working with agile teams and coaching leadership
15	12M	Self-organisation and leadership expert	Actually working within the CAS and delivering leadership. Actively involved during the transformation from hierarchy to self organisation
16	13M	Organisation and leadership expert 8 years of experience in coaching and facilitating the transformation in organisations towards self-organisation including leadership development in self-organised organisations. Holocrazy expert	Own perspective of leadership as organisational expert, coaching holocracy and leadership while actually working within a self-organised holocratic organisation
17	14M	Founder / organisation and leadership expert 16 years of experience in coaching and facilitating the transformation in organisations towards self-organisation including leadership development in self-organised organisations	Own perspective of leadership as founder, organisational expert while actually working with agile teams and coaching leadership as well as agile working methods
18	4F	Expert in employee experience/ Leadership and organisational development	Actually working within the CAS and delivering leadership. Actively involved during the transformation from hierarchy to self organisation
19	15M	Expert in leadership and employer branding / events 11 years of self-organisation experience in the case company	Actually working within the CAS and delivering leadership. Actively involved during the transformation from hierarchy to self organisation

Figure 10: Interview participants - background information

All interviewees were dedicated experts in complexity-centric leadership and had roles in organisations that are not based on traditional hierarchical structures but acknowledge complexity principles. They all gained personal experience as part of a CAS. Hence, they all

could draw on adequate CAS experience, however with different roles or functions in the underlying case organisation: Fourteen interviewees (74%) were employed in the interviewed case company and as such answered the questions from a perspective with direct CAS engagement. The remaining five interviewees (26%) reported their insights from the perspective as leadership coaches or facilitators who were part of the case CAS for a specified period. The latter ones of course could draw on a wider range of experience due to their dedicated engagements in different suitable organisations. However, all interviews were collected with primary focus on one case respectively CAS setting. From the 19 interviewed cases organisations 13 interviewees (68%) could draw on experiences from an ongoing transformation from a traditional (hierarchical) structure of the organisation towards a CAS during their engagement in the case organisation. The other six interviewees (32%) were not involved in a transformation because either the organisations were already founded as a non-traditionally structured organisation with focus on complexity-centric leadership or these interviewees only joined the case organisation after it had been transformed to a CAS structure.

4.1.2.2 Operationalisation of the semi-structured interview

The compilation of the topics and the final interview guideline was inspired by Lee and Aslam (2019) and Yeong et al. (2018) as well as Galletta (2013). To operationalise the semi-structured interviews, the researcher identified eight so called “must-have questions” that are based on the gaps that were identified during the literature review.

Figure 11 shows the “must-have” open-ended questions that were derived to answer the underlying RQs and their related literature (gaps). These defined eight base questions were asked during all undertaken interviews.

Related research question	Important topic / gap identified during the literature review	Related lit. review chapters	Derived questions asked to interview participants	Inter-view question ID
RQ1	Fundamental conditions and patterns for macro interaction/CAS collaboration Leader-follower antinomy	2.6.2, 2.6.3	Are there fundamental conditions and assumptions in place that regulate overall collaboration among the organisational members respectively leadership and followership?	1
RQ1	Underlying reason for not mandatory exchange Dependency, needs, heterogeneity and subjective clique building	2.5.3.1, 2.5.3.2, 2.5.3.3	What do you regard as underlying reason if exchange is not mandatory?	2
RQ1	Formal and informal instance in complexity-centric leadership organizations	2.5.2, 2.7.3	Who is triggering the system's self-organised emergence and where is it initiated?	3
RQ1	CAS emergence limitations and edge of chaos	2.5.3.4	Do you see any limitations regarding complexity-centric organisations and leadership emergence?	4
RQ2	Leadership and its emergence	2.6.2, 2.7.1, 2.7.2, 2.7.3, 2.7.4	Can you describe how leadership is emerging in your organisation – if not formally defined?	5
RQ3	Existence of actually emerging complexity-centric leadership roles / leadership functions in real life organisations	2.8.4, 2.8.5	How do the roles of leadership look like in your organisation?	6
RQ3	Fostering adaptability as well as stability across the entire organisational collective as part of complexity-centric leadership	2.8.1, 2.8.2 2.8.3	Is organisational adaptability and single member's adaptability proactively fostered as part of a leadership role? And how / with which measurements is it enhanced most successfully?	7
RQ3	Mediation and integration of formal-informal tensions as part of complexity-centric leadership	2.8.2	How would you describe the leadership role in your organisation in relation to the formal and informal instance?	8

Figure 11: Research questions, related literature gap and derived base questions for the interviews

Due to the nature of semi-structured interviews, there was enough space for evolution of other interesting questions that are likely to pop up individually during undertaking the interviews. Therefore, all other questions asked were entirely unstructured to follow interesting emergency.

Audio recording during interviews is discussed controversy in the literature (Saunders et al., 2016; Lee and Aslam, 2019, Gubrium et al. 2012). The author decided to audio record all interviews because of the big advantage that full attention can be paid to the research participant. The focus is on questioning and listening instead of writing notes. Moreover, considering the entire time frame of almost two years during data collection and analysis afterwards, quickly taken notes and its memories will fade, audio records will stay the same. This is even more important to realise a viable data analysis afterwards (Gubrium et al. 2012). The researcher stored and archived the raw data recordings with dates on an external data drive which functioned as the secure archive location for this thesis.

The researcher intended to conduct the first interview as a pilot as also recommended by Yeong et al. (2018) to get a feeling for interviewing regarding time, structure and themes. However, since the first interview already provided very valuable insights and proceeded very well, the researcher decided to consider this pilot interview as normal interview.

4.1.2.3 Conducting the interviews

All interviews were conducted during one hour on a one-to-one basis, between the researcher and a single research participant from the case organisations. Figure 12. shows an overview of the 19 conducted interviews with details about any interview setting, its date and interview mode.

In the frame of the Corona pandemic traditional face-to-face interviewing was literally replaced by internet mediated formats. For the first eight interviews (ID 1-8), initial contact including actual interviewing was conducted already before the Corona outbreak. However afterwards, all data was collected by means of internet enabled tools such as skype, zoom, google hang outs, webex and some interviews were undertaken by phone as listed in the column "interview mode".

Inter- view ID	Anonymisation key eg. 17FM' for the 17th female interviewee	Date	Time	Interview mode	Location
1	1M	20.09.2019	09-10 am	Telephone	Researcher's home
2	2M	08.10.2019	10-11 am	Telephone	Researcher's home
3	3M	09.10.2019	11-12 am	Face to face	Office of the case organisation
4	1FM	22.10.2019	12 am - 1 pm	Face to face	Office of the case organisation
5	4M	13.11.2019	5-6 pm	Face to face	Office of the case organisation
6	5M	18.10.2019	1-2 pm	Face to face	Office of the case organisation
7	2FM	18.10.20219	3-4 pm	Google Hang Out	Office of the case organisation
8	6M	28.01.2020	2-3 pm	Face to face	Office of the case organisation
9	7M	31.03.2020	1-2 pm	Telephone	Researcher's home
10	8M	21.04.2020	10-11 am	Webex	Researcher's home
11	9M	27.04.2020	3-4 pm	Webex	Researcher's home
12	10M	29.04.2020	5-6 pm	Skype	Researcher's home
13	11M	05.06.2020	11-11 am	Skype	Researcher's home
14	3FM	06.07.2020	3-4 pm	Skype	Researcher's home
15	12M	14.10.2020	1-2 pm	Microsoft Teams	Researcher's home
16	13M	15.10.2020	9-10 am	Skype	Researcher's home
17	14M	20.01.2020	11-12 am	Zoom	Researcher's home
18	4FM	01.02.2021	1-2 pm	Zoom	Researcher's home
19	15M	10.02.2021	11-12 am	Google Hang Out	Researcher's home

Figure 12: Interview settings

For any case, the informed consent for recoding of the interview was collected via email before undertaking the interview as outlined in section 4.1.2.1. Nevertheless, a quick reconfirmation for audio recording was collected from the research participant and then the interview was started. The researcher initiated the interview with a brief introduction phase since sufficient information on the research project as well as the person of the researcher was shared in advance and as preparation for the interview. The research and interview purpose were briefly explained again.

During every interview all defined requirement interview questions as listed in Figure 11 could be covered. Depending on the individual answers of the interviewees regarding the initially defined "must-have" questions, the researcher then asked free from questions to reveal more details on a specific topic or in order to clarify fuzzy explanations provided by the interviewee.

During interviewing and especially in case of unclear formulations as well as to proof the understanding, the researcher then dug deeper or summarised the context in order to capture complex and dynamic linkages in the correct way and to prevent incomplete interpretation. For example, during interview ID 9 while discussing conditions that ought to provide orientation within a CAS, the interviewee referred to a superordinated level in the organisational structure. For the researcher this appeared quite contradicting, thus it was asked for further clarification of this additional structural level referring to power and authority to issue directives. Such digging deeper intended to enhance clarity among the collected data and to ensure that the underlying meaning of the interviewee was understood and captured correctly.

As preparation for any interview, the researcher carefully studied the public web site of the case organisation and if available, social network sites like LinkedIn of the individual interviewee. During this "pre-research" certain points of interests emerged for any single case which were also addressed during the individual interviews. 5M for example has released a spectrum of videos on his LinkedIn channel related to CAS collaboration. Accordingly, during the interview for some aspects, it was referred to his videos or enquired on certain points in more depth. Due to the diversity of complexity-centric leadership experiences (c.f., Figure 10) on that any single interviewee was able to draw on, the individual focus of the interviewee's provided answers were quite varying. As such the sequence of the questions was likewise varying; however, for all interviews it was ensured that all interview questions (as listed in Figure 11) were stressed. Although, all interviews were executed in a respondent style where the equal interview themes were covered during all conversations, the single interview questions were addressed in a non-directive way. In most cases, the interview topics just emerged seamlessly which encouraged the participants to talk about their experiences from their own perspective in an unfiltered way. *"Only yesterday I had a conversation with a colleague from a project team who said, when asked about the fact that things had probably not been going so well in this team for a while, he said, looking back, I had had the feeling for a while but I didn't dare to take action just on the basis of a feeling."* (13M). This example excerpt from the interview with 13M shows that this collected set of interviews and therewith the entire research is very genuine and unique.

During the collection of qualitative data (Eisenhardt, 1989) and especially in case of semi-structured interviews (Galletta, 2013) both recommend to pre-analyse the data already during the collection process. Accordingly, the author was taking notes already during this data collection phase referring to prominent statements or salient themes that were emphasised across and within different interviews. Likewise, of very uncommon, outstanding, or strange explanations manually notes were taken. In general, all interviewees were open minded and pleased to disclose their experiences and were also personally interested in the research findings, hence no one withdrew from the study during or after interviewing, likewise no one refused to answer any question. The interviews were closed for all cases in the planned timeframe. As final question the interviewee was asked for an additional topic that was not yet covered during the interview, but the interviewee would have been expected to be addressed.

Altogether, the semi-structured interviews are of subjective nature and are regarded as a method to collect data from interviewees who are personally involved. Hence, they share their individual experiences and provide insights from their own perspective. Considering the underlying socially constructed research field to be investigated in this thesis, from a retro perspective the researcher can confirm that this data collection method was most appropriate to collect the kind of qualitative data that is prone to answer the underlying RQs.

4.2 Data analysis process of this thesis

Literature on qualitative data analysis agrees on the aim to draw theoretical conclusions that are adequately grounded in the collected data and to build a theory thereupon (Robert, 2019; Edmonds and Kennedy, 2017; Galletta, 2013; Grbich, 2013; Gubrium et al., 2012; Bansal and Corley, 2011; Denzin and Lincoln, 2011; Strauss and Corbin, 1990). Simultaneously, the necessity of methodological rigour within any applied method is emphasised (Bansal and Corley, 2011). Consequently, this was the maxim when following the step-by-step approach of the thematic analysis according to Braun and Clarke (2006) supported by the software tool Nvivo. This combined analysis procedure is outlined in section 4.2.2. As preparation for the actual analysis, the recorded interviews were transcribed. This transcription process is described in chapter 4.2.1

4.2.1 Transcription of audio recorded interview data

The overall aim of transcribing data is to facilitate the subsequent analysis process. Qualitative data analysis-literature highlights the transcription as critical process for the subsequent analysis because underlying meaning is drawn from the spoken words and written down (Galletta, 2013; Gubrium et al., 2012; Braun and Clarke, 2006).

The digital recordings were transcribed by the researcher herself. Transcribing was directly done from the single records of the audio recorded interviews which resulted into 98,576 total word count of all interview transcripts of this research. The recorded interviews in German language were not translated during this transcription process to not impair the original meaning of the collected data. Moreover, a one-to-one translation into English would bear the risk to lose richness and depth of the originally collected German data. These downsides when translating interviews into a not native language are also highlighted by Al-Amer et al. (2015). Therefore, in the further analysis it is planned to only translate important or significant excerpts of the interviews. Therewith it is additionally intended to achieve transparency and to mitigate a potential lack of knowledge of the German language. Consequently, transcriptions were created in German language that fulfilled the quality criteria defined by Braun and Clarke (2006). As such an orthographic correct transcript was compiled that contains all verbal and non-verbal expressions according to the abbreviation scheme from Poland (2001).

When the transcription was finalised, final data cleansing was conducted via checking for potential transcription errors between written transcript and original record to finally produce an accurate transcription as recommended by Gubrium et al. (2012). Likewise, to the underlying audio records, these raw data transcriptions were stored on the external data drive.

4.2.2 Thematic analysis of interview data supported by Nvivo Software tool

The next section will illustrate the single steps of the thematic analysis approach according to Braun and Clarke (2006), as shown in the analysis table of Figure 13 and explain how this thematic analysis approach was operationalised by using Nvivo software.

Thematic analysis steps (Braun & Clark, 2006)	Nvivo software support
Step 1: Getting familiar with the data set	Import of the unstructured transcribed interview data into Nvivo One instructed file for any interview Initial disclosure of prominent topics and issues across all interviews. Collecting, highlighting and tacking of solved and unsolved discrepancies across the interviews.
Step 2: Generating initial codes from the data	Drag and drop sections of the single interview transcripts into one or more labeled codes Creation of initial list of codes Categorising thematically interview excerpts without losing traceability to the underlying context and original interview
Step 3: Searching for themes and recognising relationships	Definitions and explanations of themes Traceability of made connections, considerations and conclusions by the researcher Evolution of lists of codes into broader themes Notes about evolution of subthemes ensured confirmability. Visualisation of relationships among themes and initial drafting
Step 4: Refining themes	Review internal consistency of all themes and subthemes Drag and drop functionality to merge, add, delete, rename themes without losing related interview excerpts Transparent traceability back to underlying original raw data
Step 5: Final preparation of themes	Validation of the actual wording of themes and subthemes Review of related interview excerpts and validation of the essence of each theme/subtheme Facilitation of presentation and discussion among themes and their relationships with externals → enhanced coherence and reflexivity Traceability of refinements and their development
Step 6: Producing the Report	Identification of appropriate excerpts / quotes across different interview transcripts to evidence and underpin the essence of theme

Figure 13: Thematic analysis process according to Braun & Clarke, (2006) supported by Nvivo Software

4.2.2.1 Single steps of thematic analysis

Step 1: Getting familiar with the data set

Comprehensive familiarising is a critical element at the start and fundamental for the entire analysis process. Thus, it was read again through all transcriptions, afterwards any single interview transcript was read again in very detail. By such in-depth exploring of any single interview data set, recurring patterns and issues were revealed initially. Such “cross-case analysis” is suggested by Eisenhardt (1989, p. 534) by means of reading as well as re-reading of the transcription to gain an initial understanding of any single case including potential similarities and conflicts across the different cases.

Accordingly, by means of such cross-case approach, key topics that were mentioned across the collected interviews were captured with the intent to provide orientation. This was supposed to indicate the importance of certain aspects. Overall, step 1, functioned as preparation for the initial codes to be created in step 2. Identified similarities that could become relevant for the subsequent coding phase were highlighted by the researcher. This was the case for example for interviewees that described the emergence of leadership in an implicit way akin to RQ2.

The author applied the same approach also for issues that appeared as particularities across different interviews. For example, if leadership may ever truly emerge in a natural way, as raised by 6M. *“Therefore, the question arises for me: are self-organised organisations not simply existing in theory, because we also want to be self-organised, but we as a shared leadership team shape the leadership expectation in terms of self-organisation for our organisation?” (6M)*. Consequently, the researcher went back and re-read the interview with 6M to make sense of this excerpt. This was a very reasonable activity in this first step, as supported by Eisenhardt (1989), to identify potential discrepancies from the transcriptions and if possible, to dissolve them. In-depth analysis of such identified discrepancies in the underlying data is also very likely to further underpin the quality of emerging findings in later analysis stages. If dissolution was not possible, the researcher kept track of these issues to get back to them later. Collecting, highlighting, and tacking of solved and unsolved contradictions as well as similarities across the interviews was well enabled by Nvivo Software.

Step 2: Generating initial codes from the data

During the second step, the focus was on the identification of certain characteristics or important sections within the unstructured data to transform and group it into (initial) general broad ideas (codes). According to Braun and Clarke (2006, p.18) “codes identify a feature of the data (semantic content or latent) that appears interesting to the analyst”. As such a code may consist of a single word or a short phrase, that can be abbreviated. Coding is a way of organising the unstructured data into meaningful groups. These groups are smaller categories than the thereof emerging broader themes. The objective of coding is to link, compare or contrast text passages of data with the same underlying or contrasting position. Therewith, coding constitutes a quite simple but valuable tool because it makes a certain and interesting extract of data available for further analysis. One data excerpt can be assigned to more than one code.

The disclosed similarities and particularities during the re-reading within this second step, were set up as folders in Nvivo software and filled with relevant excerpts from the transcriptions. Nvivo enables to drag and drop sections of the single transcripts into one or more codes respectively folders. In this way, the researcher went through any of the 19

transcripts, and created an initial coding structure for qualitative data analysis as recommended by Braun and Clarck (2006), Cassell and Symon, (2005) or Morse and Richards, (2002). This was developed further in the subsequent analysis steps. For any defined label (initial code) a definition was specified, and any code contained exemplar text passages from different interview transcripts. Therewith, Nvivo supported this coding process in a systematic way. During this initial coding step, Nvivo tool was especially helpful to organise and to sort the large data set. In this way, big as well as small excerpts of the single interviews could be categorised thematically without losing traceability to the underlying context within the original interview transcript.

Step 3: Searching for themes and recognising relationships

The objective of step three was to identify patterns and relations among the formulated codes. Based on these initial relationships, broader themes were defined that reasonably group more related codes referring to an overarching aspect. According to DeSantis and Ugarriza (2000) a theme should cover an overall idea or concept related to the underlying research question of the study and consequently bundle related data fragments. Having this in mind, folders were set up in Nvivo with topics corresponding to the eight questions that were asked to all interviewees. The primarily identified codes were then matched with these literature related folders and further aggregated into broader topics, so-called themes. For example, the code "distributed or shared leadership" was created during the second step as code within the initial coding structure. In the frame of the matching process in step three this code was aggregated to the broader theme "leadership roles" (c.f., Nvivo snapshot 1 and 2 of appendix 8).

The researcher's strategy for deciding if the collected data was omitted or admitted was based on two criteria, as suggested by Oliver (2013). Data was regarded as valuable if a) insights were provided that were addressing one or more gaps disclosed in the literature review or if b) at least in 2/3rd of the interviews (13 interviews or more) this aspect was stressed. In this way themes were identified inductively, because focus is put on the underlying collected raw data set, and deductively because focus is put on the theoretical literature perspective. Such two-directional perspective is recommended in the literature since this approach enhances reasonable identification of themes because of its twofold

focus. Therewith, it constitutes for a result-driven approach in to answer the research questions (Saunders et al., 2016).

Codes that were not possible to aggregate to a folder from the literature questions emerged as interesting topics respectively as an encounter of an unexpected phenomenon and were captured in a Z_others-folder to further track this topic. This was the case for the code "decision making patterns". Such approach is supported by Yin (2009) and Eisenhardt (1989) who state that also paying attention to not anticipated phenomenon and relationships during the analysis of the collected interview responses is a reasonable methodological way for encountering potential findings. During this matching and refining process, a wide thematical spectrum of themes was created corresponding to the broad spectrum that was covered in the interviews. For several themes, subthemes were created in Nvivo to mirror the level of granularity within a single theme. This was the case for example for the code "distributed or shared leadership". During the entire theme development process, notes were created to keep track of the made connections, considerations and conclusions that lead to the merge of two themes or the creation of a subtheme. These notes about the evolution of subthemes ensured confirmability. For single interview excerpts, that contained a significant value and hence were moved to more than one suitable theme or subtheme, Nvivo enabled visibility via colours among the relationships and connections of the single themes (c.f., The Nvivo snapshot 3 of appendix 8).

Based on these Nvivo supported visualisations, the researcher was able to develop an initial diagram about the relationships of themes and their subthemes as well as their contribution to the overall research questions.

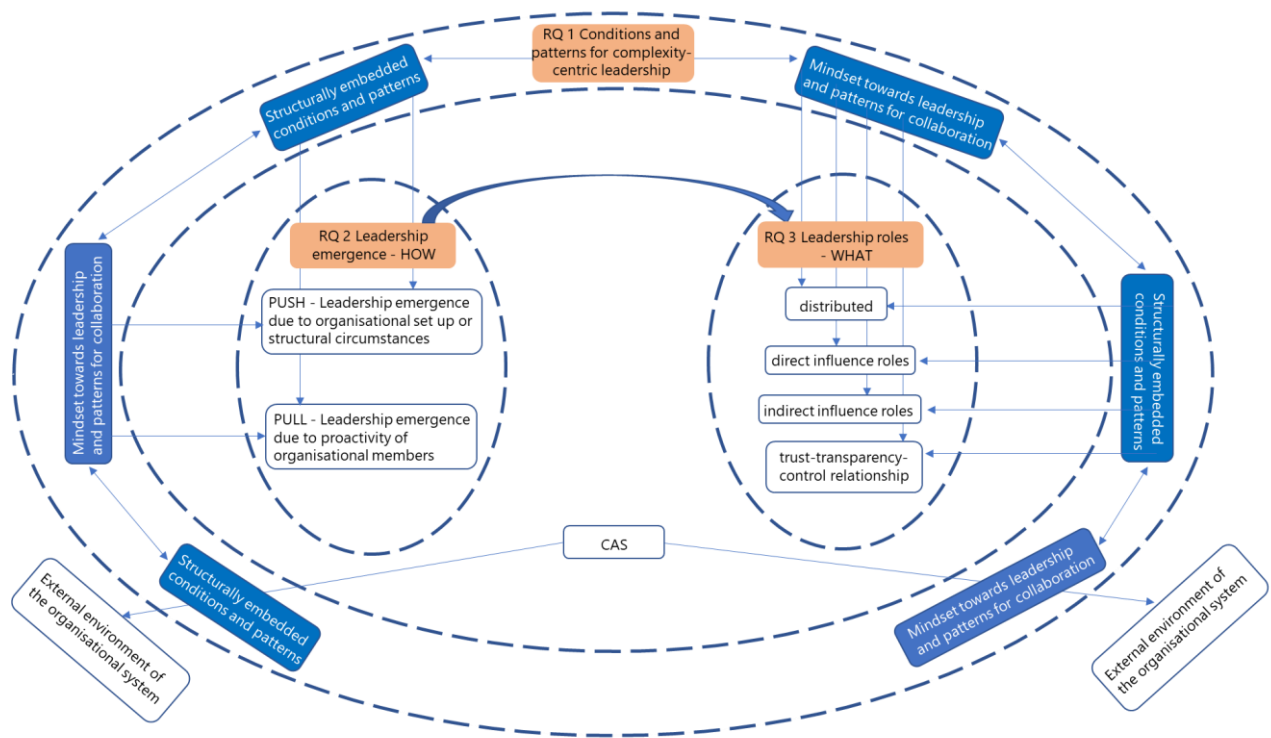


Figure 14: First high level draft on relationships of themes and contribution to research questions

Figure 14 shows – as result of this third analysis step – a high-level draft of the themes and their relationship among each other as well as to the RQs of this study. The aim of diagramming already within this early analysis phase was to visualise connections and hence to foster creatively conceptualising. Two iterative loops were conducted by the researcher until this step was evaluated as completed.

Step 4: Refining themes

Step four aimed on further compressing of the revealed themes. To do so, all data text passages that were related to a theme or subtheme were reviewed again for internal theme consistency. If a theme internally did not consist of a coherent pattern, it was evaluated if the theme itself is unclear or if just a single underlying text passage did not fit in. The aim of this 4th step was to build a thematic map which is made up of all final coherent themes together including their contribution to the overall RQs.

During this refining process, for some themes and among their subthemes it was revealed that relevant topics were not yet covered adequately among the existing themes, hence a new theme was created. This was the case for the theme “mindset” that is related to RQ 1 and

its subtheme "maturity". Since many interview excerpts were evidencing the importance of maturity among different aspects it was promoted to a higher level in the Nvivo code-folder structure. Likewise, the opposite was disclosed during this theme refinement process. Some themes did not contain sufficient or not strong enough proof to support the overall matter of the theme. This was the case for the topic grass-route movements. Consequently, the theme was deleted, and its content was merged with another already existing subtheme. The same was applied to themes or subthemes that contained too diverse or inconsistent data.

Even while compressing and refining of single themes, as well as deleting or creating new ones, the traceability back to original raw data was ensured through Nvivo and the researcher's notes about her made considerations and conclusions. The result of this 4th step in terms of theme refinement was only completed until internal consistency of all themes was reached. The high-level thematic map was advanced correspondingly.

Step 5: Final preparation of themes

During this step, the researcher's aim was to resolve the actual essence of the underlying text passages of data for each theme and to expose what is novel or special about it as suggested by Braun and Clarke (2006). The objective was to formulate a detailed analysis on every theme including their linkages among each other and their individual contribution to the RQs. During refinement of the wording for each theme the researcher drew on the actual words of the interview participants with the intention to reflect with the name of each theme on what was spoken. This was the case for example for the theme "organisational identity". It was redefined to "mindset" because all interviewees used the wording "mindset" for aspects related to organisational identify which was the wording from the corresponding literature (Devereux et al., 2020; Boal and Schultz, 2007; Schneider and Sommers, 2006). This process was especially enabled by Nvivo software because of its feature to easily and systematically search through all interview excerpts that are related to one theme.

Within this step and before producing the final report, two recall sessions with academic supervisors took place. Such debriefing session supported to disclose facets from an outside expert perspective. At the end of step 5, the researcher was able to articulate what is the main content of each theme, what is in and out of scope of this theme as well as the theme's contribution to the RQs. Consequently, this fifth step was an essential preparation for

phrasing the final report. The thematic map and its underlying themes were refined during this step several times. These refinements were facilitated by the tracing functionality of Nvivo software.

Step 6: Producing the report

Only after the themes including the thematic map were composed in their final set-up, the writing up of the analysis results was started. The actual results including unveiled findings will be outlined in the upcoming analysis and discussion chapter 5. Before starting with the outline of analysis and discussion, the next section reflects on the ethical considerations of the researcher referring to the described data collection and analysis methods.

4.3 Ethics

Saunders et al. (2016) define research ethics as behaviours that are appropriate to the conduct of research. As such ethical issues primary concern those who participate in the undertaken research and those who are affected from the research's results. Thus, any researcher is required to consider if there are potential ethical conflicts related to the research. These considerations are outlined in the following.

Research participant's consent

For this thesis, informed consent to participate to an interview that will be recorded was collected via email in advance of the interview (c.f., section 4.1.2.1). Via informed consent, the research participant agreed to its participation without coercion or deception. In advance, the research purpose and its content were outlined to the interviewee in the frame of a one-page information sheet. Thus, with the participant's informed consent, the awareness of the purpose and audience of this research project was confirmed by the research participant. The respondent was also fully aware of its rights as research participant. From initial contact until final agreement to participate to this research, it usually took several weeks or in some cases even month. During this time email conversation or phone calls were offered by the researcher for the potential participant to raise concerns and ask all open questions. This measurement was additionally included, since it was difficult to inform potential participants about everything that could become necessary to make an informed decision about their participation. This occasion to raise concerns and questions, facilitated to disclose potential

ethical issues and to identify an ethical conform solution. However, no ethical conflicts were discovered.

Voluntary nature of participation

The interviewee has voluntarily agreed via email to participate to this interview with the purpose for this DBA thesis. The agreement of the interviewee was also given via email for the recording of the interview in advance of actual interview conduction.

Confidentiality, privacy and anonymity of organisations and participants

To ensure the privacy of possible and actual organisations as well as participants, there will be no disclosure of personal data during the entire research process. The organisations and their actual participants will be offered complete confidentiality and anonymity. At no point in the project this was compromised. Furthermore, the interviewee had the right to withdraw from participation at any time. They can also withdraw already provided data.

Interviews with case organisations are for the exclusive use for the submission of a doctoral thesis to the University of South Wales. Potential findings gained from this DBA project may also potentially contribute to published, refereed journal articles in the subject areas of complexity leadership and / or complexity-centric organisational theory. The participants will be offered an electronic copy of the final thesis document as well as an executive summary with the research findings. The final outcomes of this research will be offered to organisations with an interest in the application of complexity-centric leadership and / or the set-up of a robust pioneer organisation. None of the case organisations wished to sign a confidentiality agreement.

Effects of research upon participants

There are neither positive nor negative effects expected to impact the participant due to her/his participation to this research. No harm is caused in any way. The participants of this project are unlikely to receive any direct benefits because of participating.

Impact of the data collection strategy

The researcher was clearly and openly communicating the research intent, as described in section 4.1.2.3. Covering of any information or intent on the usage of the collected data is not only non-ethical but also regarded as disadvantageous for disclosing or discussing social constructions and relationships of the organisation under investigation.

Data protection and data management

The researcher confirms to comply with the data protection legislation related to the collection, processing, storage, and use of personal and confidential (organisational) data.

Integrity and objectivity of the researcher

The researcher intends to conduct a truthful, accurate and objective research during all steps of the entire research process. No financial or commercial conflict or the pursuit of one's interest is expected since study fees as well as the entire research initiative is funded personally by Ms. Elena Kohler, the author and researcher of this thesis. Preservation of objectivity especially during data collection and analysis is a key principle for this thesis. Therewith, the accurate and comprehensive collection during interviewing is confirmed. No subjective selection or leading questioning is exercised, among others to ensure a valid data basis for analysis afterwards. Moreover, falsification or inventing of any data are intolerable.

Ethics statement

An ethical statement was created for this research project (c.f., appendix 5). This statement was provided to the ethics committee of the University of South Wales. Based on the approval by the committee, the permission to further proceed with this research initiative was granted also officially.

4.4 Data collection and analysis – summary

Data collection was done qualitatively via 19 semi-structured interviews with experts in complexity-centric leadership organisations. The details on interview access, background of interview participants, interview operationalisation and the actual interview proceeding were enlarged in the sub-sections of chapter 4.1. All case companies that were selected for this research sample, fulfilled the predefined characteristics as outlined in chapter 4.1.1. The

interviews were carried out based on an inductive approach because the interview content was derived from the gaps revealed in the literature review, as visualised in Figure 11.

Due to its non-standardised nature, the collected qualitative data was analysed with the thematic analysis approach according to Braun and Clarke (2006), which was supported by the software tool Nvivo. The additional application of Nvivo software supported the organisation of emerging themes and topics including their related extracts across all transcribed interviews in a digital, rigor, structured and retrievable way. The data analysis section 4.2 transparently outlined the detailed process of how the conversion of the 98,576-word count of all interview transcripts into meaning was conducted. By means of coding and categorisation it was structured into codes which were further compressed into themes. Finally major themes were concluded that aim on answering the RQs of this study. The analysis resulted into a draft of the initial high-level thematic map (Figure 14) that linked the disclosed themes in relation to the three research questions of this study.

The next section reports the actual results and the findings of the analysis process.

Chapter 5: Analysis and discussion

5 Analysis and discussion

5.1 Introduction

The objective of this chapter is to first present the results of the data analysis and second to discuss the therewith addressed gaps from the literature review referring to the three RQs of this thesis. For this purpose, this chapter will present the detailed findings and drawn conclusions for the three RQs by means of discussing the essence of the main themes revealed for any RQ.

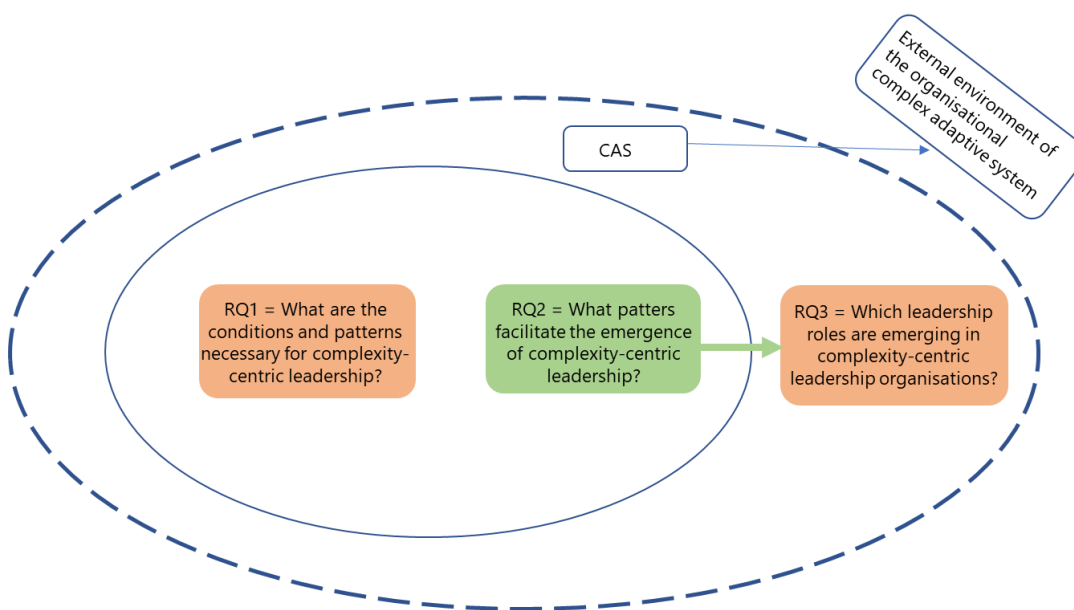


Figure 15: High-level map - relationship of research questions

Figure 15 presents a high-level perspective of the overarching relations between the three RQs based on insights provided by the interview participants. Certain conditions and patterns that were present in any of the investigated case organisation were revealed as fundamental prerequisites for complexity-centric leadership to be possible to happen. They are related to RQ1 and hence displayed in the centre of the organisation that is regarded as CAS, as outlined in section 2.5.2. Since CAS are not closed but maintain exchange to an external environment, the outer ellipse is dashed.

The RQ1 related section 5.2 of this chapter examines fundamental conditions and patterns in detail that have been identified during the data analysis. Afterwards, section 5.3 on RQ2 analyses how complexity-centric leadership is emerging. RQ1 impacts how emergence is

happening within RQ2 and both together contribute to the emerging roles of complexity-centric leadership that were unveiled in the frame of RQ3, shown in section 5.4.

5.2 RQ1 – What are the conditions and patterns necessary for complexity-centric leadership?

Complexity-centric leadership implies that leadership is not formally designated anymore (Schneider and Somers, 2006). On the actual emergence of complexity-centric leadership will be outlined in RQ2. Nevertheless, the absence of a formally designated leadership does not entail, that typical organisational tasks, such as exchange of information, taking decisions or reviewing performance are no more necessary. During data analysis it was revealed that these typical activities are executed differently, namely based on certain conditions and patterns that are structurally embedded in such type of investigated organisations.

Based on the identified gaps in the literature review, the following four base questions akin to RQ1 were defined and asked to all interviewees. An overview of all eight base questions and their theoretical sources is shown in Figure 11.

ID 1: "Are there fundamental conditions and assumptions in place that regulate overall collaboration among the organisational members respectively leadership and followership? "

ID 2: "What do you regard as underlying reason if exchange is not mandatory?"

ID 3: "Who is triggering the system's self-organised emergence and where is it initiated?"

ID 4: "Do you see any limitations regarding complexity-centric organisations and leadership emergence?"

Across the analysed answers of all interviews two overarching themes can be disclosed, as illustrated in the two blue boxes in Figure 16. From one perspective the interviewees described a certain mindset for working together that is shared between the organisational members; from another perspective, structural elements that regulate collaboration were presented to be embedded in the explored organisations. Hence the researcher reflected these both aspects as the central themes associated to RQ1: "Structurally embedded conditions and patterns" and "mindset towards leadership and patterns for collaboration". Within the subsequent chapters, first the analysed results for any theme as illustrated in the

white boxes and derived subthemes will be presented. Second, relations and potential contributions to an addressed gap from the literature review will be unveiled. Afterwards as main part of any section, the essence of the theme and the derived subthemes will be discussed.

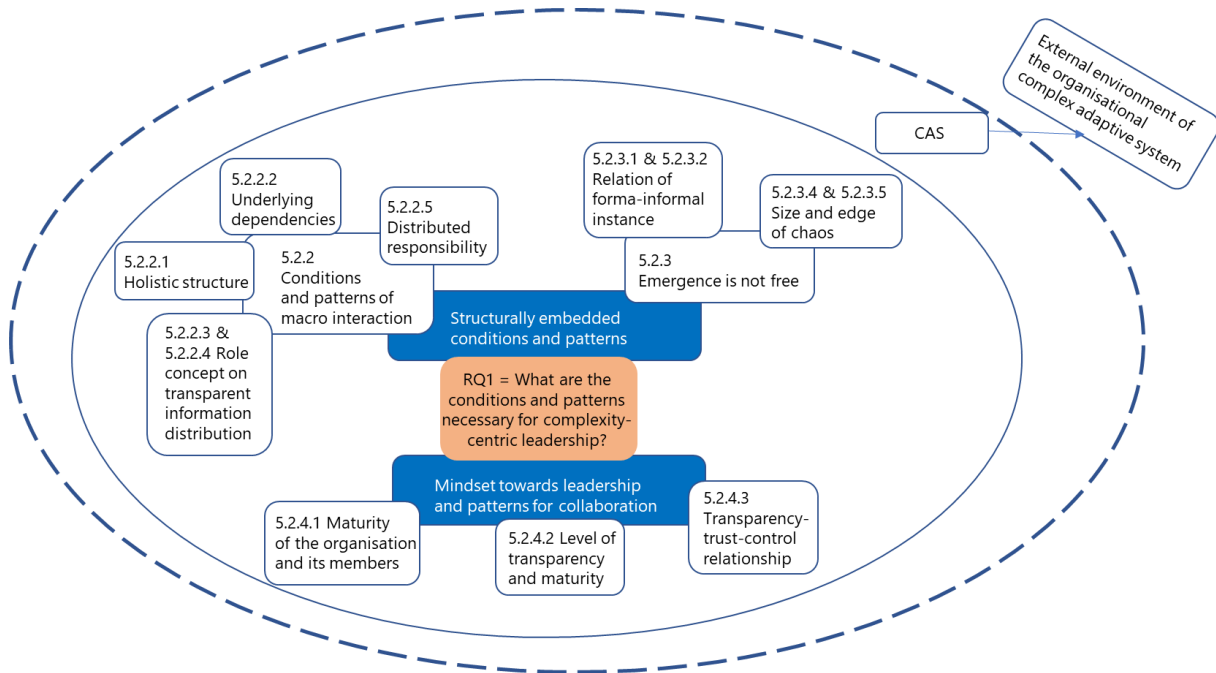


Figure 16: Thematic map - findings revealed for RQ1

5.2.1 Structurally embedded conditions and patterns

Two main facets of structurally embedded conditions and patterns were identified: Conditions and patterns of macro interaction explained in section 5.2.2 and emergence triggering and limiting aspects discussed in section 5.2.3.

5.2.2 Conditions and patterns of macro interaction

Four structurally embedded elements were identified during data analysis as central conditions and patterns that regulate how collaboration on macro level is taking place. Macro interaction relates to the exchange among teams in contrast to interaction among individuals (Marion and Uhl-Bien, 2001). During the literature review, research was revealed to ignore the interconnection among the macro level in terms of interplay on system-to-system level in contrast to interaction among individuals. It was identified as main source for divergences that are not explainable in quantitative studies (Braun et al., 2016; Marion and Uhl-Bien, 2001).

Within the collected insights while debating base questions ID 1& 2, four central conditions and patterns that contributed to enhanced macro interaction were disclosed during the data analysis. These were an underlying holistic structure (section 5.2.2.1), underlying dependencies (section 5.2.2.2), a so-called role concept (section 5.2.2.3 and 5.2.2.4) and the distribution of responsibility (section 5.2.2.5). For these, patterns and conditions will be outlined in the following.

5.2.2.1 Holistic structure and equality of organisational members

A holistic structure, where all organisational members are regarded as one collective without differentiation between leadership and followership, was identified as first structurally embedded condition. 14 interviewees (1F, 1M, 2F, 2M, 3F, 3M, 4M, 6M, 7M, 10M, 11M, 12M, 13M, 14M) shared that by means of eliminating structural barriers, a holistic perspective across the entire organisation and equality within the organisational collective, are essential elements that are embedded in their organisations' structures.

It was disclosed that such an integral perspective functions as pivotal foundation for all further identified conditions. Thus, holistic structure was listed as first aspect of the four unveiled conditions and patterns of macro interaction. Related to such an integral perspective, the literature reviewed on this topic assume leadership as equal CAS member (Porat, 2018; Braun et al., 2016; Marion et al., 2016; Will, 2016; Boal and Schultz, 2007; Marion and Uhl-Bien, 2001). The gap identified in the literature proposes – but could not finally reveal – if the differentiation between leadership and followership is an outdated approach from a complexity-centric leadership perspective or not. Therefore, this was addressed during the interviews.

In summary, the data collected from actual corporate business environments was not possible to confirm the literature propositions. 1F, 1M and 2M explicitly pointed out that there is a number of people that feel comfortable being part of the followership – probably in any organisation. Accordingly, 1M summarised the overall note across the interviewees referring to leadership-followership and a potential equality among the organisational members. *“In all systems that I have already accompanied it was always something different.*

We have noticed again and again that there are many people who want leadership and see themselves as followers as vice versa.” (1M). This indicates that in the actual corporate business environment of complexity-centric leadership organisations, the differentiation between leadership and followership is not (yet) an outdated approach. In the following, the aspects of the findings about a holistic structure and leader-follower ambiguity will be discussed:

The next quote of 6M highlighted underlying reasons for embedding an integral perspective in the organisational structure. Furthermore, 6M reflected on a spectrum of accompanied negative impacts that were mitigated via tearing down structural separations.

“Due to the division in profit centres, that were artificial barriers, the exchange of information was not transparently, it was not uniform and often intentionally it did not exist because at that time the knowledge advantage could still be used for oneself and or within the scope of one’s own profit centre. On the basis of this silo fragmented organisational structure, we could not simply request transparency and voluntary exchange of all information because the underlying organisational structure did not support this exchange. We as company owners did not understand this because we consider the organisation as a whole, but of course the employees act within the framework of their area. Based on this knowledge, we have changed the structure of our organisation in such a way that everyone is now in the same boat.” (6M).

Overall, it was shared during several interview cases that a silo mentality that is traditionally related to organisational units prevents thinking holistically and is directly and negatively impacting morale and underlying mindsets (3M, 6M, 13M, 14M).

“In case of individual silos that are in combat with one another there is no uniform understanding of behaviour, rituals and the way of cooperation in the entire organisation. Thinking in silos regarding only your own team-based goals and sub-budgets is the beginning of the end.” (14M).

Likewise, 13M argued that the problem in functional silos is that communication is nurtured only along hierarchical lines and their accompanying activities such as reporting rather than sharing responsibilities. He further drew on experiences with the intent to visualise collective

collaboration. Circles were drawn there around tasks that could only be achieved jointly as team instead of reporting lines for separate activities.

Additionally, the collected data revealed that tearing down structural separations was accompanied by also breaking down the imaginary separation associated with job titles that are relying on hierarchy levels and are associated with certain privileges: *"Especially during the introduction, it is always difficult to understand that there are no longer any privileges for individual employees, and I have seen many times that managers wanted to hold onto their privileges. Self-organisation with privileges does not work at all – a complete change is required and a real transformation."* (11M).

The consequent abolishment of privileges as one of the initial measurements that impact structural patterns and drives equality among the organisation was confirmed also in other case set-ups. For example, the organisational development expert stated that *"...it is precisely this behaviour and thought pattern that has to say goodbye it means saying goodbye to the domination of knowledge and privileges."* (3F).

Within debating leader-follower differentiation, *"...if leadership can become part of the team..."* (1M) and if equality among organisational members can be assumed, it was reported that as soon as leadership is formally designated which is usually accompanied with privileges, it is not regarded as part of the CAS, the team or the collective but considered as separated. The underlying structure then is a 1:1 relationship that additionally drives separation and is reflected in real life within usual phrases such as *"my boss told me / my employee has...."* (13M). The overall focus from a single person has to be shifted to a perspective that regards the integral team. *"If dependencies are more distributed, that the person I discuss the topics I am working with is different from the person who advises me on my personal development, only then has this one-to-one connection really been broken in organisations."* (13M).

To successfully break this behavioural and thought pattern, the organisation has to be based on a holistic integral foundation embedded in its underlying structure. Only this sets the precondition to not regard leadership as *"a zero-sum game"* (11M) which is indicating if someone has leadership, that others automatically have less leadership. Instead, if regarded

integrally in accordance with the underlying structure, leadership is likely to complement and stimulate one another (1M, 11M,12M and 13M).

Although supporting and maintaining a holistic underlying structure without units, privileges and seniority titles, there were also voices that highlighted that true equality among one organisational collective is very unlikely in any set-up. *"That everyone in an organisation is equal is never the case. Alone because of his or her personality. Also, skills and abilities are individually. Everyone has their own CV and their own strengths and weaknesses."* (12M).

"Still, we have a competence model. This competence model is evolving and is an indicator of how every member of the organisation develops his or her own competence. There are no titles behind this competency model and there is also no career development plan, but there is an orientation about how much experience and skilled competencies someone shows in which roles, so of course you have a senior and junior function in the broader sense." (2F).

The third quote endorses the two statements before by adding *"It is difficult to say how people are differentiated. This is sometimes very implicit but sometimes very explicit only because of their experience and their own status among colleagues. Although, we do not differentiate between leader and follower we differentiate between power and rank for all employees. These two categories should offer a certain framework that should lead to having an orientation in which one can work continuously and for oneself personally."* (11M).

These proofs supported a holistic underlying organisational structure and the abolishment of structural elements that foster separation among the organisational members.

Simultaneously, they emphasise that tearing down of classical structural elements does not directly contribute to equality among organisational members. The two latter quotes of 2F and 11M even somehow replaced them to provide orientation. Structural elements that are intended to provide orientation will be outlined in section 5.2.3.5.

Overall, it can be concluded that leader-follower antagonism is not yet an outdated approach. True equality among organisational members cannot be assumed because people will always somehow differentiate. Though, from a complexity-centric leadership perspective,

a differentiation between leadership and followership is supposed to become obsolete as soon as a holistic perspective is successfully embedded within underlying organisational structures. Then *“once you are leader in one activity – consequently you require other’s followership – once you are follower – consequently you need to be able to step into the follower role. It is a constant switch that only works based on a certain mindset and the adequate level of anyone’s own personal maturity.”* (12M). Therewith 12M emphasised and pointed to the interrelation between underlying integral organisational structure in the frame of the “conditions and patterns” theme and the theme “mindset towards leadership and patterns for collaboration”. Their interconnection will be enlarged in the upcoming sections.

5.2.2.2 *Underlying reason for not mandatory exchange*

The majority of interviewees (1F, 2F, 3M, 4F, 4M, 5M, 6M, 7M, 8M, 10M, 11M, 12M, and 13M, 15M) confirmed underlying dependency or needs among organisational members as key reason for exchange if not obligated. Thus, dependencies that are embedded in the organisational structure were mentioned as second condition that is likely to enhance macro interaction within real complexity-centric corporations.

Literature proposes three main reasons of not mandatory exchange: First, interdependency and underlying needs were identified as complexity principles to enhance natural exchange (Mendes et al., 2016; Lichtenstein and Plowman, 2009; Uhl-Bien and Marion, 2009; Osborn and Hunt, 2007; Schneider and Somers, 2006; Anderson, 1999; Stacey, 1995; Kauffman, 1993). Second, heterogeneity was assumed (Wu et al. 2018; Tourish, 2019). Subjective clique building was listed by Marion et al. (2016) as third reason to cause non-compulsory exchange.

During data analysis, heterogeneity was not confirmed as one underlying key reason for not mandatory exchange. Only 8M and 10M acknowledged that heterogeneity and diversity among organisational members is likely to enhance exchange because it is interesting to get to know people who are different. They simultaneously admitted that this is probably not the root cause for exchange in a professional field. Just as heterogeneity, clique building was not confirmed as reason for exchange in a professional context. Moreover, it was rather associated negatively if not proactively nurtured. However, if created consciously then it may

be advantageous for the overall organisation. In the following it will be discussed how dependencies and underlying needs can be embedded in organisational structures effectively:

It was disclosed that handover of end-to-end responsibility to a CAS was the preferred option to create dependency that in return drive adequate exchange. Such end-to-end responsibility implies being responsible from the beginning of product development or the offer of a service until the end to product or service delivery. To hand over responsibility and accordingly create dependency, it was revealed that the underlying organisational structure is set up along the value stream of the investigated organisation. Additionally, given that any team wants to contribute in the best way, there is no need to place any higher-level authority that takes responsibility and defines who must exchange information with whom. Since any team member assumes own responsibility, a team will self-organise the necessary exchange to maximise the final product value (4M, 5M, 10M, 12M, 13M).

12M described how actual end-to-end responsibility was distributed in line with the underlying value stream in their case. He explained in detail how natural interconnection among the macro level and thus exchange between CASs was enhanced due to embedded structural dependencies. *"The value stream from project acquisition to project completion is now owned by the teams. If there are six to eight employees in the team, they are limited in adding value alone within their team setup. Therefore, due to these dependencies, there is a need to exchange information with other teams to create added value. Due to the organisational structure, which is designed in such a way that a team cannot progress alone but is responsible for the higher-level area, exchange must take place."* (12M).

M13 confirmed the statements before while claiming that any team or CAS should be of an interdisciplinary composition because this contributes to higher level of autonomy. If any member originates from a different functional background, they are used to deal with arguments from different perspectives. Consequently, they will not work and think in one functional silo. Such teams and their single members are most likely to proactively exchange with other CASs according to their needs or if they depend on information from outside.

Moreover, the orchestration of organisational goals was revealed as further option to automatically create dependencies. Similar to jointly focus on the common maximisation of the underlying value stream, in order to meet a defined goal, it is necessary to exchange information (1F, 2F, M3, 4F, M5, M6). In this stance 4F shared an example for naturally emerging exchange due to an underlying common goal that induced interdependencies among two of their academies (name in the case for teams that function as CASs): *"It happens again and again that two academies join forces to work together on a product. This happens above all when there are dependencies that require working together to achieve a goal, since an academy alone could not achieve this goal."* (4F)

The example of 4F highlights that leadership here is not needed in this case to ensure the fulfilment of a goal among two teams. Hence, it was concluded that classical leadership was obsolete because the teams were allowed to operate based on an integrated underlying organisational structure with inherent dependencies. Such integral or holistic structure was already proven in section 5.2.2.1 to foster a collective perspective. Interviewees reported that embedding additional interdependencies within such barrier-free structures, enhances exchange between teams and CASs, respectively.

In the frame of discussing underlying needs as root cause for exchange, several interviewees mentioned that non-obligated exchange often is "tension driven". This implies a concrete need (4F, 11M, 12M, 13M, 15M). 12M explained this in more detail: *"Exchange and communication is or should always be tension driven. So driven by tension implies if I see a potential problem, I have to address it because whenever I have a concrete reason to enter into a dialogue, I also have a concrete opportunity to seek a formal, purposeful exchange with someone."* (12M)

Consequently, exchange due to tensions implies a broad spectrum ranging from any need for action for clarification and coordination until any type of conflict (11M, 13M). As maintained by 13M, even the call of a potential customer asking for a service that is not offered yet may result in the need for action to discuss the possibilities of offering the request with relevant colleagues. Simultaneously, it is emphasised, that the deviation of such tension into proactive behavioural patterns, and in return, actual activity, requires a certain mindset. Such a mindset aspect will be discussed in section 5.2.4.

Based on the analysed interview data it can be concluded that the principle "navigate by tension" or simply "exchange due to underlying needs and dependencies" works very well to regulate and foster exchange in the explored case organisation, although not mandatory defined.

As last point, it will be briefly draw on the mentioned aspect of informal clique building because in contrast to enhance macro interaction it was regard as a risk due to a potential separation of this sub-group from the organisational collective. 3F, 5M, 12M, 13M and 14M described unavoidable informal clique building as exchange based on sympathy and informal communication. However, 3F, 5M and 14M also argued if building of informal sub-groups is not nurtured intentionally within the organisation, individual communication is likely to take place without a framework and thus a clique creates its own identity apart from the organisational one. The resulting demarcation and separation in general were already revealed as significant restraining effect for effective macro interaction (c.f., section 5.2.2.1, holistic structure and the discussion about dependency above in this section). This point further highlights the finding. 14M emphasised the potential downside that if macro interaction is not proactively fostered across the organisational collective and therewith even underpinned the need for dependencies: *"If cooperation with other teams is not needed, for example because there are no dependencies, then cliques form more and more, which is bad for the organisation as a whole. Especially when each team has its own purpose independent of other parts of the organisation"*. (14M).

In summary, an organisational structure that is shaped with the aim to create dependencies and needs across organisational teams in terms of CASs was found as main condition to naturally foster inter team exchange if not mandatory obligated. Further, it was revealed that dependencies and underlying needs are most likely build upon a common goal or upon the underlying value-chain. Dependencies built in that ways are concluded to enhance macro interaction between teams because responsibility then is shared across the collective. Subsequently, single teams must pursue an overarching goal that is depending on the contribution of other teams or CASs in a self-organised way. In order to do so, exchange with these depending parties is needed and hence naturally happening because of their

underlying dependencies or needs that were consciously created and embedded in the organisational structure.

5.2.2.3 *Role concept, defined interfaces and transparency*

As further condition to enhance macro interaction, 16 interviewees (1F, 1M, 2F, 3F, 3M, 4F, 4M, 5M; 6M, 9M, 10M, 11M, 12M, 13M 14M, 15M) drew on the practice of a so-called role concept that is applicable for any organisational member.

Within distinct role definitions, traditional job descriptions are replaced. Organisational members then assume the roles in correspondence to their skills and preferences. In this way, any activity is distributed in an emergent way. The interviewees described a role concept that is regarded to transparently distribute responsibility and accompanying leadership responsibility. To ensure a profound application of such role concept, it was found that transparency is a pivotal underlying condition to comprehensively apply such role concept. Transparency in the sense of clearly defined interfaces and mutual expectations on the role as well as the equal availability of information for all organisational members are prerequisites for its comprehensive usage (1F, 1M, 2F, 3F, 3M, 4F, 5M, 6M, 9M, 10M, 11M, 14M). Unless such a high level of transparency about information as well as rights and obligations for anyone, a matching role model will most likely not work. Consequently, the application of a role concept was revealed as third condition for macro interaction across the entire organisational collective.

If role interfaces including mutual expectations from others towards one's role and area are not explicitly defined and transparent for anyone, people will make different assumptions that might lead to misunderstandings and contradictory or different results. This is especially true in the absence of a traditional hierarchy that functions as conflict avoidance or breaking element. Moreover, the clear definition of roles and their interfaces is also important to ensure that work is not duplicated, and nothing is left undone (3M, 10M, 11M, 14M). Such role concept application was exemplified in the quote of 1M: *"Communication between the teams is the central adjusting screw and autonomous teams in particular need incredibly clearly defined interfaces with the other autonomous teams such as contracts. This can be in writing, it can be oral, but it has to be very explicit. The interface definition between the*

autonomous teams and radical transparency is absolutely crucial. It must be defined who is exchanging what, the concrete content of the exchange is entirely up to the teams themselves. Unfortunately, one cannot assume that everyone will always stick to it, then there will be conflicts again, which is normal.” (1M).

The application of a role concept was found as determining factor for CAS exchange on macro level and hence functions as an important condition for complexity-centric leadership. However, it was concluded, that the role concept in itself does not ensure that exchange takes place or is even getting enhanced. Information as the essence of exchange needs to be available for any organisational member to effectively distribute responsibility across the organisational collective by means of a role concept. Moreover, a role concept is not a self-explanatory application but requires training to understand its usage, its intended purpose and impact.

Having this in mind, the following section discusses how information is shared most comprehensively to ensure its transparent availability as precondition to apply such a role concept.

5.2.2.4 How is information distributed to ensure transparent availability?

A major part of the interviewees (2F, 3F, 4F, 4M, 6M, 11M 15M) advocated for a push-principle where every employee gets almost any kind of information in a relatively unfiltered way. Therewith, anyone is expected to filter self-organised because selecting relevant information lies in the personal responsibility of each individual. Additionally, and referring to the tension driven principle that was outlined in section 5.2.2.2, it is assumed as obligation of everyone to address if information or answers are missing. 4F reflected on this stance by stating: *“We regard every employee as an adult and an adult can also be expected to show some pro-activity. So, it is the individual's responsibility to ask people in case of questions.” (4F).*

For transparent availability it was argued that a structure should be specified that defines how documentation and information distribution is organised because it must be ensured that everyone knows where and how to find required information (9M, 10M, 11M, 14M). However, 5M, 9M, 12M and 14M admitted that a one fits all approach is not an appropriate

solution to secure that information is transparently available for everyone. It was highlighted that especially for new employees, it is necessary that a person provides an initial high-level perspective because an established employee can also decide better what is essential or just nice to know for a new employee.

As further measurement, the findings showed that any of the explored organisations maintain certain institutionalised formats mostly supported by IT tools. It was revealed that these are in place to transparently operationalise information distribution and in return to formally establish linkages across CAS-teams and to foster macro interaction in a regular way. Moreover, an occasion and time-related usage was highlighted for these formally established exchange formats by most interviewees (1F, 1M, 2M, 3F, 4F, 4M, 6M, 7M, 8M, 10M, 11M, 12M, 14M, 15M). This is indicating that also formal formats are prone to continual adjustment and hence support the structure of the role concept that likewise relies on roles which are changing over time.

In many cases, the institutionalised formats were of a cross-functional nature. This fact triggers the exchange through the organisation to ensure broad understanding. Meetings mostly took place on a bi-weekly basis or less.

Where more frequent exchange is fostered, so called expert formats are being held where exchange takes place in one discipline. Overall, a very broad spectrum of dedicated individual formats was identified usually due to the underlying current purpose that is changing over time. Many organisations also differentiated their formats between professional exchange and personal development. Moreover, it was revealed that all of these formats are voluntary and open to potentially anyone because these companies assume that any individual is able to best decide what is necessary to know to best fulfil the roles. This is in-line with the disclosed push-principle.

It was discovered that mainly IT tools enable the mode of operation and usage of the identified conditions which are embedded in the underlying structure (barrier-free structure, dependencies, and role concept) and therewith make exchange actually happen. For example, the earlier discussed role concept (section 5.2.2.3) is applied by means of tools across all

investigated organisations that apply such a role concept. Not least since the Corona pandemic situation, IT tools are key enabling factors to drive exchange and collaboration. This was confirmed across all the investigated organisations.

"IT systems that can correctly map our business model are essential" (8M).

"For me, the Trello board is the central basis for the success of our organisation because with this software everyone can see the roles of individuals and working groups as well as concrete activities in the network in a simple and very transparent way. So, it is clear for everyone who is working on what" (1F).

"A good method is to aggregate real-time reporting in Google data Studio, where everyone can see what is going on transparently." (14M).

14M shared a real-life best practice: *"We have videos which are available for anyone on the internet, and which show exactly how principles are lived in the organisation in the context of which concrete behaviour in certain situations. In these videos you also get to know the employees of the organisation and their range of activities. At the end of the video, there is a link to the respective slack channel and contact person for questions about the content of the video."* (14M). IT enabled tools were not a key focus of this study. Therefore, this aspect is only briefly acknowledged to highlight their importance referring to the application of a role concept and the distribution of information as its prerequisite.

In summary, institutionalised meeting formats based on IT tools that ensure formal exchange and linkages across CAS-teams were found as central measures for transparent information distribution and as precondition for the successful application of a role concept. Moreover, it was concluded that usually the underlying format or tool and its structure is defined and established in an organisation formally, but the actual supply of information is in the responsibility of the CAS-team. Additionally, the establishment of a twofold approach to ensure available and transparent information distribution is important because written information only is not enough, since written text gets interpreted. Hence, there should be an option for additional personal enquiry. For example, a potential combination could be a central storage with self-organised information procurement in forms of documents, videos

and links and the possibility of face-to-face information exchange. Such twofold approach was exemplified by 14M: *"This has become particularly important in the context of Corona, where people only work remotely. It is even more important to make the structure of the documentation more explicit"*. (14M).

Since such transparent availability of information likewise functions as precondition to share responsibility, the subsequent section outlines on this aspect.

5.2.2.5 *How is responsibility distributed?*

As already stated in section 5.2, it was revealed that leadership activities are executed differently in the explored robust pioneer organisations, namely by means of distributed responsibilities across more organisational members in contrast to a single leader. This was shared among the interviewees 1F, 1M, 2F, 3F, 3M, 4F, 4M, 5M, 6M, 9M, 10M, 11M, 12M, 13M, 14M, 15M. Citing 3F: *"What the boss used to do and used to delegate must now be distributed and divided up in a self-organised manner. It must be learned to take responsibility as a team."* (3F).

In this stance, it was disclosed that the application of the role concept (outlined in section 5.2.2.3) through the entire organisation functions as fundament for sharing responsibility. Since distribution of responsibility implies distribution of leadership responsibility, "distributed responsibility" is regarded as fourth embedded condition and pattern for macro interaction. Subsequently, in the following will be discuss, how the interviewed organisations most effectively distribute responsibility via the application of a role concept:

It was discovered that the distribution of responsibility was operationalised corresponding to the capacities of any member also regarding personal preferences for what to take over. Any member can assume more than one role and members can also (ex)change their roles: *"The role is formally handed over to a colleague"* (13M). Consequently, *"roles and tasks of these roles change continuously."* (11M).

How roles are explicitly and transparently institutionalised and operationalised for certain tasks is exemplified the example of 4F: *"Roles are defined by us with regard to various criteria,*

a role has an overall definition, defined tasks, KPIs, what the role can decide which is defined as mandates.” (4F). This made clear for anyone what rights, obligations and expectations are inherent to any role. Moreover “the roles also function to make transparent who is an expert in which area, so the roles also contain the names. This is likewise listed in our wiki transparently, so everyone knows who an expert in which topic is.” (4F).

The role concept shares responsibility for tasks across more people, usually across a CAS or team and in this way accordingly distributes leadership and decision responsibility for the underlying task. 3F drew on an example for how leadership was simultaneously shared due to the role concept application: *“Every morning, all the tasks to be done are discussed. The difference to the hierarchy is, that it is not assigned centrally by someone. The employees take the tasks, including the associated responsibility. They pull them according to the pull principle.” (3F).*

11M shared how a user manual was created based on distributed responsibility:

“There was one role “create gate book” that was responsible for this manual, the person behind this role invited certain people and then it was jointly defined what is actually in it. Still one person was in charge of the creation of the manual, but the big difference was that this book was not described top-down, but rather that the owner of the role defined how this book was to be created jointly.” (11M).

Even recruiting of new employees can be done on a team level with distributed responsibility, as explained by 15M. *“In that sense, we all have personnel responsibility simply because of our peer recruiting, which is why there are no people who hire people, but the teams who hire people.” (15M).*

Due to the fact that information is likewise shared across the team, such role concept automatically eliminates information superiority. On this aspect, 6M stated that *“this prevents any possibility to exercise a certain feeling of control at all.” (6M).* This was confirmed across the organisations that rely on a role concept application. 9M underpinned the structurally embedded distribution principle while drawing on experiences from traditional hierarchical

organisations. *"In huge corporations organisational structure supports the fact that the individual may receive advantages if he or she does not share something."* (9M).

14M exemplified by means of pairing how information was distributed in their case to ensure transparent availability and how simultaneously the responsibility for this information distribution was effectively shared: *"There are five levels of competency, starting with 1 "I have no idea", 2 "I have read the theory but never applied it in practice", 3 "I have tried the practice but still need help", 4 "I can do it", 5 "I'm an expert and I can mentor other employees". This competency information of all employees is transparently available for everyone. Thus, it is automatically clearly defined who should document information: It is never the expert, otherwise no one else would become an expert, so it is the task of the expert to determine who writes a specific piece of information. The expert in return then validates the written text and whether the knowledge has been understood or not. This makes pairing a very conscious method in the context of cooperation. Thus, mentoring relationships are intentionally created between experts and other skill levels. Thus, knowledge is intentionally shared and created throughout the organisation at all levels. This also ensures that the documentation is always up-to-date, and experts continue to feel called upon to validate that the documents are correct. At the same time and automatically, it becomes a habit for everyone how documentation and knowledge is created and where it can be found."* (14M).

In the case of 12M, new requests in the sense of new tasks were likewise handled in a distributed way. He explained that any member is free to place a new request with a brief context – for example from a customer – into the tool used by the organisation (e.g., teams or trello) and ask for collaboration. Supporting this stance, 1F illustrated the underlying reason for how and why such shared handling of responsibility is working in a complexity-centric organisation. She shared an example of how a new customer's request was handled in a distributed way. *"The request of a company from the DAX index [adjusted to ensure anonymity] to present our network originally came to me, but I don't have the appropriate role. So, I write the task in our trello board. Within the framework of the underlying pull principle, anyone can now pull the task. If nobody had responded to the free request, I would have written to this DAX index company that we have no capacity. This only works because we all trust each other."* (1F). This example evidenced that complexity-centric leadership is a topic among leading organisations. A company from the German DAX index requested to present how

complexity-centric leadership looks like in the organisation of 1F because of their reputation and expertise how information, responsibility, leadership, almost everything is organised successfully in a shared way. Besides, this example showed that the underlying role concept formally operationalised tasks on a peer level that in return indicates that leadership is equally distributed.

Moreover, the quotes in this section of 1F (*"This only works because we all trust each other."*), 3F (*"...it is not assigned centrally by someone, but rather the employees take the tasks, including the associated responsibility..."*) and 14M (*"...automatically, it becomes a habit for everyone how documentation and knowledge is created."*) indicate that distributed responsibility is not only ensured by means of the embeddedness in the structural organisation, but also based on a certain mindset. Since this became likewise explicitly and implicitly evident across the interviewees, the second RQ1 theme was defined for this mindset aspect. This will be discussed in chapter 5.2.4.

During data analysis, more examples were identified of how responsibility for almost any task including leadership was shared successfully. This clearly evidenced that sharing of responsibility based on a role concept is very likely to foster macro interaction. Consequently, it is concluded that distribution of any responsibility across the collective is a pivotal element that is applied in the daily business of robust pioneer companies that operationalise complexity-centric leadership via a role concept that is mandatory for any organisational member.

5.2.3 How free is emergence? The relationship of formal and informal instance in complexity-centric leadership organisations

Based on the principles of complexity theory, the relationship between the formal and the informal instance in organisations was investigated by Schulte et al. (2019), Uhl-Bien and Arena (2018), Grille et al. (2015), Bressers and Edelenbos (2014), Lindberg and Schneider (2013), Uhl-Bien and Marion (2009), Boal and Schultz (2007) and Osborn and Hunt (2007). The literature review showed that there are gaps referring to the detailed initialisation of self-organised CAS emergence, particularly if the initiation of emergence is mainly referred to formal top-down or informal bottom-up forces within such organisations. Schulte et al.

(2019), proposed that emergence occurs locally on micro level, and Uhl-Bien and Marion, (2009) claimed that emergence may be started from any interaction and somewhere in the complex system. Whereas Osborn and Hunt (2007) argued that self-organised emergence is dependent on the needs and the willingness of the individuals in the CAS and hence not entirely free. Additionally, Osborn and Hunt (2007) asserted that in huge organisation free order emergence is unlikely. Given this lack of clarity in current literature, the objective of this study was to address in existing complexity-centric corporations, how CAS emergence is initialised as well as how informal CAS emergence is encouraged inside a formal hierarchical structure.

The answers gathered in the frame of base question ID 3 “Who is triggering the system’s self-organised emergence and where is it initiated?”, captured relevant facets referring to the above listed literature gaps. Accordingly, the results will be presented and discussed in the next five sections. First section 5.2.3.1 will enlarge on informal CAS emergence in a bottom-up or rather top-down way. Afterwards, section 5.2.3.2 will examine the collected insights for informal CAS emergence inside a formal structure. The three sections 5.2.3.3, 5.2.3.4 and 5.2.3.5 will discuss different emergence-limiting aspects.

5.2.3.1 Who is triggering the system’s self-organised emergence and complexity-centric leadership?

The data shows that a formal instance, in a top-down way was the main driver for encouraging the organisational system’s complexity-centric emergence and accordingly complexity-centric leadership. This was found during the interviews with 1M, 2M, 3F, 4M, 6M, 9M,10M,12M,13M,14M,15M. Likewise, the underlying organisations that were discussed in the frame of the interviews with 3M, 5M, 2F, 4F, 7M and 8M were already founded based on a complexity principles structure. As such also here the formal instance respectively the founder was the initiation force. The two following quotes exemplify this: *“The company is shaped by the founding family, who clearly state that we believe that if we give the employees a framework in which they can move freely and autonomously, good cooperation works”*. (2F).

And: *“The transformation towards self-organisation is still the baby of the founders, they still have a lot of weight in the fact that work is really done self-organised.”* (15M).

From 17 of the 19 interviews it was unveiled that the formal instance was triggering the system's self-organised emergence and complexity-centric leadership. And six interviewees of these (2M, 3F, 3M, 6M, 11M and 15M) pointed out that individuals' needs and willingness was additionally required for successful CAS emergence.

The following evidence provides a clear picture of the identified relationship between formal and informal instance indicating that informal emergence is likely to fail without formal backup: In this stance 12M drew on experience gained in their case: *"That's why I think it was very helpful for us and I think a key success factor is that our CEO wanted this transformation himself. And even with this CEO backup, the entire transformation was still a long-lasting challenge and continuous work. After all, we had the support of the hierarchy and therefore the possibility of overcoming certain hurdles more easily and you could always refer to it in the form of that is our vision, that's where we want to go and if there was resistance, you had the formal backup"*.

13M, 12M and 3F even more explicitly presented the formal instance as one and only source to initiate and legitimate informal CAS emergence: *"If it concerns the transformation of an entire organisation then you always have to talk to the owners, the formal management, the C-level or whatever formal instance ... well yes of course it always needs formal backup."* and further adding *"even if scrum or self-organisation is only to be introduced in a sub-area, there must always be some backing in the sense of authorisation from a formal unit to carry it out."* (13M).

"In my opinion, you have to dissolve this business romance with regard to the subject of formal versus informal, because I do believe that hierarchy can only be changed through hierarchy. I am convinced that transformation in the sense of Kotter's change management model requires a formal as-to-say senior management buy-in and this management must go ahead and must also want to do so, otherwise a transformation cannot take place across all levels of the organisation". (12M).

"A transformation of an organisation can never work if the top management level does not want it. There must be a level of suffering, a need or curiosity to want it and they have to say "yes, we want to.... or to try it at least seriously." (3F).

The quote of 3F additionally underpinned Osborn's and Hunt's (2007) claim that needs or willingness of individuals are essential for self-organised emergence. The researcher found further evidence that confirmed their argument:

"Also essential is willingness, e.g., in the sense of making an agreement with people in the organisation of wanting to agree to go this way". (2M).

"The biggest reason why self-organisation failed was the lack of willingness." (11M).

The individual egos of the employees and accompanying security needs were mentioned by 3M, 11M and 15M and therewith supporting individuals' needs and willingness as key drivers for emergence beside formal forces.

6M and 15M concluded on the essential sources of emergence: *"So if it's just the employees, it's not possible. If it's just the management, it's not possible either". (6M).* Moreover, *"the management must fundamentally have the conviction that they really want a transformation and the acceptance among the employees within the organisation must be present" (15M).*

In contrast, only interviewees 1F and 11M could draw upon contrary experiences about successful bottom-up emergence of complexity-centric leadership: *"My experience has shown that coming together in networks by individuals was the building block and the basis for trying out self-organisation on a small scale. Learning in a safe environment is important before making big changes." (1F).*

This perspective was confirmed only by one evidence. 11M reflected on his case: *"On our end, processes emerged naturally. Often, informal practices just felt better to us and then we did it that way".* Simultaneously the interviewee admitted *"with us, self-organisation is already very far-reaching. We have also decided for our organisation what our business model is and therefore what we do and what we don't do. At most organisations it is of course non-negotiable." (11M).*

However, both quotes of 1F and 11M confirm the propositions of Schulte et al. (2019) who claim that emergence occurs locally and from Uhl-Bien and Marion (2009) who assert that emergence may be started from any interaction and somewhere in the complex system. Additionally, the researcher found further evidence from interviewees that drew on experiences related to local initiatives. In principle, all these confirm that emergence occurs locally and may be started from any interaction and somewhere in the complex system. Nevertheless, they all simultaneously conceded that such informal locally initiated emergence is not substantiated. Accordingly, the next two quotes of 13M and 12M proofed the existence of bottom-up emergence, however at the same time they pointed to inhibiting factors that informally and locally initiated emergence is most likely confronted with.

“Sometimes it happens that employees in a team or in a department want to try something out, want to work together differently and they can then establish this in their group. When we talk about forms of organisation and forms of cooperation, people who are involved there, very quickly notice that they come into conflict with other players in an organisation. Because for example if there is a clear message from above that something needs to be prioritised and how the work needs to be done then it is difficult to reconcile it with self-organisation” (13M)

“There were already grassroots movements within the organisation [before the formal top-down transformation] where teams tried to work in a self-organised manner, but this was not a consistent approach due to the isolated solution” (12M)

Given the evidence, it was concluded that transformation towards complexity-centric leadership and the corresponding shift referring to collaboration and mindset is initiated most successfully from the formal instance of an organisation within a top-down approach. Additionally, it was found that local bottom-up emergence is existing, however a sustainable and successful informal local emergence is not likely without formal back up. Finally, the analysis results also indicated that next to formal forces, also needs and the willingness of the single organisational members are potentially required for successful CAS emergence.

5.2.3.2 Informal CAS emergence inside a formal hierarchical structure

Informal locally initiated grassroot movements that were discussed in the section before, need to be distinguished from formally top-down initiated island solution. These latter also

called lighthouse initiatives are usually introduced within huge corporate organisations to “try” complexity-centric leadership in a dedicated CAS frame, usually within one organisational unit. Since medium and huge organisations are in focus of this thesis, the researcher further aims to address the theoretical ambiguities that were revealed in the literature review referring to informal emergence that is initiated inside bigger formal organisations.

In the following it is discussed how informal CAS emergence is formally launched as an island set-up inside a formal hierarchical structure. 7 interviewees (1M, 2M, 1F, 4M, 3F, 11M and 13M) drew on insights from such constellations. The results from these 7 interviews indicate that the interviewed experts regard island constellations as an option to encourage informal emergence inside bigger formal organisations. However, they likewise assume this as unsustainable because the interfaces of an informal CAS are not compatible with the behavioural patterns of the formal hierarchical organisation. The borders of the two organisational structures are most likely to collide as soon as exchange is needed. If both structures are kept in parallel and the hierarchical mother corporation requires the CAS island to fulfil all formal requirements – which is in contrast to complexity theory – CAS emergence and complexity-centric leadership is not possible.

The following quotes provided evidence for this conclusion:

“It doesn't work to introduce self-organisation in a team and the rest is still in hierarchical thinking. The translation from one system to another within a large organisation always causes problems. In my opinion, isolated solutions in a large corporation definitely don't work.” (11M).

3F underpinned 11M's statement and enlarged on his mentioned “problems”: *“It is very difficult when I have interfaces from a self-organised group to a hierarchical neighbouring group. Just the question of who communicates with whom. Who from the self-organised group is authorised to communicate with the group leader and exchange important information? In addition, the teams from the pilot projects are viewed very critically, and other colleagues often become jealous. Another central problem is when the organisation decides to become a circular organisation and this can only be done in one team. Then certain committees are not filled. Likewise, all supporting circles such as HR or IT cannot really be implemented. Of course, they*

find it incredibly difficult to react in different organisational forms and in accordance to the different types of leadership and communication approaches.” (11M).

2M confirmed the listed problems but he likewise advocated for strong leadership as potential solution that may defend and delimit the informally emergent CAS from the bigger formal corporation: *“A strong leader who protects and strengthens the informal against the formal structure is essential in isolated solutions within a large corporation.....a strong leader is essential. The CA system can only function within a formal, traditional organisational structure if there are as few interfaces as possible to the superordinate group to the outside, the only interface should be the strong leader who defends his CAS to the outside world”.* (2M).

Likewise, 1M exemplified practically how formally set-up leadership protected an informal CAS from its external formal organisational environment. *“The project manager has formally obtained this structural protection for his project [= the CAS island] from the formal supporter of the entire project. This allowed the project group to work freely. Externally, the superordinate organisation was satisfied with the formal needs, for example regular reporting slides with target figures were delivered. At the time, this was a strategic decision to protect the self-organised system.”* (1M).

Further, he recapitulated and regretted this approach arguing that the formal instance should not be satisfied just because it is more powerful. *“In a retro perspective, we wouldn't do it that way today because it took formal planning requirements into account. The formal beast continued to be fed. In hindsight that was a mistake. This continued to validate the formal structure and even supported it in its existence.”* (1M).

The drafted picture of the strong leader as protector of the small CAS island from the huge corporation is not a particular case. Most interviewees associated balancing of formal and informal instance as part of the complexity-centric leadership role in this kind of explored organisation. Actual roles of leadership are in focus of RQ3. Thus, such balancing role including disclosed potential factettes as indicated in the last quote of 1M, will be discussed in chapter 5.4.

Only 13M shared a more positive and beneficial perspective on the viability of lighthouse CASs inside a formal bigger organisation while advocating for such island set-ups as reasonable option to introduce or try informal CAS emergence inside a huge corporation: *"In practice, I mostly experience that a new form is established in sub-areas. In large organisations with several 10,000 employees in particular, to say that we are now introducing a new form of collaboration throughout the entire organisation is, in my opinion, not possible or in any case not really sensible, simply because so many different departments have different needs for their cooperation. However, I doubt that there will be a total solution in the end. In large organisations, it usually stays with subdivisions"*. (13M).

All this evidence suggests that practically the parallel co-existence of a formal hierarchical system and an informal CAS system within one organisation is possible by means of clear boundary between both structural worlds. If the fulfilment of the requirements of the hierarchical superordinated structure is obligatory, could not be disclosed among the 19 undertaken interviews. A potential sustainable integration was revealed as unlikely - without formal back-up - because of the sharp contrast among their underlying behavioural patterns of both systems. Finally, it is concluded that in bigger hierarchically structured organisations, free order emergence of an informal CAS is unlikely.

5.2.3.3 Potential limitations of complexity-centric organisations and leadership emergence?

The previous finding that confirmed that self-organised CAS emergence is not entirely free as proposed in the reviewed literature, already directed to the next gap to be addressed within this thesis. Within question ID 4, the researcher asked the interviewees if they see any limitations regarding complexity-centric organisations and leadership emergence. Therewith, it was referred to the arguments of Fu et al. (2018), Marion et al., (2016), Tyssen at al. (2014), Marion and Uhl-Bien (2001) and Kauffman (1993).

Marion et al., (2016), Marion and Uhl-Bien (2001) and Kauffman (1993) who integrate complexity theory into leadership theory assume effective emergence as limited by the number of single CASs respectively the number of conflicting needs inherent in a CAS. They further regard self-organised emergence as most effective close to the edge of chaos. In contrast, Fu et al. (2018) and Tyssen at al. (2014) who both studied different leadership

approaches within complex organisational set-ups, propose to foster stable states of equilibrium by means of providing a structure and targets to reduce uncertainty. However, their studies have modelled complexity instead of investigating existing complex environments.

The findings on this aspect disclosed from existing robust pioneer corporations will be discussed in the next two sections. First, section 5.2.3.4 will enlarge on the CAS size as potential limitation factor. Afterwards section 5.2.3.5 will debate about an adequate balance between equilibrium and chaos.

5.2.3.4 Effective emergence and the size of CAS

The results indicate that successful emergence is related to the size of a CAS and hence the number of conflicting needs inherent to one CAS respectively to the overall number of CASs inside one organisation.

1M, 2F, 3M, 4M, 5M, 6M, 12M and 13M agree on the most appropriate CAS size between 3 and 7 people arguing that starting with 8 and more the effort for communication and coordination becomes exponentially large. Therefore, division into two CAS is needed.

"It has been shown that teams that exceed 8 members automatically divide themselves. Simply due to the fact that the effort involved in communication and coordination is becoming so exponential. Even there you don't need any specifications; you can trust the team to make their own assessment and decision. The team will also determine which team members to split off, because there will be members who also have other interests, alternatively there can also be a subgroup". (3M).

1M related the size of a CAS to its effectiveness, however argued that size and accompanying effectiveness is additionally depending on the underlying scope of the CAS. He further supported division to happen naturally: *"In the classic project team, we have had good experiences with sizes from 4 to 6, a maximum of 7 people. But the maximum size of a team is super difficult to answer because it also depends extremely on the domain. Site construction teams were much larger. With teams that big, we could see sub teams emerging underneath them. In the production area there can be up to 20 people, because there it is relatively clear*

that they must manufacture this product and that often in shifts, but these teams also organised themselves very well within the framework of shifts or work steps, so you could also see it there that smaller teams formed among them again.” (1M).

The quote of 6M summarises the overall agreement of the interviewees about the CAS-team size: *“We believe in the efficiency of teams of 3 to 8 people because they know each other better and are well-established. The team then has a common sense that leads to an efficient way of working.”* Therewith he was indicating a positive relationship between number of people and interests of the individuum’s respectively conflicting needs inside a CAS. As soon as 8 people or more people are contributing to one CAS-team, it is very likely to lead to inefficiency in their self-organised collaboration.

Overall, the investigated literature propositions were supported by evidence from real complexity-centric organisations, confirming that effective emergence to be limited by the number of CAS respectively the number of conflicting needs inherent in a CAS. However, referring to the overall number of CASs inside one organisation, there was no evidence collected that provided a maximal number or limiting number. The case of 12M counted 80 CASs inside the organisation at the time of interview participation and 11M even stated that: *“In my opinion, the limits of self-organisation are not the organisation due to its framework conditions such as the size, age of the employees or any other factors. Even for large companies, I see great benefits when they introduce self-organisation. It just needs the links within the company to each other. Self-organisation must be anchored in the culture and self-organisation must be well thought out”* (11M). This quote again underpinned the researcher’s argument that the identified conditions and patterns within the investigated organisations function as central underlying settings while exploring how complexity-centric leadership evolves in robust pioneer organisations.

5.2.3.5 The edge of chaos - how much chaos is possible how much equilibrium is needed?

Independent of the overall number of single CASs inside an organisation, 2F and 8M directly linked the increase of size of the overall organisation to an increase in complexity and presented this as underlying reason for the need to provide a certain frame. *“From a certain size you need, I used to call it crash barriers, today we use the wording “that a common playing*

field is marked out". I make the relation to the size of the organisation, because the larger the organisation, the personal dialogue with the individual employees can no longer be guaranteed. Therefore, it is no longer possible to linearly trace the effects of certain statements or behaviour elsewhere". (2F).

Therewith she supported the before presented proposal of Fu et al. (2018) and Tyssen at al. (2014) to provide a structure and orientation to reduce complexity induced uncertainty. Since this contrasts with Marion et al., (2016), Marion and Uhl-Bien (2001) and Kauffman (1993) the following will enlarge on these contrary arguments.

Marion et al., (2016), Marion and Uhl-Bien (2001) and Kauffman (1993) assert that self-organised emergence is most effective close to the edge of chaos. As defined in the literature section, the edge of chaos is right before actual chaos. This implies that a complex system is likely more efficient if there is any kind of structure than with a fix structure or without structure at all. However, there is no overall definition about where exactly chaos begins (Marion et al., 2016) respectively how much equilibrium in terms of structure and orientation is necessary (Tyssen at al., 2014). Therefore, it was a further aim of this research to explore how the optimal common playing field is marked out in real robust pioneer organisations.

Overall, the interviewees confirmed the literature proposition that chaos is not an option. The essence is reflected in the following two quotes of 11M and 5M:

"There is always a misunderstanding that self-organisation is chaos in which everyone does what they want. Self-organisation is also based on concrete rules and processes (11M).

And: "Absolute freedom is absolutely dangerous. Because if there is no reference point at all and there are no boundaries at all then I don't feel safe because I have no orientation at all. (5M).

The need to provide any kind of orientation especially for new and young employees, joining this type of organisation was revealed as top reason for the necessity of some structural defaults: *"When young people come into the company for the very first time, they simply need guidance. Maybe you can't really appreciate freedom and the level of autonomy if you haven't worked in traditional hierarchical organisations.....that's why we need exactly this marked*

playing field so that someone with a different level of experience or with no knowledge of our organisation's rules of the game, can first find, then read and understand, and in the end can also successfully join the common play". (2F).

In contrast, a very broad spectrum was provided for such defaults that are existing in real robust pioneer organisations. As common denominator, 12 interviewees (2F, 2M, 3F, 4M, 5M, 6M, 7M, 8M, 9M, 11M, 12M, 14M) stated to rely on a kind of framework, but their actual definitions were varying from quite precise "*specific rules and processes*" (11M) up to quite vague "*an overall picture*" (4M) or "*a reference point*" (5M). Therewith, the results did not provide an indication for how rigid and strict or loosely the optimal common playing field is marked out across these organisations.

When further analysing how these measurements were operationalised in practice, 1M, 2F, 2M, 5M and 6M highlighted the importance to form this frame according to the skills of each team(member) and in a common way.

"Basically, we want to place the responsibility for the thing in the hands of employees and jointly stake out a playing field in which self-organisation is possible". (2F).

"In conversations with our organisation members, I noticed that many want a point somewhere back there, a meaning, where we are all going. And we are still trying to find out in detail how we design it. We have the concept of opportunities space. This is a space of possibilities, so to speak, in which there is a very high degree of freedom but also a few fixed points. In relation to these fixed points, you can do anything with them, there is nothing predetermined about how these fixed points are reached, but you have an orientation as to where you want to go in the end." (6M).

12M described the operationalisation of such common frame via the applied role concept that already formally defines activities, rights, obligations, and mutual expectations for any role and accordingly any organisational member.

As highlighted in the last quote of 6M, the need to provide a certain destination flag, like a point that all want to achieve was likewise emphasised by all interviewees including the

challenge related to successfully establish such common understanding and the alignment on this high-level perspective. This was likewise summarised in the following insight: *"It is important to have a common picture regarding the collaboration in the organisation. To be able to live the autonomy in the individual teams, I think it is important to shape the direction together."* (2F).

And 3M pointed to the heard of the problem indicating that an alignment on a common purpose is needed as base for such playing field: *"The challenge with self-organisation when there are hundreds of individual self-organised systems is that these individual systems are aligned with the overall vision."* (3M).

To ensure such common understanding and alignment across the entire organisation, two contrary approaches were revealed within the collected data: On the one side, 2F, 2M, 4M, 5M, 6M, 7M, 8M,9M underpinned the stance of Fu et al. (2018) and Tyssen at al. (2014) who proposed to foster stable states of equilibrium by means of providing structure, orientation and targets to reduce the complexity induced uncertainty. 5M gave an example for this stance: *"Experience has shown that it is difficult for everyone to continuously change the level of abstraction. [...] So, it makes more sense to us to have a defined contact person, namely the accountability partner who is continuously on a higher level of abstraction and has a larger scope in view. The accountability partner helps the team to achieve the goal. The one who is accountable also has the task of interpreting the goals because it may be difficult for a team to keep an eye on the larger context and to interpret whether the goal achievement is realistic and also to assess how serious the impact is if the goal is not achieved. And this accountable is not part of the team but at a higher level of abstraction. I would like to emphasise that this is no level of hierarchy because there is no inherent authority"*. (5M).

From this perspective it was argued that by means of a certain organisational set-up - neither based on a holistic structure as outlined before in section 5.2.2.1 - it cannot be ensured that every organisational member is aware about its own contribution in the overall organisation, hence 4M stated: *"Each team can only determine for itself in its horizon what is missing, thus balancing of the individual units should be carried out by a higher-level, a central unit that*

understands how everything is connected in a circular manner and that determines where the bottle necks are, comparable to the human brain." Further he enlarged on the benefits: *"Through this central control team, these bottlenecks could be balanced, and all teams subsequently had better work environments."* (4M).

M7 confirmed such higher-level approach because it better allows to provide a central perspective on overall dynamic linkages in an organisation. He likewise emphasised that such higher-level instance must not instruct organisational members but rather support them to work autonomously: *"I just want to give a rough framework so that a team has an orientation where to work. The concrete content, however, should be based on the ideas of individual employees or in a team. This is exactly what I meant by formal employee empowerment. The formal higher-level of abstraction is introduced so that employees can work together informally and with more autonomy to achieve the overarching vision"*. (7M). Supporting this common and non-directive approach for definition and alignment on a joint frame for collaboration 5M dimensioned the adequate size: *"This frame of this playing field of freedom should be made as large as possible."* (5M).

Considering the presented evidence, one stream of investigated organisations (8 interview cases) assumed the need for a perspective on a higher level in order to successfully provide formal orientation from a superordinated instance with a broader view. The concrete demarcation of the common frame should be defined jointly, however with the superordinated instance as central driver. This in return is likely to contribute to enhanced autonomy for any team and its members when working together inside such widely set playing field.

On the contrary, the remaining 11 organisations did not see any need for an incorporation of an additional structural layer – even though without power to exercise authority – because of the following reasons: 1M ascribed the potential risk to negatively impact natural emergence of a CAS due to any formal and not really required influence from its external environment: *"I consider the introduction of a formal rule from the outside, or at a management level, to be dangerous, since this again represents a formal requirement and an intervention in the informal, self-organised system. Evolution is therefore no longer unrestrictedly possible"*. (1M).

And 11M and 4F likewise confirmed that common underlying working and collaboration principles are likely to fully substitute the need for a superordinated instance: *"We are united by this common idea of working together based on common principles. So, the value-driven connection is the basic element of our common understanding in our organisation. The underlying principle of navigation by intention functions as a very clear working principle with us: if something doesn't fit, if something is unclear, we must talk and change something."* (11M).

"Rather, the values represent the basis of our cooperation. We have really all thought about these values and principles for leadership and employee cooperation together as employees in order to have a purpose that we have defined for ourselves based on our needs. So, in many rounds and discussions, 3 behaviours emerged under each value so that the individual employee can work as output-oriented and autonomously as possible". (4F).

Similarly, in the case of 3M, the overarching purpose of the organisation functioned as a central benchmark and optimal frame for collaboration *"In order to achieve a state in which everyone makes their own contribution, all it takes is a common understanding of the overarching vision. Especially when the teams are all on one level and therefore all work independently and in parallel, it is important that the purpose of the organisation is carried through all CA systems and subsystems and that these individual systems are aligned with the overarching vision. If the alignment about the common vision is ensured, then not much more coordination is actually necessary".* (3M).

M14 even emphasised the advantage for maintaining only one structural level in the organisation because of collaboration dynamics that anyone unites as part of the organisational collective: *"In teams that really work together in a self-organised manner on one level, everyone knows the other's salary. Everyone knows each other's personal goals, strengths, and weaknesses. So, the dynamics of communication and autonomy found in this context are never found in a traditional management approach."* (14M).

Among the interviewees that advocate for one structural level only, providing a common understanding for organisational activities and the overarching purpose of an organisation

across the entire workforce was found as central pillar in any organisation's structural framework. Since this was regarded as part of the complexity-centric leadership role among the explored organisations, this aspect will be discussed in chapter 5.4 on actual leadership roles.

This section's objective was to explore how the optimal frame for cooperation is marked out and limited in such robust pioneer organisations that exist. The revealed evidence suggests that a one fits all approach is not an option here. Considering the analysed data, it was concluded on the lowest common denominator in this aspect which is stated in the quote of 5M: *"This playing field of freedom should be made as large as possible"*. However, these distinct possibilities that mark the frame are determined in any organisation individually.

Consequently, an organisation which has limited confidence and trust in its members, hence allows them less and will consequently more actively construe its structure. Accordingly, more stable states of equilibrium prevail emergence but likewise provide orientation and therewith supporting the stance of Fu et al. (2018) and Tyssen et al. (2014). However, if an organisation trusts its members and has confidence that they can collaborate for the organisation with good intent based on a common purpose, structural elements such as superordinated levels are likely to be omitted. This conclusion is further evidenced by 4F and 15M, which are both cases that do not require a higher-level instance to provide orientation: *"With us working together is based on having the assumption that the other person has good intentions."* (4F).

"Why should an employee get up in the morning and want something bad for the organisation? In the organisation we believe in the good in people and trust. We all have in common that we are pursuing the same goal, namely, to advance the product and the organisation as a whole and to live together as reasonably as possible. And as I said, very few people get up in the morning and want to see the world burn, and luckily - for reasons - none of our employees want that. That's working". (15M).

Subsequently an organisation with this approach will intentionally move nearer to the edge of chaos because of the omission of traditional formal structural elements. This indicates that there is general confidence that the informal emergent CAS will fill needed structural

elements. Therewith, Marion et al.'s, (2016), Marion's and Uhl-Bien's (2001) and Kauffman's (1993) claim is confirmed that self-organised emergence is most effective close to the edge of chaos.

Considering the disclosed two different approaches for marking the common organisational playing field which is intended to provide orientation, the findings indicate that the actual question for any organisation in this aspect is the extent to which it allows informal emergence and thus trusts its employees to draw self-organised conclusions (on CAS level) based on transparently available information (as outlined before in chapter 5.2.2.4.). This conclusion will be further underpinned within the following chapters of this analysis, that will outline on the underlying mindset and maturity of an organisation and its members.

5.2.4 Mindset towards leadership and patterns for collaboration

It was disclosed that the degree of trust within an organisation, respectively to what extent an organisation dares its employees to make self-organised conclusions, is mainly relying on a certain mindset. Such dedicated mindset was found in any of the 19 explored organisations. The researcher revealed descriptions and references to such mindset among the answers collected in the frame of base questions 1, 2, 3 and 4 – although it was not touched upon this topic actively. Therefore, "mindset towards leadership and patterns for collaboration" was defined as second central theme related to RQ1, as displayed in Figure 16

The fact that this aspect was mentioned in relation to structurally embedded conditions and patterns suggests a strong linkage of structural elements and underlying mindset as well as their interrelation among each other. Former and current literature raised organisational identity corresponding to the identified mindset aspect in this study (Devereux et al., 2020; Boal and Schultz, 2007; Schneider and Sommers, 2006). They noted the importance of organisational identity and claimed that it is part of the leadership role to create such dedicated identity. Actual leadership roles that might emerge out of the identified conditions and patterns within RQ1 will be addressed in the section on leadership roles (chapter 5.4) akin to RQ3.

According to Boal and Schultz (2007) and Schneider and Sommers (2006) organisational identity is made up of joint organisational values and shared beliefs including the organisation's purpose (Devereux et al., 2020). Devereux et al. (2020) acknowledged the multifaceted nature of corporate identity due to its presence in any organisation and the challenge to adequately conceptualise this aspect. The collected interview data underpinned the importance of an organisational identity to which is referred as mindset in this thesis because the researcher wanted to rely on the wording used in her collected interview data. It was confirmed that mindset is consisting of joint organisational values, purpose and shared beliefs, as shown in the reviewed literature. However, these aspects were not revealed as core aspects for building a certain mindset within the data analysed from existing robust pioneer corporations. Mindset in this study was rather depicted as any single member's own personal development which is made up of the individual's maturity. Furthermore, a dynamic dependency between transparency, trust and control measurements was unveiled during the data analysis. Altogether, these aspects are likely to contribute to a shared mindset among the organisational collective. Thus, the following sections will present the identified facets of such mindset including its reciprocal linkage to structurally embedded conditions and patterns that were disclosed in this research.

5.2.4.1 Maturity – the ability for self-reflection and how freedom is perceived

The aspect of any member's personal development was emphasised across most cases (1F, 1M, 2F, 3F, 3M, 4F, 5M, 6M, 10M, 11M, 12M, 13M, 14M, 15M), while labelled by the interviewees as "maturity of the organisation and its members". Therefore, the researcher defined this aspect as a subtheme as shown in Figure 16.

Maturity in the sense of personal development was perceived as made up of two central organisational members' capabilities: The ability for dealing with result openness autonomously and the ability for self-reflection. Moreover, the researcher found that these both capabilities are consciously and proactively developed within the organisations of the 14 interviewees that explicitly drew on maturity. What is meant with these two maturity capabilities in detail and how they are likely to be developed within the explored organisations will be outlined and discussed in the following:

3F provided her own's detailed explanation and definition of maturity in relation to complexity. Therewith she summarised a broad spectrum of aspects that were also presented by other interviews and that together compose how freedom is perceived and accordingly how organisational members are dealing with result openness:

"For me, the topic of maturity includes the ability to communicate, conflict-solving ability, feedback, decision-making culture, the way of thinking, so if people are more stuck in thinking linearly causally or if it is possible for them to grasp complexity. How do people deal with paradoxes and contradictions? For me this contributes to maturity. And much further before that the degree of maturity also includes people's understanding that there are different constructions of reality. For example, someone in sales has a completely different reality than someone who works in controlling. Maturity is so to recognise that what I have perceived here is not THE reality and everything else is wrong. The more people develop this understanding and then internalise the thought construct of the different realities, the more mature these people become in their personal development". (3F).

While supporting 3F's definition, 1F, 5M, 6M and 11M additionally related maturity in the practical organisational context to freedom and autonomy. On this aspect 6M argued that general openness to results is required and the corresponding ability to collaborate within an environment of vague or almost no guidelines because of being able to guide yourself. Without this ability it is very unlikely to feel conformable within a complexity-centric leadership organisation. *"Dealing with free space is of course the casus knaxus, [German saying for "the essence or key"] perhaps this is also changing fundamentally in society at the moment so that there are more people who can deal with open-mindedness, because in the end it means: The lack of framework conditions requires the ability to be able to set them by yourself. If someone doesn't have the ability, then this person will find it extremely difficult or will continuously look for some orientation. Frustration follows if no external guidance is offered." (6M).*

On this aspect, 1F explained that as soon as higher levels of autonomy are allowed, a vacuum is created that is likely to contribute to uncertainty and hence frustration of the individual. This is especially the case if employees were used to and required to request approval for even smallest tasks. To mitigate such induced frustration, she proposed to clearly define and

train the application of rights and obligations expected within new collaboration set-ups. She drew on experiences from different working environments where a higher level of autonomy was successfully introduced and operationalised while applying an underlying role concept (as explained in section 5.2.2.3). *"But this situation [frustration] only arises where it is not clearly defined what falls within the range of "I am allowed to do it". It always encourages me to see when people say "wow, I can finally do it". And that not only applies to areas of knowledge work, but I recently experienced it in the self-organisation of a logistics centre. Those in the system that route packages from A to B were suddenly allowed to decide for themselves how they would improve the process and what they need to make them happier. Just the involvement of the employees released so much energy in everyone".* (1F).

1M clearly confirmed this aspect: *"In my opinion, encouraging the team to trust themselves and to have confidence in the team is the main element to enhance their ability to deal with autonomy."* (1M).

Relying on 1M's argument, 12M highlighted that such confidence to collaborate more autonomously was successfully built particularly due to their joint orchestration and alignment on their future structural set-up: *"With us we designed the framework, the formal structure in combination with a target vision of how we would like to work in this framework in the future. We left a lot of freedom in the concrete implementation. We didn't say that from July 1st you have to work in one way or another, but how you fill this target vision and framework with activities for you in the team is entirely up to you. I see that as an indirect success factor and a lever."* (12M).

Next to the presented ability to cope with freedom autonomously, self-reflection was found as the second central ability contributing to maturity of the organisation and its members across the analysed data.

3F and 14M argued that every person has multiple identities. Within the employee role for example, anyone behaves differently than in her or his role as mother or father at home. All different roles are interwoven in one person. It is the ability of every human being to adapt to different behaviours that are expected in a certain context. It is also the ability to separate these contexts and to keep them in mind to individually prioritise which behaviours are

important in the individual roles. Additionally, modern leadership is concerned with understanding how individuals react to a certain behaviour of oneself. What complexity-centric leadership needs to recognise and to learn today is self-awareness about which things trigger which feelings. In this sense, 3F stated: *"It's always funny in seminars to hear the question "what do I have to do to make the employee change?". The answer is very clear: nobody can change an employee. You can only change yourself. The question is how you can change your own behaviour so that someone else reacts."* (3F).

While agreeing on 3F's and 14M's stance 1F, pointed out that such self-awareness including one own's ability to switch between behavioural patterns is not a natural gift but must be trained to gain awareness about own behavioural patterns: *"Of course, this is also a challenge for everyone, because often one does not understand and does not know the underlying needs. If I don't understand what I need myself, it is often not possible to understand certain actions or reactions."* (1F).

Drawing on the practical application of the role concept (as outlined in section 5.2.2.3), 13M exemplified maturity in the context of self-reflection to be able to consciously dissociate from your own personal perspective and to switch into a professional outside perspective: *"In my opinion, a sign of maturity is, despite the fact that you may not like someone, being able to assess whether the role is being fulfilled by this person in a goal-oriented and efficient manner and also being able to give objective feedback."* (13M).

Combining both abilities of maturity, so to say autonomously handling freedom while self-reflecting own behaviours, all interviewees pointed out as matter of course, that any organisational member needs to respect the limits of the common playing field and unexceptionally pay attention to the few formal processes. Otherwise *"...there will be friction"*. (11M) and *"... the system would become dysfunctional "*. (15M).

15M provided an example how dysfunctionality in their CAS is prevented but instead maintained including its dedicated mindset. Accordingly, any organisational member – without exception – adheres to rules in the sense of a certain mindset. He explained how conflicts are addressed autonomously in their organisation, contrarily to the classic

hierarchical thought pattern. Normally, in the case of an apparently insoluble issue between two parties, the manager at the next higher level is called upon to make the decision. However, in the case of 15M, there is no higher level and such issue is approached by consequently sticking to their mindset induced behavioural and thought patterns: *"Even in conflict situations where you think the management should really say something and even if you have a good relationship with the management and then go to them and say: "hey, I can't get any further, or I can't get along with the employee, could you talk to him?" Then we get a message back – and I've experienced it myself – "no, I won't do that because if I interfere now then the whole system and our mindset will not be able to continue to function like this". Through interference and even just the smallest thing, the system would become dysfunctional, because then it is always said that we cannot work autonomously at all, because employee A has a great connection to the management and if he doesn't like it, then he goes to them, next time he should just take care of everything himself. Very quickly the system and the thought patterns are disturbed. Just like being a little bit pregnant doesn't work."* (15M).

This quote highlighted the fragility of a CAS and the importance that any organisational member understands the underlying mindset including its derived behavioural patterns and in consequence is mature enough to proactively respect them both.

Consequently, as soon as traditional structures and thought patterns are reduced or eliminated, internal structures in the sense of maturity of the organisation and its members must be strengthened equally to replace the sudden vacancy. To empower any single member's ability for self-reflection and that they can handle granted freedom autonomously as well as the general openness to results, dedicated methods that train these capabilities are needed. Additionally, having confidence in the team is most likely enhancing their self-confidence and in return their ability to deal with autonomy. Both can be fostered within a joint orchestration and alignment on a future structural set-up including certain (training) methods for collaboration. This relates to actual activities that are inherent in certain roles of complexity-centric leadership that will be outlined in the chapter 5.4 of RQ3.

Beside maturity, the level of transparency was revealed as the second pillar contributing to a certain mindset across the explored organisations. Thus, the following section enlarges on transparency and its relation to maturity for building a mindset towards leadership.

5.2.4.2 *Level of transparency depending on the organisation's maturity*

All 19 interviewees drew on a high level of transparency in the sense of disclosure of information as contributing to the discussed mindset. However, there was considerable divergence about equal or differentiated disclosure of all or only most important information. Moreover, this section will address the reciprocal relation between transparency and maturity because this was highlighted by 14 interviewees.

It was found that an adequate level of maturity of an organisation and its members is required as precondition when increasing the level of transparency since maturity impacts the ability to deal with the disclosure of information that is traditionally not shared. Therefore, "high level of transparency and maturity" was defined as further subtheme of the revealed mindset towards leadership and patterns for collaboration as shown in Figure 16.

One central debate on the level of transparency in relation to maturity was found. The major part namely 11 interviewees (1F, 1M, 3F, 3M, 4F, 7M, 8M, 11M, 13M, 14M, 15M) assumed sharing of 100% of all information that is possible to be shared when respecting law, compliance and other mandatory non-disclosure regulations as a maxim. Arguing that *„organisations that keep information confidential without being required by law or otherwise do not, in my opinion, trust their employees to handle it“*. (3F).

In contrast, the deliberation of the remaining eight interviewees (2F, 2M, 4M, 5M, 6M, 9M, 10M, 12M) was *"whether 100% transparency is really desirable in all areas"*. (2F) Since it was assumed that not anyone in the organisation is mature enough to deal with amounts of information autonomously but instead may become stressed. This was clearly pointed out by 5M. *"For us the consideration is whether all members of the organisation can really handle the transparent information. Perhaps transparency creates more uncertainty than clarity for some. So implicitly we do not trust all organisation members to be able to deal with transparent information."* (5M).

It needs to be noted that the interviewees were not explicitly asked what kind of information they refer to when talking about transparency in the sense of disclosure of information. The results show that transparency was associated by the 19 interviewees to basically three groups: financial figures, salaries as well as direct communication.

Accordingly, the following section will discuss this unveiled dependency between maturity and transparency as well as what was identified as reasonable level of transparency among the three areas of financial figures, salaries and direct communication.

Based on his experiences as shared owner of the organisation, 6M explained why they do consciously not share all information among the organisational collective. He raised the aspect that it needs to be respected that not any employee is eager and comfortable when becoming faced with any information about the organisation, especially if this is not necessary to be known as part of her or his actual role in the organisation. *"Clearly it is scary for some people to know what the existential state of the organisation is. I've noticed that in many conversations, they say "it's great that you have such a high level of transparency, but sometimes I would feel better if I just don't know everything exactly". It is not without reason that employees have chosen to be employed by an employer who bears the risk rather than being self-employed or freelancers. I think that's a valid point. To think about whether transparency for everything really makes sense because not everyone can really deal with it, not even professionally but emotionally."* (6M).

In contrast, but also from the perspective as founder of the organisation, 8M regarded it as essential to share especially financial information across the organisational collective to achieve alignment: *"Financing rounds, company valuations, signed contracts, basically how our organisation is doing financially, I share 100% with the employees. That's very important to me, because that's how I ally with employees."* (8M).

And 15M confirmed the 100% transparency approach for figures from the perspective of an organisational member because collective availability of any corporate information eases collaboration. *"Of course, we also have an analytics team that deals with all company figures. You can easily go to the analytics team and ask all the number of questions you need to make a decision. These company figures are published internally by us every month."* (15M).

In the case of 4F, financials including figure based corporate objectives of the organisation are transparent available for anyone. *"We have absolute transparency about the KPIs and OKRs [=goals] of our organisation. In a file that is accessible to everyone, both KPIs and OKRs are available daily".* (4F).

Independent from the disclosure of financial figures, 1M advocated for the availability of all information for all organisational members as crucial to adequately facilitate efficient collaboration. Unless equal availability of information, for at least all members of a CAS who work on a common goal, a CAS will not be able to collaborate autonomously. 10M recommended a more moderate approach for the disclosure of information arguing that: *"Teams need as much information at their operational level as is necessary".* (10M).

The disclosure of salaries was flagged as second essential aspect which was approached differently from the two groups of interviewees. Likewise, on this aspect it is argued that the organisational collective might not be able to professionally deal with salary information. *"All salaries could theoretically be disclosed, but I also believe that the prerequisite for transparency in salaries is that the organisation has a certain degree of maturity which is not or not yet the case with us"* (2F).

Contrarily, it is advocated for 100 % transparency of salaries within a complexity-centric leadership organisation because any organisation related truth should be transparent available, otherwise suspicion is inevitable. *"What the organisation knows should be known by everyone in the organisation. Salaries must therefore also be transparent it makes an incredible difference when everyone in the organisation knows what the others are taking home at the end of the month. When salary is a secret, mistrust is set".* (13M).

In this sense, 3F proposed to implement methods that facilitate the disclosure of salaries. However, she maintained that necessary preconditions such as a certain level of maturity needs to be adequately established by means of dedicated training before the disclosure. *"If we already know certain decision-making modes within the framework of self-organisation, then we can also distribute the money that is available to us as in an organisation to pay ourselves in a self-determined manner. There are also organisations that do this, which is of course a very big challenge, and it cannot succeed right from the start because it requires a*

certain degree of maturity in terms of communication and decision-making techniques." (3F).

11M stated that this was done in their organisation due to their high level of maturity in the entire organisational collective and based on training *"We also define salary decisions together. There is also complete transparency in this area "*. (11M).

Differently, 2F and 12M mentioned as prerequisite for transparency of salaries that there is an underlying formular logic that is understandable for everyone. Transparent communication respectively feedback was revealed as third area to be approached with different levels of transparency among the interviewees. On this aspect, 2F assumed the disclosure of direct and unfiltered feedback for especially new employees as risk while arguing that nondisclosure has a certain protective function in this area. Although, giving direct feedback would only reflect reality unfiltered, she explained it would have to be assumed that this person is mature enough to be able to deal with such potentially serious negative feedback. It would further require the person to be as confident in giving and receiving feedback as any other employee who may have been working in the organisation for several years. Hence, the intention is to protect the new employee regarding her or his two disadvantages, - being new and alone against the feedback provider who is used to the process. *"Of course, you can also describe it as not trusting the employee to be able to deal with the unfiltered feedback."* (2F) and further she reflected *„In my opinion, our organisation is simply not ready for such a level of transparency from maturity point of view. Because that assumes that all participants in this round are insanely reflected."* (2F).

15M mentioned the level of transparency in feedback for new employees and likewise confirmed this transparency – maturity relationship. However, from the opposite perspective because they regard any hired employee is basically mature enough to handle truth which is the subject to be tested during the trial period. In contrast to 2F's protection approach, in the case of 15M this high level of transparency is shared with new employees equally to all other employees from day one, because after 6 months of probation, it needs to be decided if collaboration is comfortable and hence continued. If the employee's strengths and weaknesses are never openly discussed beforehand, they cannot improve either. The intention is that employees should grow on feedback and learn to work with it. *"If a feedback provider sees a problem and thinks that the feedback recipient can improve on it, then that's*

the way it is and as a consequence it's only right to tell the person it transparently and openly. That is simply the truth. Radical transparency right from the start, is intended to give all employees the opportunity to deal with it during the probationary period and to determine yes this is something for me or no I cannot deal with it. (15M).

4F presented a synthesis of 2F and 15M. She supported the direct feedback approach even for new employees as shared by 15M, however to mitigate the disadvantage of new employees when exposed to direct feedback for the first time on that was reflected by 2F, they defined dedicated and mandatory trainings for newbies that are foreseen to empower them with adequate communication skills: *"We have a productive conversations workshop, which is mandatory for every new employee and focuses on how to engage in critical discussions and conversations and how to express critical feedback. We lay the foundation in theory, in practice you sometimes just have to jump into the deep end, at the latest when you have received open feedback yourself, what each employee gets for the first time after three months. Some of this is very critical feedback, but at the latest then you realise that it is simply normal for us to communicate so openly and directly with one another without insulting or attacking anyone personally."* (4F).

Likewise, 2M advocated for dedicated training to encourage organisational members to dare something and therewith enhance personal maturity as well as capabilities to handle high levels of transparency. *"Many employees cannot be trusted because they were never taught. Most fall from the clouds when she or he is suddenly believed to be capable of something"*. (2M).

7M and 14M explained that in their cases equal transparency of information was fostered to facilitate that any member has access to the relevant information that he or she may concern. While relying on this approach they do not see any risk that the organisational collective might not be able to handle this transparent disclosure. *"As a company owner, I look at the same information as any employee, but everyone has a different perspective due to different expertise and different goals. For example, I see it on a higher level because a lot more information affects me. I would like to emphasise that I do not have more information because I*

am more important or because I have more control, but simply because I am involved in several areas and issues as part of my different roles.” (7M).

However, 14M additionally emphasised that such a transparent system cannot simply be implemented in every organisation but must be facilitated in the organisational structure and built in the organisational member’s mindset equally. *“It must be established in the organisation that employees can deal with such a high level of transparency. People have to learn to deal with reality unless high transparency tools will not work.” (14M).* Therewith, he underpinned the importance of dedicated training activities that equip the organisational collective with required abilities. Such proactive advancement via dedicated measurements and trainings was revealed already for the case of fostering the member’s maturity in section 5.2.4.1.

The evidence confirmed a positive relationship between the level of maturity and the increase of transparency. One hundred percent transparency was identified as desirable across the explored robust pioneer organisations. However, sophisticatedly dealing with (sudden) disclosure of information requires a certain level of maturity among all organisational members that must be built by means of dedicated training activities. Consequently, it is concluded that without maturity adequately established and a logic that is understandable for everyone, an organisation should not embark on transparency initiatives such as disclosure of corporate figures, salaries, or direct personal feedback. If no structures are established that give the employees orientation, such disclosure might lead to uncertainty.

5.2.4.3 Trust based on transparent exchange and their relation to the need for control measurements

Fifty-four proofs across 18 interviews were identified that shared a positive relationship between the level of transparency and trust as well as a negative relationship between trust and the usage of traditional control measurements based on figures. From these 18 interviewees, seven (1F, 3M, 4F, 6M, 11M, 13M, 15M) even provided evidence where traditional control measurements were removed without any direct replacement or were never deployed from the beginning. It needs to be noted, that it was not explicitly asked about this linkage. Interviewees related to this aspect in the frame of all base questions akin to RQ1 (IDs 1, 2, 3 and 4) that focus on the examination of conditions and patterns for

complexity-centric leadership. Therefore, this twofold relationship was identified as a pivotal pattern in this type of organisations and hence “transparency- trust-control relationship” was defined as third and last subtheme contributing to the mindset towards leadership and patterns for collaboration as shown in Figure 16.

How an increase of transparency was found to facilitate the building of trust and what was unveiled as consequence about the need for control measurements will be discussed in the following section.

13M referred to this revealed relationship quite frankly. *“It is one of the basic wisdoms that transparency is the first requirement for trust and trust is what we need to achieve in organisations in order to work better together”*. (13M).

4M directly pointed to the identified twofold linkage asserting that transparency creates trust and trust may substitute classic control activities: *“Basically, you first have to gain trust by creating transparency and talking openly about problems. If what is going well and what is going badly is communicated proactively and transparently, no further control measures are required”*. (4M).

2M presented the disclosed dynamic even more bold by doubting the fundamental effectiveness of traditional number-based control mechanisms: *“Control by figures is an illusion. Open communication is a better form of control and builds trust along the way. Only a lot of people don't understand.”* (2M).

1M confirmed 2M's statement and explained as underlying reason that classic control measurements are usually converted into individual goals. Since people then pursue their own goals instead of a common organisational objective, the actual purpose of the original control is no longer given. Thus, what is intended with control in an organisation - to successfully go towards a common aim - then is counterproductive. *“Therefore, control measures as we know it from the classic traditional hierarchical world, at most create an illusion.”* (1M).

Furthermore, 1M concluded that controlling by means of the traditionally known figure-based approach is a waste of time in an organisation. He recommended to focus to pursue entrepreneurial success and to derive customised organisational facets and accompanying activities. He emphasised that such introduction needs to happen in a common process of the organisational collective to ensure that the deviation is transparent and comprehensible for any member. A derived overarching joint objective then substitutes any other KPI. *“On the subject of monitoring based on indicators, we have therefore now decided that classic monitoring does not work. Because, in the end the overriding control is always entrepreneurial success. Depending on the context in which you move, you end up with different elements that make up entrepreneurial success. In our case this is the product price. As a team, we decided together that the product price had to be met. If the product price is higher than that of the competitor, we cannot sell anything, that is quite clear and therefore no further KPIs are required. In the best case, these variables should be worked out together with the team so that everyone can understand why these success factor components and no other aspects significantly influence the entrepreneurial success in the individual case.”* (1M).

Several evidence was identified that showed how traditional controlling elements were disabled from scratch and replaced via transparent measurements. The following both quotes are good examples for the substituting relationship of control by transparency and trust. *“We all have the same information base. Hence, we do not have any information sovereignty and therefore there is no possibility of being able to exercise a certain feeling of control at all”.* (6M).

2F drew on best practice experiences in her case. Solely the fact that current and planned activities of all teams were transparently shared and continually updated organisation wide created trust. Since anyone could review any progress no further controlling measurements were needed. Likewise, she critically reflected *“maybe the transparent tracking of progress is already a kind of control”.* (2F). Her statement as a convinced advocate against classical control measures indicates how deeply traditional thought patterns about superordinated control measurement are embedded in our way of thinking.

Further evidence was identified that explained in more depth how transparency and accordingly trust building measurements were embedded in the organisational structure.

Therewith traditional control functions were just made redundant. 3M drew on experience from his development team: *"It is important to anchor methods that create trust in a system. because trust is the absolute basis of all cooperation. So, control mechanisms can be replaced by trust mechanisms. In the sprint procedure every 6 weeks there is a reflection at eye level between the people who are involved and really work on this project. Exchanging ideas leads to mutual trust development. This means that in the event of a user story not being implemented as planned, not the culprit is sought, but a solution-oriented way is sought together on how to deal with it now."* (3M). His practical example evidenced actual self-organised collaboration without hierarchical controlling elements but based on transparent exchange and trust. It indicates that anyone in their team is relying on a shared mindset that is understood by anyone. Furthermore, any team member is highly mature and skilled within communication, feedback and decision taking methods because without superior instance, team performance is reflected, and measurements are derived due to failures.

Similarly, to 1M and 3M, the case of 4F evidenced how figure-based reviews including hierarchical authority were substituted by means of joint transparent regular meetings on a peer – team level. In this example traditional control mechanisms are more or less replaced via indirect pressure that automatically exists when transparently sharing latest progress on a peer level. Without someone who has authority to issue instructions is likely to make the huge difference. Such approach was equally shared by 6M, 7M and 15M. *"There is also a two-week team exchange where all teams come together with the focus on challenging and questioning. So, in this circle all important topics are discussed and made explicit. As part of this transparent and open communication, everyone else naturally also expects progress to be presented. Of course, this also creates a certain indirect pressure on every team or the need to continue working if this need does not already arise in the team itself. If nothing has happened after two weeks, other teams will of course ask about why are you now at this point. During this transparent exchange everyone should understand the meaning and the why of the respective goal due to the transparent presentation. This represents again challenging potential for everyone else to ask for the reason or if help is needed or what is missing".* (4F).

15M directly pointed to the overarching structural organisational set-up as reason for transparently embedded communication that drives trust and therewith eliminates the need

for any controlling instance. Beside a certain mindset, all four revealed structurally embedded conditions and patterns can be found within the following evidence of 15M. If accumulated, they unfold towards a complexity-centric leadership corporation: *"We simply have a continuous exchange, whether it is in a community or with other individual employees who I think they have an idea about the topic or just to get a different perspective. That is the core element for us, and I think it is because of our organisational structure as teams need to continuously and easily work together in a natural way. Within the framework of this cooperation, feedback and exchange take place already naturally"*. (15M).

The next quote exemplified the purchase process within the case of 15M. Due to distributed responsibility anyone can basically purchase anything. Since trust replaces figure-based controlling, there are no predefined maximum values or quantities predefined: *"With us, purchases of office equipment work as follows: We don't have any specifications there either and everyone can buy whatever they want. Strangely enough, it works without any problems due to the fact that we only hire nice people, and we trust each other completely. I know the question from many other interviews because the common pattern of thought is "if I do this for us, then everyone will order this and that and that every day". But from experience and our reality I can say no, nobody does that for us and for reasons"*. (15M).

"If it should be the case that a team has to or wants to do certain tasks and they cannot do it because they lack manpower, then the problem is formulated and discussed transparently. That will probably happen on a Portfolio Monday, or a Demo, or maybe an Open Friday. According to the motto we would like to advance the product in this way, but we lack the qualifications in the form of a person. Does anyone here in the company first want to and also have the necessary skills to help and thereby solve the problem. If it really is a new employee at the end that needs to be hired, then everyone understands that". (15M).

Such freedom-oriented stance that was presented within the last two quotes of 15M was likewise revealed by the researcher among other cases on that was outlined before (1F, 1M, 3M, 4F, 6M, 11M, 13M). In these organisations it is assumed that trust based on transparent communication makes any control measurement obsolete, without replacement.

Moreover, and even more autonomous, in the case of 3M transparent communication measurements that substitute any other control elements are not even actually embedded in the organisational structure but in the frame of a certain mindset only. 3M stated accordingly: *"With us the control mechanism is mutual compassion"*. (3M).

Likewise, 4F provided an example for mutual compassion as single control measurement for particular private circumstances of organisational members that is solely embedded within the organisation's members mindset: *"The founder's point of view and hence the approach across the entire organisation is that we want to grant you and all of us freedom and not restrict this freedom. we also have the informal handling of when an employee's child is ill that they don't need a special medical certificate for it. We just trust when an employee says their child is ill that is believed to be the truth. Due to this high degree of trust, it is of course implicitly expected that if the child then sleeps later for a few hours, the employee still works somehow within the scope of his or her possibilities, nothing is stipulated, nothing is defined, mutual goodwill is expected. we haven't experienced the exploitation of this trust-based system, maybe we just don't know it"*. (4F). The last sentence of this quote indicates the risk that is automatically inherent when relying on the establishment of a highly trust-based mindset which replaces any controlling instance. Whereas the first sentence of this quote highlights the underlying intent: namely to grant as much freedom as possible. Additionally, it is noted that such extreme approach is potentially only applicable for situations where compassion – in the case of an ill child – is assumed (by the founder) to be more appropriate than any control measurement that could potentially imply to not trust the employee. This is corresponding to 15M's explanation how it is mitigated that *".... the system would become dysfunctional"*. (15M). See quote of 15M in section 5.2.4.1. Even smallest interference could severely impair an established mindset of a CAS organisation and hence needs to be prevented.

However, the researcher identified also critical notes about the need of control elements and their potential replacement but still these interviewees underpin the overarching negative relationship between transparency-trust and need for control measurements. 2F advocated for dedicated control elements for a limited period and particularly for newbies: *"However, I*

believe that it needs a little more control when teams are completely new and new people come in from outside who do not yet know our structures, methods and how we work together". (2F).

1M asserted that control measurements cannot easily be omitted in all organisations as soon as transparency and trust have been established. As an example, he drew on the need of external financiers for traditional figure-based control mechanisms. There he explained that an external sponsor is probably not likely to just trust the team without additional proof. Therefore, beside trust additional for example feeling derived figure-based measurements are at least required to transparently share the status and progress with external parties. *"A distinction must be made between, firstly, the trust between the team members in the team and, on the other hand, the trust from outside, for example by donors, in the entire team. The latter often turns out to be problematic in the external image without the existence of a plan and control measures. We took the gut feeling as basis because we didn't have any other KPIs. So, everyone had to state what their gut feeling was like if they were on track. The individual gut feeling was the most powerful element we had. In this way things came to light that would not have been recognised even with 80 KPIs. To statements such as "my gut feeling is not particularly good in this regard", we as team decided on concrete measures. Developing this gut feeling simply does not work with slides, indicators, or traditional control mechanisms. That only works if you are – in the leadership role - part of the team". (1M).*

4M connected the need for control measurements to the potential monetary impact of the underlying circumstances. He raised the point that for example within the construction industry tremendous costs may potentially arise immediately if a certain deadline is not met since subsequent processes are impacted. Hence, he argued that replacement of traditional control measurements is not possible anywhere. *"One cannot fundamentally do without all control mechanisms everywhere: for example, the monetary impact in plant construction is so high in the case of delays. This doesn't mean that I fundamentally distrust the employee, but that the organisation simply cannot afford to make such a mistake, financially and in terms of image. In contrast, the case of software development, bugs can still be fixed quickly if they are not serious. In plant construction, a small error can result in contractual penalties running into millions. Control mechanisms must be used depending on the type of organisation and the context". (4M).*

Given this last quote of 4M, it was found that 4M contradicted himself to the beginning of this section ("*... you first have to gain trust by creating transparency.... If...communicated proactively and transparently, no further control measures are required*") (4M). Later, in contrast, he advocated for the deployment of traditional figure-based controlling for areas with higher monetary impact. Without doubt, the monetary impact in case of failures may be lower in software in contrast to construction. His statement implies that in the software industry such CAS collaboration can be made because of the lower impact, however, when it comes down to sharp impact, it is better to trust on what you know – namely classic control measures instead of organisational members. This indicates that 4M does not entirely trust and dare CAS capabilities to make self-organised (on CAS level) conclusions based on transparently available information. This evidence transparently shows how strong traditional thought patterns such as numbers-based controlling with one leader assuming responsibility are embedded in people's minds – even if they provide a semblance of control only.

This example indicates another reason to rely on traditional controlling if high impact is expected in case of failure: If one single leadership person is responsible, more quickly a guilty one is identified to be sanctioned in case of failure. This is in line with the traditional hierarchical approach for error handling - instead of looking for a solution. It corresponds with 3M's best practice on their sprint procedure and how failures are handled there, which was presented earlier in this section.

The contradictory statements of 4M might also provide the explanation why especially the cases of 3M, 4F, and 15M are relying on a very high trust-based mindset which replaces any controlling element and are intentionally willing to take some risk. These three organisations are software development companies. However, such high autonomy approach was likewise found in other industries that were part of the exploration in this study (marketing for 1st tier companies, turbines factory, logistic sector, and organisational consulting) – although not quite as high as in these three cases. Moreover, the literature review did not reveal any indication that CAS patterns are limited to any industry. Finally, as outlined in the section 5.2.3.5 on the edge of chaos, the determining factor is to what extent an organisation is willing to encourage and to trust its members that they dare to take on leadership

collectively as CAS. Hence it was concluded that in any industry it may be possible to replace traditional controlling measurement by means of transparent open communication and the involvement of anyone working on the field without traditionally known supervision.

Considering the presented evidence, different needs for control measurements can be applied even within one organisation. Either, depending on the underlying context with different (monetary) impacts in case of violation or depending on fundamental underlying perspectives regarding the effectiveness of measures. Additionally, (indirect) peer pressure or simply because everyone does it a certain way and behaves alike in the organisation was mentioned as a further root cause why measurements based on transparent communication work, without other formal control mechanisms. Overall, transparent communication by means of sharing progress and potential challenges in a common format was found as a pivotal enabler of CAS collaboration within real robust pioneer corporations. However, comprehensively establishing these behavioural and thought patterns require training to sufficiently equip the organisational collective with the needed capabilities that built such mindset.

5.2.5 Summary RQ1 - Conditions and patterns for complexity-centric leadership

Two central themes were revealed as pivotal foundation for complexity-centric leadership. Structurally embedded conditions and patterns as well as an adequate mindset was found to exist in real robust pioneer companies that apply complexity-centric leadership. Due to their interrelation, only both aspects together answer RQ1. The thematic map in Figure 16 displays these findings which were discussed in detail in the analysis sections (of 5.2) before.

The literature review revealed that research so far did not conceptualise the interconnection among the macro level in terms of interplay on system-to-system level in contrast to interaction among individuals in a CAS (see Figure 6). While identifying pivotal conditions and patterns of complexity-centric leadership organisations in the frame of RQ1 this literature gap was addressed.

A holistic perspective via tearing down of structural units was unveiled as principle structural condition since it builds the underlying architectonic foundation of any organisational

structure next to the other three central conditions. As such an integrated holistic organisational structure has an impact on the organisational members' mindsets and in return on their collaboration within thinking and doing. If dependencies or needs are embedded in this underlying structure, macro interaction was assumed to become further enhanced. Therefore, consciously embedded needs and dependencies were identified as second structural condition within robust pioneer organisations. Additionally, the collected data showed that leader-follower antagonism is not yet an outdated approach in this type of explored organisation – as suggested by literature – because true equality among the entire organisational collective is probably not achievable. However, it is concluded that a holistic structure with underlying dependencies functions as central driver in the explored organisations to dissolve traditional leader-follower antinomy. Therewith it is pursued to become normal for any organisational member to adapt between the roles of followership and leadership according to underlying tasks.

The role concept was found as central structural element to transparently distribute responsibility and accompanying leadership responsibility. Hence the deployment of a role concept was defined as third condition for complexity-centric leadership and distributed responsibility as fourth. Additionally, it was found that transparent available information across the organisational collective is a mandatory prerequisite to successfully apply such role concept.

When investigating originating sources of CAS emergence, it was found that CAS emergence is initiated most successfully from the formal instance of an organisation within a top-down approach. Additionally, local bottom-up emergence was confirmed to be existing, however it was concluded that a sustainable and successful informal local emergence is not likely without formal back up. Finally, it was found that especially in bigger formal organisation, free order emergence of an informal CAS is unlikely. Referring to potential limitations of CAS emergence it was found that without point of reference, a CAS is prone to drift into chaos. This confirmed the theoretical literature proposition that CAS emergence is probably most effective between states of equilibrium until the edge of chaos. Thus, it was concluded that the extent to what an organisation allows informal emergence and dares its employees to take self-organised decision on CAS level, defines how tightly directive orientation is

provided by the formal instance. This in return marks out if more chaos is allowed or more equilibrium is targeted.

Related to how much the collective is trusted and allowed to execute particular activities, a certain mindset towards leadership was found as inducing condition for RQ1. It was confirmed that within the explored robust pioneer corporations, mindset is consisting of joint organisational values, shared beliefs and purpose as corresponding to the literature, however these aspects were not revealed as core aspects during this data analysis of the existing robust pioneer organisations. Mindset in this study was rather depicted as the sum of any single member's maturity and how the dynamic relationship of transparency-trust and controls is institutionalised within the organisational structure. Maturity was found as precondition for a high level of transparency within the information exchange of the organisational members. This in return is most likely trust building with allows to gradually replace traditional control measurements. Thus, the level of maturity as well as transparency including its impact on trust and controlling measurements were defined as the three subthemes for the revealed mindset towards leadership, as shown in Figure 16. However, maturity including professionally dealing with transparent information disclosure needs to be trained proactively via dedicated methods to equip the entire organisational collective with required capabilities that most likely form this desired mindset.

Overall, the data indicates that the two central themes of RQ1 "structurally embedded conditions and patterns" and "mindset towards leadership and patterns for collaboration" only go hand in hand. Since organisational structural patterns mainly define the collaboration of the entire organisational collective, this as consequence influences the underlying mindset of the single members. Finally, mindset and structural conditions together shape how complexity-centric leadership evolves in robust pioneer organisations. On the emergence of complexity-centric leadership will be outlined in the following chapter.

5.3 RQ2 – What patters facilitate the emergence of complexity-centric leadership?

From the identified gaps one question akin to RQ2 was defined and asked to all interviewees (see Figure 11). ID 5: "Can you describe how leadership is emerging in your organisation – if not formally defined? "

The following quote very well exemplified the overall essence related to RQ2. Equally available information impacted how leadership and its emergence was perceived: *“Of course, the traditional thought pattern is just that, as the leader of a team, I need more information than my individual team members. But if all information is suddenly available to everyone, the mindset has to change, and you have to deal with people differently. This rethinking of the traditional idea of leadership is very difficult for many”*. (6M).

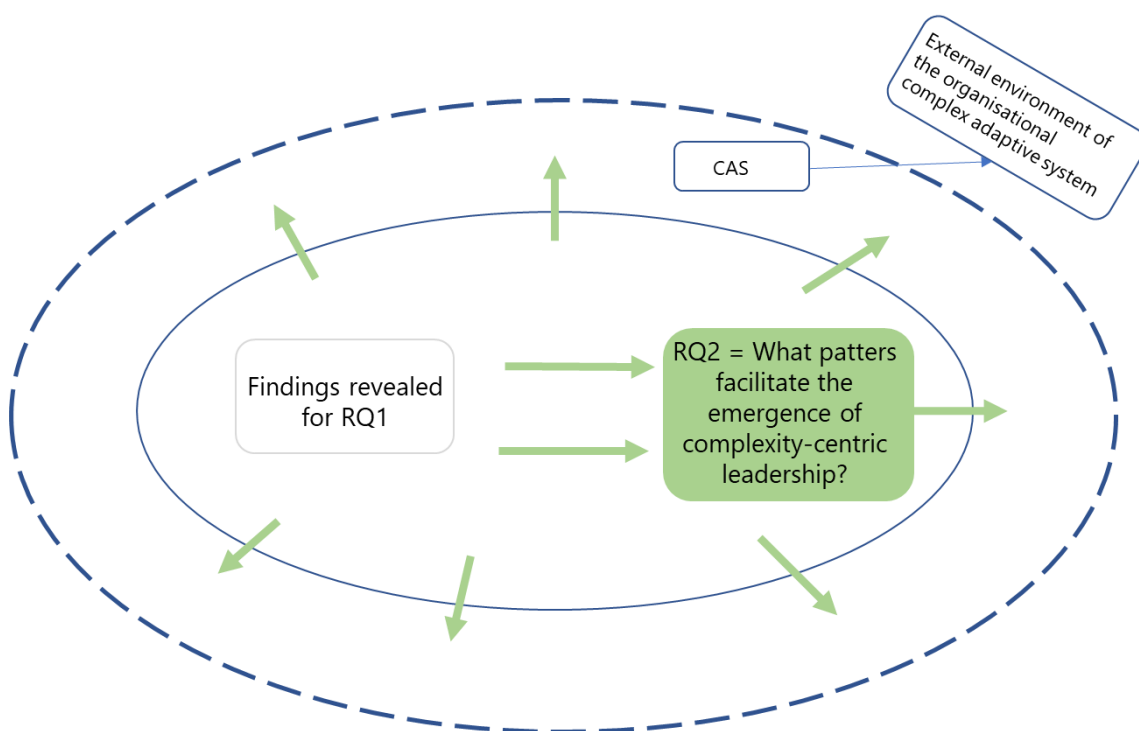


Figure 17: Thematic map - findings revealed for RQ2

It was found that the emergence of leadership is based on the dynamic interaction of the RQ1 findings in sum. Therefore, no dedicated theme was defined for the findings of RQ2 but rather both RQ1 themes (structural conditions and patterns as well as mindset) are regarded as origin for leadership emergence, as pictured within the green arrows of Figure 17. Accordingly, the essence of such leadership emergence will be discussed in the following.

5.3.1 Sources of leadership emergence in complexity-centric leadership organisations

Four of the 19 interviewees agreed that leadership in complexity-centric organisations can be assumed by any single member. They trace complexity-centric leadership emergences back

to the underlying mindset and proactivity of individual organisational members. In contrast six interviewees confirmed that complexity-centric leadership emerges due to the organisational set-up or structural circumstances. Nine interviewees, argued for a dual source of leadership emergence that is made up of a certain mindset and structurally embedded conditions and patterns in this type of explored organisations.

Thus, the literature proposition of Acton et al. (2019), Lord et al. (2017) and Mendes et al. (2016) that described leadership roles that are emerging informally and changing over time was confirmed by 13 (9&4) interviewees. Supplementing such informal emergence, Will (2016) found that leadership emerges due to contextual and structural organisational frame conditions. Similar, Acton et al., 2019 further asserted that leadership is emerging on parallel organisational levels that may be embedded structurally in the sense of formal processual mechanisms. Additionally, literature proposed that the creation of interdependencies inside one CAS as well across different CASs is likely to trigger emergence (Boal and Schultz, 2007; Schneider and Sommers, 2006). Therefore, these propositions were confirmed within the revealed interview data among 15 interviewees (9&6); primarily due to the structurally embedded distribution of responsibility (5.2.2.5) with underlying dependencies (5.2.2.2) and the comprehensive application of a role concept (5.2.2.3).

How such change of leadership roles is happening informally in organisational practice and how leadership is emerging on parallel organisational levels due to its structurally embeddedness was both addressed within the collected interview data and will be discussed in the following.

5.3.1.1 How do structurally embedded conditions and mindset drive leadership emergence?

Thirteen interviewees (1F, 1M, 2F, 2M, 3F, 4F, 6M, 7M, 9M, 10M, 11M, 12M, 15M) agreed on the argument that the emergence of leadership is substantiated in a dedicated mindset and the individual's personality and therefore emerging informally and changing over time. 2F, 2M, 7M, 12M regard this as primary source for the emergence of leadership.

12M stated: *"For me, the most important thing is to understand that leadership is not a defined role but a mindset to take leadership and responsibility."* (12M). Additionally, it is argued that leadership starts with the individual which implies that anyone is aware about her or his own

personality. This is the prerequisite for anyone to assume leadership for themselves and accompanying tasks (10M,11M, 12M). 2M, 7M, 10M, 11M and 12M argued that taking on responsibility and leadership is basically possible in any organisational set-up, including a hierarchical one because anyone who wants to, can assume leadership for own tasks without formal designation.

On the opposite 1F and 3F explicitly highlighted that if there is still a secret hierarchical structure in an organisation, it is rather impossible for leaders to develop accordingly.

"Leadership in my view needs a structural condition." (3F). 1F supported this argument while adding that a formal back-up is needed in the sense of legitimacy and being allowed to do something. Overall, it was shared that leadership emergence means voluntarily taking responsibility for own tasks. This implies that leadership is not defined for one particular task or role but rather that roles are changing over time due to required tasks, individual preferences and capacities of the organisational members. 4F evidenced this approach by stating: *"Our goal is for each person to find something they are passionate about, something they can be an expert in and thus also assume leadership."* (4F).

Such implicit nature of leadership emergence and that leadership is not rigidly bound to certain roles or tasks but is changing, was explicitly emphasised during seven different interviews:

"We don't have explicit leadership roles in our organisation anymore because we don't need them anymore. In our thinking leadership is an attitude and therefore in our organisation everybody has some leadership inside. That means everybody is responsible for their own roles and for what their passion and energy offer and for what formal competence exists." (12M).

"We don't have any supervisors. Leadership takes place through everyone but implicitly - no one has the designated role of leadership." (4F).

"We do not formally define leadership. We use an underlying role concept, but there is not the role of leadership. Leadership arises implicitly and above all indirectly within the frame of other roles." (15M).

"Implicit leaders automatically emerge again and again." (1F).

"We are constantly re-evaluating what the organisation or individual teams need and how we can best meet that need. Accordingly, of course, the roles have continuously changed." (11M).

"Since these areas of the organisation are all equal without hierarchy, there is no authority to issue directives. It is therefore particularly common for leadership to emerge naturally in this area." (7M).

"In this company I feel that I am learning to define leadership new every day." (1F).

Thus, data confirmed the naturally emerging and continually changing character of leadership identified in this type of explored organisations.

Especially underpinning the informal and varying nature 2F, 4F, 7M, 10M, 12M and 15M asserted that leadership is emergent if required and corresponding to the underlying situation. In this sense, 15M referred to the wording *„ad-hoc leadership“* for situations where a person has a particular expertise in an area then it is expected that this person just assumes leadership. Accordingly, 12M concluded *"that means one day I'm a leader for a topic and the next day I'm a follower. It's a constant interplay."* (12M).

However, simultaneously it was noted that *"... you simply have to be personally up for this self-responsible and self-organising way of working."* (15M). This quote underpinned the implicit essence of leadership emergence with its origin in the individual's personality.

The presented evidence indicates that the organisational members in this type of organisation built upon a particular mindset which functions as natural source for automatically assuming leadership or ownership for a topic in case of felt or defined responsibility. As already displayed above, this informal and changing stance of leadership

emergence was confirmed by 13 interviewees, thereof four interviews regarded the underlying mindset as main source for leadership emergence.

Another perspective was shared by 15 interviewees (1F, 1M, 3F, 3M, 4F,4M, 5M, 6M, 8M, 9M, 10M, 11M, 13M, 14M, 15M) who drew on structurally embedded elements in their organisations as source of leadership emergence. Thereof six interviewees (3M, 4M, 5M, 8M, 13M, 14M) claimed that structural conditions function as main source, whereas the other nine interviewees advocated for both aspects – structure and mindset – as two important pillars for the emergence of leadership – if leadership is not designated otherwise formally. In this stance, 1F, 3F and 13M, 14M asserted that there needs to be a formal structure that provides a framework for what leadership is and for what it functions in the organisation. When decentralising leadership, it is necessary to define which roles imply leadership for particular tasks within this new type of cooperation. Within this debate, 14M termed leadership as capability of an organisation and therewith claimed that leadership is not automatically linked to people, but must be formally, structurally, and organisationally integrated. By means of the comprehensive application of the role concept, the distribution of responsibility and leadership is operationalised most likely within the explored organisations. As outlined before in section 5.2.2.3, 16 interviewees confirmed the application of such role concept that anchors roles in the structure and thus represents the structural route cause for leadership emergence.

In contrast to the before evidenced informal source of emergence, 5M argued, that *“roles are formally defined and do not arise by chance.”* (5M). However, likewise he confirmed the varying nature of taking on leadership roles that was presented in the quotes above: *“Due to our seasonal business before Christmas it often happens that leadership roles are handed over again due to other activities in other roles”* (5M). Likewise, 1F argued that formal legitimisation is required to take over certain tasks hence ownership for relevant roles is needed.

Beside the application of a role concept, other dedicated measurements to formally imbed leadership emergence were shared by 4F. In their case a dedicated leadership mentoring and training is formally ensuring that leadership is emerging through the entire organisational collective in the sense of formal processual mechanisms as proposed by Acton et al. (2019). *“In this programme there are people who have been nominated by all other staff in the*

organisation, not just one or two, but all of them. The idea is that these people, as leadership ambassadors, bring leadership into the organisation with the aim of penetrating the perspective and attitude towards leadership." (4F). Similarly, 14M drew on a process where people designate leaders, because they were recognised to already successfully having assumed leadership and having demonstrated leadership quality. Supporting these institutionalised measurements of 4F and 14M, 13M concluded: *„I therefore believe that leadership in a non-hierarchical collaboration and organisation model does not simply emerge but is redefined.“* (13M).

In sharp contrast to leadership emergence that is operationalised 1M claimed: *"You cannot order or prescribe self-organisation. Maybe it works in one case out of 1000. It is much more important to create the ground so that self-organisation can take place and unfold."* (1M). This indicates that leadership is neither solely informally nor solely formally emerging but rather due to a combination of both which is most likely to create a viable setting for leadership emergence. For such base that is setting the formal and informal context for the collaboration and hence enabling actual leadership emergence was likewise advocated by the 9 interviewees (4F, 1F, 1M, 3F, 4F, 6M, 9M, 10M, 11M, 15M) that drew on a twofold source for leadership emergence – mindset and structure.

Underpinning such twofold context, 6M stated that in their case they do not yet regard the organisational members to be encouraged adequately enough to handle actual emergence of leadership and the accompanied higher level of autonomy. Considering the maturity level of the organisation and its members, they still offered formally defined leadership positions. At the time of taking the interview they were just experimenting with higher levels of transparency and how the organisational collective can handle such disclosure of information including the implied handover of responsibility. Therewith, they evidenced that in an actual corporate environment, conditions and patterns revealed within RQ1 are most likely to be initiated successively. Only when all RQ1 elements (structural conditions and mindset) are adequate built, then they regard their self as ready and encouraged enough for additionally coping with actual emergence of leadership. Consequently, this underpins the need for both pillars as sources that allow and foster leadership emergence. The establishment of a certain mindset and structurally embedded conditions and patterns.

Likewise, 3F, 11M, 15M agreed on individual personality respectively mindset and structural mechanisms or elements as the two pillars for leadership emergence. They described an interdependence between roles and people by means of embedding leadership emergence opportunities within the organisational structure in combination with the individual personalities of the organisational members. This contributed to the fact that roles have changed continuously. 11M shared how such two-pillar based leadership emergence happened in their case. On the one hand, roles were formally defined while using quite broad terms for an actual role. This on the other hand facilitated so called informal leadership emergence opportunities where it was reflected on the underlying purpose of this role and finally encouraged that leadership was assumed by individuals: *"We have created the roles in such a way that they fulfil the purpose of their existence in the best possible way. For example, I am an euphoric business enabler. The rough goal of this role was of course given but I personally have also continuously reinterpreted my role. We have operated a co-sensing - I think this is a very good term. In doing so, we have tried to really find out what the needs of the individual roles are to further develop the meaning and purpose of the role."* (11M).

Referring to such twofold source for leadership emergence, 3F noted: *"Structural organisation and the members themselves are jointly responsible for a true emergence of leadership. So, both are intertwined, and both are also necessary, they only have different weightings. From my many years of experience, however, I know that the organisational structures are the more formative and thus the more important factors for leadership to develop accordingly."* (3F). Her statement is also in line with the analysis results from section 5.2.3.1 that found that the formal instance, in a top-down way was the main driver for encouraging the organisational system's emergence. These findings indicate that the formal source is likewise the more essential pillar for the emergence of leadership.

5.3.2 Summary RQ2 – Leadership emergence

The analysed data unveiled structurally embedded elements (that were found in the frame of RQ1) as pivotal foundation for leadership emergence. Therewith the proposition of Will (2016) was confirmed.

Structurally embedded distribution of responsibility is concluded as one source for leadership emergence beside the accompanied mindset that facilitates to assume leadership for particular tasks by any organisational member. The application of a role concept which is operationalising the distribution of responsibility furthermore enables that leadership is likely to emerge in a natural way across the entire organisational collective.

Most interviewees agreed on a combination of both aspects to most successfully foster leadership emergence. This indicates that a comprehensive integration of structural elements with the appropriate mindset will probably facilitate the natural emergence of leadership. Referring to the weighing of both aspects, a result was not clearly evidenced. Since only structural elements ensure formal compliance with corporate law and cannot be covered within an informal mindset - even if comprehensively established - it was concluded that structural elements probably more significantly impact and promote the emergence of complexity-centric leadership.

Leadership emergence based on such twofold viable settings is most likely to contribute to dedicated roles and activities that are regarded to be part of a complexity-centric leadership role. This points to the next chapter RQ3 that outlines the actually emergent leadership roles in this type of explored organisations.

5.4 RQ3 – Which leadership roles are emerging in complexity-centric leadership organisations?

Structural conditions and behavioural patterns were unveiled as essential for complexity-centric leadership in the frame of RQ1. Since they are embedded in the structure of robust pioneer organisations, it was found that they set the foundation for the emergence of complexity-centric leadership and resulting leadership roles.

Based on the identified literature gaps, three base questions akin to RQ3 were defined and asked to all interviewees.

ID 6: "How do the roles of leadership look like in your organisation?"

ID 7: "Is organisational adaptability and single member's adaptability proactively fostered as part of a leadership role? And how / with which measurements is it enhanced most successfully?"

ID 8: "How would you describe the leadership role in your organisation in relation to the formal and informal instance?"

The analysis of the provided answers together with the insights from RQ1 and RQ2, disclosed a clear picture directing to the overarching aim of this theses. The perceptions from the interviewees of the leadership roles all referred to an image of leadership that is without direct influence on other organisational members or company results. Instead, the revealed leadership roles were associated with activities that focus on establishing an environment where organisational members feel empowered and save. This picture was also conceptualised in the reviewed literature (Wu et al., 2018; Braun et al., 2016; Marion et al., 2016; Will, 2016; Marion and Uhl-Bien, 2001). Consequently, for RQ3 the researcher defined one overarching theme: "indirectly establishing an environment where organisational members feel empowered". The four central roles that were disclosed as part of complexity-centric leadership are displayed in the Figure 18 below. They are discussed in the following.

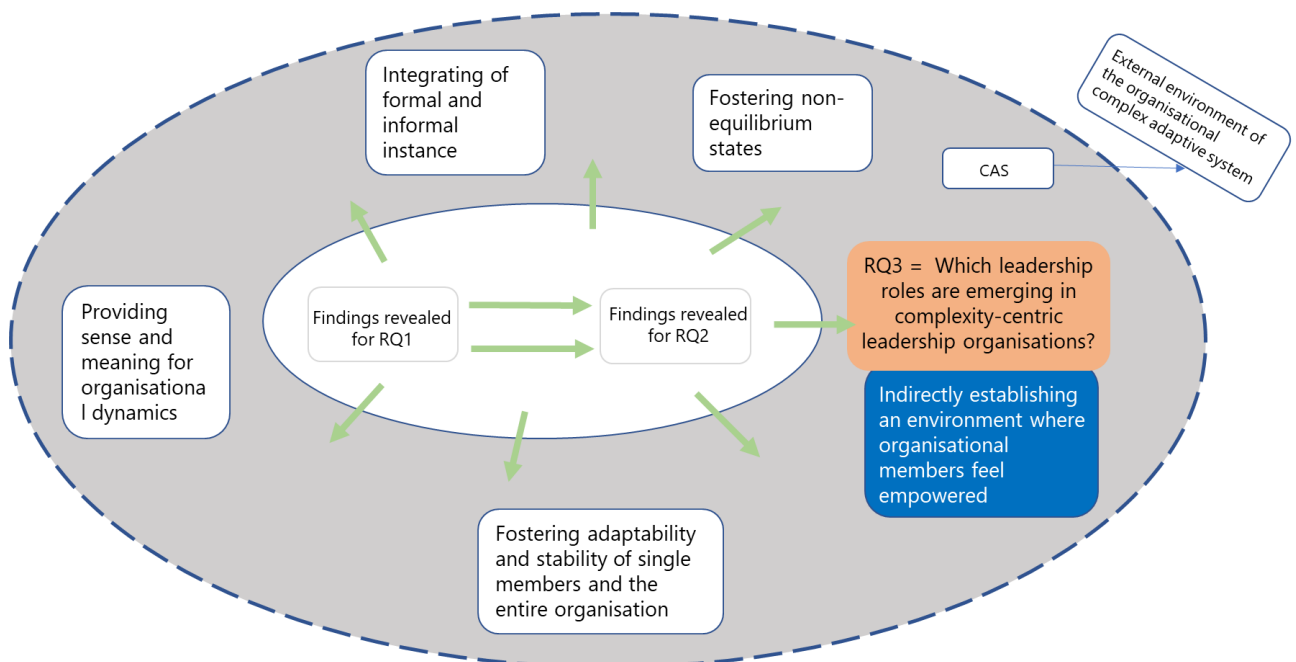


Figure 18: Thematic map - findings revealed for RQ3

As displayed in the outer circle of the thematic map in Figure 18, four leadership roles were revealed within the collected interview data to exist in real robust pioneer corporations. They correspond to four of the roles identified in the reviewed literature, which are listed below.

First, providing sense and meaning for organisational activities including their dynamics as suggested by Acton et al. (2019), Lord et al. (2017), Davis (2015), Steinbauer et al. (2015), Fulop and Mark (2013), Kohles et al. (2013) and Lichtenstein and Plowman (2009).

Second, fostering non-equilibrium states to trigger emerging stability which was proposed by Marion et al. (2016), Mendes et al. (2016), Fulop and Mark (2013) and Lichtenstein and Plowman (2009).

Third, fostering adaptability of the entire organisation and its single members as asserted by different theoretical scholars (Uhl-Bien and Arena, 2018; Hasel and Grover, 2017; Oeij et al., 2016; Will, 2016; Hazy and Uhl-Bien, 2015).

Fourth, a so-called enabling leadership role that mediates and integrates the formal-informal tension was advocated by organisational complexity and complexity leadership literature (Schulte et al., 2019; Uhl-Bien and Arena, 2018; Mendes et al, 2016; Bressers and Edelenbos, 2014; Tyssen at al., 2014; Lichtenstein and Plowman, 2009; Uhl-Bien and Marion, 2009; Boal and Schultz, 2007; Uhl-Bien et al., 2007; Schneider and Somers, 2006).

Considering the number of different literature sources supporting the overall indirect leadership role, significant divergence was unveiled regarding the actual actives related to these four listed roles respectively how such leadership is most adequately empowering indirectly CAS emergence across the entire organisational collective.

Accordingly, the upcoming sections on RQ3 focus on the actual activities ascribed to these four complexity-centric leadership roles while touching upon their indirect nature.

5.4.1 Leadership that is indirectly establishing an environment where organisational members feel empowered

The unveiled picture of the emerging leadership roles is corresponding to the one that was presented in the literature review on leadership and its roles in such type of organisation. The interviewees pictured a complexity-centric leadership with inherent roles that focus on indirectly establishing an environment where organisational members feel empowered to assume responsibility. Equally, Wu et al. (2018), Braun et al. (2016), Marion et al. (2016), Will (2016) and Marion and Uhl-Bien (2001) asserted that complexity-centric leadership is without power to control or direct influence organisational outcomes.

Braun et al. (2016) and Marion and Uhl-Bien (2001) proposed to indirectly empower the collective's capacity for self-organisation by means of eliminating physical barriers. This proposition was confirmed only partially because this only indirect power implies that it is not part of the complexity-centric leadership role to directly influence the elimination of physical barriers. Instead, a holistic structure without physical and mental barriers was disclosed as structural condition in frame of RQ1, (see section 5.2.2.1) and thus not related to any leadership role across the analysed interview data. Consequently, breaking down of barriers was not assumed as a complexity-centric leadership role.

Nonetheless, the successive evidence proofs that an indirect empowerment of the collective's capacity for self-organisation was regarded as a complexity-centric leadership role in this type of organisation. Therewith the essence of the overarching RQ3 theme is underpinned. Due to the cross functional nature of a CAS respectively a team, which is the standard practice among the explored organisations, leadership usually implies a role that does not have professional or specialist expertise. If at all, leadership as part of a CAS acts within a facilitating or coaching role. Consequently, leadership does not have the power to take decisions but rather to support the team collaboration including their decision taking via methodical expertise. Hence, complexity-centric leadership was rather perceived as instance with only indirectly impact on the overall team performance with the final aim to become obsolete for the actual working team. This leadership perception was likewise described in the case of 2F. *"The aim is that I can withdraw completely from this topic in the end. Making*

this type and role of leadership practically obsolete has always been my approach and that's why I'm now very happy to work in a company where exactly this approach is needed" (2F).

1F, 1M, 2F, 4F, 4M and 15M were confirming this overall complexity-centric leadership notion. They argued that leadership is encouraging and empowering people to be able to do their best. Consequently, leadership roles should operate exclusively in the background without being noticed on the operational side. Only if support is needed, leadership is supposed to pave the way for individual members or a team to continue working successfully. They noticed that such empowerment is not done by saying how something should be done but rather by asking what is needed. This was regarded as what leadership has in common with coaching. The coach is also not an expert in the underlying subject, but the coaching role is to ask the right questions. *"Leadership acts like a shadow of the employees in the sense of keeping their backs free and enabling the individual employee to work."* (4M).

Likewise, 1F stated that *"leadership does not manage a system, leadership maintains a system"*. (1F). She explained that maintaining implies inspiring members in the system to create freedom and to protect them as well as to support the team while applying new forms of cooperation and not to fall back into old patterns. Especially, therefore she argued that even with indirect functionality *"these leadership roles are extremely important"*. (1F).

15M stated it even more direct: *"No one has to do what someone else says unless the individual sees it as reasonable because nobody is authorised to give instructions"*. (15M). He further presented the core reason that facilitated to successfully apply this behavioural pattern in their case: *"Due to the fact that there are no managerial roles or positions in our organisation "*. (15M). This corresponds to the findings outlined in section 5.2.2.1 on the holistic structure. Supporting this stance, 4F argued: *"leadership roles do not claim to direct other employees anything but aim to let employees grow"*. (4F).

Using the example of the feedback process, 15M emphasised that feedback, is no instruction to the feedback recipient. *„Everyone can deal with the feedback how they think they have to deal with it. Likewise, the entire feedback round is not authorised to give instructions"*. (15M). Additionally, this equality approach is not only embedded within the organisational structure

but also in the mindset of the organisation: *“Our approach is you can only show employees what is going badly, what is going well and help with what might be a good way. When people show resistance to advice, that's just the way it is.”* (15M).

This evidenced indirect nature extends across all four disclosed complexity-centric leadership roles. Thus, the researcher will again touch upon this association during the following sections that will discuss these main leadership roles which were identified as most likely and effectively to establish an environment where organisational members feel empowered.

5.4.2 Providing sense for organisational activities within the leadership role

Sixteen interviewees (1F, 1M, 2F, 2M, 3F, 4F, 4M, 5M 6M 7M, 8M, 11M, 12M, 13M, 14M,15M) within 53 excerpts explicitly confirmed that providing sense and meaning for organisational activities including their underlying dynamics is a central leadership role. Hence, “providing sense and meaning for organisational dynamics” was defined as first of the four central complexity-centric leadership roles found among the existing robust pioneer corporations.

Lord et al. (2017), Davis (2015), Steinbauer et al. (2015), Fulop and Mark (2013), Kohles et al. (2013) and Lichtenstein and Plowman (2009) suggested the following different options for how sense and common purpose are most likely formed indirectly within the leadership role in complexity-centric organisations:

- within an emerging bottom-up set-up (Lord et al., 2017)
- via applying derived activities within the daily doing and bi-directional communication (Kohles et al., 2013)
- via establishing a comprehensive understanding for the underlying dynamics (Steinbauer et al., 2015)
- within storytelling, arguments, speeches, and discussions (Fulop and Mark, 2013; Lichtenstein and Plowman, 2009).

The first three activities were confirmed and will be enlarged in the following three sub-chapters 5.4.2.1, 5.4.2.2 and 5.4.2.3. Since only 3F and 12M drew on storytelling or speeches as successful activities to form a common purpose and meaning for organisational activities, this aspect was not confirmed.

The majority of respondents gave high priority to providing meaning as a task of leadership. This has its origin in the shared believe that the most effective way to realise a successful organisation is not rooted in hierarchical reporting or command and control structures, but through all organisational members contributing to a positive organisational outcome as core of any organisation. *"Individual people are the decisive driver for securing the entrepreneurial survival"*. (3M).

One shared purpose is essential to provide orientation and sense for voluntarily taking over activities. Accordingly, 1F stated that *"without meaning and purpose proper collaboration doesn't work"*. (1F). The underlying argument is: With a purpose that is not clearly defined, there is the risk to repeatedly question the basic purpose of working together which is very time-consuming and inefficient. *"If the overarching purpose is not clear to everyone, one becomes too preoccupied with oneself rather than putting her or his energy to pursue the organisational purpose."* (1F). This is especially true for a system without hierarchical instructions because organisational members need to be equipped to be able to fill the vacancy of the traditional leader with their own leadership activities. Just like in the opinion of 14M, sense, meaning and purpose have the function of a lighthouse that enables everyone to go in the same direction even in case of unforeseen activities anyone should still be able to pursue to one shared direction. *"You can still remain resilient and react to sudden changes but always with a view in the direction of the lighthouse"*. (14M). Therefore, such common alignment about the core organisational purpose is pivotal to manifest an understanding in the sense for why working together is worth. *"Only after this clarification of why I can start with how the cooperation can work"* (1M).

Consequently, the following will enlarge and discuss how complexity-centric leadership looks like when establishing a shared purpose in the existing robust pioneer organisations.

5.4.2.1 *Providing sense and forming a joint purpose within an emerging bottom-up set-up*

Referring to the activities suggested in the literature to create such purpose, the findings clearly indicated that sense, meaning and joint purpose is most likely established within an emerging bottom-up approach. This was explicitly confirmed by 11 interviewees (1F, 1M, 2F, 2M, 3F, 4F, 7M, 11M, 12M, 13M,15M). This bottom-up approach was presented by means of dedicated events such as classic workshops (2F, 2M), weekend retreats (1M, 4F), "workation"

events as combination of vacation and work (11M) and any other specific onsite formats in the physical organisation (1F, 3F, 12M, 13M). All these events intent to jointly depict the corporate business model in the frame of a shared purpose that facilitates an effective collaborative fulfilment of this corporate mission. In the case of 4F, 11M and 15M a manual of and for the own organisation was commonly created. The final objective was revealed as having a stable joint purpose that overall provides sense and meaning for organisational activities. On the objective of a corporate purpose that was created via an emerging bottom-up process, 3F stated that: *"The minimum that needs to be generated through leadership is that on the basis of the common understanding everyone can continue working with a good gut feeling"*. (3F).

Simultaneously, the difficulty of this leadership role related to such emerging bottom-up approach was described by the interviewees as twofold because the intangibility of a purpose needs to become somehow tangible, and the individual requirements of the organisational members need to be somehow orchestrated. 1F and 13M drew on this twofold challenge by stating: First: *"because something that is somehow there but represents an intangible value that somehow has to be made tangible"*. (13M). Second: *"The leadership task is to reconcile the individual needs of the members in the system in order to work together towards this purpose"*. (1F).

1M, 2M, 3F, 4F, 7M, 11M, 12M and 13M shared best practices for how to overcome this twofold challenge most successfully when aiming on establishing sense within a collective bottom-up approach. 13M relied on bringing together a broad spectrum of organisational members: *"People who know their organisation really well because they identify with it very much or because they are very networked with a lot of people in the organisation so people who understand the organisation relatively well."* (13M).

Whereas 3F aimed on bringing together a most contrasting spectrum of members: *"To represent the entire bandwidth of the organisation. In my opinion, the greatest possible differences in terms of hierarchy levels, different areas, male, female, seniority level is very important to prevent system blindness."* (3F).

Contrarily, 4F and 11M drew on their insights from initially drafting, continually advancing and rewriting of their organisational handbooks during off site events where all organisational members were allowed to participate as best practice for such emerging bottom-up process. *"At the beginning we dealt in great detail with how we want to work together as an organisation and we jointly defined what we wanted, from which the handbook emerged. This handbook is intended as an introduction for new employees and describes all processes, our meeting rounds, and the general structure of our organisation. That's what we all relate to. But it's not a fixed document. In the retreats as we review it over and over again and often find that it no longer feels right as it is written."* (11M).

In the cases of 7M and 12M no handbooks were drafted. However, they defined their joint purpose within a similar commonly way to 11M and still advance it together. While explaining this process 7M reflected on the challenge and the importance to redefine their purpose still jointly and continually even when the company became bigger. The case of 7M in 2020 employed more than 100 employees. *"At some point we noticed that these sentences are no longer self-explanatory, so at the beginning when we defined them as a group of ten, it was clear to everyone what we meant by that, as more and more employees became involved, we defined these short descriptions to clarify what we exactly mean"*. (7M).

1M and 2M advocated that creating a common purpose is accompanied by comprehensively forming one big team which is most successfully within classical workshops: *"We do 2–3-day workshops off site and build cohesion, we form the team, with gin tasting in the evening and going for a run in the morning, so the really big Zinnober [German saying for extraordinary activities]. Every team that has gone through such a workshop in which 3 days were invested in being together is much faster in implementation afterwards and is also qualitatively better"*. (2M).

1M supported such approach and added that this is much more than the traditionally known usual project kick-off where *"we get to know each other briefly and then the team is formed"*. Within a truly emerging bottom-up process that intends to create a common purpose it is required as part of the leadership role to identify an intersection of all needs and expectations and based on that to really unite all organisational members as one team. *"The*

aim is to put that on the table with radical transparency and to find an intersection that makes everyone together. This requires talking, talking, talking. This is not only exhausting, but also costs a lot of money but the result is impressive. It creates amazing teams that are really strong and can work together. I believe that leadership has to facilitate and coach this emergent process". (1M).

In summary, independent of their individual best practice approaches, they all agreed on the necessity to put into words what makes the organisation special. This has nothing to do with a marketing slogan, nor is it a USP because it is not about differentiation in the market. A common purpose should provide an inward orientation. This is a lot about feelings, perceptions, and the intuition of the individual employees.

5.4.2.2 Providing sense and forming a joint purpose via applying derived activities within the daily doing and bi-directional communication

The second finding confirms the suggestion from the literature to establish meaning throughout the organisational collective as part of the complexity-centric leadership role. This was explicitly mentioned by 6 interviewees (3F, 4M, 5M, 7M 12M and 14M) and is best done within derived activities during daily actions and bidirectional communication.

12M drew on experiences from their joint purpose establishment process and therewith underpinned the value of derived activities within the daily doing in a bi-directional way. *"Moderated by the organisational development leadership team, but in the end the employees really defined the principles together until they finally settled on exactly these seven. For us this is practically the playing field and framework for cooperation. These seven principles should give us orientation in our daily work."* (12M).

7M provided an example for how meaningful work can and cannot be conveyed successfully within the frame of the leadership role by means of daily activities. *"If someone tells me do A, then B, then C without giving context and meaning, that's bad leadership. Saying do A then B then C and giving the context is still bad. But if leadership gives the context and the underlying problem with the question "think about how you would solve it now", also on a team or colleague level and in the best case, with the background of what impact this problem has, then the employee understands the why for an activity. This is a completely different motivation for*

the individual." (7M). Despite its indirect interference, 7M's quote attributes a powerful function to the leadership role in the sense of making people want to, instead of having to. It is essential as part of the leadership role to unveil the individual's impact to the overall organisational purpose within the individual's single activities. In the best case, this contribution is visualised, which was highlighted by 3F, 4M, 5M and 12M. *"Impact to purpose is a massive motivator for the individual. And leadership is responsible for creating this context."* (4M).

3F picked up on this point and asserted that people need to understand their work as meaningful. Hence, leadership should include dedicated communication and feedback into various daily processes and involve them and make them feel appreciated. Moreover, the collective needs to understand that they are allowed to make mistakes. 5M supported this stance however, he argued that leadership and anyone may only obtain the power to *"attract others to volunteer with their effort"* (5M) because it is not possible to develop another person. Therewith the indirect nature of the leadership role when establishing sense and purpose is again substantiated. Moreover, 5M further concluded that, leadership is only able to support people to develop their selves. *"I can go ahead and say "wow that's incredibly important that we're going in this direction and here are these reasons for this and that. Do you understand them?" and if people want to join then they will follow me."* (5M).

14M pictured a corresponding example that implies the importance of a leadership role that takes members with them indirectly: *"If someone is used to chopping down a tree with an axe and someone new comes up with a chainsaw and says it's a much better tool, the one with the axe must believe the other. If he's convinced of the axe tool, he'll keep cutting the tree with the axe. The potential and benefit must be recognised in the organisational collective and this is part of the leadership role."* (14M).

5.4.2.3 *Providing sense and forming a joint purpose via establishing a comprehensive understanding for the underlying activities and dynamics*

As third activity to provide sense most likely, establishing a comprehensive understanding for the underlying organisational dynamics as proposed by Steinbauer et al. (2015) was confirmed. Nine interviewees (1F, 2M, 4M, 5M, 6M and 7M, 8M, 12M and 14M) explicitly supported this activity. The following will discuss how understanding for organisational

dynamics is likely to be created across the organisational collective within a complexity-centric leadership role. In this study with organisational dynamics, it is referred to the four central conditions and patterns that enhance macro interaction (holistic structure, underlying dependencies, role concept that distributes (leadership) responsibility) as revealed in chapter 5.2.2.3.

There was an overall agreement from the nine interviewees that leadership is required to approach this topic with each member of the system individually because the contribution of everyone is only possible based on everyone's understanding. To understand something, some people need detailed instructions and some people do not want to know details at all. Hence, individual adaption to the person opposite is required in this particular leadership role. It is assumed as the most probable way that everyone can develop individually within the common framework of the team and hence contribute within the system's playing field. In the best case, as result, understanding is created for each member, and anyone is willing to collaborate in the CAS. 2M's quote exemplified this dynamic: *"Leadership can be seen as a service that must be offered to the individual members of a system according to their needs. Only when leadership responds individually to people's personalities is it good leadership"*. (2M).

Likewise, 8M reflected on the importance to ensure understanding and meaning for certain organisational activities for any individual because they have a wide range of knowledge backgrounds across their organisational members: *"Therefore, as part of my own CEO update video, I try to express myself in such a way that everyone can really understand me. That's also my own claim. I can be transparent, it's just pointless if people don't understand what I'm doing and why I'm doing it"*. (8M).

Considering to the role concept application that aims to distribute responsibility across the organisational collective (see chapter 5.2.2.3), 12M mentioned that this organisational dynamic and its related activities need to be understood by any organisational member. Thus, understanding needs to be established equally for how and why responsibility is supposed to be distributed within the organisation.

14M drew on the challenge when distributing leadership responsibility: *„It is no longer the manager who takes responsibility for the team result, but each individual in the team, and that is extremely difficult for many people“*. (14M). That this challenge is perceived by anyone individually (severely) needs to be addressed by creating an understanding for anyone why this approach makes sense.

Consequently, this difficulty must be mitigated as part of the leadership role by means of investigating any individual's needs and by creating understanding accordingly to facilitate that each individual feels safe. Only if members feel safe and equipped with information that fosters understanding, they are most likely to feel adequately encouraged and empowered to engage into organisational dynamics respectively to proactively assume responsibility for a topic. In this sense, 1F claimed that people can go beyond their limits when the meaning and the why of certain actions is comprehensible. *“Employees are not used to expressing their needs. It is like the iceberg model: Everyone only sees the obvious actions, but the underlying needs lie hidden. Therefore, it is required by leadership to infringe these needs“*. (1F).

To share leadership responsibility across any single organisational member, adequate understanding and adequate patterns and conditions akin to RQ1 (mindset and structural conditions as outlined in chapter 5.2) need to be created as part of the leadership role. Since all these aspects aim on influencing a certain behaviour and the understanding of other people, as such they can only be established in an indirect way within the leadership role. Only if both aspects go hand-in-hand it is likely to achieve that any individual feels safe and hence may have the courage to self-responsibly assume ownership for her or his own personal development as well as own leadership activities.

All this evidence indicates that an organisational purpose cannot be taught from a formal instance in a top-down way, rather bi-directional communication together with an emerging bottom-up process are most likely to create sense and purpose as well as comprehensive understanding for organisational dynamics across the organisational collective. This is especially true for immaterial values such as purpose and understanding. Since the organisational members are the ones actually working and hence are able to best depict the organisation's purpose, the leadership role may only indirectly enhance this process.

5.4.3 Fostering non-equilibrium states via proactively addressing issues

It was found that dealing with conflicts and ambiguities proactively was further acknowledged as part of the complexity-centric leadership role by 12 interviewees (1F, 2F, 1M, 3F, 3M, 5M, 4F, 10M, 11M, 13M, 14M and 15M). These insights were collected in the frame of discussing the base questions akin to the roles of leadership (ID 6,7& 8) because it was not directly asked about the handling of conflicts. Therefore, "fostering non-equilibrium states" was defined as second complexity-centric leadership role.

Literature was likewise referring to a leadership role that is supposed to proactively encourage disorder to contribute to paradoxically self-organised emerging stability (Marion et al., 2016; Mendes et al., 2016; Fulop and Mark, 2013; Lichtenstein and Plowman, 2009). Similarly, so called conflicting and connecting activities were proposed to mitigate traditional pro equilibrium forces (Uhl-Bien and Arena, 2018). Consequently, the following will discuss how this leadership role looks like when fostering non-equilibrium states in existing robust pioneer organisations.

Although, this role might sound paradoxically at the first sight, 1M shared the underlying sense of conflicting and connecting activities. In his example about CAS collaboration, via the transparent articulation of an uneasy gut feeling, initially a problem was addressed which in return contributed to overall clarification: *"Looking back, he said: "I've had the feeling for a long time, but I didn't dare to act on the basis of a feeling alone." We all know such formulations. Everyone knows this moment, you have a feeling in your stomach, but you dare not only to be active based on a feeling in a professional context."* (1M). Further he advocated that *"We need to turn these physical perceptions into the organisation because they are the most important clues and that is exactly what making feelings and concerns transparent and sharing them is immensely important to become faster and to work better together."* (1M).

As indicated in this quote, the need to raise potential tensions or conflicts that lie underneath the surface even if they are only based on feelings is especially required in a CAS set-up because before hierarchy liberated from discourse. It was argued that hierarchy functions as a conflict avoidance mechanism: In case of tensions or conflicts with a colleague, a direct dispute is avoided due to the superordinated boss who decides on a higher hierarchical level. If this mechanism is eliminated, in the context of a CAS, all conflicts have to be resolved in a

rather self-organised way on peer-level. To be able to do so, any organisational member needs to be equipped and empowered with appropriate personal skills. However, building these skills requires time and training which implies a strenuous learning phase for any individual member. In this stance 13M stated: *"If I take this conflict avoidance machine away from people then they are left with the conflicts and so I have to give them a functional equivalent that somehow enables them to deal with conflicts in a good way."* (13M).

This implies that any organisational member when collaborating in a complexity-centric leadership organisation must learn that conflicts are no longer resolved at a higher level. It is therefore the role of complexity-centric leadership to address dispute and any antagonism on a peer-level and likewise support to solve them on a peer-level. Additionally, it was emphasised that a basic understanding for conflicts that arise as natural result needs to be created across the entire organisational collective. A CAS like any other social system is made up of individual egos and personal needs, this obviously implies that conflicts may arise. Consequently, conflicts are not longer to be avoided or suppressed but to be stressed and solved collectively. Thus, leadership in a complex organisational system must step into the role of a driving force that is encouraging the team to raise controversies, to point out perspectives and to proactively bring up questions. This requires moderation, coaching and mediation skills on a peer-level. Otherwise, automatically but unintentionally, there will be a fall back into traditional behavioural and thought patterns with a hierarchical leadership authority to issue directives.

5M explained this concluded leadership role while exemplifying concrete moderation and mediation techniques to facilitate a consent with a team: *"You really have to understand the process and concept of consent and to be able to carry it out intuitively. This includes a change of perspectives, understanding other people, really wanting to hear other people, responding to objections but not trying to build a compromise into the process. So, if you have all these competencies, then leadership is, in my ideal conception, the "facilitation of consenting". Facilitating the consent decision. Facilitating this process, NOT making the decision."* (5M).

Since people are generally more likely to avoid tension, it is part of the leadership role to empower the overall organisation and accordingly any single member to address tensions or

conflicts in an unemotional way while aiming on a resolution. You have to be able to say *"what you did was not good, I don't like it, it hurt me, it was too personal for me"*. (10M). Such professional and factual discussion can pave the way to continue working together placidly.

It is concluded that conflict resolution methods, moderation and mediation methods, as basic competences for effective collaboration in a CAS need to be trained adequately among the entire organisational collective to equip the organisational collective with sufficient abilities to deal with each other in a self-organised manner and hence to substitute hierarchy's function. This conclusion is underpinned by 14M who asserted: *"You can see that with all pioneering organisations that deal with each other in a self-organised manner, conflict-solving skills are trained massively from the beginning."* (14M).

The same proactive and open approach applies to dealing with mistakes. Next to perceiving conflicts as naturally when different people are coming together, likewise failures should be regarded as naturally arising when taking over activities. Like any kind of issue, failures should be addressed proactively via similar methods that facilitate a factual approach to failures. Accordingly, 3F, 4F, 11M and 15M proposed to approach failures with the aim on achieving a learning effect for the involved parties because learning from mistakes is a basic principle of self-organisation. Additionally, the interviewees emphasised the importance to make the experience that a failure is understood as learning instead of denunciation. This is what makes up an environment where people feel save to take ownership and potential risks. In this stance 11M stated: *"It's not about blaming, that is, making someone else look stupid. We really ask ourselves, first what happened here, second what do we learn from it and third can we adapt structures so that it doesn't happen again. If that basic openness and willingness isn't there, then self-organisation would be difficult."* (11M).

Supporting this stance, the interviewees shared diverse best practices how the entire organisational collective can be equipped with appropriate conflict, issue as well as failure resolution skills and how leadership might most adequately and proactively encourage issues to contribute to self-organised emerging stability.

According to 1F, 1M, 2M, 3F, 10M, 11M, 13M and 14M, part of the leadership role is to encourage people to dare to make decisions and at the same time not to step into the hierarchy trap what implies to safeguard the decision from a higher instance (if there is still one). 3M and 4F and 11M drew on dedicated training measurements which are embedded within their underlying structure and additionally in the role concept. Therewith they implement addressing ambiguities as a natural activity within their daily collaboration. 3M drew on a dedicated role in their case which was responsible for conflict work on intra team level as well as inter-team level regarding all issues related to collaboration or conflicting opinions. *"This role has the task of decentralised support between individual systems or within one team in the role of a coach or mediator in case of conflicting opinions or questions about joint cooperation."* (3M).

Likewise, 4F stated: *"The role of the steward is responsible for us as a coach and mediator for the anyone's personality development or individual questions of employees"*. (4F). As part of this coaching- leadership role, the focus is on helping people to help themselves by asking questions such as *"have you ever tried to..., how about this opportunity, have you ever talked about it?"* (4F). Additionally, to the steward role, the case of 4F implemented the principle of challenging which implies that everyone can openly discuss any topic with anyone. *"Challenging is a fundamental principle of our organisation. And this "challenging" is explicitly expected."* (4F).

Similar to 4F's challenging principle, the case of 11M relies on "navigate by tension" as principle. 11M noted that this principle alone is enough in their case because almost all members in the organisation maintain coaching or training abilities and thus it is ensured that the organisational collective is equipped with sufficient knowledge about conflict and communication methods, as well as methods for personality development and team building. *"That of course simplifies communication in our organisation a lot, since the basic techniques and tools of the different theories and conflict methods are fundamentally known."* (11M).

2F did not draw on a principle for proactive and transparent communication, however she likewise supported to openly articulate problems and challenges as part of the leadership role even related to own issues. *"To be able and to be allowed to say in your own leadership*

role "I have a problem and I am looking for someone as a sparring partner. How would you do that?" either because this person is an expert or maybe because this person is very far away from this topic and has a completely new perspective on my individual challenge." (2F).

The interviewees further agreed that there are people especially newbies who are inhibited in their open communication and do not dare to speak to everyone directly. These personality traits are already assessed during recruiting, and it is expected to acquire missing skills or to overcome inhibitions latest within learning by doing or learning by witnessing. Further, it was argued that, hierarchical thinking and associated behavioural patterns diminish as the various methods and techniques are grasped. On this aspect 3F regarded accompanying workshops with focus on communication, conflict handling and feedback as most essential to equip people with adequate tools and to encourage their usage.

On this aspect, 15M highlighted the fundamental approach in self-organisation, namely that only indirect measurements are effective because you can neither force abilities to be acquired by other people nor their application. Accordingly, 15M stated: *„We used to try to really teach people constructive feedback and communication, but we found that you can't really teach everyone. That didn't really work out for us". (15M).*

From the 12 interviewees that evidenced fostering non-equilibrium states as complexity-centric leadership role, six interviewees (1F, 4F, 7M, 11M, 13M and 15M) indicted that this role enhances natural leadership emergence in their organisation because it can be assumed by anyone. It was argued that people that proactively encourage potential debates most likely have the natural mentality to take ownership to clarify issues. This attitude may be unconsciously associated by others with assuming leadership. Moreover, proactively addressing not only issues but anything that might be relevant for the collaboration or the organisational collective, implies to push something forward and to make a difference what again amplifies that these members are perceived by the collective in a leadership role.

This argument was evidenced by 4F *"We don't have superiors; hence anyone can assume leadership. We call this situational leadership. That means if someone notices I have an expertise in a topic or I feel very strongly about a topic then everyone is free to take on the topic*

or conflict or whatever it is and then be the leader in that area."(4F). Likewise, 7M confirmed that in the frame of this particular leadership role, natural leadership emergence is automatically enhanced. *"I see a kind of situational leadership, i.e., taking on leadership based on the underlying situation, regardless of the role. Leadership is emergent for me because of the situation where it is particularly needed."* (7M)

In summary, raising potential issues to foster a spectrum of potential outcomes and stressing ambiguities collectively with the intent to enhance overall stability in the CAS as proposed by Uhl-Bien and Arena (2018), Marion et al. (2016), Mendes et al. (2016), Fulop and Mark (2013), and Lichtenstein and Plowman (2009) were confirmed to be inherent in a complexity-centric leadership role. The findings suggest that this leadership role is again amplifying leadership emergence. Moreover, this study confirmed the indirect functionality of this complexity-centric leadership role even when proactively addressing ambiguities. Since direct influence and control are only possible regarding anyone's own behaviour, even direct impact on the structural settings will likewise only indirectly influence other people's behaviour.

5.4.4 Fostering adaptability and stability of single members and the entire organisation

Because of the name alone, adaptability is considered as guiding principle and pivotal ability for a CAS. Question ID 7 (Figure 11) was asked to examine this context. "Is organisational adaptability and single member's adaptability proactively fostered as part of a leadership role? And how / with which measurements is it enhanced most successfully?"

The importance to proactively foster adaptability of the organisational system including its single members was confirmed. Additionally, the need for stability was equally identified during data analysis. Stability is expected to mitigate the adaptability induced non-equilibrium states and to provide orientation. All 19 interviewees confirmed the need to proactively foster adaptability and stability across the entire organisation and its members and regarded to pursue both states as part of the leadership role. Hence, "fostering adaptability and stability of single members and the entire organisation" was identified as third emerging complexity-centric leadership role. These revealed analysis results confirmed

the CLT of Hazy and Uhl-Bien (2015) that ascribed simultaneously fostering adaptability and stability as part of a complexity-centric leadership role.

Literature proposed three different approaches that are likely to foster adaptability of the entire organisation as well as of any organisational member:

- Via trust-based relationships and leadership backup, Uhl-Bien and Arena (2018), Hasel and Grover (2017) and Oeij et al. (2016) asserted to create adaptability and likewise stability. This was confirmed by the interviewees and will be presented in sub-chapter 5.4.4.1
- Via training of the organisational collective to switch from known to new issues and approach them appropriately, Will (2016) advocated for building adaptability. This was confirmed by the interviewees and will be enlarged in the sub-chapter 5.4.4.2.
- Via conflicting and connecting activities, Uhl-Bien and Arena (2018) argued to establish adaptability. This approach was not unveiled among the collected data to foster adaptability. However, conflicting-connecting activities were confirmed as part of the leadership role that is supposed to foster non-equilibrium states, on which was outlined before in the section 5.4.3 before.

Additionally, Marion et al. (2016), Will (2016) and Marion and Uhl-Bien (2001) proposed that fostering adaptability as well as stability is enhanced by leadership only indirectly.

The following will discuss how these measures, look like in the examined robust pioneer corporations of this study. Additionally, it will be touched upon the indirect nature of this leadership role.

5.4.4.1 Leadership role that is fostering both adaptability and stability via informal measurements such as trust and relation building

Fifteen interviewees (1F, 1M, 2F, 2M, 3M, 4F, 4M, 5M, 6M, 7M, 8M, 9M, 10M, 12M and 14M) maintained that within a leadership role that aims on building a trust-based environment and where members can rely on leadership back-up, adaptability is most likely to be promoted across the organisation and its collective. However, only 1F and 2F explicitly pointed out that besides adaptability also stability is required to be built simultaneously within the leadership role to provide formal guidance. Despite of this fact, it is concluded that both adaptability and stability are fostered as part of this leadership role because leadership back-up as well as

trust and relationship building are activities that overall focus on stability respectively that the individual can feel safe. Apart from that, all evidence supported the indirect nature of this leadership role.

1F, 3M and 4M stated that trust is the absolute basis of all cooperation. In order that organisational members feel comfortable and safe, it is essential to continuously maintain a high level of trust. Hence, this leadership role is becoming more and more important. 4M added that without an adequate level of trust within overall CAS collaboration, people do not dare to communicate openly and without fear. Moreover, the interviewees highlighted that a trust-based environment is enormously important for the personal safety of every employee. Especially, in case of unforeseen problems that require to behave adaptable, it was argued that people mainly rely on their informal network respectively on colleagues they trust. This indicates that trust is required to accommodate unusual adaptable behaviour.

How trust is most likely successfully created within a complexity-centric leadership role, was shared within practical insights from the interviewees 1F, 1M, 2M, 3M, 4F, 4M, 5M, 10M. Equally, to the leadership role that is supposed to provide sense via establishing an understanding for underlying dynamics (on that was outlined in section 5.4.2), trust is most likely built with each person individually. Hence the interviewees agreed that meeting the individual needs of the single members when establishing a trust-based environment is an important part of this leadership role. Moreover, since trust is a reciprocal construct that is only built over time, leadership must trust the employees and vice versa, therefore pursuits are required from both sides. 2M drew on this individual trust building process and its need for mutual effort. *"Employee A is happy with one conversation a year. Employee B needs continuous small conversation units to be able to trust the manager. However, many people are not asked what they need, and vice versa, these people do not ask questions either, so trust does not develop"*. (2M).

According to 1M, leadership in a CAS that aims on building a trust-based environment, has to take an extreme leap of faith in the team. This was confirmed by 2F, 3M, 5M and 10M. Beside this, for building trust, a consistent exchange, to talk to each other concretely or based on moderated retrospectives are most effective approaches. Leadership needs to develop a gut

feeling which works best while being an actual part of the team. Accordingly, 10M claimed that *"... leadership needs to first gain or earn trust by proving the team that as a leader you are there for your team and not the other way around."* (10M).

In the case of 4F, such trust building leadership role is particularly defined as role in their applied role concept and therewith naturally emerging and operationalised. To mitigate the formal note of this role and potential inhibitions for open communication, 4F explained that this trust creating role ought to be independent from the "normal" work environment. *"The intention and role of the Stewart is to act as a confidant for employees. so that employees can exchange ideas with one person. To make this work as openly as possible, the steward must not work in the same department or in the same team to ensure that communication is as open, honest and trustworthy as possible. Otherwise, there is the danger that problems will not be discussed openly. Potential barriers to open communication or possible conflicts of interest should not arise at all."* (4F).

A dedicated role for relationship building and personal development was likewise confirmed from 7M. In their case they institutionalised individual's development referring to personality and career within the role concept. This example indicates that a trust-based environment may not only focus on a comfortable and save feeling of the organisational members but also foster their individual advancement and growth in the sense of challenging and supporting: *"I would like to give the employees, who carry the company, someone formally at their side who is a contact person for each individual with regard to their individual problems as well as their personal development. In the sense of a sparring partner who can challenge the individual to stay on a growth path and not just to flounder around in the comfort zone."* (7M).

3M, 5M and 7M particularly raised the importance of leadership back up within a trust-based environment. They argued that the concrete leadership role here is to support and to encourage people within their development and making them feel save and empowered in their working environment to enhance their confidence and in return performance. 5M drew on best practices in the frame of their employed agile coach role both during the initial formation of a team as well as when promoting their continuous cooperation: *"With us, our agile coaches strongly drive finding a team structure. Their goal is to establish an efficient and*

effective team setup. Their cooperation is training by applying routines that help them to function efficiently as a team.” (5M).

3M confirmed this approach while asserting that within this leadership role, an environment should be created that encourages behaviour that matures new ideas or unconventional approaches by asking "what is needed" rather than "yes, but". Only in such a backed-up environment members are likely to feel confident enough to try something and adapt their behaviour in an unusual way. Accordingly, 8M who is the founder of the interview case, defined his primary role of leadership with: *“For me, leadership means being available. Being there for the employees. Keeping my word and deadlines.” (8M).* This quote obviously implies leadership back-up.

As found in chapter 5.2.4.3, to establish trust, a high level of transparency in the entire organisation is very advantageous and in return transparency requires an adequate level of maturity within the organisational collective. Referring to the role of leadership in this aspect, 1F and 2F both emphasised that leadership needs to continually review on whether the employees maintain sufficient capabilities to keep this maturity – transparency - trust relationship in a self-organised way. If not, the leadership role is to put more focus on strengthening trust and security by means of measurements that provide guidance and therewith empower the collective to again collaborate autonomously.

Considering the revealed evidence, it was concluded that adaptability across the entire organisation as well as of any organisational member is most likely to be fostered as part of a complexity-centric leadership role based on trust building relationships and relying on leaderships backup. Because no one can directly make people to behave adaptable and comfortable, this leadership role was confirmed to be of an indirect nature. The building of a trust-based relationship and the feeling of being encouraged adequately first takes time and second does not rely on a linear cause and effect relationship but needs to be gradually established in a reciprocal way. Finally, it was concluded that the creation of an environment where organisational members feel safe implies stability and hence fostering stability next to adaptability was equally assumed to be part of this complexity-centric leadership role.

5.4.4.2 *Leadership role that is shaping conditions that empower the collective to switch from known to new issues and approach them appropriately*

Adaptability is fostered by means of empowering the organisational collective to adapt between known and unknown situations and to approach them appropriately. 10 interviewees (1M, 2F, 2M, 5M, 6M, 7M, 9M, 12M, 14M, 15M) explicitly referred to this course while discussing how adaptability is enhanced within a complexity-centric leadership role. Moreover, the indirect nature of this leadership role was confirmed.

2M, 14M pointed out that effective leadership in complex corporate organisations ought to be aware and able to approach different issues by means of adequate approaches depending on whether they are more predictable or unpredictable. As part of the complexity-centric leadership role, it was assumed to introduce this ability likewise among the organisational collective. Unfortunately, *"there is no best leadership approach. One-size-fits-all is not a valid option."* (2M). Hence *"optimal leadership takes shape between pragmatism and structure in the space"* (2M).

The interviewees drew on a spectrum of experiences they are likely sensitising the organisational collective for different appropriate approaches on the one side for known issues in rather equilibrium states and on the other side for unknown challenges that are closer to the edge of chaos. While discussing this leadership role, 1M and 14M referred to the resilience of an organisation as being prepared for something that happens unexpectedly and being able to adapt very quickly to this new situation. They asserted that this capability needs to be trained consciously to equip organisational members with necessary theoretical as well as practical experiences. Both are important prerequisites to first being able to assess a challenge comprehensively and afterwards being able to apply appropriate approaches. Accordingly, 14M asserted: *"In order to make an organisation more resilient, crisis situations must be actively experienced, so employees can practice dealing with challenges without knowing whether there is a solution and what the best solution might look like."* (14M).

Only by means of intentional practice, members are likely to be empowered as well as encouraged to switch between behavioural patterns from little autonomy to high autonomy. Then the probability that one of these different approaches might be the right one is much

higher. In this sense 1M stated: *"In a complex system it is important to be prepared for all possible things that could happen."* (1M).

Knowing the range of behavioural patterns is enormously important, especially, in areas where something has to be decided quickly. *"If the house is on fire, then there is no need for a voting process then someone just has to say clearly what is going to be done now quickly"*. (5M).

It was found that the most important activity within this leadership role is to train the collective among different behavioural patterns and approaches in formally defined set-ups, cases, challenges and formats. Afterwards reviewing of the applied behaviours is important to reflect why it was handled in this or that way. Only by means of such dedicated practice it is possible to gradually abandon behavioural patterns, e.g., as shyness but instead to dare to be more confident.

"A continuous expansion of dedicated set-ups that require an inter-team cooperation leads to a higher adaptability of the individual staff members, as they are continuously used to, and it is normal for them to adjust to other staff members. Such a mixing also promotes cooperation modes on a meta-level of the organisation as a whole." (14M). This quote indicates that by means of formally planned set-ups that are launched by complexity-centric leadership, teams and single members were regarded to get out of their daily business comfort zone which is most likely to positively impact the organisation's entire level of adaptability.

The cases of 1M, 5M, 6M, 7M, 9M, 14M, 15M drew on best practices how informal approaches that trigger adaptability and different behavioural patterns were launched. During formally established formats, space was created for the emergence of adaptability enhancing informal structures. In this stance, 14M suggested to offer certain days or hours where employees can do exactly what they have in mind, as a challenge in contrast to their daily doing.

Furthermore, leadership could initiate internal pitches. In that way, a stage respectively space was provided where employees could promote own ideas in front of their colleagues. Within such unconventional frames, organisational members can practice dealing with challenges without knowing if there is a solution. Such initiatives were likewise confirmed as task bucket in the case of 1M. He emphasised how ideas were coincidentally shared with people that

already had a similar idea and as consequence contributed to the natural emergence of leadership for the joint realisation of the idea. 1M reflected on such set-ups by stating: *"Only by creating the possibility to behave in an unconventional way, something unplanned and also unpredictable can emerge."* (1M).

In this context, 6M again mentioned their concept of opportunities space (on which was already enlarged in section 5.2.3.5). It is formally defined that 20% of the time can be used to experiment and to adapt approaches to address new challenges. Similarly, 7M advocated for formally prescribing only a rough frame that a team has an orientation towards where it is working. However, the concrete content should emerge precisely based on ideas from individual members or in a team frame. Likewise, in case of 5M there is one day defined for non-operative work. *"4 days are spent working in the squad and one day in the chapter."* (5M). 15M shared in even more detail how such formally defined informal spaces were used in their case: *"This method has a great momentum of its own. In the context of these set-ups, people talk about new product ideas about processes about problems in the company in the organisational structure or who knows what they want - so a space is actively and specifically given to the employees."* (15M).

Independent from the concrete format in place, it was further agreed that such formal events should be time boxed. This has the advantage that a clear free space with beginning and end is defined. *"With all kinds of informal activities that you think they are worthwhile for you and or the organisation as a whole. If something has been achieved by this time then great, in the best case maybe something has been learned, if not then it can be done better next time."* (6M). It was further claimed that this is how people learn to deal with openness to results. This aspect was before identified (see section 5.2.4.1 about maturity) as important part making up one individual's level of maturity and overall contributing to a certain mindset. Finally, 12M summarised the successfully filling of such formally created free spaces with emergent collaboration as *"...the supreme discipline of the leadership role, which is to achieve that these formal structures are then really filled with life while informally cooperating in the organisation."* (12M). Altogether, these best practice examples again underpinned the indirect nature of this complexity-centric leadership roles because they all intent to foster adaptable behaviour in an indirect way.

1M, 5M, 14M and 15M were referring to the potential risk of wasting time when offering space without pre-defined intention. They all explained due to own experiences that unproductiveness was never an issue because these informal set-ups were voluntary. Consequently, people were joining who were keen on trying out new ideas and there are just as many who wanted to continue their work and hence did not participate. *"We have never experienced that 100% of all people only want to generate ideas. In my opinion, in a social system there are always enough people of different natures, which is why diversity is extremely important in a social and hence complex system, so that it automatically results and balances itself."* (15M). 5M again emphasised in this context that employees could simply be trusted much more: *"I personally believe that people are much more empowered than they are generally given credit for."* (5M).

In summary, proactively offering formal space to use informally was confirmed as important part of a complexity-centric leadership because it allows organisational members to adapt between the poles of well-known equilibrium approaches and highly autonomous unknown behavioural patterns that focus on adaptive experimentation. By making understanding that everything is open to change including dedicated training that empowers the collective to approach different issues appropriately, adaptable behaviour is most likely to be fostered indirectly. Moreover, via creating awareness for ambiguities between equilibrium states and the edge of chaos in the organisational collective, not only the level of adaptability is enhanced, but also stable behavioural patterns are trained, which are likely to be applied in stable states. However, the prerequisite is that complexity-centric leadership is self-capable to deal with the different behavioural patterns to adequately support the collective.

5.4.5 Integrating of formal and informal instances in a complexity-centric organisation

While discussing question ID 8: "How would you describe the leadership role in your organisation in relation to the formal and informal instance?", all 19 interviewees agreed on the importance of a leadership role that integrates the differences between the formal and informal instance within their robust pioneer corporations.

It is highlighted that the leadership role that is consciously creating informal space within a formal frame to foster adaptability (outlined in section 5.4.4.2), needs to be distinguished from the leadership role that is aiming on overall balancing the forces of the formal administrative and the informal CAS structure within one organisation. The latter one is the focus of this section.

Fifteen interviewees (1F, 1M, 2F, 2M, 3F, 4M, 5M, 6M, 7M, 8M, 9M, 10M, 12M, 13M, 14M) argued that the comprehensive integration of formal and informal instance or even their unification – although a challenging task – functions as underlying precondition within a robust pioneer organisation because *“formal and informal structure definitely co-exist together in an organisation.”* (14M). Confirming 14M’s statement, 12M mentioned that there is always a formal structure alone due to compliance requirements and hence integration of formal and informal structure is needed. Consequently, “integration of formal and informal instance” was identified as fourth and last complexity-centric leadership role.

The remaining four interviewees (3M, 4F, 11M, and 15M) referred formal measurements to only absolute must have measurements to ensure the fulfilment of mandatory compliance requirements as a corporation. Hence these four organisations did not assume the need for a dedicated leadership role that balances the informal and the formal structure. In contrast to these findings from the interviews, there was an overall agreement among CLT scholars about the existence of and need for dedicated activities as part of a complexity-centric leadership role that integrates the formal and informal power within organisations.

Most complexity-centric leadership scholars (Schulte et al., 2019; Uhl-Bien and Arena, 2018; Bressers and Edelenbos, 2014; Lichtenstein and Plowman, 2009; Uhl-Bien and Marion, 2009; Boal and Schultz, 2007; Uhl-Bien et al., 2007; Schneider and Somers, 2006) advocated for so called “enabling leadership” that is supposed to mediate and integrate the formal-informal tension. Hazy and Uhl-Bien (2015) as part of their CLT, similarly presented a role that is mitigating formal-informal antinomy, but by means of a broader spectrum of concrete activities in contrast to such enabling leadership. An enabling leadership role was confirmed in this study; however, not the entire spectrum of individual activities as proposed in the literature.

Fostering interaction and interdependence (Schulte et al., 2019; Uhl-Bien and Arena, 2018; Bressers and Edelenbos, 2014; Lichtenstein and Plowman, 2009; Uhl-Bien and Marion, 2009; Uhl-Bien et al., 2007; Schneider and Somers, 2006) were proposed to enhance formal-informal tension. This aspect was confirmed and will be outlined in the section 5.4.5.1.

Integration of the formal-informal tensions via immaterial elements according to Hazy and Uhl-Bien (2015) and Uhl-Bien and Marion (2009) as well as material support as claimed by Schulte et al. (2019) was also confirmed. They referred to this as leadership role that equips the informal instance adequately and thus enables a comfortable work environment. On these aspects will be outlined below in the section 5.4.5.2.

Differently, collecting information as part of the leadership role to integrate formal-informal stances as proposed by Hazy and Uhl-Bien (2015) was not confirmed in this study.

Transparently sharing information, in this research was rather regarded as part of the leadership role that is fostering non-equilibrium states (outlined in section 5.4.3) but not with the goal to integrate formal-informal tensions. Neither, distributing knowledge according to Hazy and Uhl-Bien (2015) was confirmed because the investigation of knowledge creation was not in scope of this study. Finally, enabling leadership by means of story or issue telling (Schulte et al., 2019; Boal and Schultz, 2007) was also not confirmed.

The concrete activities that were disclosed to be entailed in this integrating leadership role within existing robust pioneer organisations, will be discussed in the following.

5.4.5.1 Leadership role that fosters integration via supplementation of the formal instance by the informal one

Ten interviewees (1F, 2F, 2M, 3F, 5M, 6M, 7M, 8M, 9M, 13M and 14M) from the overall 15 claimed that the integration of formal and informal structure as part of a complexity-centric leadership role should be established in a way that formal and informal structure supplement each other. 2F explained that this was achieved in her case by relying on the principle "... we focus on what makes sense". *"If an informal pragmatic way leads to the same goal, then there is nothing to be said against it"*. (2F). This is to say that any organisational member is encouraged to behave appropriately according to the underlying nature of issue. Likewise – even not relying on a shared principle – in the case of 5M and 7M formal overarching goals

are supposed to merely provide the frame for a common marching direction. It is consciously not intended that these are broken down or actively influence operational CAS activities. The CAS alone is supposed to fill the informal operational tasks. Complexity-centric leadership, ought to facilitate this by means of empowering the informal CAS instance and therewith supplement the formal frame of the organisation. 1F confirmed this integration via supplementation approach. She further detailed that the leadership role here is regarded to provide orientation within a high-level formal structural frame while deriving supporting activities that encourage the collective to operationalise this frame quite autonomously. 5M defined this combination as *"enabling constraint; this term sums it up pretty clearly"*. (5M). Referring to this term he further explained on the actual role of leadership which is to facilitate the process of defining the structural frame so that everyone feels to be able to contribute and to be heard. This ensures the understanding within the organisational collective for the reasons of this frame and its shape. Finally, leadership should achieve that any member feels comfortable with this field of work where formal and informal instances are integrated.

From a different perspective, 1F and 1M asserted that integration is only successful if the informal instance can create acceptance, is taken seriously and is respected by the formal one. To gain respect is regarded as important leadership role. 1F shared that they were only taken seriously when their CAS won a high ranked internal prize in the corporation: *"We have gained attention by winning an important internal company award"*. (1F). As part of the leadership role, she proposed to be able to justify the purpose and the positive impact to the formal instance. Leadership has to *"...achieve that our network is seen as impact creating in the hierarchical group, which means that we don't just meet for fun, otherwise we have no reason to exist. In my opinion, this is a relatively good way to get ahead"*. (1F). Only if there is an advantage for the formal organisation, back up can be demanded. Likewise, 1M recommended such formal legitimisation of the informal system. He advocated for the involvement of the formal hierarchical structure from the very beginning to ensure formal protective space of the informal structure rather than fighting for a protective space. *"We found that with early involvement, it can be illustrated better that the informal systems also bring benefits to the formal corporation"*. (1M).

In the context of establishing acceptance and respect for the informal system as part of the leadership role, 1M additionally highlighted that this is currently a good time to successfully achieve this because self-organisation and agility concepts are in vogue and top management likes to present these successful prestige projects.

The interviewees confirmed a complexity-centric leadership role that aims on the inclusion of the informal instance in the high-level formal frame while deriving support measurements that encourage the operationalisation of the informal CAS. Additionally, referring to this aim it was mentioned that the informal system should gain respect and legitimisation from the formal one.

5.4.5.2 Leadership role that fosters integration via elimination of obstacles between formal and informal instance

Beside the integration of the informal instance inside the formal one, 8 interviewees (1F, 1M, 4M, 5M, 7M, 9M, 10M, 12M) from the overall 15 advocated for an integration by means of eliminating obstacles such as administrative requirements as well as faulty working equipment that are likely to hinder collaboration between formal and informal instance. This indicated that it was assumed to decrease formal impediments as part of the complexity-centric leadership role. Therewith it is intended to first protect the informal system and second facilitate its unhindered informal collaboration. Since such barrier-free and protected work environment was regarded as immaterial element and functioning working equipment was referred to as material element, the results from this study confirmed the theoretical propositions from Hazy and Uhl-Bien (2015), Uhl-Bien and Marion (2009) and Schulte et al. (2019), as listed above in section 5.4.5.

It is highlighted that very similar wording was used among 6 different interviewees while drawing on the leadership role assumed for this aspect:

"It is supposed to enable people to work undisturbed." (1M)

"Central role of leadership is to keep the team free to work undisturbed." (10M)

"...to remove the sticks that block working in real working life." (4M)

"... supposed to remove stumbling blocks from the employees' way that hinder their work."
(7M)

"... you just don't have to put obstacles in the way of the employees". (5M)

"...to remove blockades". (9M)

On the leadership role related to the protection of the informal system from work obstacles due to formal requirements, 4M explained that based on feedback from employees, the approach was derived that an ideal working environment consists of unhindered work and adequate resources. Thus, as part of the leadership role, it should be pursued to facilitate a flow experience while working. On this stance, 4M cited an employee's statement: *"If everything would run smoothly at work, so that one could work sensibly, I would not need any further additional measurements."* (4M).

In this context, 1F and 12M additionally emphasised the need for dedicated activities when new team constellations are formed. Hence, it was asserted that for people who do not yet know established processes and structures, leadership must learn if they are equipped with anything materially and immaterially that allows them to work proactively and additionally if they feel comfortable. This is important because new employees often have an inhibition to demand. Confirming this approach, 12M named this leadership role for new people as *„docking point"* (12M).

The case of 1M was set up as an island CAS in one of the largest plant engineering manufacturers in Germany. 1M shared how an undisturbed work environment due to deliberation from formally required administrative tasks and the omission of planning and forecasting activities accelerated collaboration procedures in the CAS *"...that would never have planned in this way before"*: *"Our success is not only based on price but also on our ability to bring new products to the market extremely quickly. When a new type of gas turbine comes along, we can build it within a very short time. No other supplier has this ability."* (1M). This finally resulted into monetary advantages as well as improved customer satisfaction as to say overall positive final organisational outcomes. In retro perspective 1M reflected on this successfully experience: *"The staff there has gained an incredible energy. They have become a*

really strong unit that fights to continue living and working like this." (1M). This quote emphasised that the effectiveness in CAS collaboration and a unite feeling was indirectly amplified by lessen the requirements of the formal instance. This in return enriched the workflow experience in the informal CAS and positively influenced overall organisational outcomes. Since this insight was based on the successful integration of an informal island CAS inside a big formal manufacturing corporation, it was concluded that complexity-centric leadership is likely to profoundly balance the tension between formal and informal instance even in such challenging constellation.

The findings indicate that – despite its only indirect influence on the behavioural patterns of the organisational collective – complexity-centric leadership may have the potential to contribute to overall positive (monetary) organisational outcomes. Altogether, the findings confirmed an informal-formal balancing complexity-centric leadership role that is creating a comfortable work environment where organisational members feel safe and empowered by means of equipping the informal instance adequately and deliberating it from formally induced impediments.

5.4.6 Decision taking was not regarded as part of a complexity leadership role

As revealed in section 5.2.4.2, all 19 interviewees drew on a high level of transparency referring to the disclosure of information. Thereof 17 interviewees (1F, 1M, 2F, 3F, 3M, 4F, 5M, 6M, 7M, 8M, 9M, 10M, 11M, 12M, 13M, 14M, 15M) regarded such collective availability of information as main underlying condition to comprehensively facilitate distributed decision making in the explored complexity-centric leadership organisations.

10M advocated that *"the basic empirical assumption is that fundamentally better decisions can be made if one has information."* (10M). And 3F argued that *"The greatest possible transparency of information is needed so that teams and people in their roles can make the best possible decisions."* (3F). Therewith 3F provided roles respectively the role concept application as underlying conditions for how decisions are made in complexity-centric leadership organisations. Consequently, taking decisions was revealed as not assumed as part of a complexity-centric leadership role. Instead, and similarly to any other operational task,

taking decisions is shared across the entire organisational collective within any role mainly while applying the role concept. The following evidence underpins this approach:

"Decisions are not taken centrally; everyone has to make their own decisions. Everyone has to take responsibility for what they do." (15M).

"Everyone has to deal with the decision that concretely affects them. This is how the assumption of more responsibility takes place." (8M).

"The aim is to keep the decision as decentralised as possible." (7M).

"In the end, the people who hold the role make the decision" (1F).

3F and 8M explicitly stated that decisions should be made where the impact of the decision is. Correspondingly to any other operational task, for taking decisions, complexity-centric leadership was regarded to support this process within a facilitating, encouraging or coaching function while removing impediments that may hinder making decisions.

This stance was exemplified in the quote of 2F: *I see the central role of leadership in a decision facilitator function to help the team in decision making or learning the process. Not in the sense of we are doing this because I know this, instead to show possibilities with emphasis on "but please go your own way".* (2F).

That organisational members in their roles are empowered to make the best possible decisions based on transparently available information, was explicitly confirmed by 10 interviewees (1F, 1M, 2F, 3F, 4F, 9M, 11M, 13M, 14M, 15M) as part of a complexity-centric leadership role. Confirming this perspective 9M stated: *"Decisions can only be made on the basis of transparent information. The flow of information must be ensured so that teams can work together autonomously and informally without hindrance."* (9M).

The majority of interviewees referred to a decision-by-consent approach which implies to quickly make a decision that is safe to try but open for adjustment after implementation. Opposing voices must be formulated in a positively improving way and the role of leadership is to facilitate this process. This implies a willingness to change one's perspective and wanting to hear and to understand other people. 5M drew on challenges related to such

consent decision making from a complexity-centric leadership role: *"Facilitation of consent - in other words, not making the decision but facilitating this decision-by-consent process in which all opinions are really considered and to see if we have really found a solution that is enough for now and that we can now try without trying to build a compromise into it."* (5M).

Simultaneously, the interviewees emphasised the necessity to develop an adequate understanding of this leadership role which is often a learning process. Consequently, the behavioural and thought patterns that decision making is associated to the underlying role instead of (hierarchical) authority needs to be likewise established in the mindset of the organisational members. 3F shared how leadership is most likely to support the decision-making process itself while likewise gradually establishing a corresponding mindset *"People should be given tools, such as a resistance questionnaire, to make their own decisions. With the learning of the different decision-making techniques, this hierarchical thinking, including the hierarchical behaviour, is also minimised."* (3F).

Some interviewees raised that one common misunderstanding in public perception is that self-organised teams are often associated with continuous and pointless discussions that do not lead to final decision taken due to the peer level set-up (1F, 3F, 4M, 6M, 8M, 11M, 15M). In the same breath they explained that self-organisation implies that everyone has a purpose, and it is anyone's own time that would be wasted – in contrast to the eight hours that need to be spend in any case in a traditionally organised company. As consequence, communication within the frame of CASs is more focused. 11M and 3F shared reasonably experiences for this explanation: *"In the traditional hierarchical thought pattern, pointless discussions take place because the eight hours that you have to complete are usually given. Within the framework of self-organisation, everyone wants to create an impact and we don't need a boss to tell us how to archive something."* (11M).

3F explained that underlying roles and the consistent use of the role concept enhances joint decision making: *"...the communication effort, is greater in self-organisation, the time effort is not necessarily because what has to be communicated and decided takes place in a shorter period of time. So, you don't have these meetings anymore where it's not clear what the goal of the meeting is, where there are often people who don't have to be in a meeting. For selecting*

participants, you think about what role we need in the appointment. Meetings should generally only be set up depending on the roles.” (3F). A wide spectrum of best practices and decision techniques was shared for how decisions are likely to be taken effectively and efficiently without hierarchical authority but on peer level. In the organisation of 12M a central decision model toolbox is available that everyone can access and see how decisions can be made in different ways. At the same time, teams also have the possibility to join dedicated decision-making workshop. Overall, the interviewees agreed that the choice of decision-making method depends centrally on the nature of the decision.

Surprisingly, the interviewees proofed that taking decisions was not regarded as part of a complexity-centric leadership role. Due to the embedded patterns to share responsibly for any task across the organisational collective, accordingly taking decisions is shared across the different roles and is not associated anymore exclusively to leadership. Consequently, it was concluded that these structural elements in combination with a certain mindset (as outlined in section 5.2.4) were most likely and effectively facilitating comprehensive decision taking across the entire organisational collective.

5.4.7 Summary RQ3 – Emerging complexity-centric leadership roles

Four complexity-centric leadership roles were disclosed to be emergent within real robust pioneer corporations. These roles are perceived to be of an indirect nature without power to directly impact organisational outcomes or organisational members but to indirectly establish an environment where organisational members feel empowered and save. Accordingly, this was defined as main theme akin to RQ3 as shown in Figure 18. Therewith the overarching literature proposition about the indirect nature of complexity-centric leadership was confirmed (Wu et al., 2018; Braun et al., 2016; Marion et al., 2016; Will, 2016; Marion and Uhl-Bien, 2001).

Providing sense, meaning as well as a common purpose was unveiled as first complexity-centric leadership role since this is especially essential for a system without hierarchical instructions. Meaning and purpose is supposed to enable the organisational collective to go in the same direction. This is most successfully done within a joint emerging bottom-up process and dedicated events where the entire organisational collective is participating.

There, complexity-centric leadership is required to identify an intersection of all needs and expectations and based on that, to provide an inward orientation. Additionally, sense and purpose should be derived as part of the leadership role within daily activities. By means of bi-directional communication it is essential to unveil the individual's impact to the overall organisation. As third activity to provide sense most likely, establishing a comprehensive understanding for underlying organisational dynamics was disclosed. Only if members are equipped with sufficient information, they feel adequately encouraged and empowered to engage into organisational dynamics.

Raising non-equilibrium states via proactively addressing issues was defined as second complexity-centric leadership role. This leadership role is especially required in a CAS set-up because traditionally hierarchy before liberated from discourse. In the context of a CAS, all conflicts must be resolved in a self-organised way on peer-level. As part of this leadership role, it is supposed to encourage the transparent articulation of issues which in return is likely to contributed to overall clarification. This implies that one pivotal complexity-centric leadership activity is to facilitate conflicts and to bring understanding for ambiguities to the team. To be able to do so, any organisational member needs to be equipped and empowered with appropriate personal skills such as conflict resolution methods as well as moderation and mediation techniques. As basic competences for effective collaboration in a CAS these need to be trained adequately to equip the organisational collective with sufficient abilities to deal with each other in a self-organised manner.

Fostering adaptability of any single member and across the entire organisation was found as third central complexity-centric leadership role. Since causality is not applicable in a CAS, adaptability functions as guiding principle. Adaptability and likewise stability were disclosed to be built most likely within a trust-based environment. It was asserted that without an adequate level of trust within overall CAS collaboration, people do not dare to communicate openly. As part of this complexity-centric leadership role, an environment should be created that encourages behaviour that matures new ideas or unconventional approaches. It was found that such trust building leadership role may be institutionalised in the frame of concrete defined roles that can be applied in the role concept of an organisation. Only in such a backed-up environment, members are likely to feel save and confident enough to try

something and to adapt their behaviour in an unusual way. Likewise, it was found that adaptability is fostered by means of empowering the organisational collective to adapt between known and unknown situations and to approach them appropriately. To do so, the collective of an organisation needs to be equipped theoretically and practically with a spectrum of methods that enable them to respond to unforeseen situations. Accordingly, the most important activity within this leadership role is to train the collective among different behavioural patterns and approaches. This could be achieved within formally defined formats that are used by the organisational collective informally while experimenting on new ideas. In that way organisational members learn to step out from their conform zone and to approach different topics with different colleagues by means of different behaviours.

The integration of formal and informal instance was found as fourth and last central complexity-centric leadership role because alone due to compliance requirements, there is a formal structure in any organisation. Integrating an emergent CAS into the formal structure is most successfully triggered by means of creating informal space with the highest possible degree of autonomy inside the bigger formal playing field. By means of deriving support measurements (e.g., the deviation of informal measures that may thrive the organisational members' maturity and personality) the operationalisation of the informal CAS is most probably encouraged. Additionally, as part of the leadership role formal impediments such as administrative requirements or faulty working equipment are supposed to be reduced or even eliminated which might trigger unhindered informal collaboration. Finally, complexity-centric leadership should achieve that any member feels comfortable and able to contribute within her or his field of work. Both approaches do not have the potential to directly achieve integration. They focus on the adjustment of environmental settings and as consequence aim on influencing certain behaviours of the organisational collective. This again underpins the indirect role of a complexity-centric leadership in robust pioneer corporations.

Chapter 6: Contributions, limitations, and future research

6 Contributions, limitations, and future research

Chapter 6 will first review the research journey of this study in section 6.1. Afterwards, it is reflected to the three RQs of this thesis in section 6.2. The contributions of this research to knowledge are present in section 6.3 and the ones to practice are outlined in section 6.4. The limitation of this study and opportunities for future research are illustrated in section 6.5. Finally, this chapter will close with the reflective positions of the author in section 6.6.

6.1 Review of research journey

The underlying rationale and necessity for this research lies in the fact that the majority of traditional (hierarchical) organisations present an unrealistic image of a complex organisational living system (Davenport, 2017; Lowe, 2017; Reeves, 2016; Zeuch, 2015; Hamel and Zanini, 2014; Pfläging, 2011). Due to the complexity that is inherent in any organisation, traditional leadership concepts are not capable anymore to ensure the organisational survival by means of Tayloristic approaches that are based on a linear postulate. By applying the principles of complexity theory to leadership, the organisation is acknowledged as a complex living system made up of human beings (Marion and Uhl-Bien, 2001). From this perspective, the research aim – to analyse how complexity-centric leadership evolves in robust pioneer organisations – was approached.

Organisational complexity theories and CLTs were reviewed that regard leadership as an emerging organisational phenomenon that better deals with complexity via accepting and integrating its characteristics instead of controlling or commanding. Therefore, the literature review was undertaken in chapter 1.7 corresponding to the underlying research aim and its derived objectives: First, with focus on underlying conditions and patterns that foster complexity-centric leadership emergence (sections 2.5 and 2.6), second on the emergence of complexity-centric leadership (section 2.7), and third on actual roles of leadership (section 2.8). From the gaps that were disclosed during the literature review, the RQs of this study were derived:

RQ 1: What are the conditions and patterns necessary for complexity-centric leadership?

RQ 2: What patterns facilitate the emergence of complexity-centric leadership?

RQ 3: Which leadership roles are emerging in complexity-centric leadership organisations?

To answer these RQs, eight must-have questions for data collection were defined. This research approach is displayed in Figure 11. Primary data was collected qualitatively via 19 semi-structured interviews with experts from exiting robust pioneer companies that apply complexity-centric leadership. The audio recorded interview data was transcribed and analysed by means of the thematic analysis process which was operationalised by the application of the software tool Nvivo. This methodological approach was explained in chapter 2.9.

Based upon the analysis of these collected insights, the theoretical framework of Figure 19 was developed. This framework for complexity-centric leadership in robust pioneer organisations represents the results of this study. It integrates the disclosed findings in relation to the underlying research questions. Therewith it meets the overall aim of this research and answers its derived RQs. The concluded essence of these answers and the drawn contributions to knowledge and to practice will be outlined in the following sections.

6.2 Reflections on the research questions

6.2.1 Reflections on conditions and patterns for complexity-centric leadership

Structurally embedded conditions and patterns together with a particular mindset were unveiled as core elements to facilitate the emergence of complexity-centric leadership and its emerging roles in existing robust pioneer organisations. These both main themes were regarded as two sides of one coin that cannot be handled without one another. One determines the other and vice versa and only in combination they ensure complexity-centric leadership to happen. Subsequently, it was concluded that both aspects need to be stressed among the organisational members with equal importance and in a concurrent way.

Four pivotal conditions and patterns of macro interaction were disclosed that drive complexity-centric leadership. A holistic structure without units as artificial barriers but underlying embedded dependencies were identified as first two conditions because they set the basis for – third – the distribution of (leadership) responsibility via the application of a mandatory role concept – as fourth condition. Such role concept functions as critical element to operationalise and institutionalise behaviourally as well as mentally that responsibility for

certain tasks including leadership responsibility can be assumed across the organisational collective. Thus, its mandatory applicability for any organisational member was disclosed as core to structurally embed the concept of shared responsibility and to enable that it is lived within behavioural and thought patterns. This is supposed to form the required mindset across the organisational collective.

Via assuming leadership by any member, it is intended to become normal for anyone to adapt between the roles of followership and leadership according to underlying tasks. Nonetheless, leader-follower antagonism is not yet an outdated approach because true equality among the entire organisational collective is probably not achievable. Consequently, it was concluded that a holistic structure with underlying dependencies and distribution of any task via the role concept have the power to gradually dissolve the leader-follower antinomy.

It was found that CAS collaboration and accordingly emergence relies on formal back up and is usually triggered in a top-down approach. Therefore, it was confirmed that emergence is not free. The results indicate that emergence may start locally in an informal way. This may happen via informally initiated local grassroots movements or formally initiated island solutions within a bigger frame organisation. The incompatible underlying behavioural patterns of formal and informal instances may heavily collide at their interfaces. Thus, it was concluded that informal emergence inside a formal structure is most likely not sustainable. However, formally launching an informal island CAS, was found as a reasonable option to initiate CAS emergence especially in existing big corporations because it is nearly impossible to just change their organisational structure in a big-bang way. Hence, island solutions provide a realistic option to gradually promote CAS emergence.

There was no evidence collected that provided a maximal or limiting number of single CASs in one organisation, instead it was concluded that the identified conditions and patterns including the underlying mindset function as emergence-limiting settings. Accordingly, CAS emergence was found to be limited mainly by the organisational perspective and its corresponding mindset towards the edge of chaos. This is to say how much chaos is possible to be allowed and how much equilibrium is needed. Consequently, it was concluded that CAS

emergence is limited by the extent to what an organisation shares transparently available information and thereupon trusts and dares its employees to make self-organised conclusions on CAS level.

This consideration is primarily dependent on the underlying maturity of the organisational collective. Across the explored robust pioneer organisations, it was found that the level of maturity is positively related to the level of transparency and trust as well as negatively related to the application of traditional controlling measurements. On this relationship it was concluded that transparent communication by means of sharing progress and challenges in a common format and openly is an essential aspect for successful trust-based CAS collaboration within existing robust pioneer corporations.

The identified specification of mindset revealed in this study is not entirely in line with the one revealed in the literature review. Mindset in this study was depicted as the sum of any single member's maturity and how the dynamic relationship of transparency-trust and controlling elements is institutionalised within the organisational structure. By adding maturity as capability of the organisation and its members, this study's mindset-conceptualisation is extending the literature one. Literature presented organisational values, shared beliefs and purpose as core elements to make up a certain organisational mindset. Moreover, the importance of mindset and the building of an adequate mindset, was identified with much higher worth across the interviewees in contrast to the note reviewed in literature. However, comprehensively enabling these behavioural and thought patterns that frame such adequate CAS mindset, requires training to sufficiently equip all organisational members with the needed capabilities.

These conditions and patterns together with an adequate mindset, set the scene for subsequent activities in the analysed robust pioneer organisations. This also explains why conditions and patterns have such a high weighting compared with the two other analysed aspects of leadership emergence and roles.

6.2.2 Reflections on the emergence of complexity-centric leadership

The comprehensive integration of structural elements together with an appropriate mindset determine CAS collaboration and hence facilitate the emergence of leadership. Leadership emergence based on such twofold sources is concluded to contribute to dedicated emergent complexity-centric leadership roles in the explored robust pioneer organisations.

Particularly, due to the structurally embedded and institutionalised distribution of (leadership) responsibility (via the application of a role concept as outlined in chapter 5.2.2.3), it was found that complexity-centric leadership is supposed to establish the corresponding mindset. That is to say, leadership may create an understanding that leadership is an activity that can be assumed by any organisational member related to one own's individual tasks. Since roles are changing over time, it was concluded that sooner or later, it is everyone's turn to take on a leadership role. Correspondingly, it is supposed to become normal for any organisational member to step into a follower role for one task and to assume a leadership role for another task. This finally implies natural leadership emergence.

6.2.3 Reflections on emerging complexity-centric leadership roles

Providing sense and meaning for organisational dynamics was revealed as first complexity-centric leadership role because it is assumed to substitute hierarchy that traditionally provided structural orientation. This is likewise assumed for the second identified leadership role – proactively addressing potential issues that in the first step may result into disorder, however when successfully resolving issues, paradoxically self-organised emerging stability is resulting. Hence, it was concluded that these two complexity-centric leadership roles are mainly important to substitute the classical functions of hierarchy in the existing robust pioneer companies. However, to ensure adequate replacement, an appropriate mindset of any organisational member needs to be establishment as well as concrete methods and capabilities need to be trained to proactively address tensions.

As part of the further two roles, complexity-centric leadership is assumed to successfully navigate in the field of tension between equilibrium und edge of chaos. One the one hand adaptability and stability must be balanced and on the other hand informal and formal instances have to be integrated in the frame of these two complexity-centric leadership roles.

Consequently, it was concluded that the art of successful complexity-centric leadership is to balance a CAS between as much formal guidance as necessary and as little as possible.

Every organisation and every CAS are made up of organisational members as social elements. Thus, their dynamic interplay is individual for any organisation. Consequently, there is no best practice for this balancing challenge. This is equally true for complexity-centric leadership activities that aim on creating an understanding for underlying organisational dynamics (section 5.4.2.3). Moreover, it is also applicable for activities as part of the leadership role that is fostering adaptability and stability via informal measurements such as relationship building (section 5.4.4.1). Therefore, it was concluded that both aspects can only be encouraged with each member on an individual basis. If anyone in the organisation is empowered individually and feels safe to dare something, consequently the system can evolve naturally while releasing the full potential from the CAS.

Since formal structure is always a part within any organisation, its integration with the informal instance – regarded as a CAS – was unveiled as one pivotal role of complexity-centric leadership. Beside this aspect, organisational members need to feel secure in the organisational environment to release their full potential instead of being caught as pawns between the fronts of formal and informal instances. To achieve this, complexity-centric leadership ought to derive supporting activities that encourage the collective to operationalise the informal CAS frame quite autonomously. If informal CAS emergence is facilitated in a way that the formal frame is supplemented, integration was concluded to be successful.

As confirmed by all interviewees, formal structure is not per se limiting informal CAS emergence. This was revealed in contrast to the overarching literature note. The analysed data rather framed formal structure as guiding and orientation providing element with the potential to supplement informal autonomous operations if purposefully integrated as part of the leadership role. However, it was simultaneously revealed that formal measurements which are not absolutely mandatory, might imply a control instance and thus potential distrust. Therefore, it was concluded that concrete measures for integrating the formal and informal instance can also be traced back to an underlying mindset towards the employees

and CAS collaboration, namely either they are trusted or not. This is likewise applicable and hence concluded for the deployment of measures for controlling. However, establishing a mindset of truly trusting organizational collectives is a difficult challenge for organisations as a whole as well as for individuals in their complexity-centric leadership roles as classic behavioural and thought patterns are embedded since the industrial age.

It was further concluded that complexity-centric leadership is concerned with the development and the understanding of the own personality. To do so, capabilities need to be maintained or developed that allow any organisational member to master the revealed leadership roles for one own's tasks and activities. Complexity-centric leadership is about learning and becoming aware of the individual's reactions to own behaviours. Hence, it was concluded that only if understanding of organisational dynamics and own personality is profoundly established, one is probably capable to support other organisational members with building these capabilities.

The indirect nature was revealed as central theme for all four emergent complexity-centric leadership roles. The complexity principles especially non-linearity without direct cause and effect relation were concluded as underlying reason for their indirect characteristic. Since behaviour of other people is unlikely to be influenced directly, complexity-centric leadership most likely indirectly impacts behavioural and thought patterns of organisational members. It was evidenced that even indirect measurements contributed to enhanced monetary organisational outcomes because they were found to enhance the level of adaptability and to facilitate profound formal-informal integration. Therefore, it was concluded that also indirect interference in the frame of complexity-centric leadership is likely to result into overall positive organisational results.

Advantageous (monetary) impacts due to an enhanced level of organisational adaptability are very likely because adaptability is becoming more important considering the increasing fast pace in product life cycles or economical and most recently political environments. If an organisation and its members are used to behave highly adaptable, they will not fall into panic but rather adjust their patterns in case of unforeseen situations. Consequently, it was concluded that complexity-centric leadership is needed to foster an environment where

organisational members feel empowered and safe to adaptably apply new behaviours and to assume (leadership) responsibility.

6.3 Contributions to knowledge

The aim of this research was to analyse how complexity-centric leadership evolves in robust pioneer organisations. The framework in Figure 19 for complexity-centric leadership in robust pioneer organisations integrates the disclosed findings and conclusions drawn from this research including their relation among each other. It is the result of this study and answers its aim and RQs. As such, this framework furthermore implies the derived contributions to knowledge and to practice.

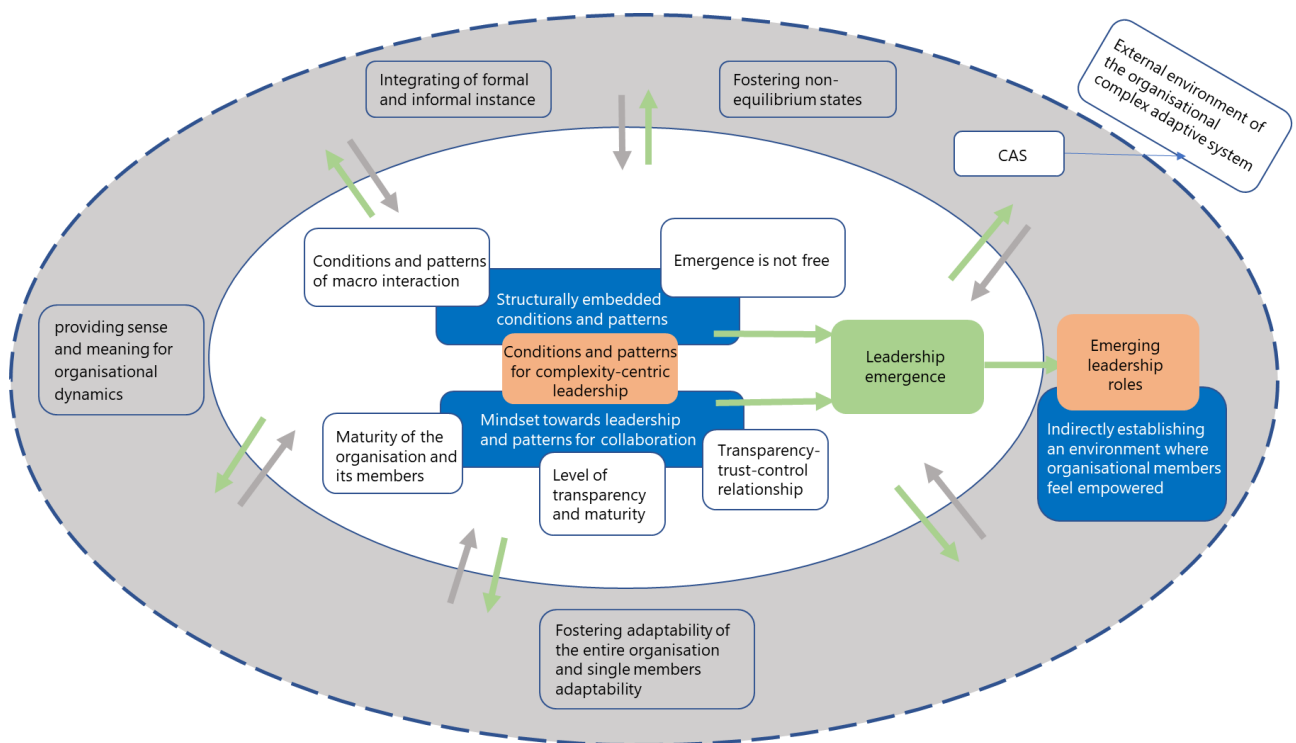


Figure 19: Integrative framework for complexity-centric leadership organisations

The first, original contribution to knowledge from this research lies in the disclosed causality between conditions and patterns of macro interaction and complexity-centric leadership emergence. Research so far did not conceptualise the interconnection among the macro level in terms of interplay on system-to-system level in contrast to interaction among individuals in a CAS. This was identified as main sources for divergences that are not explainable in quantitative studies (Braun et al., 2016; Marion and Uhl-Bien, 2001). While identifying pivotal

conditions and patterns of complexity-centric leadership in robust pioneer organisations, this central literature gap was addressed. The conceptualised causal relationship between conditions and patterns as sources for leadership emergence and actual complexity-centric leadership activities is a novelty because it was unveiled inside a complex system that is not underpinned by cause-and-effect explanations due to its underlying dynamic non-linear nature (Kauffman, 1993).

The findings from this qualitative research indicate that macro interaction in robust pioneer organisations functions based on the dynamic interplay of the four identified conditions and patterns. These elements are the principal sources and can be embedded formally and structurally. Mindset as well as the level of transparency and its relation to control measurements also function as sources, however these cannot be structurally imposed because they are rather built up gradually. Solely conditions and patterns are formally embedded requirements that fundamentally allow the emergence of complexity-centric leadership and hence function as causal conditions in the complex system. The derived framework of Figure 19 visualises this integral conception of the three research aspects of conditions and patterns, leadership emergence and leadership roles in an original and causal way.

Particularly, these unveiled conditions and patterns for macro interaction were found with a twofold dynamic function: First, they facilitate the emergence of complexity-centric leadership because they allow that the four complexity leadership roles can be assumed by any organisational member (as displayed in the green arrows). Second, empowering, the organisational collective as part of all four leadership roles, manifests the underlying patterns and conditions including mindset. This in return amplifies that complexity-centric leadership co-emerges (as displayed in the grey arrows). Sense and purpose for activities, addressing issues proactively, adapting to different requirements and collaboration without obstacles – these four leadership-induced practices again facilitate to assume leadership – at least for dedicated tasks. This identified consequence implies an emergence loop between conditions and patterns and leadership roles which is pictured within the parallel position of green and grey arrows. Therewith the integrative framework for complexity-centric leadership presents an original contribution to knowledge and provides a tool for academics and researchers. It

supplements and advances current literature that examined the sources of leadership emergence and leadership behaviour when incorporating the underlying structure of an organisation (Acton et al., 2019; Schulte et al., 2019; Hazy and Uhl-Bien, 2015; Uhl-Bien et al., 2007).

The second, original contribution to knowledge from this research is the high importance and necessity of an adequate mindset that was disclosed across all robust pioneer organisations that were analysed in this study. This has not yet been profoundly investigated and incorporated within existing conceptual frameworks in this research field (Acton et al., 2019; Schulte et al., 2019; Uhl-Bien and Arena, 2018; Hazy and Uhl-Bien, 2015; Lichtenstein and Plowman, 2009). As displayed in the integrative framework of Figure 19, the three blue boxes represent the central aspects that were unveiled or confirmed within this study. Amongst them, mindset was disclosed with equal importance. The high relevance of such particular mindset and its inherent thought and behavioural patterns function as equivalent source – besides structurally embedded conditions and patterns – for the emergence of complexity-centric leadership in existing robust pioneer companies. Literature before relied on complexity principles as main sources for emergence (Uhl-Bien and Arena, 2018; Uhl-Bien and Marion, 2009; Uhl-Bien et al., 2007). While conceptualising this complexity-centric leadership-mindset it was additionally revealed that this is not created directly in the frame of a complexity-centric leadership role but only built gradually and indirectly via training and supporting measurements. Consequently, complexity-centric leadership is capable of reinforcing or encouraging the behavioural patterns of such required mindset.

These two contributions were only possible to be identified due to the deep insights that were collected in the frame of interviews with complexity-centric leadership experts. These experts could draw on reasonable practical experiences exactly from complexity-centric leadership approaches in robust pioneer organisations that are existing. This qualitative research is in contrast to insights gained from experimental set-ups, which was done by a major part of the reviewed literature. Consequently, the methodological approach of data collection for this study substantiates its drawn conclusions because this data base allowed to derive profound conclusions for exactly such complexity-centric leadership set-up.

6.4 Contribution to policy practice

The practical contributions derived from this research are directed to organisations and leadership practitioners that are willing to develop their leadership approach towards a complexity-centric leadership. The practical contributions are supposed to support organisations that are willing to take the journey towards complexity-centric leadership. Additionally, they are intended to encourage companies that already started this journey and that want to refine already integrated complexity-centric leadership practices. The framework of Figure 19 can be used as tool for leadership practitioners and organisations during any stage of such transformative journey because it integrates the success drivers for robust pioneer companies. Thus, the practical contributions are for all companies that endeavour to transform their selves into robust pioneer companies. Furthermore, it is also for organisations that want to be prepared for survival in the complex environment of our rapidly changing world in which no reliable predictions can be made any more. Finally, these implications are dedicated to any organisation that wants to survive.

A practical contribution for recruiting activities is to focus on people who are adaptable and who can handle high levels of result openness instead of people with A level grades. For existing employees, trainings should be offered with focus on adaptable behaviour according to different contexts. This is most successfully achieved within formally defined and time-boxed formats that trigger to step out from a conform zone and to approach different topics with different colleagues by means of different behaviours. Concrete formats could be internal pitches, open days or hours that are prone for experimentation. To comprehensively train new habits, it is important to review the applied behaviours and to reflect why it was handled in this or that way. Only by means of such dedicated practices it is possible to gradually abandon traditional behavioural and thought patterns in practice.

The employment of dedicated trainings for self-assessment and professional communication as well as feedback giving and receiving is a practical contribution to reasonably provide formal organisational trainings. Likewise, personality training and understanding of own behavioural patterns should be offered to all members in organisations that aim to introduce complexity-centric leadership. These kind of training measurements are essential because they all aim on leveraging the level of maturity across the entire organisational collective. As

consequence, traditional hierarchical induced management trainings or MBA degrees might gradually to become useless.

As practical contribution considering the applications of IT tools, it is suggested to apply videos which are available for anyone on the intranet, and which show exactly how principles are lived in the organisation in the context of concrete behaviours in certain situations. Within such interactive videos especially new organisational members can get to know colleagues and their range of activities. Contact can be established easily if the video links to the respective slack channel and relevant person to contact.

Since big corporations cannot just change their organisational set-up, truly implemented island solutions are the most viable way to stay or become again competitive and innovative – given the speed of smaller competitors. The most important practical implication for leadership on this aspect is likely to mitigate the contradictions of the two organisational worlds and to translate between them. For comprehensively launching and integrating a CAS island inside a huge corporation, the following two practical contributions are derived for the structural set-up: First, the bigger formal organisation should not require traditional administrative measurements from a CAS but instead acknowledge that a CAS – as its name implies – is adaptive in its nature. Second, the bigger organisation needs to equip the CAS with required resources to reach the CAS purpose. Such formal back up mentally and monetarily might be the biggest advantage of an island solution in comparison to an emerging start-up because the latter ones usually have a lack in resources.

The visualisation of collective collaboration is a reasonable practice to picture the contribution and dependencies of one CAS or team in the whole company. That is to say via drawing circles around temporary teams and their depending tasks or goals that can only be achieved jointly instead of drawing hierarchical reporting lines for separate activities in the form of a traditional organigram. Likewise, the linguistic usage of "the one is above or under the one" is simply not appropriate anymore in a CAS but first must be established in the linguistic usage. Moreover, it is problematic that an expert career is not equal to a leadership career from a traditional perspective. If these patterns are anchored in people's heads, complexity-centric ways of thinking are challenging to become introduced.

Finally, only a robust pioneer organisation with a complexity-centric leadership approach in the sense of the developed framework can master the rapid changes in our environment because talented organisational members are required as most important resources. Evidence suggests that these are most likely to be attracted and retained more easily within an organisational environment where they feel encouraged to take decisions and where they feel safe to take risks. Any traditionally hierarchically organised company is not able to offer such rather self-organised environment due to their structural, organisational, and processual limitations. Consequently, they will probably have difficulties finding and retaining these most needed resources. Therefore, this integrative framework for complexity-centric leadership organisations is relevant for any company that wants to survive.

6.5 Limitations and future research

The limitations of this research offer a spectrum of chances for future research to extend the current study as well as to expand it:

Considering, the broad research field that was covered within this thesis, future studies are well advised to investigate in more detail on each of its three aspects (conditions and patterns, leadership emergence, leadership roles). For example, how the distribution of responsibility based on a role concept is structurally applied in detail in existing robust pioneer organisations. The four elements of macro interaction (roles, distributed responsibility, dependencies and transparency) were identified as main conditions that facilitate the emergence of complexity-centric leadership. With the absence of one of the four elements, the findings suggest that macro interaction is no longer functioning in a stable way which makes complexity-centric leadership unlikely to emerge. However, this needs to be verified by future research. Similarly, the identified positive relationship between maturity, transparency-trust and its negative association to the application of control measures calls for subsequent examination in greater depth. Future qualitative research is needed to verify the cultural contingency of trust and controlling measurements from a social-psychological perspective to draw reasonable implications for practical leadership application. Future quantitative research is needed to confirm the relationships of the three elements and to derive reasonable implications for theory.

Related to this is aspect, is the limitation of generalisability of drawn conclusions from this study. Since this research was conducted with 19 complexity-centric leadership experts, it offers opportunities to extend the investigations in this research area by further studies to verify the findings of this study. Although, data collection was done in a rigor and diligent way, the focus and expansion on individual topics was varying during any interview.

Accordingly, particular interviews provided more valuable evidence for certain areas than others. This may impair the overarching generalisability in terms of external validity of the findings of this study. Leading complexity-centric leadership scholars however advocate for deriving and generalising such findings, despite of the underlying distinct context, to apply them to general leadership theory (Nite and Bopp, 2017; Braun et al., 2016; Will, 2016; Uhl-Bien and Marion, 2009). Nonetheless, this limitation offers opportunities for future research to expand this undertaken study by incorporating more complexity leadership participants or to deep dive into a particular area to verify the conclusions drawn from this study.

The scope of this study was to investigate medium-to-large sized organizations. Therefore, the limitation of generalisability further concerns the applicability of the findings in medium sized companies as opposed to large companies because of the wide range in terms of number of employees. Since the implementation of structurally embedded measures tends to be more feasible in organisations with some hundreds of employees compared to those with some thousands across different locations, future research is necessary to explore the contingencies related to size of an organization.

The research area “complexity-centric leadership” and the accompanied exploratory nature of this thesis is prone to lack on internal validity because causal relationships are difficult to prove in this research field. However, this limitation was mitigated by following rigor methods for data collection and analysis. Moreover, during the interview initiation procedure and actual collection of data, focus was put on credibility via building of trust and establishing a deeper relationship with the interviewee because this is supposed to enhance credibility (Lincoln and Guba, 1985).

Future research may also extend its focus of data collection to existing real business environments. Indeed, this thesis is providing valuable evidence from actually existing robust pioneer organisations, however it should be seen as a starting signal to further collect qualitative real-life and in-depth experiences from existing corporate environments that acknowledge complexity. Studying behavioural and thought patterns inherent to existing organisational complex living systems is a very promising way to adequately explore them – in contrast to experimental set-ups. Therefore, further research is called to launch investigations to qualitatively study CASs that are existing in reality to verify the findings and derived conclusions of this thesis.

The structural operationalisation of CAS island initiatives inside bigger hierarchical organisations was not a focus of this thesis. However, this set-up is a very common concept in real life to try out CAS operationalisation and complexity-centric leadership in a formally defined frame, especially by huge organisations. Accordingly, from the 19 interviewees, 5 leadership experts drew on insights from such constellations. This implies an opening scope for further research to investigate the deployment of CAS islands in more depth.

Considering the undertaken literature review, in retrospective the review focus could be shaped differently or extended with the mindset aspect (leadership emergence and roles and mindset). Mindset itself was specified in a novel and extended way given former theoretical conceptualisations. Additionally, mindset and its accompanying maturity was identified to function as emergence-limiting settings. Thus, future studies might investigate this conceptualisation and the importance of mindset in complex environments in more detail theoretically as well as practically.

Taking decision was not anymore assumed as part of a complexity-centric leadership role in this study. However, this finding needs to be verified within further investigations on the roles of complexity-centric leadership in robust pioneer organisations. Hence this aspect provides a reasonable endeavour for further research.

Due to the Corona pandemic that was influencing this research project, the importance of IT enabled remote collaboration tools was highlighted during the interviews. Consequently,

future studies with focus on tool enabled virtual CAS collaboration should investigate how software tools drive complexity-centric leadership in real corporations for example in contrast to the function of tools in traditionally structured organisations.

6.6 Reflective positions of the author

Reflexivity may be one way of making the audience understanding how values or personality of the researcher influence this research project. Although it is debate on the value of reflexivity in research (Maton, 2003; Bourdieu and Wacquant, 1992), the author assumes this reflective discussion in the sense of reflecting on how she deals with own beliefs as important because of her underlying passionate motivation to start investigating this research field together with her ontological and epistemological perspectives that are basically determining how she assumes to answer this study's research questions. Since researcher and author of this study are in one person, in the following section, the author will reflect on her considerations in a structured approach by means of addressing three central reflexivity questions, as posed by Grbich (2013), while using the "I" narrative style.

1. What have been the experiences of the researcher? Exposure of who the author actually is (past influences, beliefs, values and experiences as well as their responses in all situations) should be available.

Now in 2022, while completing this thesis and reflecting on my very underlying motivation for this research project on that was outlined at the very beginning of this thesis, I am looking back of 8 years of working experience in organising IT projects, by means of applying traditional management approaches. Simultaneously, undertaking my research in the case organisations that organise work and collaboration completely differently was broadening my horizon and is inspiring me to incorporate viable approaches into my daily traditional work. During the last four years, for me, this daily possibility of practical integration was a source of motivation for continually conducting this research. The traditional corporate world provides me at least one real life situation every day that triggers my thoughts about how else this situation could be handled. Moreover, with colleagues I am discussing my convictions that other ways of working together would also be possible in a huge mainstream established corporation. Regarding the individual personalities of my project

team, this allows me to try out unconventional approaches within my small project team world – of course only up to a certain degree.

This research and in particular the confrontation with the collected data, most of all influenced and advanced my own maturity in terms of self-reflection and to step back again to reflect own first glance impressions and derived assumptions. The study was launched with the intent to explore how (in contrast to hierarchy) leadership could look like. This massive and rich insights that I have gained including actual best practices convinced me that complexity-centric leadership is possible in any organisation if there is willingness on the C-level. But most of all – I have realised during this research – that courage is needed from all involved parties to try new methods and to allow yourself to make failures.

With the completion of a DBA degree, I am expecting myself to be an expert in this field and to be able to contribute theoretically as well as practically to the development of new leadership related insights, in the best case to knowledge in corporate organisations as well as in the academic organisations. My overall objective for my personal development is to advance the understanding and my knowledge regarding leadership as well as organisational complex dynamics.

2. Has the researcher been highly involved as a participant in her own right or what has been her position?

From the beginning of this thesis, I was in the role of an external researcher. My objective was to become invited by organisations that are open to discuss and share their organisational approach with me as external. As external researcher I felt more confident to ask questions without any prior relation or dependency to disclose the roles of leadership and how they emerge in different organisations that all rely on a non-traditional approach towards organisational complexity. As such permission for collecting data und interviewing employees was negotiated early in advance to establish trust with the actual research participant and in order to address and align on all relevant questions by mutual consent before. Despite the challenge of gaining access to the desired organisation and of identifying a final research participant, such external stance has proven to be advantageous especially related to step in with an open mind on both the interviewee's as well as the interviewer's side. As an external

researcher for me it was easier to not become influenced before through experiences (positive or negative ones), or subjective impressions that were gained when instead involved as an internal researcher in an organisation.

Considering the examination of common patterns, conditions, and leadership roles in different case organisation the stance of an external researcher is more reasonable in order to impartially gauge when collecting and analysing data. Such external researcher perspective supported me to apply an objective interpretation instead being actively involved in an organisation. I have a pluralist perspective on this research field because for me the diversity and fragmentation that is inherent in any organisation, enhances researching leadership by means of subjective and diverse perspectives that are mainly based on experiences. Nevertheless, I am aware that a pluralist kind of research implies risks. Risks that are related to the nature of subjective data as well as the risk of disagreement among the collected insights. For me however, the advantages that lie in disclosing rich and in-depth data far outweigh potential shortcomings.

3. How close to the participants' view, voices, emotions, and feelings is the display of data and how much 'shaping' (changing or manipulating) has the researcher been involved in?

In the following I am critically reflecting my considerations and potential concerns while analysing my collected data.

As outlined within my answers on the two questions before, I am having an opinion towards the entire topic of my thesis as well as to its research questions. However, the facts are the following: I am reading and thinking about this field of research since 2015 and I finally ended up writing a thesis on this topic on that I am really passionate for. For me this obviously mirrors that my objective is to identify academic based answers that were researched diligently. Otherwise, I could have just started writing a blog. Definitely, I am aware that personal convictions and beliefs are hardly or only hard to exclude during interviewing or reading the records. When I realised the desire to start a conversation while taking the interview that would imply my own opinion to the given answer of the participant, I learned to hold back and to write down this thought to express it after the official interview. For me this understanding and the thereof developed practice was an essential method to

successfully separate personal subjective thoughts from academic data collection in a reasonable and professional way.

Although following the step-by-step approach of the thematic data analysis, the decisions to focus on this theme over another were taken by myself. I am aware that I am a solo researcher and that such selections are likely to indirectly shape the direction of data analysis. To ensure a high level of validity, I explained and conducted the data analysis in a transparent and rigor way which is replicable and consistent for a subsequent researcher. Due to the exploratory nature of this research, it was not possible for me to truly archive internal validity. For internal validity in interpretative research, Lincoln and Guba (1985) suggest focussing on credibility within the investigation. I aimed on achieving this via building of trust and establishing a relationship with the interviewee especially during the interview initiation procedure. This measurement enhanced credibility of the gained insights and answers. Additionally, applying Nvivo software, for me further ensured a methodologically rigorous approach for analysing the collected data. I am convinced that the stringent following of these methodological measurements will enhance the validity of this research.

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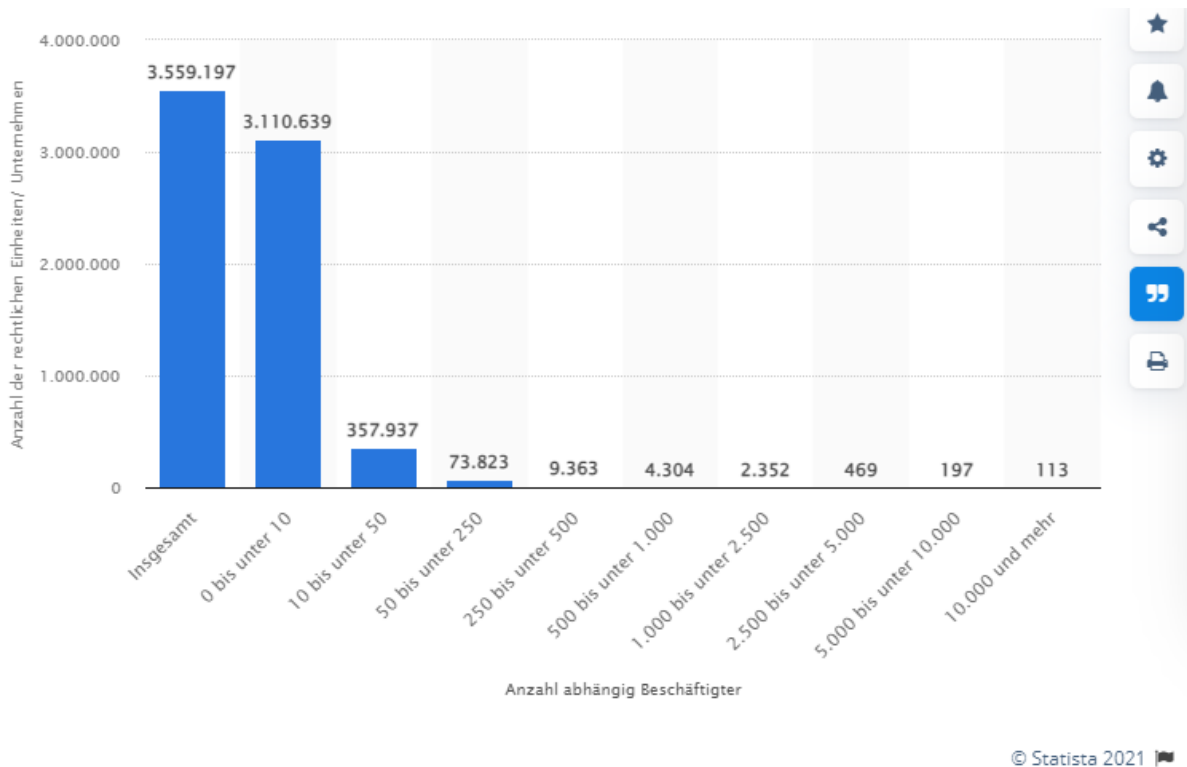
Appendices

Appendix 1: Literature review article classification (excel)



ComplexityLeadership_Literature review

Appendix 2: Number of German companies in 2019 according to number of registered employees (Statista 2021)



Appendix 3: Initial information sheet sent to all interview participants



OverviewComplexity-centricLeadership1

Appendix 4: Example (1M, 2M, 1F, 9M) for research participants' consent to interview participation and recording



ResearchParticipantsConsensusAudioRecording

Appendix 5: Ethical statement



DBA_EthicsStatement_ElenaKohler.pdf

Appendix 6: Scopus literature review results 1



Scopus_LitaratureR
eviev_Results1 Sear

Appendix 7: Scopus literature review results 2



Scopus_LitaratureR
eviev_Results2 Sear

Appendix 8: Nvivo snap shots with coding structure and coding aggregation



Nvivo snap shots
coding structure an