Transformational and shared leadership

in self-organising teams:

An action research study

Thesis submitted in accordance with the requirements of the University of Liverpool for the degree of Doctor of Business Administration by

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1 Abstract

In recent years, software development companies have begun to face the need for faster product release cycles due to market pressure. Accompanying the faster product release cycles is a paradigm shift in the process of software development: away from a command and control approach towards self-organising teams. These self-organising teams are not leaderless; instead, leadership is shared among the team members. Shared leadership, therefore, is a team-based approach, distinguished by leadership responsibility that is widely decentralized among team members. Effective shared leadership presupposes that the team members have the relevant competencies to assume shared leadership, and that their patterns of interactions truly reflect the 'shared' concept. Both aspects constitute a challenge for organisations and present a paradigm shift in terms of conventional notions of leadership.

This quantitative action-oriented research study investigated shared leadership behaviour and shared leadership competencies in self-organising software development teams, examining the relationship among team members and their influence on one another. Some parts of this study were undertaken in a telecommunication company, where effective shared leadership is central to the company's performance. Accordingly, issues related to the team members' shared leadership competencies and the appropriate patterns of interactions among team members are areas of vital importance to the company. However, within the company, these aspects of shared leadership had never been examined; thus, a knowledge gap existed. This study sought to remedy this knowledge gap by addressing the following questions: What shared leadership competencies does a team member need to have in such a team? What is the individual perception of a member's influence on the other team members as seen by a single team member? How is leadership distributed to facilitate shared leadership in self-organising teams?

For the purpose of this study, a shared leadership instrument was developed and a social network analysis (SNA) was applied to study the team members' shared leadership relations. First, an extensive literature review on shared leadership competencies and, subsequently, five interviews with experts were conducted. Both were synthesised to identify the key competencies of shared leadership in self-organising teams, resulting in five major shared leadership competencies that were grounded in transformational leadership: decision making, vision, communication, coordination, and teamwork. To assess these key competencies, a 9-item research instrument was developed and tested with respect to validity and reliability. The research instrument enabled a social network analysis of a self-organising team and was

combined with Bass' transformational and transactional leadership survey (TMLQ). A pilot study was undertaken on three self-organising teams in a university setting prior to applying the research instrument in an action research study with six action cycles on five self-organising teams in a telecommunication company.

In this action-oriented research study, TMLQ results revealed high values for the attribute transactional management by exception (active) (MBEA) in all teams, indicating that team members were sensitive to the possibility of mistakes among their team peers with a view to taking corrective actions. Some teams indicated higher values for the transformational factors individualised consideration (IC) and inspirational motivation (INSP), which might be because of the self-organising approach of the teams. Overall, the teams did not show significantly higher values for transformational or transactional leadership behaviour compared to normative values. The evaluated teams showed low shared leadership for the decision making factor, indicating that decision making was not shared; rather, the decisions were made by some individuals in the team. One of the fundamental rules of a self-organising team is that decisions are made collaboratively. One interesting finding was that the surrounding organisational management team even exhibited shared leadership avoidance for the decision making factor. This study revealed that shared leadership decision making competence seems to be the most problematic aspect in self-organising teams.

The SNA of the proposed 9-item shared leadership research instrument allows for a graphical representation of the five shared leadership dimensions (decision, vision, communication, coordination, teamwork) of a team. Together with the corresponding parameters network density (a measure of the total amount of shared leadership) and network centralisation (a measure to characterise the disparity with which team members participate in the leadership process), the SNA illuminates how team members perceive one another with regards to shared leadership. It allows the identification of not only key decision makers and members who share leadership but also isolates who do not contribute to the team's self-organising approach.

The study and the subsequent critical discussion showed that the proposed 9-item shared leadership research instrument seems to be a suitable tool for capturing the shared leadership competencies of a self-organising team. The shared leadership instrument developed in this research constitutes a potentially useful tool to assess a team and to take corrective actions immediately, since it involves a combination of a team-level view and an individual-level perspective of shared leadership strengths.

2 Introduction

Many software development organisations face numerous problems in their attempts to be competitive in the market because the market demands increasingly faster release cycles for their developed products. In recent years, this has led to a paradigm shift in the execution of software development projects and the composition of project teams. Project teams have moved away from a leader-centred approach towards an approach involving self-organising, agile teams where the responsibility of fulfilling the team's goal lies with the team. This organisational change has implications for the applied leadership styles of the team members working in such self-organising teams.

Traditional software development cycles (Cockburn and Highsmith, 2001; Schwalbe, 2004) include proper requirement definitions followed by a coding and testing phase until the product is released to the market (Highsmith, 2010). The execution of this traditional project setting follows a command and control approach (Cockburn and Highsmith, 2001), where one person assumes team leadership. This person has full authority and the shared leadership competencies, including the decision making authority to lead the team. In a command and control approach, the work is coordinated hierarchically, with a clear separation of the roles in the team.

In contrast, in a self-organising team such as an agile software development team (Cockburn and Highsmith, 2001; Schwaber, 2004), the work is coordinated in a self-organising manner. The team holds all the authority; each team member takes over the leadership tasks, and the team decides how the work is to be coordinated and executed (Dackert et al., 2004; Moe et al., 2009b; Moe et al., 2010). In a self-organising team, leadership is shared among the team members and is assigned to the person with the most suitable competency for the task to be fulfilled. Thus, leadership is shared in a self-organising team.

The concept of shared leadership (Pearce, 2004; Craig et al., 2009; Clarke and Oswald, 2010) was introduced to describe more complex processes of mutual influence in teams. Shared leadership is defined by Pearce and Conger (2003, p. 1) "as a dynamic, interactive influence process among individuals in groups" whose goal is to mutually lead for goal achievement. Instead of allocating the decision making authority to a single person in the team, all the team members have equal influence on the activities of the team and all of them have the competencies required to be productive in such a team. This shared leadership in teams requires the individuals to have different competencies as compared to a command and control project, where the team members execute specific tasks and return the results to the

person leading the team. Shared leadership requires an individual to have competencies in coaching, the ability to take care of the well-being of others in the team, and the ability to engage others using one´s charisma in order to generate commitment to a common goal (Pearce, 2004; Schwaber, 2008; Ralf and Rodney, 2010; Hoch, 2013).

Usually, a self-organising team consists of experts in their respective fields; they have to be highly skilled to fulfil the task and do not necessarily have explicit leadership skills (Moe et al., 2009b). This raises the following questions. Who is agile-compatible? Can classical command and control leaders learn to work in a self-organising shared leadership environment? How can shared leadership be measured so that the team members can be trained to be more productive in a self-organising team? All these aspects belong to the field of research on leadership.

Although one of the most mature and applied leadership instruments is the theory of transactional and transformational leadership developed by Bass (1985), shared leadership is a rather new field of research and there are only a few extant empirical studies on shared leadership (Pearce and Conger, 2003; Carson et al., 2007a; Moe et al., 2009b; Gockel and Werth, 2010; Hoch, 2013; Muethel and Hoegl, 2013). Thus, there is a need for a suitable validated measure of shared leadership for measuring shared leadership at the team level. This study aims to address this research gap (section 3.6). To this end, it conceptualises and introduces an instrument for measuring shared leadership, which is applied to a set of self-organising teams.

2.1 Thesis organisation and role of the researcher

To give the reader an overview of how this document is structured, an overview picture is provided to present the overall thesis structure (see Figure 1). Since the nature of the thesis is action-oriented research (section 4.2), the study is divided into core action research and personal reflection sections. Thus, the structure of the document follows the structure of interwoven cycles of action and personal reflection of the researcher´s action and personal reflection as depicted in the picture of the thesis work in Figure 1.
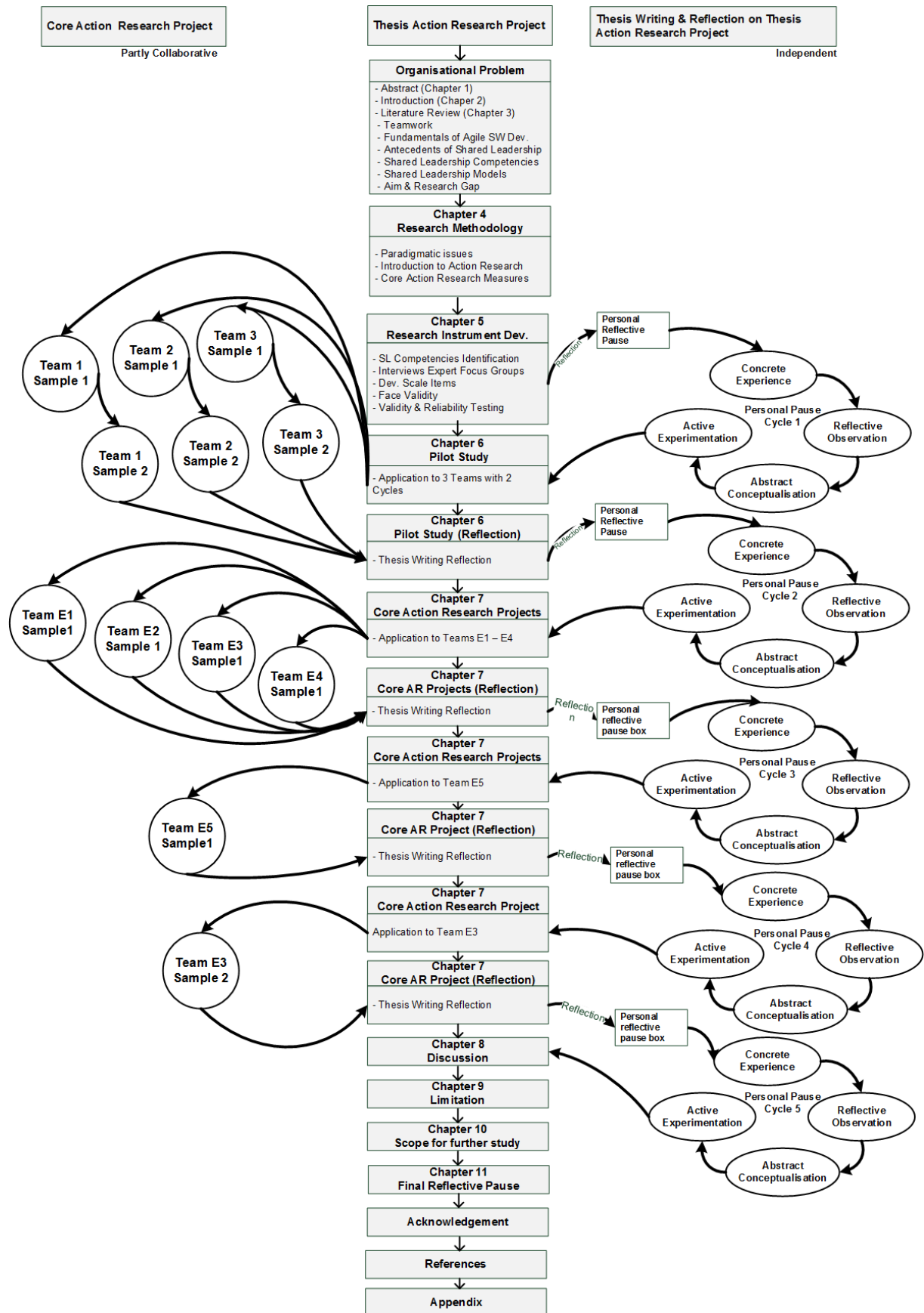
Figure 1: Thesis Organisation

To illustrate the role of the researcher in the context of this research, the researcher is briefly introduced in this section. In over 15 years of work experience, the researcher worked in command and control and in self-organising teams in different roles (software tester, team leader, project manager, group leader or scrum master). He experienced the difficult transition from working in command and control projects to working in self-organising teams, which is what stimulated his interest in the subject. Additionally he observed that team members have to learn to organise their work on their own and to make collaborative decisions. As a professional, the researcher is interested in a scientifically grounded method to evaluate such self-organising teams. The researcher had previously worked in the Swedish telecommunication company where the core research projects were undertaken. However, in his previous work assignment, he was not part of any of the teams investigated in this research (see section 7). The structure of the teams investigated and the work culture changed towards an agile self-organising culture. These changes were achieved by introducing open space offices and the Kanban and Scrum methodology (see section 3.2.7 and section 3.2.6). Because of this transition the company faced a challenge: they did not know how well the newly introduced self-organising teams work together. Further, the company wanted to support the competence building up initiatives in order to help their employees to make the transition from command and control to self-organising teams. The good private and professional connection of the researcher with the Swedish telecommunication company enabled this study, helping the company with competence building up activities based on the findings of this study. In his current role as a consultant, the researcher supports other companies in their transition from a command and control structure to self-organising. Thus, the scientific methods and background gained during the thesis project on self-organising teams would help the researcher/practitioner in his future career.

The following chapter reviews the literature on teamwork (section 3.1) and provides an overview of how teamwork is executed in teams so that shared leadership is possible (sections 3.2 and 3.3). On this basis, the key competencies for shared leadership are identified (section 3.4). Subsequently, to solve the organisational problem under investigation in this research, a review of the state-of-the-art leadership models (section 3.5) and the respective measurement scales is undertaken, followed by a description of the identified research gap (section 3.6).

3 Background and State of the Art

The following sections present an overview of the extant literature relevant to the research topic under investigation in this thesis. In section 3.1, the definitions used in the thesis are presented. First, teamwork is described and defined; second, the differences in team organisation between a command and control setting and a self-organising team are described. Further, the fundamentals of agile software development are described together with the associated methodologies (section 3.2), followed by sections on antecedents of shared leadership (section 3.3) and on shared leadership competencies (section 3.4).

An overview of the state-of-the-art leadership models with their respective measurement scales is given in section 3.5, and a judgment is made about which model and scale are suitable for the research topic under investigation. Finally, the description of the identified research gap is given along with a methodology to close this gap for the purpose of solving the organisational problem related to shared leadership competencies (section 3.6).

3.1 Teamwork

The following sub-sections describe the difference between teams that work hierarchically in a command and control environment and teams that work in a self-organising manner, where the team members hold authority. For the purpose of this research study, it is important to understand that in a self-organising team, a single dedicated person no longer takes over leadership duties; the whole team and every team member needs to have the capabilities to take on leadership. Self-organisation can happen only if there is no dedicated leader because leadership is shared among the team members. A typical example of a self-organising team is a team that uses the Agile methodology, a concept that is explained in section 3.2 (Cockburn and Highsmith, 2001; Schwaber, 2008; Hoda et al., 2010).

3.1.1 What is a team?

A team consists of a group of people who are meant to fulfil a common purpose. In an organisation, this can be a project group, a work group with different ways of working: self-managing, self-directed, or self-organising (West, 2012). A group consisting of individual people does not necessarily compose a team. A work team in an organisation is a group of people situated within organisational boundaries who perform tasks that contribute to organisational goals. In a team, the team members usually have all the skills and strengths required to fulfil all the tasks needed to complete a team goal. The work a team performs affects others within or outside the organisation. In a work team, the members support one

another, and the work team is recognised in the organisation as a team. There is a large dependency between the individual team members and the performance of the work team. The membership of a work team is usually stable and full-time, and the tasks of the members are well-defined (Cohen and Bailey, 1997).

In a command and control team structure, there is one team leader who bears the responsibility and takes over leadership for several team members who report to the team leader. All the leadership tasks to integrate team members, to regulate, to standardise, and to monitor the necessary interactions of the team members are taken over by the team leader (Zaccaro et al., 2001). Thus, the team leader needs to have leadership competencies and the competencies to organise the team and the team work (West, 2012).

The way a team works and organises itself can be different, and teams can be regarded as a *self-directed* team, a *self-managed* team, or (borrowing the term used in agile software development) a *self-organising* team. What these teams have in common is that they organise their work themselves, differently from the way a command and control-directed team works. Even if these teams organise their work themselves, there are fundamental differences among the different team models. Therefore, for this study, one has to be clear about the definitions, and which term to use in which context

3.1.2   Self-directed work teams

The origin of self-management dates back to the fact that in the 1970s companies had to cope with decreasing quality of production, employee dissatisfaction, and a high level of turn-over. This led to new approaches for managing work teams and these complex and uncertain environments (Trist et al., 1977). Kerr and Jermier (1978) reported that when the tasks and the demands of the tasks are well known, this knowledge can be seen as a substitute for leadership. A key issue for self-management is the process by which a person is confronted with immediate response alternatives that might have different consequences depending on the alternative the person chooses. This can include personal goals and instructions on how to achieve these goals (Manz et al., 1980). Usually, the team goal is received from outside the team, whereas the team self-manages all the tasks needed to fulfil the given goal.

'Self-directed work teams' is a term that was used in the 1980s with the same purpose as 'self-managed teams' i.e., to cope with the increasing global competition and to be quicker, more flexible, and more innovative. Self-directing is meant to give people greater control over their destiny. Self-directing can differ depending on the employee involvement in different

tasks in a project. A self-directed team is the most advanced form of empowerment; this is referred to as employee involvement or a sociotechnical system (Whitworth and Biddle, 2007). A self-directed team can be regarded as a further development of a self-managed team; the main difference is that a self-directed team takes its directions and the team goal not from a supervisor but from the work that needs to be done (Fisher, 2000).

3.1.3 Self-organising teams

A self-organising team is a further development of self-managing and self-directed teams; these teams are mainly found in the software engineering discipline that uses agile software development methodologies (Takeuchi and Nonaka, 1986; Schwaber, 2008; Hoda et al., 2013). In a self-organising team, each individual takes accountability for his/her own workload, shifts and distributes work among team members, and takes over responsibility to achieve the team goal (Moe et al., 2008a; Highsmith, 2010). A self-organising team involves inter disciplinary individuals who work together to meet a self-defined goal with all the authority and ability to take decisions and to adapt to changing demands. Importantly, self-organising teams are not leaderless teams. The team self-organises in some fashion described in more detail in section 3.2.6 depending on the task to be fulfilled, so that the team is steered in the right direction to accomplish the self-set goal. There is a significant difference between self-organising and self-directed teams. In a self-organising team, the team goal is set and given by the team members, whereas in a self-managed team, the team goal is received from outside (Manz and Sims, 1986; Guzzo and Dickson, 1996; Highsmith, 2010).

As described in section 3.3, a self-organising team is a prerequisite for investigating shared leadership because shared leadership related to self developed team goals takes place in these teams. Shared leadership happens in self-directed teams as well, however, the team goals of such teams assigned externally. Nevertheless, what is of interest here, given the dearth of studies on the subject, is how shared leadership is manifested in a situation where the team develops its own goals. An agile software development team (described in section 3.2) is an example of a self-organising team; therefore, such a team is suitable for this study to research on shared leader. In section 3.5, the difference between leadership and shared leadership is explained, and the most recent leadership models and their measurement scales are described

3.1.4 Teamwork in command and control vs. self-organising organisations

In order to understand the differences between the classical command and control team structure (Schwalbe, 2004; PMI, 2010) and an agile team structure (Cockburn and Highsmith, 2001; Schwaber, 2008; Highsmith, 2010), it is important to understand that in a traditional

team setting, changes in the product specification are seen as changes that increase the scope of the project; thus, such changes are seen as risks. In traditional project management terms, such a change in scope is seen as 'scope creep', and it is often regarded as a large risk that could lead to project failure (Highsmith, 2010). The traditional view is to prevent complexity and changes in a team through proper planning, so that the issues that might occur can be resolved efficiently (Truex et al., 1999).

In contrast, agile teams were introduced to have faster release cycles for software products. According to Hoda et al. (2012, p. 610) "agile software development methods follow an iterative and incremental style of development". In an agile setting, "self-organising teams dynamically adjust to changing customer requirements" and findings during the development of the software; they adjust and change the requirements as well as the scope (Dyba and Dingsoyr, 2008). The functioning of self-organising teams is quite dependent on the interaction between the team members and the interaction of the team members with the customer feedback and its goals and values. In an agile software development team, which works in a self-organised way, the team members are responsible for the team goal, which is anchored in an organisation that has its defined boundaries. Self-organising teams manage their own workload and distribute the work themselves depending on the best fit in terms of the competency needed for a certain task and each team members takes part in the decision making process (Hoda et al., 2012). Agile teams are not without a leader. In an agile team, the leaders are responsible for setting the direction for certain subtasks, coordinating team members who are working on the same or similar tasks, and creating a vision and good work atmosphere (Dackert et al., 2004; Schwaber, 2008; Moe et al., 2010). In a self-organising agile team, leadership is shared among the team members depending on the task to be solved, and there is no single dedicated leader.

Although the majority of prior studies support the argument that self-organising teams are faster and more productive compared to command and control teams, it needs to be noted that self-organising teams suffer from certain drawbacks. On moving the authority from a single person to the whole team, each team member feels accountable for the product and for reaching the team goal (Dackert et al., 2004). Consequently the team members are expected to be highly skilled and able to support the team to reach the team goal. Less experienced team members might experience difficulties in such teams, thus endangering the team goal. Additionally self-organising implies that the teams would set their own team values and norms, expecting each team member to commit to these to be part of the team. If (new) team

members are unable to commit to these team values and goals, it could lead to pressure from the other team members. As the whole team is held responsible for the team goal, the team members might be required to work overtime on occasion. In such cases, the team has to decide who would take on the extra workload, as some team members might not be able to work overtime because of personal obligations. In such cases team interests and personal obligations are mixed up, and the different personal obligations of each individual team member are compared with one another (Barker, 1993).Consequently, a team culture might evolve where everyone observes another in terms of mistakes and productivity (Barker, 1993). Another risk is that the team members might be are unwilling to commit to a decision, or team members rely on the assumption that the scrum master would make all the decisions (Drury et al., 2012; Moe et al., 2012). Because of the rapid and short release cycles, the team members might make decisions based on vague and unstable requirements (Drury et al., 2012). Despite the disadvantages associated with self-organising teams in agile software development, the members of such self-organising teams are highly skilled and experts in their respective field. Therefore, it may be assumed that they are able to communicate openly within the team, when they face these disadvantages. The case might be different in self-organising or self-directed work teams in hardware manufacturing, where the individual competence/skill profile is different, therefore, these team member may have difficulties in articulating their obligations (Barker, 1993).

3.2   Fundamentals of agile software development

This section gives an overview of the different models used in software development. It is important to understand the Scrum methodology and its combination with the Kanban system to understand how self-organising works in such teams. These teams are not leaderless rather leadership is shared by the team members.

The focus of this section is on agile software development methodologies. The foundation and enabler for lightweight software development was the introduction of the *Agile Manifesto* (Highsmith and Fowler, 2001) with its values, which will be described first (section 3.2.2). This will be followed by a description of the whole team approach (section 3.2.3) and a delineation between agile and agility (section 3.2.4). The most commonly used agile methodology, i.e. extreme programming (Beck, 1998; Beck, 2000) is introduced in section 3.2.5, the methodology of Scrum (Highsmith and Cockburn, 2001; Schwaber, 2008) in section 3.2.6, and the model of the flow-based software development system Kanban (Anderson, 2010; Poppendieck and Cusumano, 2012) in section 3.2.7. The main focus of this

section is to describe the Scrum methodology. Understanding how Scrum works is essential to understand why shared leadership happens in such Scrum teams (section 3.2.6). All the teams investigated in this study used the Scrum process model.

3.2.1 Agile software development process models

In his review of agile history, Abbas et al. (2008, p. 1) called the emergence of Agile "the most drastic change in software development and software process thinking" over the last years. The basis for Agile methods was set in the 1970s (Larman and Basili, 2003). In recent years, several software development models were proposed. The most widely used and classical model is the waterfall model proposed Royce (1970), other models include the V-Model (IABG, 1992) and the extension V-Model XT (IABG, 1992). All these models follow a sequential approach and use a defined start and end date for each phase. The next phase can start only once the previous phase is finished. These models follow a strict plan, and changes to the plan are seen as threat to the predefined plan (Cockburn and Highsmith, 2001; Highsmith, 2010). The main disadvantages of these models are: they are inflexible; there is a need for a significant amount of documentation; and they do not focus on customer needs since the inherent model generally does not include any feedback loop with the customer (feedback loops if any are usually late). Because of the inflexibility of change and late customer feedback, these models are perceived as heavyweight models.

In the 1980s, it was noticed that the sequential approach to software development was too rigid and inflexible, and that the market needed faster release cycles to deal with changing requirements during the software development phase (Larman and Basili, 2003; Abbas et al., 2008). This was the reason for the development of software process models such as Scrum, which have great flexibility during the development of complex software products (Rising and Janoff, 2000; Schwaber, 2008). In comparison to the heavyweight sequential models, flexible models such as Scrum that do not follow a sequential process are called lightweight models. Scrum teams are self-organising and cross-functional and the Scrum teams choose how best to accomplish their work in a self-organising manner (Schwaber, 2008). Software is developed in an iterative and incremental way in iterations of two to four weeks, where the self-organising teams adjust dynamically to changing customer feedback (Dyba and Dingsoyr, 2008; Moe et al., 2008a; Hoda et al., 2010).

Agile software process models have led to a shift in the organisation of software development projects from a command and control project structure towards self-organising (Moe et al., 2008a) project teams (see section 3.2). The basis for Agile software development and its

associated processes was formulated in the *Agile Manifesto* (Highsmith and Fowler, 2001; Hazzan and Dubinsky, 2014).

In terms of the distribution and usage of these Agile models, the study of VersionOne (VersionOne, 2011) shows that Scrum, Kanban, and extreme programming are the most widely used models and practices in agile software development. In practice, these models are often used in combination with classical models, leading to hybrid models based on Scrum and Kanban models. The central aspect of these hybrid models is the self-organising character of the teams with their daily stand-up meetings, where each team member reports the progress of his/her tasks. Scrum prioritises people and communication over process (*Agile Manifesto*) and it includes feedback loops (retrospectives) for continuous process improvement.

3.2.2 Agile software development and the *Agile Manifesto*

The *Agile Manifesto* was prepared by 17 software practitioners in 2001 in order to find a common ground for their perception of the software development process (Highsmith and Fowler, 2001; Hazzan and Dubinsky, 2014). The main intention was to formulate the processes that are common and have already been implemented in different software development organisations. The result of that meeting was the *Agile Manifesto*, representing alternative approaches to the planned and command and control-driven software development processes that were in use over the preceding 40 years.

The values stated in the *Agile Manifesto* are as follows (Highsmith and Fowler, 2001):

Individuals and Interactions over processes and tools

Working software over comprehensive documentation

Customer collaboration over contract negotiation

Responding to change over following a plan

3.2.2.1 Individuals and interactions over processes and tools

This principle focuses on the people and individuals in the development process rather than on the process and tools. This means in practice that high priority is given to people and the interactions with and communication among the people who participate in the development process. During the development process, the people in the team should interact, think, discuss, and make decisions with respect to the software development process. The interactions and the decision making process are within the team, and the decisions are

communicated if they would affect the work of other team members. Instead of wasting time and effort in the maintenance of tools, the development efforts should be channelled towards the construction of a development environment that enables the participants (team members, customers, and management) to understand the development process, to become part of it, and to handle the process in a collaborative manner (Highsmith and Fowler, 2001; Hazzan and Dubinsky, 2014).

3.2.2.2 Working software over comprehensive documentation

The main focus of this *Agile Manifesto* principle is to produce quality software products that suit the customer needs. Working software is a lot more valuable for the customer than too much and detailed documentation. Since working software is available to the customer much earlier in the process, instant feedback can be given to the development team. Changes can be easily incorporated, and the resulting product will fit the customer needs (Hazzan and Dubinsky, 2014).

3.2.2.3 Customer collaboration over contract negotiation

The emphasis of this principle is on the human relationship involving the customer and the development process and the team members. Fast feedback loops with the customer enable the team to cope with frequent changes in customer requirements. In practice, structures are required to incorporate the customer feedback. These frequent feedback loops are supported by the Scrum methodology (Schwaber, 2008; Hazzan and Dubinsky, 2014).

3.2.2.4 Responding to change over following a plan

Most customers cannot predict all their requirements a priori. Therefore, an iterative process is required by which the requirements are understood by the customer, and the resulting requirements are shared and communicated with the development team. Changes are not seen as a threat; rather, changes are seen as opportunities to understand customer requirements. Since there is flexibility in the development process to embrace change, responding to change is much more important than sticking to the plan (Hazzan and Dubinsky, 2014).

3.2.3 Whole team approach

The idea of the whole team approach in agile practices is that the project team communicates face to face as much as possible. To facilitate this approach, the development team is located in a collaborative workspace. All the team members actively take part in team meetings with the customer and product owner as well as in product planning sessions. Traditionally, the roles of developer and tester are separate; in an agile team environment, these roles are not

separated any longer and developers and testers belong to the same team. On a daily basis, the team is located in the same place, where walls and tasks boards serve as means of communication and create an informative and collaborative workspace. Moreover, the entire team participates in a short stand-up meeting every morning, where each team member reports individual progress and obstacles faced. The whole team takes part in the product planning sessions as well as in retrospective feedback sessions to improve the software development process. One of the most commonly used agile methodologies that supports the whole team approach is the Scrum methodology (explained further in the section 3.2.6).

Various methods exist that support the principles laid out in the *Agile Manifesto* such as Scrum (Rising and Janoff, 2000; Cockburn and Highsmith, 2001; Schwaber, 2004), extreme programming (XP) (Beck, 1998; Abbas et al., 2008), and Kanban (Ohno, 1988; Junior and Godinho Filho, 2010). These methods are described in the following sections.

3.2.4   Agile vs. Agility

The terms 'agile' and 'agility' are often used synonymously. Agile methodologies were conceptualised over a decade ago, with the *Agile Manifesto* introducing agile software development methods (Highsmith and Fowler, 2001). The term 'agility' has a longer history than the term 'agile'; the former has its roots in the manufacturing industry (Burgess, 1994). Agility measures a company's ability to change and to adapt to changes in the environment (Helo, 2004; Conboy and Fitzgerald, 2004).

Agile

The *Agile Manifesto*, with its principles (see section 3.2.2), represents a fundamental change in and critique of formalised software development methods. As of today, however, there is no unique and ubiquitously accepted definition of an agile method in software development. One reason for this could be that the *Agile Manifesto* (Highsmith and Fowler, 2001) was conceived by software development practitioners and was not grounded in management and philosophy theory and science (Conboy and Fitzgerald, 2004). Consequently, the *Agile Manifesto* presents overall values and principles for agile software development but not an explicit definition (Kettunen, 2009). According to Anderson (2010), agile software development methods are more profitable than traditional software development methods. Highsmith and Cockburn (2001) described agile as a way of responding to and creating changes while balancing flexibility and stability. Currently, various methods used in software development are categorized as agile in accordance with the *Agile Manifesto*.

Given this background, with respect to the core action research projects undertaken in section 4.2.1 of this study, the term 'agile' is used to refer to specific agile software development methods, even though there are many different agile software development methods. These methods are described in sections 3.2.6 and 3.2.7 (Scrum and Kanban).

Agility

Similarly, it is difficult to find an ubiquitous definition for the term 'agility' in the literature. The term 'agility' is not exclusively used in agile software development; in fact, this term originated in the manufacturing industry (Levine, 2005). A literature search for the term 'agility' in the extant manufacturing literature reveals that prior researchers who studied agile manufacturing faced similar problems in defining agility as those studying agile software development methods face today (Burgess, 1994; Conboy and Fitzgerald, 2004). McCurry and McIvor (2002) defined agility as the aim to position the organization and to adjust quickly, fast, and effectively. Cockburn and Highsmith (2001) defined agility as the ability to both create as well as respond to change in order to profit in a turbulent business environment. According to the definition proposed by Larman and Basili (2003), agility is a means of rapid and flexible response to change. While the word 'flexibility' might be close to the term 'agility' in the sense of adapting to a changing environment, it tends to be connected to the ability to produce or to manufacture under differing conditions. In contrast, agility is a business concept that largely focuses on the overall performance/productivity/achievement of a company (Helo, 2004). Thus, the term 'agility' is used at the business level and conveys the ability of a business to change as a whole (Laanti et al., 2013).

In the context of this doctoral research study, the term 'agile' is used to describe how a team applies agile methods (section 3.2.1) for software development and how team members interact while using these agile methods during the course of this application. The focus is on teams and on the team members' interactions within a team executing such agile methods. The aim is to understand shared leadership capabilities and the interaction among team members. In that sense, the research instrument developed to measure shared leadership in agile teams (chapter 5) and applied in the core action research projects (chapter 7) does not constitute an agility measure or an agility scale for the whole company or organisation. Rather, the focus

and purpose of the shared leadership research instrument is to examine shared leadership at the team level and not the organisational or company level (Laanti et al., 2013).

3.2.5 Extreme programming

The late 1950s were critical in the era of computing because large computer systems became available to research institutes and universities in this period. Even though these computers were used primarily in engineering and natural sciences, soon, these computer systems became indispensable in business as well. A new science was established that moved from mathematical operation towards programming these computers using programming languages. Over the years, these programming approaches were transformed from an individual task to team tasks and became even more complex (Rojas, 2000; Wirth, 2008). Beck (1998) describes extreme programming (XP) as a discipline of software development for guiding medium-sized projects of small teams in order to get ordinary programmers to achieve extraordinary goals. Extreme programming emphasises the basic values of communication, simplicity, feedback, productivity, flexibility, informality, and teamwork with limited use of technology (Beck, 1998). A number of principles have been derived from these basic values such as those listed in the following Table 1.

Table 1: Extreme programming principles, derived from Beck (1998); Robinson and Sharp (2005)

XP Principles	
Rapid feedback	XP favours early and rapid feedback if possible. Early feedback allows programmers to focus on the most important software features.
Assumed simplicity	XP focuses on as trivial an implementation as possible to produce a working product. XP focuses on today's problems and does not plan future extensions of the software.
Incremental change	A huge software change usually never works at the first try. Therefore, XP advocates small changes to incrementally enhance the system with desired functionality.
Embracing change	The best strategy is the one that preserves the most options while solving the most pressing problems.
Quality work	Quality and customer satisfaction are the most important aims in XP. The XP approach focuses on basic values to ensure excellent quality.

Organising work in a more collaborative and collective manner with the involvement of clients, including the whole design and software development process, is the basic idea of XP (Wood et al., 2012). As described by Robinson and Sharp (2005), shared responsibility and trust within the team are important for effectively executing XP. Further, certain characteristics are required to be productive in an XP environment (Young et al., 2005). Interpersonal skills, the passion for challenging tasks, and a passion for enhancing one's individual knowledge are important. Overall, XP can be seen as a collection of best practices where not all the values and principles are applied for each software project. It is more a flexible framework where the values and the principles that best suit a complex project are applied as appropriate. Thus, XP set the base for collaborative self-organising teamwork in software engineering, together with Scrum and Kanban.

3.2.6   Scrum

The Scrum methodology is one of the most widely adopted Agile methods in software development (Fitzgerald et al., 2006; Hoda et al., 2010). According to Li et al. (2010, p. 2) Scrum is very useful "in situations where it is difficult to plan ahead" because Scrum has feedback loops, and software is developed in an iterative manner. The Scrum team is given full authority to plan, schedule, assign work packages to team members, and make collaborative decisions (Schwaber, 2004; Moe et al., 2008a). Scrum is a very versatile method to organise self-organising teams since it follows an iterative process with continuous feedback loops. According to Takeuchi and Nonaka (1986) self-organisation is one of the six core characteristics of Scrum. Figure 2 illustrates the Scrum methodology.
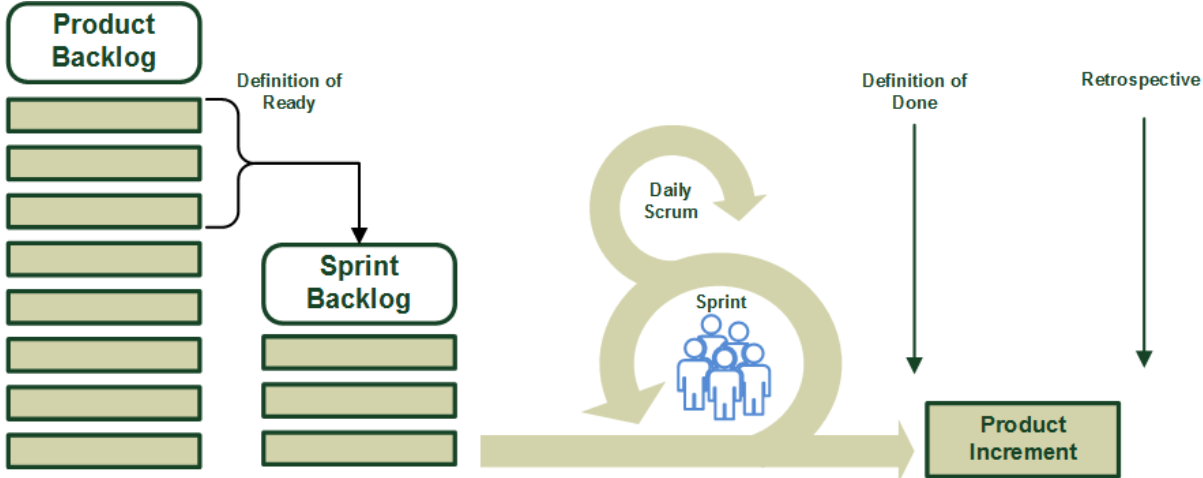
Figure 2: Schematics of Scrum Methodology

One of the fundamental components of the Scrum methodology is that there are defined events that are time-boxed. In the Scrum methodology, a time-box means that an activity has

a defined length, and the time for a certain activity is limited. The typical Scrum events are a Sprint, Sprint Planning, Daily Scrum, Sprint Review, and Sprint Retrospective. These events are described in the following sub-section (adapted from Schwaber (2008)).

3.2.6.1 Scrum events

Sprint

A Sprint is a time-box of one month or less during which a potential shippable product increment is created. Each sprint has the same duration and starts with Sprint Planning. A sprint can be considered as a project with a duration of four weeks. A sprint enables predictability by ensuring inspection and adaptation of progress towards a sprint goal. Because of the small duration, a sprint limits the risks and costs of a project.

Sprint Planning

In a Sprint Planning meeting, the work to be performed in the sprint is planned. This plan is created collaboratively by the entire self-organising Scrum team. The team selects the requirements that will be implemented during the sprint. By the end of a Sprint Planning meeting, the self-organising development team knows what to do in order to accomplish the sprint goal.

Daily Scrum

The Daily Scrum is a daily 15-minute time-boxed meeting of the self-organising team that is meant to synchronise the team's activities. Usually, this is done by inspecting the work performed since the last Daily Scrum meeting. The questions answered during the Daily Scrum meeting by each team member are:

What did I do yesterday that helped the team to meet the sprint goal?

What will I do today to help the team to meet the Sprint goal?

Do I see any impediment that prevents me or the team from meeting the sprint goal?

Sprint Review

At the end of a sprint, a Sprint Review is performed to inspect the product increment and to adapt the Product Backlog if needed. The focus of the Sprint Review is to collaborate with the team and the stakeholders to review what was done in the sprint

and to retrieve feedback from the customer. The result of the Sprint Review is an updated Product Backlog with items and adjusted overall requirements (if any).

Sprint Retrospective

The Sprint Retrospective is a chance for the team to evaluate and inspect the team and team processes to create a plan for the improvements that are to be enacted in the next sprint. The result of the Sprint Retrospective is a list of improvements to be implemented in a later sprint (the improvements could be implemented any time). Thus, the Sprint Retrospective offers a formal process to focus on inspection and adaptation.

3.2.6.2 Scrum Artefacts

Product Backlog

The Product Backlog is a list of functional or non-functional requirements that fulfil the vision of the customer after implementation. All the requirements in a Product Backlog are prioritised and planned for different releases. Items are dynamically added or removed from the Product Backlog because some requirements become clear over the course of the development process.

Sprint Backlog

The Sprint Backlog contains a list of tasks that the team implements during a sprint. Each task is assigned to a member of the self-organising team, and the task is described in as much detail as possible so that every team member understands the requirement.

Increment

The result of a sprint is an Increment, i.e. a potentially shippable product. The means that the software product is developed, tested, and documented so that the product can be shipped and all tasks are marked as 'Done'.

Definition of Done

The Definition of Done describes when a Product Backlog Item or an Increment is ready for acceptance. One prerequisite for a common understanding of when a task is fulfilled is that the team has a common understanding of 'Done'; this is achieved by

collaboratively defining the Definition of Done by the team. The Definition of Done varies for different teams.

3.2.6.3 Roles in a Scrum Team

Scrum Master

The Scrum Master ensures that the Scrum process is followed and applied so that the maximum added value and advantages of Scrum can be obtained. Moreover, the Scrum Master acts as a coach and helps the team to remove impediments so that the team can work in a self-organised manner.

Product Owner

The main responsibilities of the Product Owner are the Product Backlog and maintenance and the updating of the release plan. The Product Owner is a representative of different stakeholders (e.g. the customer).

Development Team

The Development Team is a cross- and multi-functional team that is responsible for the development of the functional requirements of the Product Backlog. The Development Team works in a self-organising manner and has the competencies and full authority required for the sprint goal to be achieved.

3.2.7 Kanban

Kanban is a management approach for visualising and optimising the flow of work within an added value chain. Kanban was introduced as part of the Toyota production system to control inventory levels and the production of supply components (Ohno, 1988; Junior and Godinho Filho, 2010). Kanban is a flow of information and is defined as a material flow control mechanism to control production operations (Poppendieck and Cusumano, 2012). With the introduction of Agile methods in software engineering, the Kanban system has become very popular to follow up on the incremental software development. Kanban is commonly used to control the incremental software development and to optimise the development process.

3.2.7.1 Kanban elements

The most important elements of the Kanban system used during software development in combination with Scrum (Highsmith and Cockburn, 2001; Schwaber, 2008) are the

visualisation of the workflow to all team members, the limit of work in progress (WIP), and the lead time.

Making the workflow visible:

In a Scrum team, the workflow of a task is usually visualised. This visualisation is achieved via a Kanban board. The columns of the Kanban board represent the activities of the value-added chain that a task has to pass through before the task is finished (Figure 3). The order of the columns of a Kanban board needs to be in line with the tasks to be fulfilled. In the history of Kanban, different types of Kanban boards have been used (Junior and Godinho Filho, 2010). A typical Kanban board used for software development in combination with the Scrum method is described in Figure 3. The columns could be customised to the tasks that need to be fulfilled depending on the value-added chain of the development process. Usually, while working on a certain task, the requirements become clearer, and it might be necessary to refine a task. In that case, it would be useful to customise the Kanban board and to refine columns.
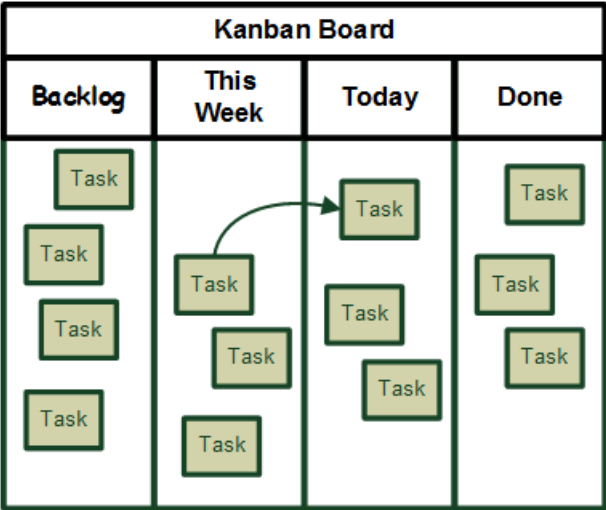
Figure 3: Schematics of a Kanban Board

Limit of work in progress

The work task capacity of a team and the amount of tasks that can be processed in parallel by a team are limited. Work in progress (WIP) describes the amount of tasks that can be worked on in parallel by the team. For each of the columns of a Kanban board as described in Figure 3, a WIP limit is introduced. This WIP limit describes

how many tasks can be simultaneously executed by the current team members so that no tailback occurs, and the flow of tasks is not interrupted.

Lead time/velocity

The lead time describes the average time required for a task to go through all the steps of the value-added chain of the Kanban system (Kniberg and Skarin, 2010). A task is classified as done when a task has gone through all the steps of the value-added chain, and the definition of 'done' for that task is fulfilled. The lead time of a task depends on the velocity of the team. This velocity can differ from team to team depending on the competence and experience of the team members.

Kanban supports multi-functional as well as functional teams. That is, there are no roles assigned, and the Kanban system is used to coordinate the workflow of the tasks of a multi-functional team. Therefore, the use of a Kanban system in combination with the Scrum software development method has become a de facto standard to organise self-organising teams (Junior and Godinho Filho, 2010; Hoda et al., 2010; Hoda et al., 2012).

Having described the Scrum methodology and its combination with the Kanban system to organise self-organising teams, it is important to understand that these teams are not leaderless; rather, leadership is shared among the team members (Hoegl and Parboteeah, 2006; Moe et al., 2008a; Hoda et al., 2013). In the next section, antecedents of shared leadership and shared leadership competencies that the team members need to have in order to work in such self-organising teams are described.

3.3 Antecedents of shared leadership in self-organising teams

As described in section 3.1.3, a self-organising team is a team that works together in a collaborative manner to achieve a self-defined goal. The team holds all the authority as well as all the abilities that are required to fulfil the self-defined goal, including decision making authority, coordination, communication, and teamwork culture (Schwaber, 2008; Moe et al., 2009b; Moe et al., 2010). The literature review performed for this thesis revealed the complexity related to shared leadership, there are many antecedents that enabled shared leadership to happen. Some common patterns among the antecedents of shared leadership emerged when reviewing the literature on shared leadership. According to Pearce and Conger (2003), there are many different ways to share and distribute authority. However, for shared

leadership to happen, the team needs to have at a minimum the authority to chart the path forward as well as the awareness that the team members need to take over leadership tasks (Gronn, 2002).

One basic prerequisite of shared leadership is that the team members are willing to participate in shared leadership. This willingness is usually found when the teams are composed in such a manner that the team members have the authority to make decision interdependently with others (Small, 2010). This process of working interdependently requires the team members to influence others and to be influenced by others; if this is the case, shared leadership will happen (Perry et al., 1999; Small, 2010). Having a shared vision and communicating this vision to bring the vision alive are further ingredients for shared leadership. A vision can come alive only when the vision is shared (Westley and Mintzberg, 1989).

A self-organising team is never decoupled from other external surrounding organisations where external leadership roles are taken over. Leadership in a self-organising team is considered to be internal (Yukl, 2013). The internal leadership role in a self-organising team involves taking over the tasks and responsibilities assigned by the team and shared among the team members (Yukl, 2013). This means that for the assigned tasks, the members of a self-organising team work according to their internal values. Carson et al. (2007a) argued that one form of shared leadership is when the members of a team meet to discuss important issues and make a group decision. This is in line with the way of working in an agile self-organising team as described in section 3.2.6, where the team meets for 15 minutes to discuss what has happened, what will be the next step, and what are the obstacles. Moreover, as described in section 3.2.2, with the introduction of the *Agile Manifesto*, individuals and interaction were valued over processes and tools, additionally customer collaboration became important. Such interaction and collaboration require communication and coordination capabilities in the self-organising teams as well as the transformation of a vision into a working product (Highsmith and Fowler, 2001; Hazzan and Dubinsky, 2014). The review of the literature on the antecedents of shared leadership indicates that there is limited empirical research on the issue (Carson et al., 2007a; Small, 2010; Bergman et al., 2012). A self-organising team seems to be the perfect subject to investigate shared leadership and shared leadership competencies and paves a new path away from the traditional conceptualisation of shared leadership and team effectiveness towards team structure and how team members are influenced by others.

3.4 Shared leadership competencies

Many studies have focused on the leadership behaviour of an individual leader leading a team and the power of these leaders (Manz and Sims Jr, 1987; Cohen et al., 1997). However, only a few investigations have focused on the leadership competencies that a leader needs to have in order to apply shared leadership in a self-organising team. Bonner (2010) investigated the competencies that an agile manager needs to have to be successful in an agile environment. These are interaction style, innovation/exploration propensity, approach to change, information acquisition mode, and visionary ability.

Table 2: Agile competencies (adapted from Bonner (2010) and references within)

Agile competence	Description
Interaction style	Believing in and trusting people to do a good job intervening when necessary
Innovation/exploration propensity	An individual's tendency to look outward and to investigate new ideas that challenge the norm
Approach to change	How an individual views and handles change
Information acquisition	The manner in which a person seeks to obtain data can be characterised as their information acquisition mode
Visionary	How well a leader is able to look ahead and envision or imagine the desired future state

An extensive review of the extant literature on shared leadership and the enablers that facilitate shared leadership in an agile self-organising team revealed that competencies such as decision making, vision, team design/teamwork, communication, and coordination. (Schwaber, 2008; Moe et al., 2012) seem to be important success factors in self-organising teams. According to (Schwaber, 2008) a self-organising team promotes quick decisions, shares a common vision, functions with little coordination effort, is good at communication and is able to work as a team. These key elements are described in detail in the following sub-sections.

Further elements of potential relevance for shared leadership in self-organising teams are power, control and structure. None of these attributes, however, can be learned or taught easily they refer more to a team property than to an individual behavioural attribute. Since all the team member in a self-organising team are equal, leadership roles are not assigned.

However, this would be necessary to legitimise power or control. Thus it does not seem to be useful to investigate power and control in this context. Although gender and cultural background inevitably would influence the individuals of a self-organising team, the study of these elements in the present research study would potentially over-broaden the scope of the research.

3.4.1 Shared decision making authority

In a self-organising team, the team members commit to the self-defined goal and work collaboratively towards fulfilling it. Baker (1982) pointed out that if the members of a group or a team work collaboratively and distribute power equally, the base is set for less bureaucracy. Subsequently, leaders will emerge formally and informally and will share the decision making authority during the operation. It is important to note that authority refers to role legitimisation by the acknowledgement of the followers (Bass and Bass, 2013).

This is supported by Hoegl and Parboteeah (2006), who state that all the team members share the decision making authority in a self-organising team, and the team members have the competencies required to undertake their decisions regarding their work for the team on their own and without the support of other team members (Yukl, 2013). The absence of authority and decision making competence might lead to the failure of the whole team during crises (Manz et al., 1980; West, 2012). Therefore, it is important for the team members to have the required competencies and to feel accountable for reaching the team goal so that they are able to make decisions. In the context of an agile self-organising team, the decision making competence is two-fold. On the one hand, a person working in a self-organising team must have the decision competence for the work area for which he/she is responsible. That is, the person must have the competence to technically judge what is needed to fulfil the task. On the other hand, the person must be able to make collaborative decisions with the team (Cockburn and Highsmith, 2001).

3.4.2 Shared team vision

Envisioning, also known as visionary leadership, was investigated by Sashkin (1988) who suggested that visionary leadership requires teamwork and the ability to deal with change in order to fulfil ideal goals. Visions are goals and should be forward-looking and meaningful to the team members (West, 2012). West (2012) identified a conceptual framework for team development with four major themes: vision, participative safety, climate for excellence, and norms of and support for innovation. In this context, the vision is the shared team goal. In order to have a shared team vision, the team vision has to be jointly worked out by the team

and shared by everyone in the group (Dackert et al., 2004; West, 2012). A shared team vision that is worked out by the whole team describes not only what the team does but also why it is worthwhile and exciting to pursue (Yukl, 2013). A visionary leader empowers his/her team members with his/her vision; simultaneously, his/her visionary skills empower himself/herself as well. It is important to note that a team vision can come alive only if it is shared (Westley and Mintzberg, 1989). A core competency of visionary leaders working in a shared leadership environment is the ability to analyse the situation, envision the potential of the team, and create a strategic visionary concept. Only leaders who share the vision and have the competencies to work with competent team members will turn a shared vision into reality (Korngold, 2006).

3.4.3 Shared team design

A self-organising team requires a structure and a team design such that the team structure supports the team as well as the organisational goals (Pearce and Conger, 2003). In the past, organisational and team structures were designed to control the individuals' activities in a team. In a self-organising team, a structure is needed that recognises the performance of the team and allows for the identification of weak or strong links in the team set-up. In a shared leadership environment, a person who takes over leadership for a certain task must have the competence to detect deviations from the proposed goals and to take appropriate actions (Ginnett, 1999). The leaders working in a self-organising team should have the ability to help their team members to gain access to additional resources and/or to help and train other team members to achieve the team goal (Wellins, 1992).

3.4.4 Shared communication

Communication skills are essential when working in self-organising teams since the success of the team depends on the information flow between the team members. If the team members are unable to present their views related to their knowledge and their areas of expertise, this might constitute a problem for the whole team (West, 2012). A self-organising team with shared decision making authority facilitates open and shared communication among the team members (Hannemann-Weber et al., 2011). A person working in a shared leadership environment needs to foster communication throughout the team or organisation (Pearce and Conger, 2003).

3.4.5 Shared coordination

In teams with a high degree of autonomy, as is the case in a self-organising team, the team members rely on one another to take over the coordination of tasks and to share the

coordination of sub-tasks (Hoegl and Parboteeah, 2006). A number of prior studies e.g. (Baker, 1982; Pearce and Sims, 2002; Moe et al., 2008a; Moe et al., 2010) reported that a core competence in a shared work environment is the ability to break down work and to coordinate the work and sub-tasks among the team members; this core competence leads to success in high performance teams (Faraj and Lee, 2000). Augenbroe et al. (2002) supported these arguments and added that these coordination functions take place among the collaborating team members at a required level of control via coordinating the sub-task responsibility.

These five leadership competencies, decision making authority, visionary ability, team design, communication, and coordination are used in chapter 5 to develop the research instrument. The following section focuses on the theory of leadership, shared leadership, and leadership models.

3.5 Leadership, shared leadership, and leadership models

To investigate shared leadership and the competencies that team members require to be productive in a shared leadership environment, it is important to understand what leadership is and what shared leadership is. In the extant literature, there are many leadership and shared leadership models with corresponding measurement instruments. This section (adapted from the practitioner´s DBA residency conference paper, see Menzel (2013)) presents an overview of the history of leadership and the evolution of shared leadership as well as a description of the most widely used and accepted leadership models and their measurement research instruments.

A review of the literature on leadership reveals many different definitions and concepts of leadership. In the 1920s, leadership was defined as impressing "the will of the leader on those led and induce obedience, respect, loyalty, and cooperation" (Moore, 1927, p. 124). In the 1930s, leadership was considered to be a process where many were organised to be moved into a certain direction by the leader. Subsequently, the definition of leadership evolved to include the "ability to persuade and to direct beyond the effect of power" (Bass and Bass, 2013, p. 15). In the 1980s, leadership was considered to consist of inspiring others to take purposeful actions. In the 1990s, leadership was seen as the influence of the leader and the follower to make real changes that reflect their common purpose for a review, see Bass and Bass (2013).

The practitioner is a supporter of the definition of leadership as a process where leadership involves the cognition, interpersonal behaviour, and attributes of both the leader as well as the

followers as they affect each other's pursuit of their mutual goals (Bass and Bass, 2013). This definition of leadership is in common with Northouse (2011, p. 5), who sees "leadership as a process whereby an individual influences a group of individuals to achieve a common goal". With the definition of leadership as a process involving interactions between the leader and the subordinates, leadership is not defined as a one-way interaction process but as a two-way interaction process between the leader and the followers or the team members. Such leadership can be alternatingly executed by any member of the team and not only by the formally elected leader (if there is any).

Traditionally, leadership is seen as vertical leadership with a focus on leader-follower behaviour (Pearce and Conger, 2003). In a vertical leadership setting, leaders use their power and authority to influence the performance of their followers in the context of a specific task. Several models have been developed to conceptualise the leadership of a single assigned leader or the leadership behaviour of a team as a whole. Researchers have questioned the suitability of the vertical leadership approach to cope with the demands of self-organising work teams where no formal leader is appointed (Manz and Sims Jr, 1987). In the early 1920s, the philosopher Mary Parker Follet introduced a new concept of leadership that was different from vertical command and control, which shifted leadership to an empowered and democratic structure (Follett, 1926; Fox, 1968; Shapiro, 2003). Follet introduced the ideas that leadership can be changed, and that authority can be shared.

The ideas of Follet were further theorised by Manz et al. (1980); (Manz and Sims, 1986) in such a way that followers can also be leaders. The shared leadership function involves sharing of the leadership capacity by the entire team. This involves sharing the power, stepping forward when a particular situation calls for leadership, and stepping "back at other times to allow others to lead" (Pearce and Conger, 2003, p. 2; Day et al., 2004).

As the basis for theorising the concept of shared leadership, the definition of Yukl (2013) is used: all important decisions are made collectively, leadership responsibilities are distributed among the team members, and leadership is rotated frequently. A more precise and apt definition of shared leadership was proposed by Pearce and Conger (2003, p. 1), who stated that shared leadership is a "dynamic, interactive influence process" among team members in a work group in which the objective is to achieve team goals. Thus, shared leadership describes a collective approach where individual team members take over leadership capabilities and leadership tasks in a self-organising team. Shared leadership is "an emergent team property that results from the distribution of leadership influence across" more than one team member

(Carson et al., 2007a, p. 1218). By doing so, the consequence is to enhance the team performance for reaching the team goal and to maximise the potential of the team (Manz and Sims Jr, 1987). The relationship between a leader and followers has been used for the definition of shared leadership, and the relationship of leadership and followership as defined by Pearce and Conger (2003) has been used, where the relationship is shared. Shared leadership occurs when two or more members engage in the leadership process of a team in an effort to influence and direct the fellow members to maximise team effectiveness (Bergman et al., 2012).

In the following sub-sections, an overview of the relevant leadership theories and models is given; these theories and models are evaluated in terms of their respective advantages and disadvantages with respect to the problem under investigation.

3.5.1 Multifactor Leadership Questionnaire and Team Multifactor Leadership Questionnaire

One of the most common approaches for the measurement of shared leadership is to investigate the collective commitment of the team members' follower/leader behaviour using the transformational, transactional leadership measures of the Multifactor Leadership Questionnaire (MLQ) (Burns, 1978; Bass, 1985; Avolio et al., 1991; Bass, 2002). In the context of shared leadership, the measurement of the leader-follower behaviour is relevant; to this end, the MLQ assesses dynamics, capabilities and effectiveness on team level. A key difference according to Pearce and Sims (2002, p. 176) is that "the agents of influence are often peers of the targets of influence". From a practitioner perspective, the measurement of shared leadership in software development teams was investigated by Hoegl and Parboteeah (2006); Moe et al. (2009a); Moe et al. (2009b). The drawback of these studies is that the proposed research instrument was not validated; further, a single item focused on shared leadership overall and not on the shared leadership capabilities needed to enact shared leadership in a self-organising team. Related prior studies on shared leadership attempted to measure the emergent leadership (similar to shared leadership) in self-organising teams these studies defined certain leadership characteristics that a leader needs to be successful in self-organising teams. However, none of the leadership characteristics defined in these publications focusses on shared leadership directly as a characteristic (Hinkin and Schriesheim, 1989; Dennis and Winston, 2003; Dennis and Bocarnea, 2005; Reed et al., 2011). Prior researchers used different approaches to investigate leadership style such as the network view to investigate the relations among the team members. A second approach is the

leader-follower view, which is a shared leadership environment where the leader moves from being a leader to a peer who takes over leadership tasks. Additionally, a number of scales are available to measure leadership styles; however, none of these scales primarily focus on shared leadership styles (Charalambides, 1984; Carson et al., 2007b; Moe et al., 2009a; Moe et al., 2012).

The basis for the transformational and transactional leadership theory was established by the political scientist, James MacGregor Burns (Burns, 1978), who investigated political leaders. According to Burns, politicians exchange rewards with their voters; i.e. politicians make promises, and in return, the voters vote for them. Based on this observation, Burns defined two modes of leadership: the transactional leadership style and the transformational leadership style. The transactional leadership style is characterised by a leader who exchanges rewards with his/her subordinates or followers. This exchange includes rewards as well as punishment (Limsila and Ogunlana, 2008). In contrast, leaders using the transformational leadership style encourage and motivate their followers via challenging tasks and mentoring.

The Multifactor Leadership Questionnaire (MLQ; also known as MLQ 5X-Short) developed by Bass and Avolio Bass (1985); (Avolio et al., 1991) is a tool to empirically evaluate the Burns leadership model of transactional and transformational leadership. The scale of the MLQ is based on a factor analysis using a five-point Likert scale. The MLQ (5X-Short) consists of 45 items for a team survey and for research purposes. In the last decade, the MLQ (5X-Short) survey has been frequently applied to projects to test the transactional and transformational leadership paradigm. The MLQ went through many revisions and is still under development and refinement (Avolio et al., 1991). Prior research undertaken on leadership styles using the MLQ (5X-Short) uncovered that leaders using the transformational leadership style are more successful compared to leaders using the transactional leadership style (Thite, 2000; Ralf and Rodney, 2010).

As a further development of the MLQ (a strength of which is that the team members rate the individual leader), a Team Multifactor Leadership Questionnaire (TMLQ) was developed by Avolio et al. (1996) to extend the concept of the transformational/transactional leadership of individual leaders to a whole team. With the TMLQ, the target of the evaluation process is not the individual leader but the leadership capabilities of the whole team. The TMLQ has been validated and applied to several studies and is based on the MLQ; thus, it is considered the de facto standard tool to for evaluating the transformational/transactional leadership behaviour of a team (Bass, 1990; Avolio et al., 1991; Carson et al., 2007a).

3.5.2 Pearce and Sims shared leadership

Pearce and Sims (2002) developed a shared leadership model that is based on the conceptual work of Avolio et al. (1996); Bass (2002) on transformational and transactional leadership. The model categorises shared leadership according to the following leadership types: directive, transactional, transformational, aversive and empowering. Pearce and Sims (2002) developed and validated this shared leadership survey comprising 96 questions. The main purpose of the survey is to assess a whole team with regard to these leadership capabilities in order to identify the strength of the team's shared leadership. So far, the shared leadership survey was applied only to a limited number of teams. With 96 questions, it is a large survey. With so many questions, it might be difficult to evaluate the survey via a social network analysis (SNA, see section 4.3.2), since each member of a team has to rate the other members based on the 96 questions. Moreover, only a subset of the questions is applicable for the data evaluation of a specific area of shared leadership.

3.5.3 Leader-member exchange

The leader-member exchange (LMX) theory emerged in the 1970s. The focus of this leadership theory is the interaction between the followers and the leader. The main concept is that within an organisational unit or work group, the follower of a leader (the subordinate) becomes either part of the in-group or out-group of the leader, depending on how good the leader-follower relation is. Subordinates who cooperate with the leader negotiate "with the leader what they are willing to do for the group" (Northouse, 2011, p. 163). Members who expand their role and involve themselves by expanding and responsibilities are part of the in-group. Members who are part of the in-group receive more attention and information from the leader, and their tasks go beyond their formal job descriptions. Members who are part of the out-group are not willing to take on new job responsibilities (Graen and Uhl-Bien, 1995; Northouse, 2011). The LMX theory is an excellent tool for evaluating how a leader relates to his/her subordinates and whether he/she is sensitive whether the subordinates receive more or less attention. The typical application of LMX is in a leader-centric team setting, where the relationship of the leader and follower is mapped. One criticism of the LMX is related to the measurement of the LMX theory. Several different measurement scales have been proposed with different levels of analysis, which make the reported results difficult to compare (Graen and Uhl-Bien, 1995; Schriesheim et al., 1999; Schriesheim et al., 2001).

3.5.4 Servant leadership

The theory of servant leadership falls into the category of a 'skill and style approach' of a leader. The theory focuses on the style or behaviour of the leaders towards their followers.

Servant leadership has been the focus of leadership research for over 40 years now, starting with Greenleaf and Center (1973); (Greenleaf, 1997; Greenleaf, 2002). In the servant leadership approach, the follower comes first; this approach empowers the followers so that the followers can increase their personal leadership capabilities (Northouse, 2011). A servant-leader leads for the good of the company, the organisation, or the team. Spears (2002) attempted to characterise servant leadership and identified ten characteristics of servant leadership in Greenleaf (1997). Other researchers defined scales for the measurement of servant leadership and to clarify the theory of servant leadership (Dennis and Bocarnea, 2005; Barbuto Jr and Wheeler, 2006; Sendjaya et al., 2008). With all its positive features, the major weakness of the servant leadership model is that too many different scales were developed, representing different core dimensions of the model (Northouse, 2011).

3.5.5 Authentic leadership

Authentic leadership has its roots in the research area of transformational leadership (Bass, 2002; Bass and Bass, 2013). Researchers defined authentic leadership from a development perspective. Authentic leadership can be developed by the leader and is not something that is already inherent in the leader (Avolio and Gardner, 2005; Avolio et al., 2009). Walumbwa et al. (2008) conceptualised authentic leadership. Their concept of authentic leadership is rooted in the psychological qualities of the leader and is grounded in four distinct components, namely, self-awareness, internalised moral perspective, balanced processing, and relational transparency. The main concept is that an authentic leader learns and develops these four categories over his/her lifetime. From a practitioner perspective, two approaches describe how to become an authentic leader. Terry (1998) uses a guide (action wheel) on how to develop or to do leadership; the focus of the model is on taking action either by the leader or the organisation to develop an authentic leader. Another practitioner approach to conceptualise authentic leadership is the approach taken by George (2010), who describes in a practical way how the rudimentary capabilities of authentic leadership can be developed so that one can become an authentic leader (Northouse, 2011).

Although authentic leadership is an interesting approach that may be suited for newer forms of teamwork, the drawback is that the theory is still in a nascent stage. The two concepts developed by Terry (1998) and George (2010) are not fully developed yet. Moreover, as of now, only one research instrument is available but it is still under development (Walumbwa et al., 2008), and is only disseminated only to a limited extent. Further, its applications are limited, therefore a comparison of the results will be difficult.

3.5.6 Raelin's leaderful concept

A relatively newer concept of leadership is Raelin's 'leaderful' concept (Raelin, 2003; Raelin, 2010). Raelin's concept is part of the leadership paradigm that knowledge-based organisations will require everyone in the organisation to share the leadership knowledge and to serve as a leader. Of course, not the all members in the organisation serve as a leader simultaneously, however, leadership will be collective. This means that the leaders in a leaderful organisation will serve as a leader and serve others. Raelin defined the four C's of leadership: leadership is concurrent, collective, collaborative, and compassionate. According to this concept, all the team members, not only the appointed leader, are in control of and may speak for the entire team or the organisation. The concept evaluates the leadership capabilities of the team members with regards to the four C's via a survey of twelve questions, where each leadership area is evaluated with three questions. One drawback of the survey is that the survey is not validated systematically, and there are only a few extant, which makes it difficult to compare the results. Moreover, the concept assumes that in a team, there is a formally appointed leader, but other members could take over leadership as well. Therefore, whether the concept is applicable to a self-organising team is questionable because there is no appointed leader in such teams.

3.5.7 Taxonomy of leadership models

The leadership models described in the previous sections (sections 3.5.1 to 3.5.6) are a subset of the extant leadership models; these models seem to be suitable for a study on shared leadership. The models were selected and described with particular emphasis if they investigated either leader-follower behaviour or leadership at the team level. Additionally, each research instrument was evaluated according to how many questions the instrument had, and whether the instrument was validated. Table 3 presents a summary of the evaluated models and the proposed shared leadership model.

Table 3: Overview of Extant Leadership Models

Transformational, Transactional, and Laissez-faire Leadership Models		
Leadership Factors	Research Instrument	Data Evaluation
Transformational - Idealised influence - Charisma - Inspirational motivation - Intellectual stimulation - Individualised consideration *Transactional* - Contingent reward - Management-by-exception (active) - Management-by-exception (passive) *Laissez-Faire* - Non-leadership	Multifactor Leadership Questionnaire (MLQ) consisting of 53 questions. Five questions per leadership factor	Values are given for transformational, transactional, and laissez-faire leadership for the leader of the team
Leader-Member Exchange (LMX)		
Leadership Factors	Research Instrument	Data Evaluation
- Respect - Trust - Obligation	Leader-Member Exchange (LMX7), Likert scale 1-5. In total, seven questions	Values are given for the team leader for the leadership factors respect, trust, obligation
Servant Leadership		
Leadership Factors	Research Instrument	Data Evaluation
- Conceptualising - Emotional healing - Putting followers first - Helping followers' grow/succeed - Behaving ethically - Empowering - Creating value for community	Servant Leadership Questionnaire (SLQ): 28 questions on a Likert scale	
Authentic Leadership		
Leadership Factors	Research Instrument	Data Evaluation
- Self-awareness - Internalised moral perspective - Balanced processing - Relational transparency	Authentic Leadership Questionnaire (ALQ): 16 Questions, four questions per leadership factor area	

Avolio´s Model of Shared Leadership		
Leadership Factors	**Research Instrument**	**Data Evaluation**
Transformational - Idealised influence - Charisma - Inspirational motivation - Intellectual stimulation - Individualised consideration *Transactional* - Contingent reward - Management-by-exception (active) - Management-by-exception (passive) *Laissez-Faire* - Non-leadership	Team Multifactor Leadership Questionnaire (TMLQ) consisting of 53 questions. Five questions per leadership factor	
The Pearce and Sims Model		
Leadership Factors	**Research Instrument**	**Data Evaluation**
Aversive Leadership - Intimidation - Reprimand *Directive Leadership* - Assigned goals - Instruction and command *Transactional Leadership* - Material reward - Personal reward - Management-by-exception (active) - Management-by-exception (passive) *Transformational Leadership* - Performance expectations - Challenge to status quo - Vision - Idealism - Inspirational communication - Intellectual stimulation *Empowering Leadership* - Encourage self-reward - Encourage teamwork - Participative goal setting - Encourage independent action - Encourage opportunity thinking - Encourage self-development *Team effectiveness items* - Output - Quality - Change - Organising/planning - Interpersonal - Value - Overall	Shared Leadership Survey (SLQ) consisting of 96 questions	

Raelin's Leaderful Concept		
Leadership Factors	Research Instrument	Data Evaluation
- Concurrent - Collective - Collaborative - Compassionate	Survey with 16 questions, four questions per area	
Proposed Shared Leadership Model		
Leadership Factors	Research Instrument	Data Evaluation
- Decision making - Vision - Coordination - Communication - Teamwork	Shared Leadership Survey with 9 questions distributed over the leadership areas	Evaluation is performed at team level via social network analysis

3.5.8 Applicability of the reviewed models to investigate shared leadership in self-organising teams

The main aim of this thesis was to identify how shared leadership takes place in self-organising teams. The focus was on identifying the strengths and weaknesses of team behaviour and investigating how well the members of a team apply shared leadership in a team. A requirement to achieve this is that the whole team needs to be analysed. The aim was, therefore, to investigate how the teams perform and to find out how shared leadership happens in practice.

The reviewed models (section 3.5) can be divided into leadership models that analyse a team as a whole, models that focus on team leadership traits, and models that investigate the traits of the leader (Northouse, 2011). Given that the aim was to analyse the whole team's behaviour, the authentic leadership theory, servant leadership, Raelin's leaderful concept, the MLQ, and the LMX were determined not to be suitable models for the investigation because these models analyse either the leadership traits or the relationship between the leader and the followers. Two models seemed to be suitable for this research investigation: the Pearce and Sims model of shared leadership (Pearce and Sims, 2002) and the TMLQ (Avolio et al., 1991).

Another prerequisite for an investigation of shared leadership is that the relationship and influence of the actors in a team should be investigated. This is necessary to assess the strength of the mutual influence on the leadership behaviour of the team members. To analyse this interaction aspect of shared leadership, a social network analysis (SNA) is a suitable approach, where each member of the team rates the other team members (Borgatti et al.,

2009). According to Schwaber (2008), a self-organising team consists of up to nine team members (in some rare cases up to 12 members). For the application of a SNA, each team member has to rate the other team members for each of the questions (D'Innocenzo et al., 2014). Therefore, a model with a limited number of questions is needed otherwise each member would have to respond to too many survey questions. The Pearce and Sims model has 96 questions, and the TMLQ has 53 questions. Using either one of these models and analysing the data via a SNA is not feasible because each of these would require each of the respondents to answer 200+ questions.

Therefore, there is a need to develop a model whose primary purpose is to focus on a shared leadership scale with a minimum number of questions, which can then be analysed via SNA. One of the two extant models (the Pearce and Sims model of shared leadership or the TMLQ) can be used to ground the team behaviour on a model that is accepted in the research community, depending on where sufficient data is available so that the data gathered can be interwoven with the newly developed shared leadership model. For this, the model of choice is the TMLQ because several prior studies have used this model and this leadership model analyses the team behaviour as a whole. By using the TMLQ and by developing a stringent shared leadership research instrument, the gathered results can be related to the well-known and accepted model, which would give more confidence in the newly developed model.

3.6   Research gap and way forward

As discussed in section 3.1.3, self-organising teams are teams where shared leadership is facilitated. The study of shared leadership and related leadership behaviours requires access to a team setting where shared leadership can happen. Although there are many different theories on leadership with corresponding models and instruments to investigate them (as described in section 3.5), few models are available for shared leadership in self-organising teams. The individual team members, the team formed by them, the team's structure, and its internal relations constitute essential influencing factors for the shared leadership observed in such teams. Further, all these relational aspects need to be analysed with respect to key criteria describing the leadership aspects, such as decision making, vision, communication, coordination, and teamwork.

To obtain a comprehensive picture of a self-organising team and its behaviour in order to observe the shared leadership behaviour in such a team, the problem of observing the

leadership and corresponding leadership behaviour could be split in several facets, aspects, or questions. These are:

- Self-perception of a team member; i.e. how does a team member evaluate himself/herself?
- Perception of the team by each member; i.e. how does a single team member evaluate the team as a whole?
- Individual perception and influence of the other team members as seen by a single team member; e.g. How do I evaluate my peers individually? Is A doing better than B in aspect XY?

Each of the above mentioned facets needs to be evaluated with respect to a particular leadership trait (with respect to decision making, for instance).

The first facet, self-perception, may be assessed using the leaderful concept (Raelin, 2003) or the theories of servant leadership and authentic leadership (Greenleaf and Center, 1973; Greenleaf, 1997; Terry, 1998; Walumbwa et al., 2008). For the first facet, when the leader-follower relation as a process is under investigation, a suitable tool might be either the concept of transformation/transactional leadership by Avolio et al. (1991) or the leader-member exchange (LMX) by Graen and Uhl-Bien (1995); Schriesheim et al. (1999).

The second facet, where the capability of the whole team is under investigation, might be illuminated using the team multifactor leadership questionnaire (TMLQ) (Avolio et al., 1996; Avolio et al., 2009), which was developed and validated to measure the transformational/transactional capabilities of a team. A second model to evaluate the team capabilities is the model developed by Pearce and Sims (2002). The two groups of researchers adapted the ideas of specific leadership behaviours to the whole team in order to conceptualise shared leadership (Gockel and Werth, 2010).

However, studying the third aspect — the individual perception of the team members as seen by each of the other team members — is not straightforward as it requires investigating the contribution of each of the team members to the overall team performance with respect to important aspects of leadership, such as decision making, vision, etc.

Such an individual analysis of the influence of each of the team members on the team and the kinds of behaviour (as seen by the remaining peers) would allow a deep insight into the shared leadership behaviour observed for the complete team. Simultaneously, it would help to

identify gaps in the leadership behaviour and the team structure, subsequently, these gaps could be addressed, and closed or corrective coaching actions could be taken.

There have been very few attempts to investigate shared leadership in self-organising teams, especially the relational aspects involving each team member. Carson et al. defined several factors and tested the relational aspects in consulting teams in a university setting using SNA (Carson et al., 2007a). While Carson et al.'s approach was (to the best of the practitioner's knowledge) the first to combine the assessment of shared leadership with SNA, the study population consisted of preformed consulting teams in an MBA student setting; whether these teams were self-managed or leader-centred was not mentioned in the study. Pastor and Mayo (2002) theoretically defined an approach to measure shared leadership via social network analysis to investigate shared leadership. However, this approach has not been applied to a real team yet; therefore, the proposed method seems to be very useful to investigate relational aspects in teams.

For self-organising teams where no dedicated leader is appointed (such teams are more commonly found in IT projects), it is proven that shared leadership takes place (Pearce and Conger, 2003; Dackert et al., 2004). It can be expected that different leadership aspects are relevant than the ones applied in Carson et al. (2007a) because they investigated shared leadership with regard to team effectiveness. There is a dearth of studies focusing on the relevant aspects of leadership for self-organising teams and on the relational influence of the team members on the team as a whole. It is important to study these aspects since more teams will move away from a command and control way of working towards self-organisation in the near future. Therefore, it is necessary to have a better understanding of how shared leadership in self-organising teams happens, what kind of competencies are required, and how such a team can be analysed. This will help to evaluate such teams and to gain a better understanding of self-organisation.

The shift in software development away from command and control structures (where one single leader is appointed) towards self-organising teams implies that in the latter, all the team members need to take over leadership tasks to contribute to the team goal.

So far, there is a paucity of measurements methods available to investigate such self-organising teams. It is in this context that the present study (section 7.1) has sought to develop just such a method specifically to address the lack of information on shared leadership. Based on the practitioner's experience, attention thus needs to be given to what kind of competencies

a person is required to have in order to contribute to the team goal. Moreover, for improving of the self-organising team's performance, it is essential to understand the relationship among the different team members in order to identify weak areas. These identified weak areas can be discussed during a retrospective session (as per the Scrum methodology) to improve the team's performance.

The research method and research instrument proposed in this thesis work attempt to address this research gap. This study aimed to produce a comprehensive view of shared leadership and the associated leadership capabilities that are needed. It intended to provide a method to study the relational influence that an individual has and how leadership is shared. The study aimed to provide a concise questionnaire in combination with social network analysis that assesses the leadership behaviour of each individual team member as seen by the other members. Social network analysis is especially useful in leadership research because it visualises the leadership behaviour in a team; because of this visualisation, the manager and the team can take corrective actions.

Thus, to fill the research gap, the following approach was chosen:

A research instrument was developed with five leadership areas (see chapter 3.4) to investigate shared leadership behaviour via a social network analysis in order to make shared leadership team behaviours visible so that actions can be taken. This research instrument was subject to a rigorous reliability and validation process via literature review, interviews, face validity, and reliability tests using SPSS. The results of the reliability and validation process indicated that the research instrument appropriately measures the attributes that the instrument was developed to measure (shared leadership competencies).

To root this study in a well-known and often used leadership theory, the TMLQ (which evaluates the team leadership behaviour of the whole team and is based in the tradition of measuring the leadership behaviour of the leader and followers) was used. Because of the visualisation process and the combination with the TMLQ, a larger understanding of shared leadership in self-organising teams can be gained, and actions can be defined to increase the organisational and team efficiency.

As part of the research approach, an action research design was used (section 4.2) because the developed research instrument was applied to self-organising teams in different cycles. The action research design, with its emphasis on action and reflection cycles, facilitated the generation of directly applicable, new knowledge with each cycle.

4   Research Methodology

The previous chapter focussed on a review of the extant literature and the prerequisites for undertaking a research study on shared leadership (section 3.3). To transform the research gap into a suitable methodology a self-organising team that executes the Scrum methodology (described in section 3.2.6) needs to be accessed. The Scrum methodology requires self-organising teams that commit to a self-defined team goal, and the team leads itself to reach the team goal. Therefore, leadership is shared according to the task to be fulfilled. For the evaluation of such a self-organising team, their team structure, and authority relations, there is a need for a research instrument that allows a team-level evaluation of leadership behaviour accompanied by a social network analysis which evaluates the relation of leadership behaviour at the team level. Since each team member evaluates the other team members, a slim and stringent leadership research instrument is required, so that the number of questions in the research instrument is limited. Since the application of this shared leadership research was undertaken in an organisation and applied to self-organising teams, an action research approach was used. With the action research approach, the findings related to the weaknesses in the team structure can be directly introduced and acted on in cycles. By doing so, new knowledge can be immediately generated and applied in the organisation.

4.1   Methodology associated with this research

A research study is based on the vision of the world that is in common with the researchers' view of the world. The researcher with a positivist view believes that there is an out there reality, which is measurable by applying a methodology that aims for a better understanding or explanation of the world (Creswell, 2007). The approach that a researcher applies for a research study includes the epistemological, ontological, and methodological premises, which is a framework that underpins the beliefs of the researcher (Denzin and Lincoln, 2009). The chosen research approach defines how a researcher aims to create new knowledge. Ontology is the assumption about reality, and it defines how knowledge is created. The values of the researcher are reflected in the epistemology these values and beliefs of a researcher influence the research process. This influence is guided by the selection of the research method, the research sample, the analysis and the interpretation.

Historically, leadership research investigated leadership behaviour by studying the individual leader and his/her followers in conjunction with team performance (Bass, 1985; Avolio et al., 1996; Bass, 2002). Thus, prior leadership research is characterised by a positivist view that

identifies and combines the competencies and the leadership behaviour of an individual leader. From an ontological viewpoint, a positivist frames reality as something that is out there to be apprehended (Chia, 1995; Easterby-Smith et al., 2008b). The basic assumption of positivism is that reality is external and objective, and that the researcher is not part of the research study; knowledge is significant only if it is observed by this external reality (Easterby-Smith et al., 2008b). Compared to traditional leadership research (which was leader-centred), there is a need to investigate shared leadership differently, since shared leadership emerges in a group and is constructed via dialog and interaction.

This action-oriented research study is based on a positivist approach, building on the working assumption that there is an "out there reality" of shared leadership, which needs to be measured. To this end, the TMLQ (section 3.5.1) in conjunction with SNA measures (section 4.3.2) the extent to which self-organising teams exhibit the attributes of these frameworks. For the core action research projects, i.e. the study in the Swedish telecommunication company (section 7), the researcher was asked to limit disturbance of the team members to a minimum; thus, unfortunately it was not possible to conduct interviews with individuals. Therefore a positivist approach was adopted: an ideal notation of shared leadership was measured, without socially constructing it. Consequently, in this thesis, it might be surprising to find a more positivist language than is usually expected in an action research study. Nevertheless, an action "oriented" research approach was chosen, which is suited for the scope of this work because of its changing nature over time.

The main methodology of action research is used with its different cycles related to the action research core projects and the action research thesis writing process cycles (Zuber-Skerritt and Perry, 2002; Coghlan and Brannick, 2010). The measures used for the research project for the different cycles are defined and described in this chapter (section 4.3). Zuber-Skerritt and Perry (2002) proposed a method for action research and action research thesis writing that separates the action research project into a core action research project (section 4.2.1) and action research thesis writing and reflection processes (sections 4.2.3 and 4.2.4). The core action research project depicts the action research field work undertaken in an organisation; the reflection process takes place in a collaborative manner. The action thesis writing process is the action and reflection process of thesis writing where the researcher reflects on and conceptualises the findings derived from the fieldwork.

One of the main differences between the core action research project and the action thesis writing process is that the reflection process of the core action research project (fieldwork) is

performed partly collaboratively while that for the thesis writing action research project is undertaken independently. As suggested by Coghlan and Brannick (2010), the technique of a reflective pause was used to reflect on the learning gained during the course of the thesis work, to document the development as a researcher, to depict the reflection and learning, and to challenge the practitioner's own thinking biases and believes. Following Bourner (2003), the methodology for this reflective pause involved reflecting in public and showing the journey throughout the action research thesis process (section 4.2.2). The following sections describe in detail the methods and measures used for the core action research project, for the action thesis writing project, and for the reflection process.

4.2   Introduction to action research

The approach chosen for the investigation was determined by the nature of the University of Liverpool's DBA program, which is based on action research (Zuber-Skerritt and Perry, 2002; Coghlan, 2008; Pedler, 2008; Jean McNiff, 2011). The notion of action research was introduced by Kurt Lewin (Burnes, 2004). It combines the generation of theory and the changing of a social system by the researcher through action taken on or in the social system and by reflecting on the results to generate critical knowledge (Susman and Evered, 1978; Schein, 1999). Action research has become very popular over the last few years (Reason and Bradbury, 2001). From an epistemological and ontological perspective, action research is aligned with subjective epistemology and realist ontology (Coghlan and Brannick, 2010). From a phenomena and people perspective, reality is considered; however, the view of reality is the interpretation of different phenomena and the personal experiences of the person involved. Positivism (Johnson and Duberley, 2000) separates the researcher from the subject under study. In action research, the researcher is part of the subject under study, and the researcher combines research knowledge when solving an organisational problem.

The methodology chosen for this research study was an action research approach as described by Zuber-Skerritt and Perry (2002), who divide the action research project into a core action research project and action research thesis writing and reflection processes. To undertake and justify the action research methodology and to classify research as action research, three key aspects are needed (Zuber-Skerritt and Knight, 1986; Zuber-Skerritt and Perry, 2002; Jean McNiff, 2009):

- a group of people who work together
- involvement in the cycle of planning, acting, observing, and reflecting on their work

- producing a public report (which might be a thesis)

The aim of this research study was to investigate shared leadership and the development of a self-organising team in a social and professional manner. This was achieved by conducting investigations at the team level. For the current research study, only some of the prerequisites classifications as action research study were fulfilled. Consequently this research study does not strictly take a pure action research approach, which usually follows a highly collaborative design while making changes and taking action in an organisation or in a social team setting (Reason and Bradbury, 2001). The investigation of a self-organising team was undertaken by studying a group of people who work together. The doctoral researcher/practitioner however was not a permanent part of this group. Therefore, the social collaborative interactions with the teams took place during predefined measurement appointments. During these measurement appointments the researcher engaged in social collaborative interactions with the teams, either by giving background information about the research study and on shared leadership, or by discussing how shared leadership could happen in such self-organising teams. The changes and findings were subsequently implemented by the teams independently, and the action and reflection took place in cycles, during the intensive social interactions between the different teams and the researcher, i.e. during the TMLQ and SNA result discussion and presentation.

Thus, the left hand side of the thesis organisation picture (see Figure 1) describes the different team samples taken at the measurement points, when the researcher interacted via discussions, presentation of results, or by giving suggestions for improvement in a collaborative manner with the different teams. This is different from the classical pure action research approach, where the researcher is part of the team and observes, acts and reflects in a participative manner. Because of external constraints the researcher could be only partly collaboratively connected with the teams; thus an action-oriented research approach in the tradition of a positivist view was chosen to measure the phenomenon of shared leadership. In this setting taking actions only at the defined appointments seemed to be a suitable approach.

Two distinct projects were introduced: a core project led by the doctoral researcher, which was undertaken in an organisation; and the action thesis writing process to write and reflect on the creation of knowledge acquired during the core action research project. This combined the acquisition of organisational knowledge and the documentation of this acquired knowledge in a report (i.e. a doctoral thesis). For this research study, the approach presented in Figure 4 for a core research project and the action thesis writing process was introduced and followed.
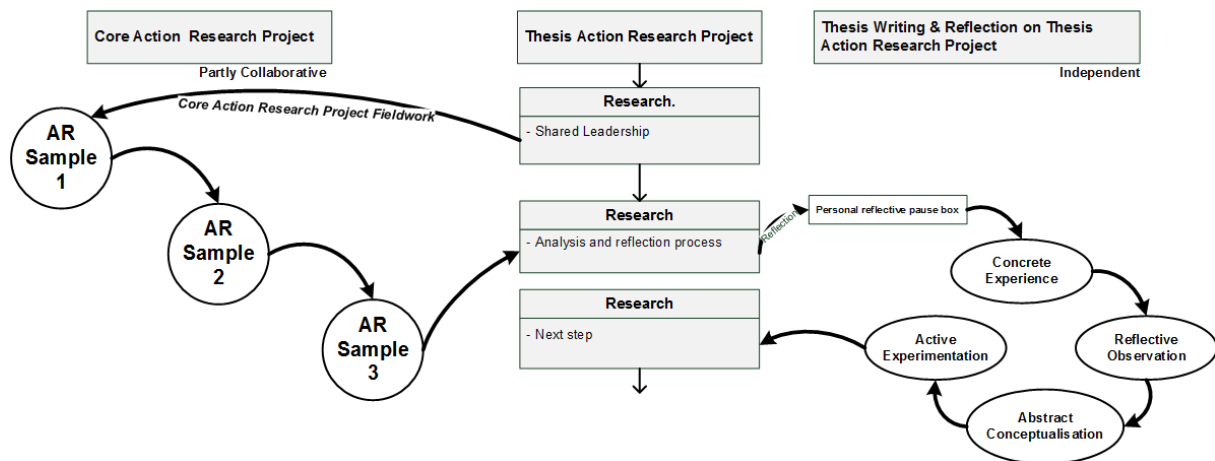
Figure 4: Schematics of Core Action Research Project and Thesis Writing Project

In this thesis work, the quality criteria for action research defined by Herr and Anderson (2005) were followed. Herr and Anderson (2005) used the term validity and defined five validity areas. The validity areas 'dialog and process', 'outcome', 'catalytic', 'democratic', and 'process' (depicted in Table 4 were adapted from Herr and Anderson (2005) and enhanced for applicability to the thesis work. The following sections describe the different action research projects and measures.

Table 4: Rigorous Quality Criteria for Action Research (Table adapted from Herr and Anderson (2005) and mapped to research thesis)

Goals of Action Research	Quality/Validity Criteria	Applicability to thesis
Generation of new knowledge	Dialog/process validity	New knowledge on how shared leadership is achieved in self-organising teams for the researcher and the organisation
Achievement of action oriented outcome	Outcome validity	Core action samples and reflection cycles (action-oriented approach)
Education of researcher/participant	Catalytic validity	Reflection is performed partly collaboratively within the team
Result is relevant to the organisation	Democratic validity	Core action research projects are partly collaborative
A sound/appropriate research methodology	Process validity	Use of action research cycles with Kolb's reflection cycles and defined and validated measurements

4.2.1 Core action research projects

For the core action research projects, five self-organising teams working in accordance with agile methodology as described in section 3.2 were chosen, these were suitable for the study of shared leadership; Two samples were taken (Coghlan, 2001; Humphrey, 2007). These core action research projects took place in a telecommunication research and development centre where five self-organising teams that apply the Scrum methodology for software development and maintenance were investigated. The core action research projects and their different cycles are described in chapter 7 of the thesis, where the setting is described in detail.

4.2.2 Personal reflective pause sections

Each thesis writing reflection step was accompanied by a reflective pause box (sections 5.7, 6.5, 7.4, 7.6, 7.7) as described by Coghlan and Brannick (2010). These reflective pause boxes focussed on what was encountered, after major achievements were made during the thesis work, how this was reflected in the situation and the findings, and on the practitioner's development as a researcher. The main focus of these pause boxes was to reflect on the experience obtained, to critically re-think the situation, to evaluate how the findings challenged the practitioner's beliefs, to determine which changes will be integrated and to determine how to show the practitioner's development as a researcher. As described by (Bourner, 2003) the method used for the critical reflection process (which is a rather personal issue) used a questioning approach to learn, to explore the nature of learning of reflective thinking, and to transform tacit knowledge to explicit knowledge (Coghlan and Brannick, 2010). Contrasting the pause sections in the thesis document was the reflection on the thesis writing process and their findings, which followed Kolb's reflection model (Kolb, 1984; Kolb and Kolb, 2009). The beauty of Kolb's reflection model is that the model directly conceptualises the reflection findings such that these concepts can be applied in one of the subsequent core action research cycles. The thesis writing and reflection processes following Kolb's method are described in the next sections.

4.2.3 Thesis writing action research process

During the course of thesis writing, the method of Kolb's (Kolb, 1984; Kolb and Kolb, 2009) reflection process was followed; five cycles of the thesis writing process took place. The cycles journalized the development and refinement of the thesis work, and they documented how the generated knowledge was transferred in practice, triangulated with the extant literature, and applied in the real world via action research. Even though reflection was an important part of traditional education and learning, reflection is even more important in

action research because the actions that are taken are based on the decisions made during reflections (McNiff, 2000; Zuber-Skerritt and Perry, 2002; Jean McNiff, 2009). Reflection is a highly personal cognitive process: a person takes on the experience gained during the research process, brings it to mind, makes connections to other experiences, and connects the experience with the extant literature, thereby generating new knowledge and setting the base for further actions Wood Daudelin (1996). Within the research process, the reflection process needs to be formalised, which requires dedicated time and a particular reflection approach (Nadin et al., 2006; Alvesson et al., 2008). During the thesis writing process, these dedicated times of reflection took place after major steps of the investigation:

1: After the development of the research instrument (section 5.7)

2: After the application of the research instrument in a pilot study (section 6.5)

3: After the first cycle involving four self-organising teams and the data evaluation of the leadership research instrument (section 7.4)

4: After the first cycle where the instrument was applied to team E5 (section 7.6)

5: After the second cycle for team E3/E4 and the corresponding data evaluation (section 7.7)

The method used for reflection and conceptualisation was Kolb's (Kolb, 1984; Kolb and Kolb, 2009) reflection cycle, which complements the action research methodology.

4.2.4   Kolb's reflection method for thesis writing process

Kolb's reflection model (Kolb, 1984; Kolb and Kolb, 2009; Bergsteiner et al., 2010) describes a process where "knowledge is created through the transformation of experience" (Kolb, 1984, p. 38) (Figure 5). This happens on a concrete level by grasping and transforming this experience through reflective observation and synthesising this with the experience and knowledge from the extant literature in order to conceptualise the findings obtained from the reflection. Kolb's reflection method was chosen because it complements the action research process of reflection and conceptualises the process of reflection. The generated knowledge gathered from the field action core projects were fed into the reflection cycles during the thesis writing process (Kolb and Kolb, 2009; Bergsteiner et al., 2010) and conceptualised so that new actions could be taken.
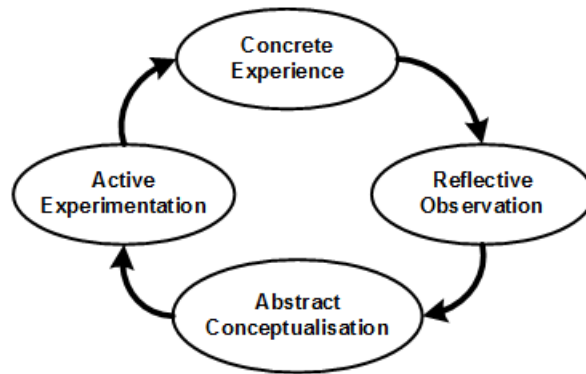
Figure 5: Kolb's Reflection Cycle (Figure adapted from (Kolb, 1984; Kolb and Kolb, 2009))

This abstract conceptualisation needs to be actively applied to create a new concrete experience and to follow the cycle of reflection again (Kolb and Kolb, 2009). The five thesis reflection cycles are described in sections 5.7, 6.5, 7.4, 7.6, and 7.7 of the thesis; these describe and journalize the different cycles undertaken during the thesis writing process.

4.3 Core action research projects measures

The following sections describe the measures used for the core action research projects. As described in section 3.5, several leadership models are available, with corresponding measurement scales. The model chosen for this research was the Team Multifactor Leadership Questionnaire (TMLQ), with its corresponding scale. For the evaluation of the team members' interactions, a social network analysis approach was followed. The TMLQ and the social network analysis (SNA) approach are described in the subsequent sections.

4.3.1 Team Multifactor Leadership Questionnaire

The Multifactor Leadership Questionnaire (MLQ) developed by Bass (1985); Avolio et al. (1996); Bass (2002) assesses the leadership behaviour of a single person and/or an individual leading the team. Since the focus of this study is to investigate team behaviour, the MLQ is not a suitable measure.

Other investigations focused on collective, collaborative, shared, or distributed leadership in teams (Manz and Sims Jr, 1987; Raelin, 2003; Pearce and Conger, 2003). More recent attempts to measure the performance of a team and to describe their leadership capabilities are Hoegl and Parboteeah (2006); (Moe et al., 2010). None of these team models use a validated scale; therefore, these are not suitable for this study. A further development of the MLQ is the Team Multifactor Leadership Questionnaire (TMLQ), which can be taken as the base to assess the leadership behaviour and leadership competencies of a team. The TMLQ is a well-known instrument; it has already been applied to many projects and uses a validated scale. It

can be considered as the standard tool to evaluate leadership styles at the team level. A detailed description of the conceptual leadership style described by Bass (1985) is given below:

***Laissez-faire style*:** Because of the avoidance or the absence of leadership, necessary decisions are not made; therefore, necessary actions are delayed (Bass, 1985).

***Transactional style*:** Transactional leaders motivate their employees through delegation and the clarification of goals and tasks. Together with the goals, there is a clear rewarding system to motivate subordinates (Bass, 1985).

Transformational style: This leadership style is characterised by the encouragement of subordinates to spend extra effort and to go beyond what was expected from a subordinate before.

In Bass (1985); Bass (2002); Jens and Kathrin (2007) the three different leadership styles examined by the TMLQ are further categorised into eight leadership factors Table 5. These factors are used to measure and describe the specific leadership styles (transformational, transactional, and laissez-faire leadership styles) in more detail following Bass (1985).

Table 5: Leadership Styles and Corresponding Factors (taken from Bass (1985))

Leadership Style	Factor	Description
Transactional	Contingent reward (CR)	Defining the exchanges between what is expected from the follower and what the follower will receive in return
	Management-by-exception (active) (MBEA)	In order to maintain current performance status, the focus is on detecting and correcting errors, problems, or complaints
	Management-by-exception (passive) (MBEP)	Addressing problems only after they have become serious
Leadership Style	Factor	Description
Transformational	Idealised influence charisma (III)/(IIB)	Instilling pride in and respect for the leader; the followers identify with the leader
	Inspirational motivation (INSP)	Articulation and representation of a vision; leaders show optimism and enthusiasm
	Intellectual stimulation (IS)	Followers are encouraged to question established ways of solving problems
	Individualised consideration (IC)	Understanding the needs and abilities of each follower; developing and empowering individual followers

Leadership Style	Factor	Description
Laissez-faire	Non-leadership	Absence of leadership behaviour

4.3.2 Social network analysis

During the evolution of shared leadership, researchers used different approaches to measure shared leadership (Kilduff and Mehra, 1997; Pearce and Conger, 2003; Mehra et al., 2006; Borgatti et al., 2009; Gockel and Werth, 2010). Shared leadership describes a collective approach, and researchers measured shared leadership via a network system approach by investigating the power distribution in a team (Bavelas, 1950; Guetzkow and Simon, 1955). The network system approach was further developed to a social network approach in order to understand how shared leadership works in a self-organising team. (Sparrowe et al., 2001; Carson et al., 2007b; Small, 2010). In a social network approach, the focus is on how individual team members use the power in a team, and whether there is more than one person in the team who takes over leadership tasks to reach the team goal. The theory of social network analysis (SNA) is that individuals are part of a group or team with social relations and interactions (Borgatti et al., 2009). The primary focus of the social network theory is on the social interaction of a node in a social network. In the 1990s, SNA was extended from biology and physics to a wider range of research fields, including management research (Hoppe and Reinelt, 2010). In management research, SNA approaches gained importance in understanding the relationship structure of individuals in teams (Balkundi and Kilduff, 2006; Carson et al., 2007b; Hoppe and Reinelt, 2010). A social network perspective of teams moves the focus away from an individual and his/her attributes towards the dynamics of a social infrastructure, such as that of a self-organising team. The nodes in a social network are interconnected with one another and can be considered to be collective. The leadership in a self-organising team is shared among the nodes in the social network; further, the power in such a team is distributed (Bavelas, 1950; Guetzkow and Simon, 1955). The SNA approach examines this collective leadership that is formed between different nodes in a social network and the relationship among these nodes. (Sparrowe et al., 2001; Small, 2010). The SNA is a well-suited method for investigating shared leadership behaviour because SNA is an inherently relational approach that allows such investigation when there is more than one leader within a team; further, it models the vertical and horizontal leadership behaviour (Krackhardt and Kilduff, 1990; Mehra et al., 2006) of a team. Pearce and Sims (2002) showed that shared leadership measured with a SNA approach captures the actual patterns of shared leadership behaviour in a team. Within a social network, a node represents the people in the

network, and the links represent the relations involving those people. These links in a social network can be undirected or directed. The directed links can be directed one-way or two-way (Hoppe and Reinelt, 2010).

Table 6: Social Network Link Types (adapted from Hoppe and Reinelt (2010))

Link Type		Relationship Leadership
Frank Tom ○———○	Undirected	Frank and Tom know each other and have spoken with each other
Hans Michael ○——→○	Directed (one-way)	Hans knows Michael and perceives Michael as a leader
Fritz Gail ○←——→○	Directed (two-way)	Fritz and Gail know each other and perceive each other as leaders

In classical leadership with a centred-leader behaviour setting as depicted in Figure 6a), the node in the centre represents the formally appointed leader. All the other sub-nodes are subordinates of the leader. The directed line from a subordinate node with the arrow pointing to the node in the centre means that the person in the centre is perceived as a leader (Mehra et al., 2006). The shared leadership network is depicted in Figure 6b); each person in the social network perceives the other people in the network as a leader.
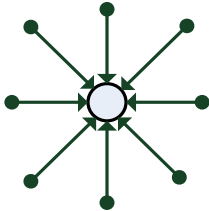
(a)   (b)
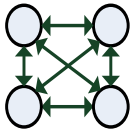
Figure 6: (a) Leader-centred Social Network and (b) Shared Leadership Social Network

To measure the five dimensions of the shared leadership instrument (decision, vision, communication, coordination, and teamwork), a social network approach was followed using SNA metrics such as the network density for evaluation, which measures the perception "of the total amount of leadership displayed" by the other team members (Carson et al., 2007b, p.

1225; Hoppe and Reinelt, 2010). For the sample network in Figure 6b, there are a maximum of six possible links (M = 6) between four nodes (N = 4).

The network density was computed as follows:

$$Density = \frac{2M}{(N(N-1))}$$

Each team member rated each of his/her team peers on a Likert scale (0: 'not at all' to 4: 'frequently or always') on the self-developed research scale of the shared leadership instrument (chapter 5). To be consistent with the TMLQ approach, the approach used by Sparrowe et al. (2001); Pearce and Conger (2003) was followed. The responses for the five different competence areas from each team member were averaged into 3×3 or 4×4 squared matrices, depending on the team size under investigation. The values were dichotomised, i.e. values less than two were considered as zero, and values greater than or equal to two were valued as one (Sparrowe et al., 2001; Pastor and Mayo, 2002). By doing so, the data was translated from a valued-based system to a binary network; importance is given to (presence of) the links among the relationships, rather the strength of the relationship. The relationship among the different team members is represented by an arrow.

If an arrow points from one member (T1) to another (T2), this means that (T2) is perceived as a source of leadership for a specific competence (see Figure 7, adapted from Carson et al. (2007b)). Two-headed arrows indicate that each of the members perceives the other as a leader. For evaluating and generating the statistics of the sociograms, the tools NodeXL (CodePLex) and UCINET 6 (Borgatti) were used.

(a)   (b)   (c)
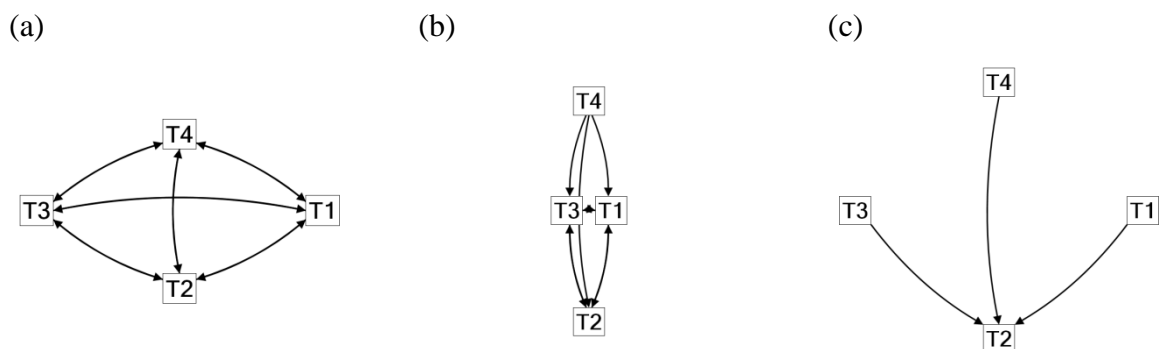
Figure 7: (a) Highest Level of Shared Leadership; (b) Medium Level of Shared Leadership; and (c) Low Level of Shared Leadership for a particular competence

The highest level of shared leadership for a specific competence (Figure 7a) is achieved when all the nodes in a network are connected with one another, and each node perceives the other

as a leader (see Figure 7a). A medium level of shared leadership (see Figure 7b) happens when at least two-thirds of the team members perceive another member as a leader. A low level of shared leadership is achieved when less than a third of the members perceive another member as a leader (see Figure 7c).

In a social network, the centrality metric describes and measures how and to what degree an individual person and his/her position in a social network influence the network Borgatti (2005); Sutanto et al. (2011). Centralisation characterises the disparity with which team members participate in the leadership process (Pearce and Conger, 2003). The closeness centrality measures the extent to which an individual lies at a short distance from the other actors in the network (Freeman, 1978; Freeman et al., 1979). For shared leadership and for this study, the degree of shared leadership that is used can be thought of as team decentralisation. As a proposition, when all the members of a network participate in and show leadership behaviour, it can be viewed as the highest degree of shared leadership. In contrast, when the leadership behaviour in a social network is dependent on one or only a few nodes in the network, leadership can be seen as centralised; therefore, it is at a low level in terms of shared leadership (Pearce and Conger, 2003). According to Freeman et al. (1979), the equation to compute the centralisation C_D for a group or a team consisting of N nodes is as follows:

$$C_D = \frac{\sum_{i=1}^{N}[C_D(n^*) - C_D(n_i)]}{[(N-1)(N-2)]}$$

where $C_D(n_i)$ is the degree of centralisation (i.e. the number of links for this node) for the ith node n_i, and $C_D(n^*) = \max[C_D(n_i)]$ (the highest observed value for a single node's $C_D(n_i)$ in the particular network).

Shared leadership in a team occurs when the nodes in a network have similar influence on the other nodes in the network. It is equally important to take into account the total amount of influence that the team has. A network with a high density value represents a team that has a high amount of influence on each individual team member. The degree of shared leadership can be thought of as a degree of team decentralisation. If all the members of a network participate equally in displaying leadership behaviour, the team would have the highest level of shared leadership. If the team centralisation value is low, the maximum shared leadership value will be one because leadership is decentralised and shared among different team members (Pastor and Mayo, 2002). For the classification of shared leadership, the approach as described by Pearce and Sims (2002) was followed. The network density can be either high

or low (1 or 0, respectively). Network decentralisation can take values between 1 or 0. This constitutes a classification instrument for shared leadership with four classifications: low shared leadership, high shared leadership, leadership avoidance, and vertical leadership (explained in detail in the next section). The classification can be best understood with an illustration (see Figure 8).
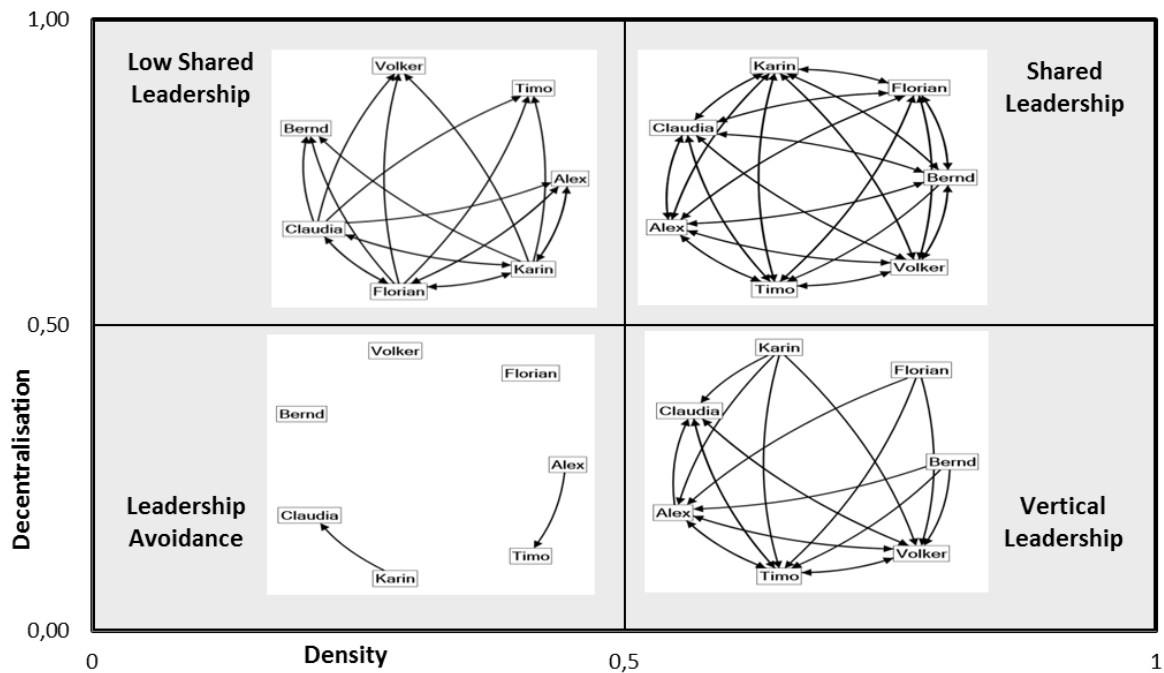
Figure 8: Degrees of Shared and Vertical Leadership (adapted from Pastor and Mayo (2002))

For a team with seven team members, the quadrants of the example depicted in Figure 8 can be understood as follows.

Quadrant I: Low Shared Leadership (low density/high decentralisation)

This quadrant represents a low/moderate attitude of shared leadership, where the distribution is equal but has a low level of influence. The team members prefer not to take on a leadership role as long as everything is going well in the team.
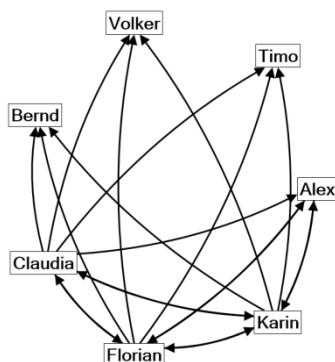
Low Shared Leadership

Density: 0.50

Decentralisation: 0.97

Members: 7

Links/Member: 3.00

Quadrant II: High Shared Leadership (high density/high decentralisation)

This quadrant represents the highest degree of shared leadership. All the team members have high influence on the other team members in an equal way and perceive high power and influence in the team. This setting is expected to be found in self-organising teams.
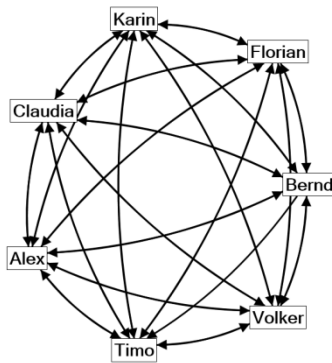
Shared Leadership

Density: 0.76

Decentralisation: 0.97

Members: 7

Links/Member: 4.50

Quadrant III: Leadership Avoidance (low density/low decentralisation)

Only a few team members have a few connections to other team members. There are some isolated, cases who have no connection to the other members (isolates). This might be the typical traditional hierarchical team setting for teams with a long work history.
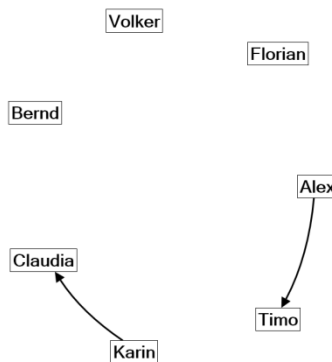
Leadership Avoidance

Density: 0.02

Decentralisation: 0.01

Members: 7

Links/Member: 0.14

Quadrant IV: Vertical Leadership (high density/low decentralisation)

This quadrant represents cases of strong leadership in a very hierarchical structure. Only one member or a few members have high influence in the team. This pattern may be expected in teams with charismatic leadership.
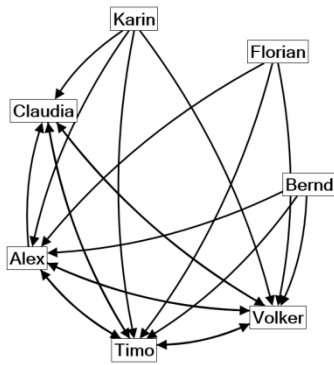
Vertical Leadership

Density: 0.50

Decentralisation: 0.42

Members: 7

Links/Member: 3.00

The main focus of this research is to use the shared leadership competencies defined here and to analysis these competencies using the social network approach at the team level via team centralisation and team density in order to measure the shared leadership behaviour of the team.

4.3.3 Data evaluation

This section describes the different steps undertaken to evaluate the gathered data. This includes a description of how the TMLQ data was gathered and evaluated, as well as a description of the tools used for the SNA.

The TMLQ data was evaluated using the evaluation sheet provided by Mindgarden (2015). For the purpose of this research study, an official TMLQ survey was purchased (including the evaluation sheet). The TMLQ survey was purchased from Mindgarden (Mindgarden, 2015). A Microsoft Excel sheet was developed, and the data was manually entered for the paper surveys, as illustrated in the sample evaluation in Table 7. For each TMLQ attribute, for the team the mean of the respective answers was computed. The answers that needed to be considered for each attribute are listed in parentheses (e.g. 'Idealised Attributes' is computed by taking the mean of answers 2, 12, 22, 32, and 42).

Table 7: TMQL Data Evaluation in Microsoft Excel (Mindgarden, 2015)

TMLQ attribute		Ellen	Karl	Spencer	Simon	Uli	Elena	Martina	Team
Idealised Attributes (2, 12, 22, 32, 42)	III	3.20	3.60	2.40	2.20	3.00	2.60	3.20	2.89
Idealised Behaviours (4, 14, 24, 34, 44)	IIB	2.60	3.20	1.80	1.20	2.00	1.80	1.50	2.01
Inspirational Motivation (6, 16, 26, 36, 46)	INSP	2.20	3.20	1.80	1.00	2.20	2.20	2.20	2.11
Intellectual Stimulation (8, 18, 28, 38, 47)	IS	2.40	3.60	2.40	1.80	3.20	2.40	2.80	2.66
Individualised Consideration (10, 20, 30, 40, 48)	IC	3.40	3.40	2.60	2.40	2.60	3.00	3.20	2.94
Contingent Reward (7, 15, 25, 35, 45)	CR	3.20	2.40	2.00	1.40	2.40	2.60	1.80	2.26
Management-by-Exception (Active) (5, 13, 23, 33, 43)	MBEA	2.80	2.40	1.80	2.00	1.80	2.40	2.40	2.23
Management-by-Exception (Passive) (3, 11, 21, 31, 41)	MBEP	1.40	0.00	0.60	1.00	0.60	1.20	1.50	0.90
Laissez-faire (1, 9, 19, 29, 39)	LF	1.40	0.40	0.00	1.40	0.60	0.60	1.00	0.77
Extra Effort (17, 27, 37)	EE	2.67	3.00	2.67	1.33	2.00	1.67	1.67	2.14
Effectiveness (61)	EFF	3.00	2.00	2.00	2.00	3.00	3.00	3.00	2.57
Satisfaction (62)	SAT	3.00	2.00	3.00	2.00	1.00	3.00	3.00	2.43

The TMLQ proposed by (Bass, 1985) (henceforward, 'the Bass TMLQ) used a standard Likert scale 0 = 'Not at all'; 1 = 'Once in a while'; 2 = 'Sometimes'; 3 = 'Fairly often'; 4 = 'Frequently or always'. In addition to the mean value for each TMLQ attribute, box plots for each attribute were created (Figure 9). These box plots depict the mean value (triangular symbol) and the median (horizontal line); the bottom and top of the box represent the first and third quartiles of the data distribution; the whiskers depict the full data range (i.e. max and min value). In cases where the team members have similar evaluations of one another, the full data range is narrow; otherwise (i.e. in cases of outliers) the data range spread is correspondingly large. Both cases involve additional information that would be lost if only the mean were considered.
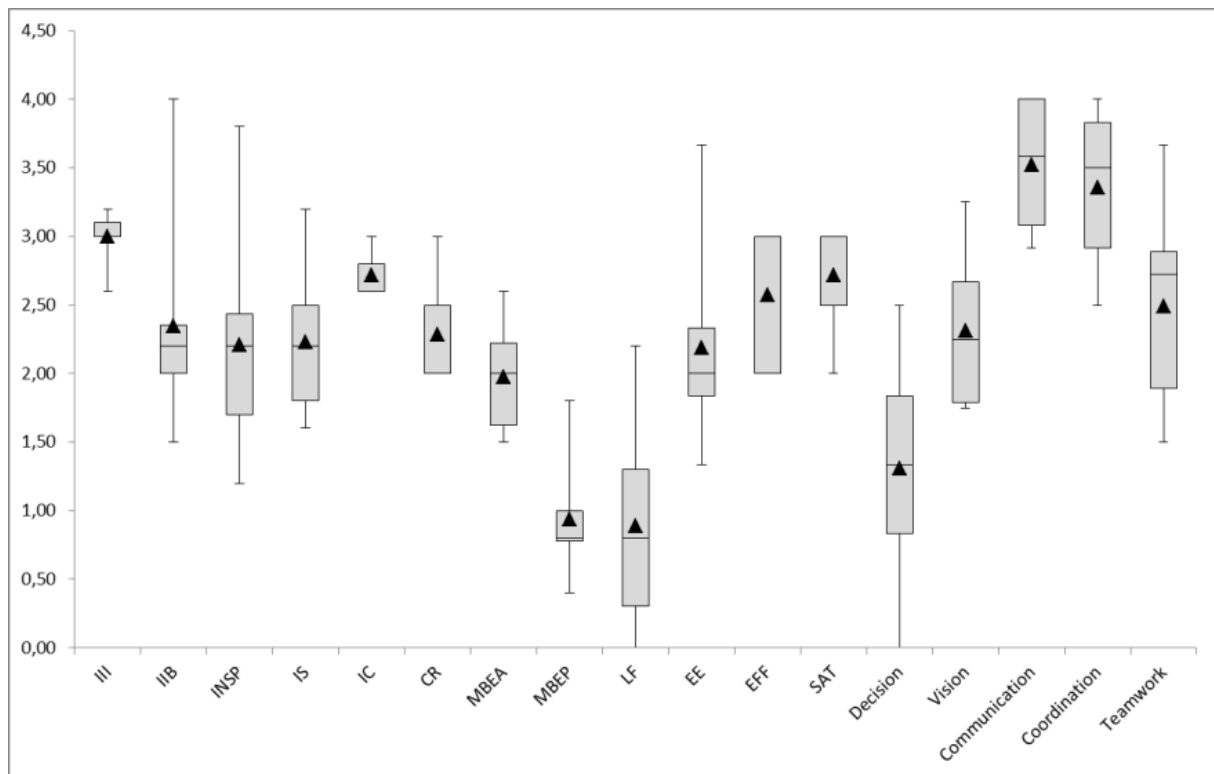
Figure 9: Box Plot for TMLQ Data

Calculation of decentralisation

For calculating the decentralisation, the UCINET tool (Borgatti, 2002) was used. For each of the completed surveys on shared leadership competencies rated by each member, the lowest value could be 0 and the highest value could be 4 (see Table 8). The answers/values given to the different areas were averaged as suggested by Pastor and Mayo (2002).

Table 8: Sample Matrix for Shared Vision (following Pastor and Mayo (2002))

Matrix of Shared Vision								
	Ellen	Karl	Spencer	Simon	Uli	Elena	Martina	Total
Ellen	0	3	3	3	3	3	2	17.0
Karl	3.5	0	4	2.5	4	3	2.5	19.5
Spencer	1.5	2.5	0	1	2.5	1.5	1.5	10.5
Simon	2	2	2	0	2	1.5	1.5	11.0
Uli	1	2	2.5	2.5	0	1.5	1	10.5
Elena	2.5	3	3	2.5	3	0	1	15.0
Martina	2	2.5	2.5	2	2.5	2	0	13.5

In the example of the shared vision attribute in Table 8, each cell represents the vision attributed to the other members of the team. The total in the rows can be used as a measure of the shared leadership's coordination influence attributed to each member by his/her peers. A higher value represents a higher influence on other team members.

Sociograph of shared leadership

As suggested by Pastor and Mayo (2002), the represented shared leadership values of the vision attribute data were dichotomised. Practically, values less than 2 were considered as 0, and values greater than and equal to 2 were assigned the value 1. By doing so, the value-based network data was transformed into a binary network where only the presence was counted and not the strength of the relationship. The dichotomised network for the example in Table 8 is presented in Table 9.

Table 9: Dichotomised Matrix for Shared Vision (following Pastor and Mayo (2002))

Matrix of Shared Vision								
	Ellen	Karl	Spencer	Simon	Uli	Elena	Martina	Total
Ellen	0	1	1	1	1	1	1	6
Karl	1	0	1	1	1	1	1	6
Spencer	0	1	0	0	1	0	0	2
Simon	1	1	1	0	1	0	0	4
Uli	0	1	1	1	0	0	0	3
Elena	1	1	1	1	1	0	0	5
Martina	1	1	1	1	1	1	0	6

To calculate the decentralisation for the shared leadership vision attribute based on the dichotomised example in Table 9, the matrix was entered and saved into the Matrix Editor of the UCINET tool as shown in Figure 10. In the UCINET tool, using the menu selections 'Network' -> 'Centrality and Power' -> 'Degree', the file that was previously saved for the shared coordination attributes was opened to calculate the decentralisation measures. The output for the centralisation measure is presented in Figure 11.
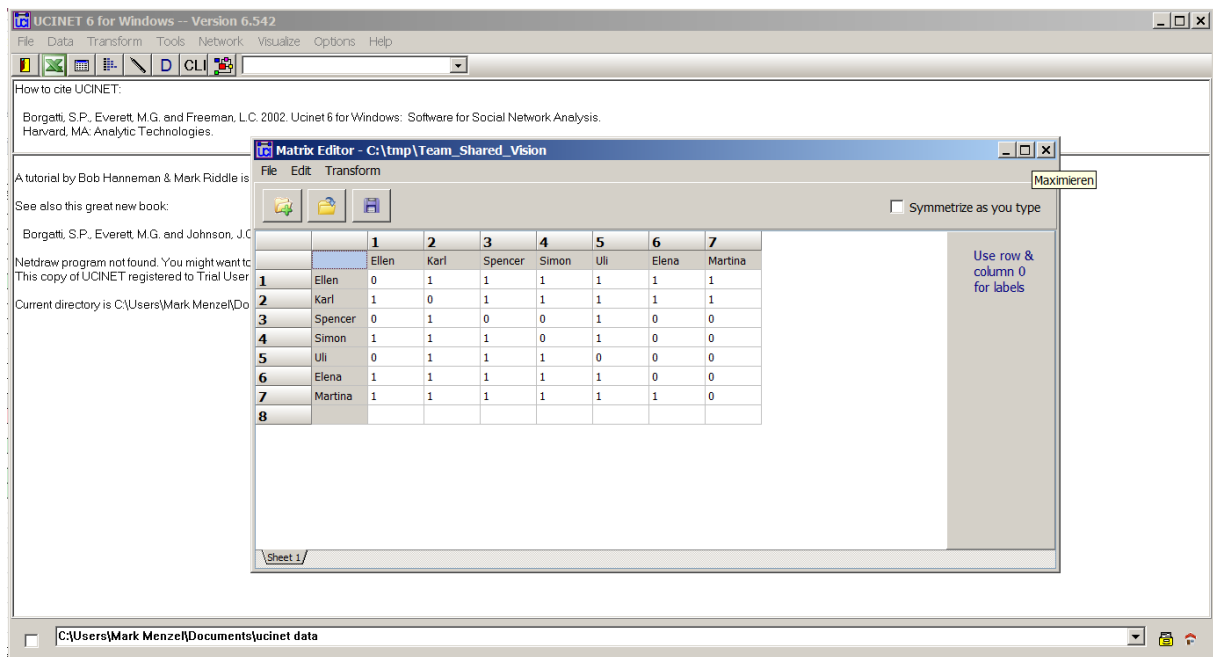
Figure 10: Matrix Editor in UCINET (Borgatti, 2002)
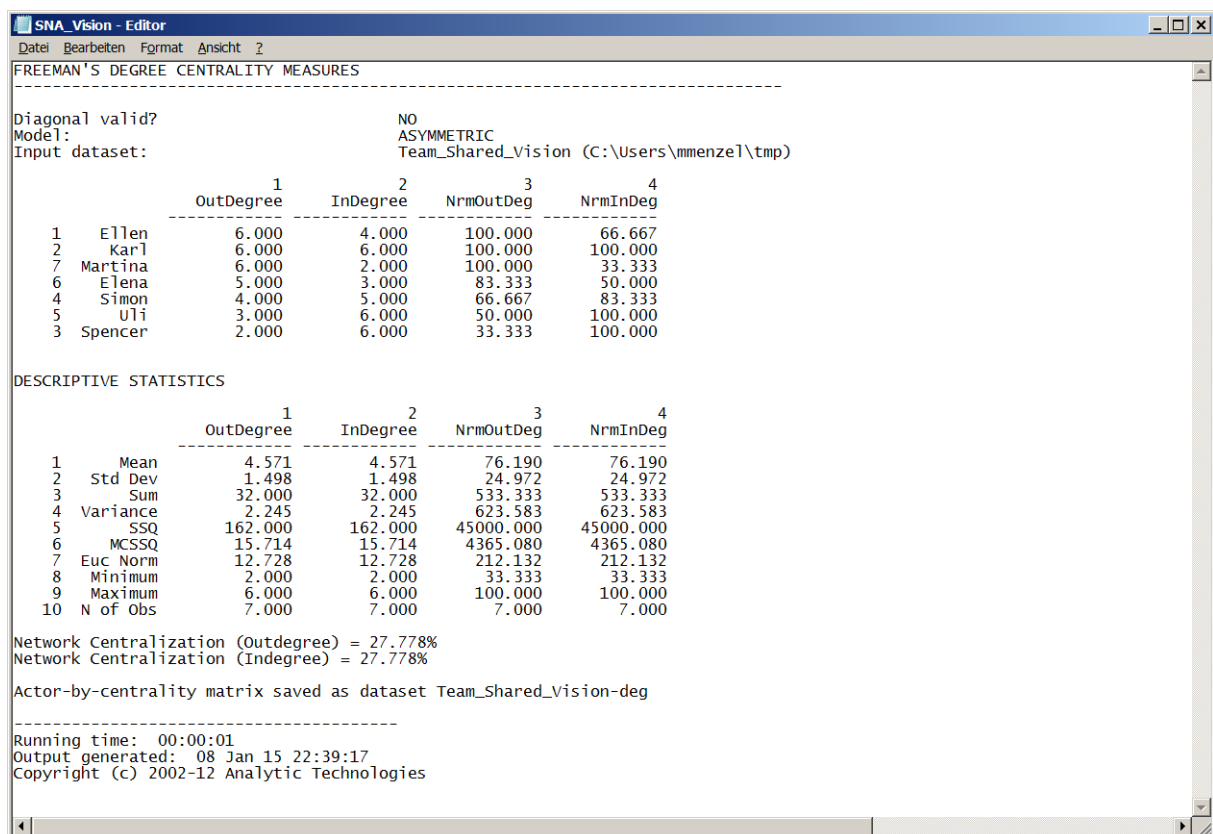
Figure 11: Output File for Decentralisation in UCINET (Borgatti, 2002)

The calculation printout gives an overview of Freeman's centrality measures for the evaluated network matrix. For example, the number of nodes (seven in this example) and the standard deviation are provided. Further, the indegree of network centralisation is given. In an

undirected network, indegree refers to how prominent a node is. For the example above, the network centralisation is 27.779, which means the decentralisation is 0.72.

Visualising social network diagrams

For visualising the social network diagrams, the tool NODEXL (CodePLex) was used to create the social network diagrams. The previously dichotomised matrixes were used (see Table 9) as input data. The same example is used to show how the graphs and the respective statistics were gathered with the NODEXL tool. One advantage of the NODEXL tool is that it automatically calculates the network density and the number of unique edges for the social network.
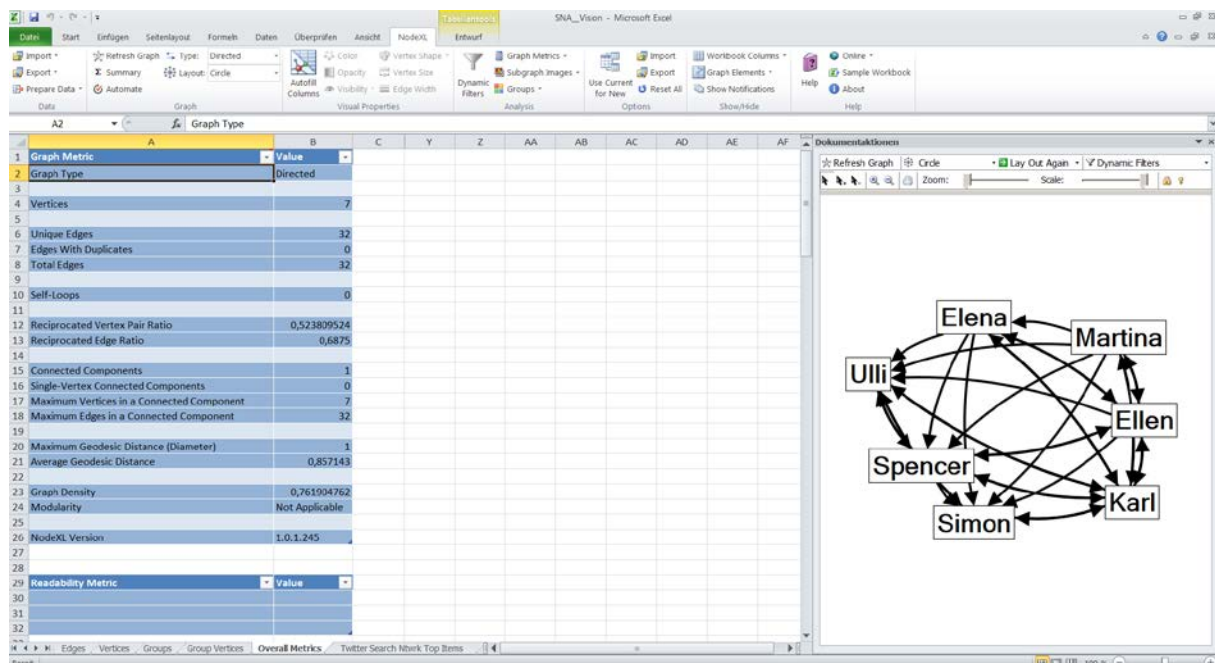
Figure 12: Microsoft Excel Template for NODEXL (CodePLex)

Once the data is entered in the NODEXL tool, a social network diagram can be easily created, and the power relation of the team can be visualised (Figure 12). The entire data gathered during the core action research projects was collected using paper-based surveys. Subsequently, this data was manually processed as described in these steps in order to evaluate the data.

5 Development of Research Instrument on Shared Leadership

As described in the previous chapter, combining social network analysis with a shared leadership model requires a stringent shared leadership research instrument. To address this need, a shared leadership research instrument was developed in this study .

For the development and validation of the shared leadership instrument, a step-wise approach was followed as proposed by Gehlbach and Brinkworth (2011). In step one, the shared leadership competencies that a person needs to be productive in a self-organising team were identified; (these competencies were described in section 3.4). In step two, interviews were conducted with expert focus groups (see section 5.2) to assess the experts' experience in these competencies. In the third step, the findings of the literature review were synthesised with the expert interview data. In step four, the scale items were developed (see section 5.3). In step five, an expert face validation was performed (see section 5.4). Finally, in step six, a pilot and the evaluation of the validity and reliability of the developed instrument were undertaken (see section 5.5).

The purpose of validating the shared leadership instrument is to ensure that the developed research instrument measures what it is supposed to measure by using mathematical and statistical methods. Following these six steps for the development of the shared leadership research instrument, would ensure that the instrument is reliable, i.e. it is accurately measured and validated via statistical methods so that the instrument scale items measure the shared leadership competencies as expected.

Hinkin and Schriesheim (1989) and Rattray and Jones (2007) proposed a new, conceptually consistent theoretical definition of the constructs of a scale development as discussed in section 3.4. To underpin the shared leadership characteristics identified during the literature review with a more practical view on shared leadership competencies, face validity was performed (Easterby-Smith et al., 2008a). Face validity refers to expert opinions regarding whether or not the developed scale items represent the relevant domains and the concept of the survey (Ferguson and Cox, 1993; Rattray and Jones, 2007). Face validity is an initial step to validate the theoretically identified shared leadership competencies using expert opinions.

5.1 Research Instrument Development Step 1: Identification of shared leadership competencies

As detailed in section 3.4, based on an extensive literature review, five shared leadership competencies were identified, namely, decision making authority, visionary ability, team design, communication, and coordination.

5.2 Research Instrument Development Steps 2–3: Interviews with expert focus groups and adaptation of competence areas

Structured interviews were conducted with five experts working in different companies in the field of agile software development and software testing in order to inductively gain a better understanding of how shared leadership in self-organising teams is executed. The interviews were conducted in August 2013. A semi-structured interview technique was used with a defined questioning plan according to the identified shared leadership competence areas (Easterby-Smith et al., 2008b). During the interview, a natural conversation flow was followed, which led to a deviation from the original plan in some cases (Easterby-Smith et al., 2008b). The people interviewed had work experience in self-organising teams ranging from 7 months up to 6 years, and they used Scrum as the Agile methodology (Schwaber, 2008).

Before the interviews took place, each interview partner was asked to complete the leaderful questionnaire by (Raelin, 2010). The leaderful questionnaire measures the leaderful readiness of a leader working in a self-organising team using Raelin's leaderful concept (Raelin, 2003; Raelin, 2010; Raelin, 2011). According to Raelin's concept, a person who has a leaderful score above 30 is a leader who shares leadership and power with others in the organisation. Each of the interview partners scored above 30 as depicted in Figure 13, their scores are depicted as a radar chart in Figure 14.
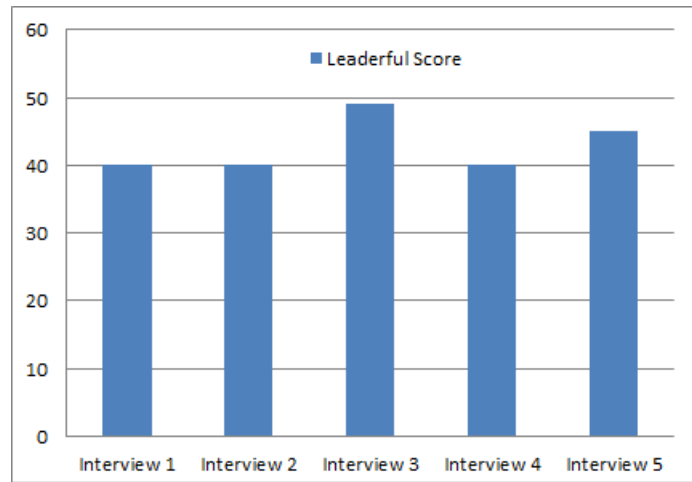
Figure 13: Raelin's Leaderful Score (y-axis) for the Five Interview Partners
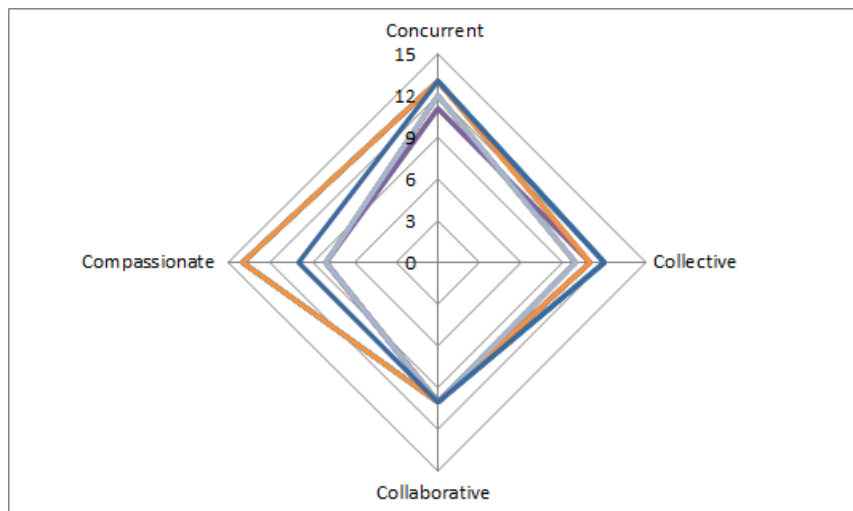
Figure 14: Raelin's Leaderful Score of the Five Interview Partners in a Radar Chart

The results related to Raelin's leaderful scores indicated that all the interview partners are experienced leaders who are familiar with the concept of shared leadership, since everyone scored above 30. Thus, they apply shared leadership in their respective teams. Therefore, they were suitable interview partners to give advice on shared leadership competencies. The roles that the interviewed partners held in a self-organising team were either team member or Scrum Master (see section 3.2.6.3) in the agile team they were working in. The rationale for choosing these people was their extensive years of work experience in self-organising teams. The expectation was that with increasing experience of working in self-organising teams, the best possible view on shared leadership competencies may be obtained. Moreover, the industry branch that the interview partners were working in ranged from consulting and medicine to telecommunication, and they were working in different companies, which was an added advantage. The aim of the interviews was to confirm or to enhance the identified areas of shared leadership. For the interviews, a template for the semi-structured interviews

(Easterby-Smith et al., 2008b) was created, separated by the identified competence areas (see section 3.4) as listed in Table 10.

Table 10: Template for the Semi-structured Interviews (items marked with * adapted from (Moe et al., 2009a))

General Questions		
Question	Answer	Comments/Purpose
How much work experience do you have in Agile teams?		
In what roles have you worked in an Agile team?		
What Agile methodology have you used? Kanban, Scrum, mixture of Waterfall/Scrum		
What competencies do you think a person working in an Agile team should have? Technical/Social		
What competencies do you think a 'leader' in an Agile team should have?		
Competence Areas of Shared Leadership in Agile Teams		
Question	Answer	Comments/Purpose
Is everyone in the team involved in the decision making process?*		Is the decision authority shared?
Are the decisions made depending on the task by the person with the most experience in the area in which the decision is to be made?		Is there a difference between authority and task overall authority?
Do team members make important decisions without consulting other team members?*		Is there only one person taking the decision, e.g. the Scrum Master?
Question Area Team Vision		
Question	Answer	Comments/purpose
How is the team vision defined?*		Is there a single person defining the team vision, or is the team vision defined by the team?
How is the team vision presented and made visible in the team?*		Is the team vision presented by a single person? Is the team vision presented only for a sub-task?
How is the vision expressed and shared among team members?		

Question area Shared Agile Team Design Competence		
Question	Answer	Comments
Is the team designed (and redesigned) according to its purpose?*		
How is the decision made if a team needs to be designed or re-designed?		
How is it recognised if some team members have specific potential (strength/weaknesses)?		
How and when are these specific weaknesses discussed, if at all?		
Question area Shared Agile Communication Competence		
Question	Answer	Comments
How is the communication in an agile team performed?		Do team members communicate directly with one another? Does communication only go via the project leader, e.g. Scrum Master?
How is information about the project received?		From other team members? Only from the Scrum Master or one responsible person?
How does communication take place among the team members sharing one sub-task?		
Question area Shared Agile Coordination Competence		
Question	Answer	Comments
How is the work related to sub-tasks within the team harmonised, coordinated?		Is the work harmonised, separated, and equally/fairly distributed?
Is a clear goal for any sub-tasks communicated?		
How is the goal for the sub-tasks communicated?		There were clear and fully comprehended goals for sub-tasks within our team
How is the work for sub-tasks distributed? Do team members decide on their own or are the tasks given by someone else?		

Summary Questions		
Question	Answer	Comments
After having answered all the questions, do you see now different competence areas needed for shared leadership?		
How do you see shared leadership in agile teams? Do you think that leadership is shared?		
Do you feel that you have taken over leadership in an agile team? Even when you have not had a 'formal' leadership role? If so, what were the most useful skills you used to take over the 'non-formal' leadership role?		
Do you wish to make any other comments?		

The qualitative interviews were evaluated according to the standards proposed by Mayring (2000) and followed a qualitative content analysis method. By undertaking the evaluation according to Mayring (2000) standards, the aim is to reduce the material in such a way that the essential content is retained with consistency, while having a manageable amount of data.

For instance, the content analysis revealed that team design competence was not confirmed during the interviews with statements like 'The team had all the competencies needed to perform the assigned tasks' or 'If a competency was missing the team member was sent to a training course'. Therefore, it seems that the teams were not re-structured during an iteration or during the lifetime of the project. In most of the cases, the team was established with the required amount of manpower and the technical competencies needed; therefore, there was no need to change the setup. One respondent said that if a person could not cope with the work tasks assigned, his/her tasks were assigned to another person. It seems that even if the team is a self-organising team and by definition flexible in terms of the scope of the product, changes to the team structure seemed to be kept to a minimum, which is in agreement with what is stated in the Scrum guidelines (Schwaber, 2008).

Further the interviews revealed that in a self-organising team, social skills seem to be an important factor for project success and teamwork. All of the interview partners opined that a leader in an agile team should be a team player and should combine technical competence with highly developed social skill competency. Statements such as 'A person in an agile team should be a good team player and have a positive attitude' confirmed this.

West (2012) separated the social dimension of teamwork into three functions: social support, support for growth and development, and general social climate. Thus, the originally defined shared leadership competence areas (section 5.1) were changed after reflection; 'team design' was removed and replaced by 'teamwork/sociable' according to the outcome of the interviews. All the other shared leadership areas remained the same.

5.3   Research Instrument Development Step 4: Development of scale items

For each of the identified competence areas, questions (scale items) were developed to evaluate the appropriate competence area and to judge the shared leadership competence. The main intention of the developed questions was to complement the Bass TMLQ with specific questions that were intended to evaluate the ability of a person working in a self-organising team to execute and apply shared leadership. Parts of the developed questions were adapted from Moe et al. (2010) and Stettina and Heijstek (2011) and were developed further to be applicable for shared leadership evaluation at the team level.

To emphasise the team structure, the questions were designed by beginning each question with 'Members of my team ...' By starting each question this way, the person responding to the survey would identify him/herself with the team and would judge others accordingly. To be consistent with the Bass TMLQ, a standard Likert scale was employed: 0 = 'Not at all'; 1 = 'Once in a while'; 2 = 'Sometimes'; 3 = 'Fairly often'; 4 = 'Frequently or always'.

5.4   Research Instrument Development Step 5: Face validity

A second cycle of face validity was undertaken with the developed questions; the questions were given for review to three people interviewed in cycle 1 and two other people who were not familiar with the subject. The rationale for selecting these individuals as reviewers was to have a similar set of people who were involved in the research on the topic along with two people from outside in order to have an outside view (Gehlbach and Brinkworth, 2011).

Some of the feedback received for the item:

'associate their work to the tasks of other team members'

was changed to:

'link their work to the tasks of other team members'

'Linking' brings in even more collaborative aspects to the question.

For the questions related to coordination, the word 'coordination' was changed to 'structure', which is more specific and precise than the word 'coordination'.

'structure their own work independently and harmonise work with others'

'structure their work task with the team to achieve the team goal'

Based on the previous steps, the final 12 scale items were defined as shown in Table 11. These questions interrelate with the different elements of shared leadership competencies as depicted in Figure 15.

Table 11: Research Instrument Development: Revised scale items (questions)

Shared Leadership Behaviour	Question: Members of my team ...
Decision Making	x1: are actively involved in the decision making process
	x2: make important decisions without consulting other team members
Team Vision	x3: present a well defined and clear team vision for their work area
	x4: establish a team vision according to the team needs
Communication	x5: communicate directly with other team-members
	x6: share openly information with the team-members
Coordination	x7: structure their own work independently and harmonize work with others
	x8: structure their work task with the team to achieve the team goal
	x9: distribute work among team-members
Teamwork / Sociability	x10: take into account alternative suggestion from others during team discussion
	x11: regularly comment on other team-members` work
	x12: link their work to the tasks of other team-members
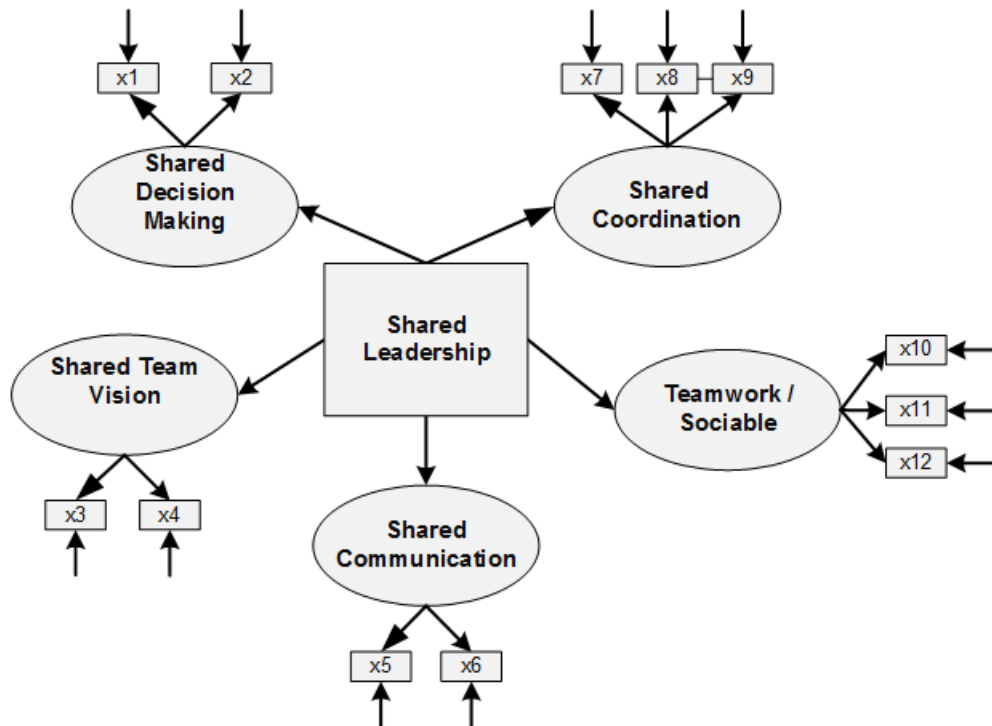
Figure 15: Schematics of Shared Leadership Research Scale Items

5.5 Research Instrument Development Step 6: Validity and reliability testing

In the next step, a web survey was created to validate and test the reliability of the research instrument. The web survey was conducted over four weeks from mid-August 2013 to mid-September 2013. The survey received sufficiently complete responses ($N = 144$) to undertake an exploratory factor analysis (EFA). According to Ferguson and Cox (1993), the minimum number of responses required to perform a factor analysis is 100. Bryman and Cramer (2001) proposed that at least five respondents per item are sufficient. The web survey link was posted in the appropriate LinkedIn user groups (Linkedin, 2013) and was given to experts in the practitioner´s company with the scale items listed in Table 11. Of the 144 respondents who completed the survey, 41 were female and 103 were male.

Table 12 lists the descriptive statistics for the scale determined using SPSS (Bryman and Cramer, 2001). Based on the responses, the maximum range of the scale was used for all of the items except item x5, where the maximum range of the scale was not used.

Table 12: Descriptive Statistics for the Developed Scale (using SPSS)

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
x1: Members of my Team ... are actively involved in the decision-making process	144	0	4	3.06	.977
x2: Members of my Team ... make important decisions without consulting other team members	144	0	4	1.47	1.010
x3: Members of my Team ... have a well defined and clear team vision for their work area	144	0	4	2.78	1.005
x4: Members of my Team ... establish a team vision according to the team needs	144	0	4	2.29	1.223
x5: Members of my Team ... communicate directly with other team-members	144	1	4	3.53	.738
x6: Members of my Team ... share openly information with the team-members	144	0	4	3.31	.863
x7: Members of my Team ... structure their own work independently and harmonize work with others	144	0	4	2.80	.950
x8: Members of my Team ... structure their work task with the team to achieve the team goal	144	0	4	2.79	.989
x9: Members of my Team ... distribute work among team-member	144	0	4	2.62	1.031
x10: Members of my Team ... take into account alternative suggestion from others during team discussion	144	0	4	2.97	.992
x11: Members of my Team ... regularly comment on other team-members` work	144	0	4	2.36	1.081
x12: Members of my Team ... link their work to the tasks of other team-members	144	0	4	2.52	1.010
Valid N (listwise)	144				

Table 13: Summary Statistics: Inter-item correlation

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Inter-Item Correlations	.310	-.176	.601	.778	-3.411	.039	12

The inter-item correlation (Table 13) shows a distribution with a minimum value of -0.176 and a maximum value of 0.601, which is in the range of 0.778. The variance is 0.039, which is rather low, suggesting that the data variance is not large. Overall, these values are suitable values and conform to what was reported in the extant literature. The measure of sampling adequacy (MSA) was used to test whether the sample data is suitable to undertake a factor analysis. The Kaiser-Meyer-Olkin (KMO) measure for the data sample is 0.87 (see Table 14). According to Kaiser (1960), the data is good for undertaking an explorative factor analysis (EFA) and a confirmatory factor analysis (CFA). Every KMO value below 0.5 is not acceptable; KMO values > 0.6 are acceptable, and KMO values > 0.8 are good.

Table 14: Results of Kaiser-Meyer-Olkin Test

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.870
Bartlett's Test of Sphericity	Approx. Chi-Square	597.768
	df	66
	Sig.	.000

It is essential to show that the developed questionnaire is reliable. Reliability refers to the stability, repeatability, and internal consistency of a survey (Rattray and Jones, 2007). To test the consistency and reliability of the scales that form the shared leadership instrument, Cronbach's Alpha was used (Table 15). For a widely used scale, Cronbach's Alpha of 0.70 is acceptable as argued by Peter (1979). For an exploratory study, a score of 0.60 in social science research is acceptable (Anastasi, 1988). The scale for the shared leadership developed here had Cronbach's Alpha of 0.839, which confirms the reliability of the scale (Peterson, 1994).

Table 15: Reliability Statistics for Shared Leadership Scale

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.839	.843	12

Subsequently, the Kaiser criteria (also known as the K1 method) was applied. The K1 method is, in practice, the most used technique for identifying factors. The rule is that only the eigenvalues that are greater than one should be retained for the interpretation of the data (Kaiser, 1960). An EFA was applied to the data, and the Kaiser criteria retrieved three factors with an eigenvalue greater than one, as shown in Table 16.

Table 16: Eigenvalues for the Gathered Data

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.944	41.202	41.202	4.944	41.202	41.202	3.424	28.532	28.532
2	1.088	9.066	50.267	1.088	9.066	50.267	2.594	21.616	50.148
3	1.043	8.693	58.961	1.043	8.693	58.961	1.058	8.813	58.961
4	.860	7.164	66.125						
5	.792	6.596	72.721						
6	.715	5.960	78.681						
7	.648	5.401	84.082						
8	.487	4.059	88.141						
9	.441	3.673	91.813						
10	.356	2.964	94.777						
11	.333	2.779	97.556						
12	.293	2.444	100.000						

Extraction Method: Principal Component Analysis.

The simplicity of the K1 method is critically discussed in the extant literature (Ledesma and Valero-Mora, 2007). How to determine the number of factors to be retained is very important. One factor retention decision method might deliver a different number of factors to be retrieved compared to another method. Using random data sets, Zwick and Velicer (1986) showed the robustness of alternative methods other than the K1 method for retrieving a different number of factors. The main intentions of a factor analysis are to establish a statistical method for data reduction, to reach an economical understanding of the measured variables of a common factor, to adequately represent the underlying correlation, and to differentiate major factors from minor factors (Norris and Lecavalier, 2010). If too few factors are chosen, it will result in the loss of important information by neglecting relevant factors. As a result of the K1 method, some factors might be combined with other factors, with the result that the items load on factors that are not included in the model. On the other hand, specifying

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too many factors might lead to a focus on minor factors at the expense of major factors, which would have a less severe effect (Zwick and Velicer, 1986). In conclusion, there is a risk in selecting too few or too many factors, and the decision will have a significant influence on the reduction and the interpretation of the data set (Norris and Lecavalier, 2010).

Additionally, a simulation was performed with 100 randomly generated data sets to generate a reference for the eigenvalues and the Cronbach's Alpha values. To this end, 100 randomly generated data sets that had the same dimensions as those of the developed shared leadership research scale were created (Ruscio and Roche, 2012). These random data sets were generated using Matlab Mathworks (Chipperfield and Fleming, 1995).

With the generation of the random data sets and the calculation of the eigenvalues of 100 data sets with the same dimensions as those of the shared leadership research items, sampling errors could be excluded. After the calculation of the eigenvalues for each of the simulated data sets, descriptive statistics were calculated to evaluate the average number of factors retrieved for each of the random data sets as well as on the values of the extracted eigenvalues.

Table 17: Simulation with Random Data: Descriptive statistics illustrating that the mean number of factors obtained from the shared leadership instrument is 5.74 ± 0.562 (mean ± std. dev.)

Descriptive Statistics

	N	Minimum	Maximum	Mean		Std. Deviation
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic
Nr of factors with eigenvalues greater 1	100	4	7	5.74	.056	.562
Valid N (listwise)	100					

The minimum number of factors identified in the simulation (Table 17) was four and the maximum was seven. The mean number of factors obtained from the 100 simulations was 5.74, with a standard deviation of 0.56. Further, Cronbach's Alpha was calculated for the 100 random data sets; the resulting reliability data is shown in Table 18. Cronbach's Alpha tests the consistency and reliability of scale. The random data had a low Cronbach's Alpha as was expected (Table 18).

Table 18: Simulation with Random Data: Cronbach's Alpha very low

Descriptive Statistics

	N	Minimum	Maximum	Mean		Std. Deviation
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic
calpha	100	-.3520	.3420	-.008329	.0115907	.1159065
Valid N (listwise)	100					

All the Cronbach's Alphas with an eigenvalue greater than or equal to 1 obtained from the 100 random data sets resulted in the descriptive statistics presented in Table 19.

Table 19: Simulation with Random Data (eigenvalue in the range of 1.0–1.72)

Descriptive Statistics

	N	Minimum	Maximum	Mean		Std. Deviation
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic
1.54	534	1.0000	1.7210	1.244062	.0072998	.1686859
Valid N (listwise)	534					

As shown in the simulation with the 100 random data sets for the factor analysis, the average number of factors with an eigenvalue greater than 1 was 5.74 ± 0.56 (mean + std. dev.), which implies that the real number of factors for the developed research instrument is greater than three factors (as the EFA suggested) and closer to five factors. As was discussed earlier, there needs to be a balance between choosing too few and too many factors. Because the shared leadership instrument is a newly developed instrument, the risk of obtaining false results by combining the five factors into three factors seems to be higher than the risk associated with using five factors with distinct loadings on these five factors. One possible reason for loading only on three factors might be the web survey sample, which might not reflect the true population. Therefore, the decision was taken to set the factor sizes in the CFA to five and to use varimax rotation. All the factors with factor loading values below 0.63 were suppressed as proposed by Guadagnoli and Velicer (1988) for sample sizes below 150. The CFA is a measure of how the theoretical construct of the shared leadership items are consistent with reality. The CFA tests how a certain assumption fits the theoretical model. All factor loadings value above 0.63 are to be considered so that the reality fits the theoretical model.

As shown in Table 20, Factor 1 (Vision) loads on scale items x3 and x4, while Factor 2 (Teamwork) loads on scale items x9, x10, and x11. Factor 3 (Communication) loads on scale

items x5 and x6. Factor 4 (Coordination) loads on scale item x7, and Factor 5 (Decision Making) loads on scale item x2. The summary of the CFA is presented in Table 21.

Table 20: Confirmatory Factor Analysis for the Developed Research Scale

a

	Component				
	1	2	3	4	5
x1: Members of my Team ... are actively involved in the decision-making process					
x2: Members of my Team ... make important decisions without consulting other team members					.961
x3: Members of my Team ... have a well defined and clear team vision for their work area	.788				
x4: Members of my Team ... establish a team vision according to the team needs	.760				
x5: Members of my Team ... communicate directly with other team-members			.878		
x6: Members of my Team ... share openly information with the team-members			.708		
x7: Members of my Team ... structure their own work independently and harmonize work with others				.866	
x8: Members of my Team ... structure their work task with the team to achieve the team goal					
x9: Members of my Team ... distribute work among team-member		.792			
x10: Members of my Team ... take into account alternative suggestion from others during team discussion		.691			
x11: Members of my Team ... regularly comment on other team-members` work		.625			
x12: Members of my Team ... link their work to the tasks of other team-members					

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
Rotation converged in 7 iterations.

Table 21: Summary of Confirmatory Factor Analysis

Summary of CFA with varimax rotation of items (n = 144)	Load
Scale Item: Decision Making	
x2: make important decisions without consulting other team members	0.961
Scale Item: Team Vision	
x3: present a well- defined and clear team vision for their work area	0.788
x4: establish a team vision according to the team needs	0.760
Scale Item: Communication	
x5: communicate directly with other team-members	0.878
x6: share openly information with the team-members	0.708
Scale Item: Coordination	
x7: structure their own work independently and harmonize work with others	0.866
Scale Item: Teamwork	
x9: distribute work among team-members	0.792
x10: take into account alternative suggestion from others during team discussion	0.691
x11: regularly comment on other team-members` work	0.625

There was no significant loading on the scale items x1, x8, and x12; therefore, these items were removed from the instrument. Item x9 seems to load on 'teamwork' and not on 'coordination' as was previously expected; therefore, item x9 was allocated to 'teamwork'. Table 21 shows the finalised and reduced list of items for the shared leadership research instrument; the number of items were reduced from 12 to 9 items.

5.6 Research instrument development: Summary

The main purpose of the CFA was to eliminate items with a lower load. The development of the shared leadership research instrument went through two cycles, and the instrument was revised according to the observations and reflections.

A review of the extant shared leadership competencies was undertaken, and five areas of shared leadership competencies were identified. These five shared leadership competencies were face validated through semi-structured interviews. The interviews revealed that a self-organising team does not change during the life span of the team; therefore, the research scale item 'team design' was removed and replaced by 'teamwork/sociability'. The instrument's questions were anchored in the literature and face validated by experts in the field; the

questions were changed according to the feedback received. A web survey was conducted with the intention of gathering data from experts working in self-organising teams in order to test the retrieved data for validity and reliability and to apply EFA/CFA. The nine items in Table 20 loaded significantly on the respective five shared leadership factors, with loading values greater than 0.63. This indicated that the shared leadership research instrument demonstrated a strong convergent validity using these nine items.

The nine shared leadership items complement the Bass TMLQ. To set the basis for a social network analysis (SNA), it was necessary for each team member to judge the other team members. Therefore, the shared leadership instrument as shown in
Table 22 was presented to them. The instrument was customised for each team that was evaluated, so that the survey reflected all the team members. The final leadership questionnaire including TMLQ and shared leadership is shown in

Table 22. Because of copyright constraints, only up to five items from the TMLQ can be reprinted, therefore all but five of the survey questions from the TMLQ have been blacked out as shown in Table 22. The main intention of presenting the complete shared leadership and TMLQ scale items even when some are blacked out is to give the reader an overview of how the final scale items looked, and how these items were distributed to the different teams.

Table 22: Final TMLQ and Shared Leadership Questionnaire

	0	1	2	3	4
Directions: The Team Multifactor Leadership Questionnaire (TMLQ) describes the average or typical leadership behaviour exhibited by your team members. Following are descriptive statements about the team you are rating. Please evaluate each statement in terms of your team's overall leadership behaviour. For each statement, judge how frequently, on average, your team displays the behaviour described. On this answer sheet, circle your rating for each statement. Leave the response blank if you are uncertain, if the statement is irrelevant, or if it does not apply to your team. Use the scale below for the first 65 questions.					
Date:					
Use the following scale:					
0 = Not at all					
1 = Once in a while					
2 = Sometimes					
3 = Fairly often					
4 = Frequently or always					
Members of my Team ….	0	1	2	3	4
1. ███████████████████████					
2. ████████████████					
3. ████████████████████████████████████					
4. ████████████████████████					
5. ██████████████████████████████████					
6. ██████					
7. clearly communicate what each member needs to do to complete assignments					
8. ███████████████████████████████					
9. █████████					
10. █████████████					
11. delay taking actions until problems become serious					
12. ██████████████████					
13. closely monitor each other's performance for errors					
14. ██████████████████					
15. work out agreements about what's expected from each other					
16. ███████████					
17. █████████████████████					
18. ██████████████████████████					
19. ████████████					
20. █████████████					
21. ████████████████████████					
22. ██████████████					
23. ██████████					
24. █████████████████					
25. ██████████████████████					
26. ███████████					
27. ████████████					
28. ███████████████					

Use the following scale:					
0 = Not at all					
1 = Once in a while					
2 = Sometimes					
3 = Fairly often					
4 = Frequently or always					
Members of my team …	**0**	**1**	**2**	**3**	**4**
29. avoid making decisions					
30. ████████████████████					
31. ███████████████████████					
32. █████████████████████					
33. ███████████					
34. ██████████████████████████					
35. ████████████████████████					
36. ██████████████					
37. ██████████████████████████					
38. ██████████████████████					
39. ██████████████					
40. █████████████████████████████					
41. ███████████████████████					
42. ████████████					
43. ████████████████████					
44. █████████████████████████					
45. ████████████████████					
46. █████████████████					
47. █████████████████					
48. █████████████████████					

Use the following scale:					
0 = Not at all					
1 = Once in a while					
2 = Sometimes					
3 = Fairly often					
4 = Frequently or always					
Members of my team …	**0**	**1**	**2**	**3**	**4**
49. are actively involved in the decision making process					
Team Member 1					
Team Member 2					
Team Member 3					
Team Member 4					
Team Member 5					
Team Member 6					
Team Member 7					
50. make important decisions without consulting other team members					
Team Member 1					
Team Member 2					
Team Member 3					
Team Member 4					
Team Member 5					
Team Member 6					
Team Member 7					
51. present a well-defined and clear team vision for their work area					
Team Member 1					
Team Member 2					
Team Member 3					
Team Member 4					
Team Member 5					
Team Member 6					
Team Member 7					
52. establish a team vision according to the team needs					
Team Member 1					
Team Member 2					
Team Member 3					
Team Member 4					
Team Member 5					
Team Member 6					
Team Member 7					

Use the following scale:

0 = Not at all
1 = Once in a while
2 = Sometimes
3 = Fairly often
4 = Frequently or always

Members of my team …	0	1	2	3	4
53. communicate directly with other team-members					
Team Member 1					
Team Member 2					
Team Member 3					
Team Member 4					
Team Member 5					
Team Member 6					
Team Member 7					
54. share openly information with the team-members					
Team Member 1					
Team Member 2					
Team Member 3					
Team Member 4					
Team Member 5					
Team Member 6					
Team Member 7					
55. structure their own work independently and harmonize work with others					
Team Member 1					
Team Member 2					
Team Member 3					
Team Member 4					
Team Member 5					
Team Member 6					
Team Member 7					
56. structure their work task with the team to achieve the team goal					
Team Member 1					
Team Member 2					
Team Member 3					
Team Member 4					
Team Member 5					
Team Member 6					
Team Member 7					

Use the following scale:					
0 = Not at all					
1 = Once in a while					
2 = Sometimes					
3 = Fairly often					
4 = Frequently or always					
Members of my team …	**0**	**1**	**2**	**3**	**4**
57. distribute work among team-member					
Team Member 1					
Team Member 2					
Team Member 3					
Team Member 4					
Team Member 5					
Team Member 6					
Team Member 7					
58. take into account alternative suggestion from others during team discussion					
Team Member 1					
Team Member 2					
Team Member 3					
Team Member 4					
Team Member 5					
Team Member 6					
Team Member 7					
59. regularly comment on other team-members` work					
Team Member 1					
Team Member 2					
Team Member 3					
Team Member 4					
Team Member 5					
Team Member 6					
Team Member 7					
60. link their work to the tasks of other team-members					
Team Member 1					
Team Member 2					
Team Member 3					
Team Member 4					
Team Member 5					
Team Member 6					
Team Member 7					

61. The overall effectiveness of the team can be classified as:

    A. Not effective

    B. Only slightly effective

    C. Effective

    D. Very effective

    E. Extremely effective

62. In all, how satisfied are you with the leadership abilities of the team that you are rating?

    A. Very dissatisfied

    B. Some what dissatisfied

    C. Neither satisfied nor dissatisfied

    D. Fairly satisfied

    E. Very satisfied

63. The gender mix of your team:

    A. All male

    B. Majority male

    C. Equally mixed male and female

    D. Majority female

    E. All female

64. Your own ethnicity:

    A. African American

    B. Alaskan Native

    C. Asian or Pacific Islander

    D. Caucasian

    E. Hispanic

    F. Native American

    G. Other (please specify):

65. Your own gender:

    A. Female

    B. Male

5.7 Thesis writing and reflection cycle 1: Research instrument development

As described in chapter 4, a reflection section was inserted at periodic intervals to reflect on the thesis writing process and on the personal learnings during the thesis writing process. This section describes the first thesis writing reflection cycle after the initial development of the research instrument. The reflection was done on the outcome of the testing of the reliability and validity undertaken with SPSS.

5.7.1 Personal Reflective Pause: Research instrument reliability and validity results
One of the most significant learnings related to the development of the research instrument was that the practitioner needed to be about aware how much work was required to undertake all the steps for validating a research instrument. Another important learning was that the practitioner needed to gain knowledge about qualitative data evaluation and quantitative data evaluation. Moreover, the practitioner's statistical knowledge was strengthened, the practitioner learned how to evaluate data samples via SPSS and how to transcribe interview data. This experience showed that the practitioner sometimes jumped to tasks without knowing how much work it would require. This experience would help (and has helped) the practitioner to judge an idea and its consequences on the thesis work much better, so that the practitioner can quickly decide in the future, whether or not to spend the time, and whether the idea is of sufficient value to take the practitioner's research forward. Another surprising issue was that during the development of the research instrument, the assumption was always that there were five areas to be investigated. However, the collected research data suggested the use of only three areas. This prompted intensive reflection, as to whether something was wrong because the practitioner had not yet reached at such mature working levels with these kind of statistical tools and methods. Consultation with the doctoral supervisor resulted in suggestions about some very good readings. After several discussions, there was good evidence to stick with the five areas; it could be that the data sample did not mirror the whole bandwidth as required. Therefore, the idea of undertaking a statistical measure with random generated data was conceived. The questions to be answered here were: How can random data be generated? How should the data be evaluated? The whole process is described and conceptualised in the next Kolb reflection section.

5.7.2 Description: Concrete experience

Since the final evaluation of the shared leadership research instrument was over, and all the validity and reliability tests were executed with SPSS, the expectation was that the statistical methods would confirm the five shared leadership items that were defined during the literature review. However, the CFA suggested the use of only three factors. During the interviews, one shared leadership area that was not confirmed during the interviews already had to be revised.

5.7.3 Reflective observations

On noticing that the statistical reliability and validity testing did not deliver the expected result, the practitioner felt that sufficient care had not been taken to define the 'right' items during the definition of the research instrument. How should the practitioner proceed? Should the five items be merged into three items? Could it be that the gathered sample size did not reflect the whole population as required? How could the practitioner show that the defined areas are still valid, although maybe not for the gathered research sample? Would the practitioner need to define a new area and new items? However, this would have implied going through the validity and reliability cycle once again; further, there would still be the risk that the new items might deliver the same results by not confirming the predefined areas.

5.7.4 Conceptualisation

Thinking further on the issue, it became clear that further statistical tests needed to be undertaken, but with a different set of data because for the available data set, it could not be validated, whether the sample reflects the group that the practitioner intended to research. Prior literature that criticises the CFA and suggests alternative methods to determine the amount of factors to be retrieved was reviewed. During this review, the idea of using random data sample sets of the same matrix sizes as those of the research instrument was conceived. The CFA with this random data for 100 data sets showed that the factors retrieved are greater than three (Zwick and Velicer, 1986).

5.7.5 Action plan

To undertake the CFA with a random data set, how to create a random data set and which tools were to be used to create the random data needed to be investigated. The Matlab tool seemed to be a useful tool for creating such a random dataset (Chipperfield and Fleming, 1995). Once the random data was created, the CFA and the reliability test needed to be repeated 100 times using SPSS to retrieve the eigenvalues and the Cronbach's Alpha values. With the 100 eigenvalues and Cronbach's Alphas that were retrieved, further statistical

analysis could be performed to justify why more than three factors should be chosen (contrary to what the CFA with the real dataset had suggested).

6 Pilot Study: Shared Leadership in a Group Setting

A pilot test was conducted as described by Gehlbach and Brinkworth (2011) before the developed methodology and tools were applied to the core action research projects (see section 7). This section describes the application of the TMLQ and shared leadership survey research instrument in a pilot test involving three small teams that conducted their projects in a self-organising manner.

6.1 Introduction

The author of the doctoral thesis took on lectureship at Fresenius University of Applied Science (Munich, 2014) in Munich and supervised a case study course over four months (September–December 2013). The course methodology involved lectures to the whole class as well as individual coaching sessions for the small self-organising project teams to reach the goal that they had defined for the course duration. The practiotioner was in charge of guiding and coaching the different university teams on the course topics as well as supervising the teams. The course participants consisted of nine students in the first semester of a Master's course in business administration. Eight students were female and one was male. The aim of the course was to undertake a teamwork project in the area of business administration. In the first meeting, the course participants were asked to voluntarily form groups for undertaking their projects. Three teams were formed with three members in each team; one team was a mixed-gender team, and two teams had only female team members. The age range of the students was between 22 and 25 years. The students were instructed in project management and research methods. At the beginning of the course, each team had to define its own project topic in consultation with the supervisor and in accordance with what the team wanted to achieve during the four months. No roles were assigned or given to the team members; each team had to form itself, as is the nature of a self-organising team. Over the term of the course, the teams met the instructor on seven occasions.

6.2 Sampling method and action research process

The setting of the course with its small self-organising teams fits very well for the application of the research method on the shared leadership behaviour of self-organising teams. The teamwork took place during seven appointments according to the structure depicted in Figure 16.
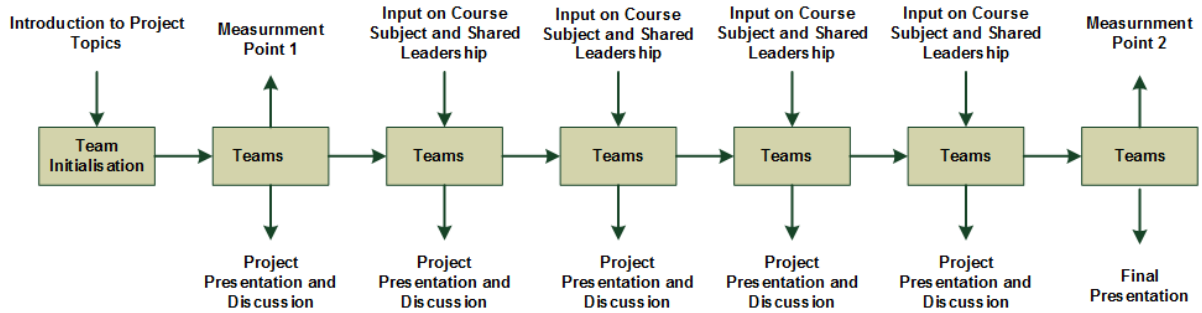
Figure 16: Teamwork Schedule

During the first meeting, the students were introduced to the nature of the course, the topic, and what would be taught and learned as part of the course. During the second meeting of the course, the different teams were asked to complete the Bass TMLQ and the shared leadership survey (depicted in Figure 16 as 'Measurement point 1'). Measurement point 1 is the initial measurement taken directly after the teams were formed to obtain a snapshot of the leadership behaviour of the team. The development of transformational and shared leadership is recognised when leaders in a work team use their transformational and shared leadership capabilities to create a culture of shared leadership. It evolves over time, which fits into an action-oriented research approach (Avolio et al., 1991; Pearce and Sims, 2002; Bamford-Wade and Moss, 2010). The data gathered during the first measurement point was evaluated by the doctoral practitioner/instructor of the course so that the instructor was aware of the transformational and shared leadership capabilities of the different teams. During the different coaching sessions that the instructor had with the different teams, the instructor coached the team on course topics as well as on the shared leadership behaviour, specifically. During the final meeting of the course, the students were asked to complete the TMLQ and the shared leadership survey once again, which is labelled 'Measurement point 2' in Figure 16. By doing this, an inductive understanding of how the leadership behaviour in the self-organising teams evolved or changed over time could be obtained. In the following sections, the evaluation of the data gathered from the different teams is presented from the perspective of the applicability of the shared leadership instrument and the TMLQ. Since the different teams were newly assembled, the teams were expected to run through the phases of storming, norming, and performing (Tuckman, 1965; Kormanski, 1988; Patnode, 2003; Lee, 2008), which might have influenced the data collected. However, even in an organisational setting, teams are newly assembled or members might join or leave the team.

6.3   Observations: TMLQ and shared leadership (Teams 1–3)

For the pilot study, the shared leadership behaviour of the three teams (Teams 1–3) was investigated. Team 1 was a mixed team consisting of one male and two female team members. Teams 2 and 3 comprised three female students each.

6.3.1   Results: Team 1

The box plots in Figure 17 depict the evolution of the transformational leadership behaviour of Team 1. In the first sample, it is interesting to note that none of the values were above 3 for any of the leadership behaviours. Among the transformational leadership behaviours, IS had the highest value (2.35), followed by INSP with a value of 2.20, as shown in Table 23.
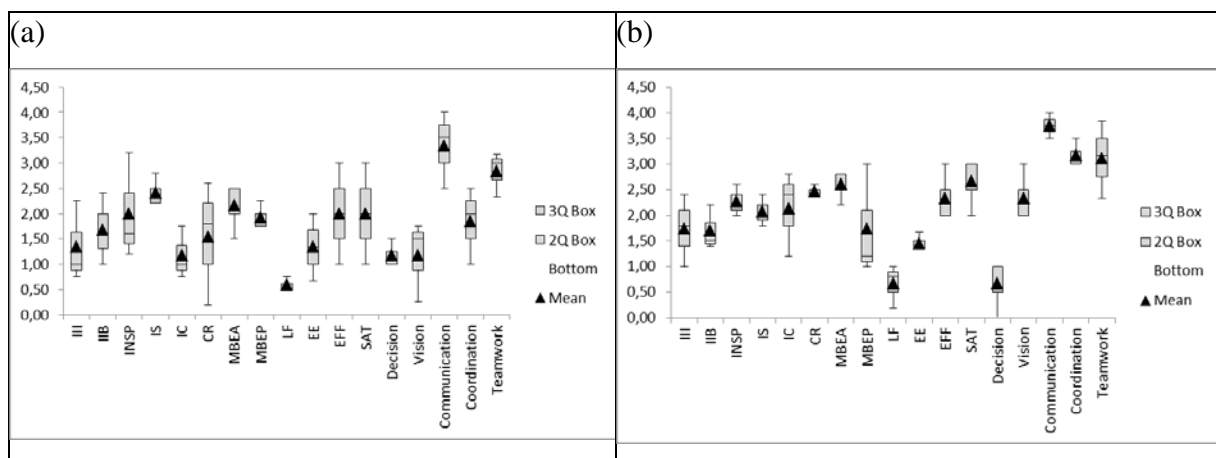

Figure 17: Box Plots for Team 1: (a) First sample; (b) Second sample

As described in the introduction of section 6.2, two samples were taken for each team in order to capture the evolution of the TMLQ and shared leadership attributes. For the second sample, all the transformational leadership values were below 2. None of the transformational or transactional leadership behaviours of the team increased. Further, the extra effort and effectiveness values decreased. The radar chart of the shared leadership index of Team 1 is presented in Figure 18. The radar chart (Figure 18) depicts the mean values of the shared leadership capabilities of the team. Prominent changes between the two samples were observed for vision and coordination. The shared decision making capabilities decreased from sample one to sample two. Teamwork and communication remained the same. Table 24 presents the SNA results corresponding to Team 1.

Table 23: TMLQ Results: Team 1

| Comparison of TMLQ Results for Team 1 with Normative TMLQ values			
Leadership Style	TMLQ 1st sample Mean	TMLQ 2nd sample Mean	Bass & Avolio's Norm (2004) (n = 27285) Mean
Transformational Leadership			
Idealised Attributes (III)	1.69	1.30	2.94
Idealised Behaviours (IIB)	1.90	1.28	2.77
Inspirational Motivation (INSP)	2.20	1.70	2.92
Intellectual Stimulation (IS)	2.35	1.55	2.78
Individualised Consideration (IC)	1.75	1.60	2.85
Transactional Leadership			
Contingent Reward (CR)	1.85	1.85	2.87
Management-by-Exception (Active) (MBEA)	2.13	1.95	1.67
Management-by-Exception (Passive) (MBEP)	1.88	1.30	1.03
Non-Leadership			
Laissez-faire (LF)	0.75	0.5	0.65
Team Effectiveness and Satisfaction			
Extra Effort (EE)	1.58	1.08	2.74
Effectiveness (EFF)	2.25	1.75	3.07
Satisfaction (SAT)	2.50	2.00	3.08
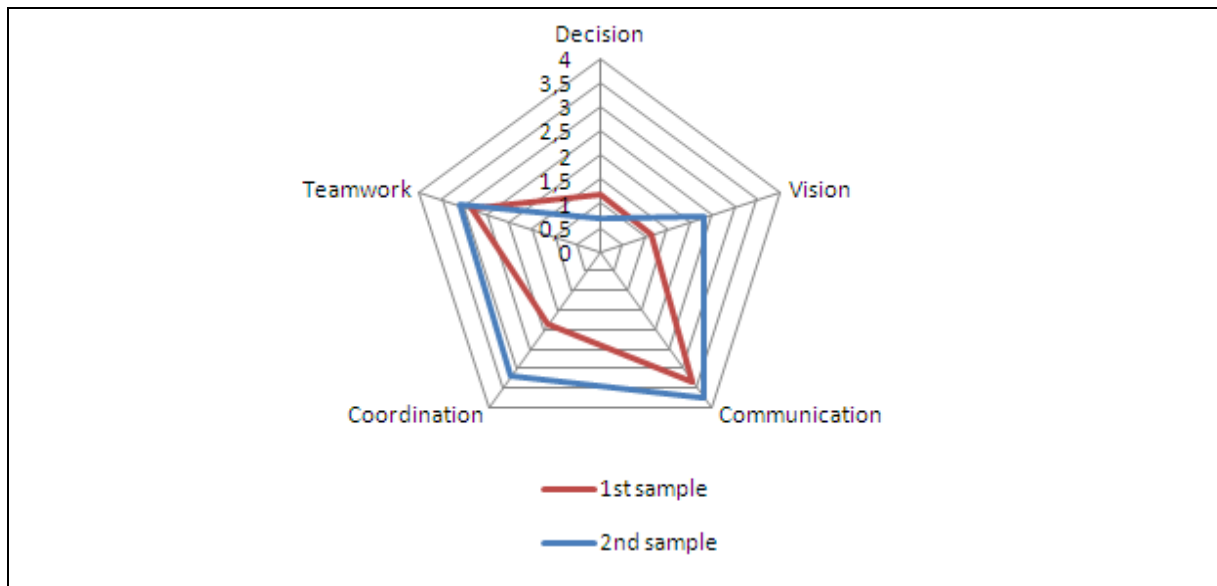
Figure 18: Radar Chart: Shared Leadership Index Team 1

Table 24: Social Network Analysis Results: Team 1

Shared Leadership Factor	1st sample	2nd sample
Decision Making	Gaby, Katrin, Bernd	Gaby, Katrin, Bernd

	Sample 1	Sample 2
Density	0.33	0.16
Decentralisation	0.00	0.50
Members	3	3
Links/Member	0.66	0.33

Shared Leadership Factor	1st sample	2nd sample
Vision	Gaby, Bernd, Katrin	Gaby, Bernd, Katrin

	Sample 1	Sample 2
Density	0.33	0.83
Decentralisation	0.00	0.75
Members	3	3
Links/Member	0.66	1.00

Shared Leadership Factor	1st sample	2nd sample
Communication	Gaby, Bernd, Katrin	Gaby, Bernd, Katrin

	Sample 1	Sample 2
Density	1.00	1.00
Decentralisation	1.00	1.00
Members	3	3
Links/Member	1.00	1.00

Shared Leadership Factor	1st sample	2nd sample
Coordination	Bernd, Katrin, Gaby	Gaby, Bernd, Katrin

	Sample 1	Sample 2
Density	0.50	1.00
Decentralisation	1.00	1.00
Members	3	3
Links/Member	0.66	1.00

Shared Leadership Factor	1st sample	2nd sample
Teamwork	Gaby, Bernd, Katrin	Gaby, Bernd, Katrin

	Sample 1	Sample 2
Density	1.00	1.00
Decentralisation	1.00	1.00
Members	3	3
Links/Member	1.00	1.00

The social network analysis (Table 24) results showed that vision, communication, coordination, and teamwork were on the highest level of shared leadership for the second sample. Decision making capabilities decreased from sample one to sample two for Team 1.

The evaluation of the TMLQ for Team 1, showed that all the transformational leadership values were below the average values compared to the normative values. Only the transactional MBEA was above average compared to the normative values. With respect to shared leadership, it can be observed that the decision making behaviour of the team was on a low shared leadership level for both the samples. Vision/coordination changed from sample one to sample two of the shared leadership behaviour of the team. Communication/teamwork remained the same for both samples. Thus the team worked well together, except for the decision making attribute, for which the team seemed to have problems in reaching consensus.

6.3.2 Results: Team 2

The box plots in Figure 19 depict the variance in the transformational and the shared leadership team competencies of Team 2.
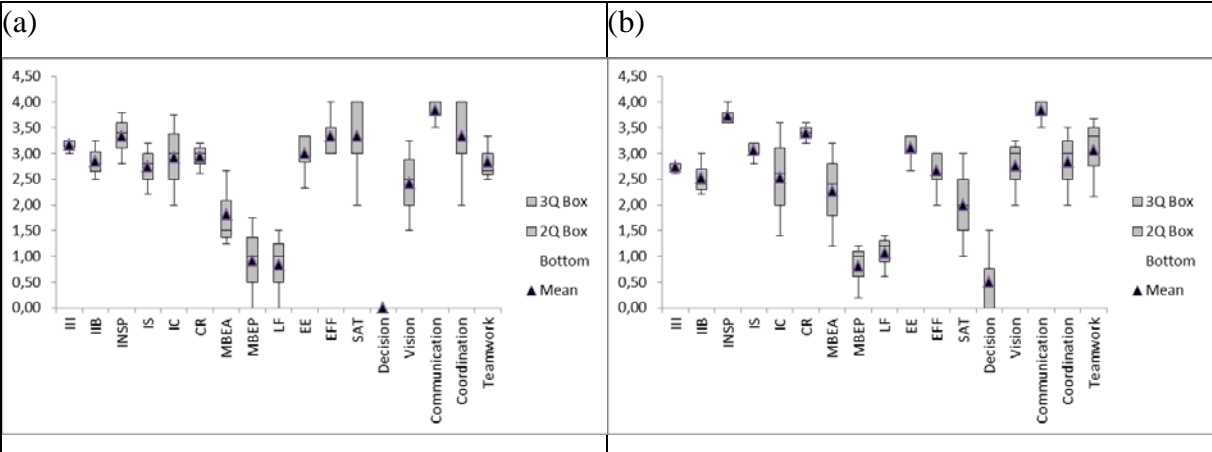
Figure 19: Box Plots for Team 2: (a) First sample; (b) Second sample

For Team 2, all the transformational leadership attributes increased and reached values above 3, except IIB, which had a value below 3 (see Table 25) All the values for the second sample were above or the same as that for IIB, i.e. slightly below the normative values. The high values for CR and MBEA are interesting. Moreover, it seemed that overall, the team spent a lot of extra effort in team activities i.e. working on team tasks to complete the team project, which is depicted by the high value for EE. The radar chart of the shared leadership index of Team 2 is presented in Figure 20. All the shared leadership attributes of the team increased slightly, except the coordination attribute. The shared decision making competence of the team remained rather low. Table 26 presents the SNA results corresponding to Team 2.

Table 25: TMLQ Results: Team 2

Comparison of TMLQ Results for Team 2 with Normative TMLQ values			
Leadership Style	TMLQ 1st sample Mean	TMLQ 2nd sample Mean	Bass & Avolio's Norm (2004) (n = 27285) Mean
Transformational Leadership			
Idealised Attributes (III)	2.83	3.07	2.94
Idealised Behaviours (IIB)	2.73	2.53	2.77
Inspirational Motivation (INSP)	3.33	3.70	2.92
Intellectual Stimulation (IS)	3.20	3.33	2.78
Individualised Consideration (IC)	3.08	3.60	2.85
Transactional Leadership			
Contingent Reward (CR)	3.20	3.53	2.87
Management-by-Exception (Active) (MBEA)	1.92	2.53	1.67
Management-by-Exception (Passive) (MBEP)	1.17	0.67	1.03
Non-Leadership			
Laissez-faire (LF)	0.50	0.75	0.65
Team Effectiveness and Satisfaction			
Extra Effort (EE)	3.11	3.67	2.74
Effectiveness (EFF)	3.00	2.00	3.07
Satisfaction (SAT)	3.33	2.67	3.08
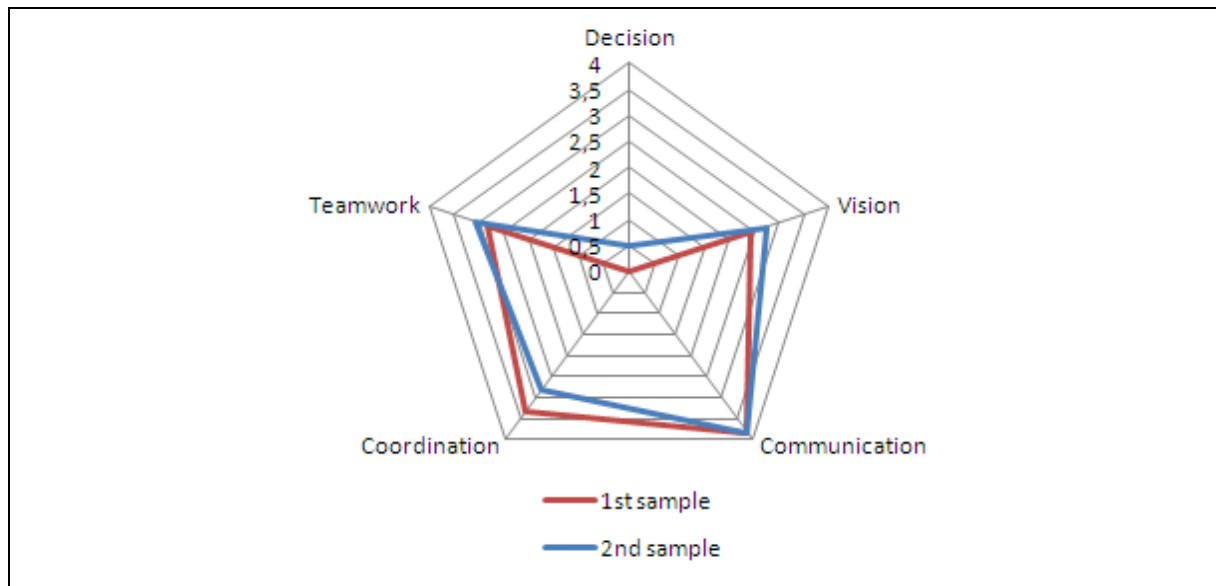
Figure 20: Radar Chart: Shared Leadership Index Team 2

Table 26: Social Network Analysis Results: Team 2

Shared Leadership Factor	1st sample	2nd sample
Decision Making		

	Sample 1	Sample 2
Density	0.66	0.17
Decentralisation	0.00	0.50
Members	3	3
Links/Member	0.00	0.33

Shared Leadership Factor	1st sample	2nd sample
Vision		

	Sample 1	Sample 2
Density	0.66	0.83
Decentralisation	0.50	0.75
Members	3	3
Links/Member	1.00	1.00

Shared Leadership Factor	1st sample	2nd sample
Communication		

	Sample 1	Sample 2
Density	1.00	1.00
Decentralisation	1.00	1.00
Members	3	3
Links/Member	1.00	1.00

Shared Leadership Factor	1st sample	2nd sample
Coordination		

	Sample 1	Sample 2
Density	0.83	0.83
Decentralisation	0.75	0.75
Members	3	3
Links/Member	1.00	1.00

Shared Leadership Factor	1st sample	2nd sample
Teamwork		

	Sample 1	Sample 2
Density	1.00	1.00
Decentralisation	1.00	1.00
Members	3	3
Links/Member	1.00	1.00

The shared decision making attribute range of Team 2 slightly improved from sample 1 to sample 2; however, it was still in the area of low shared leadership. Vision improved as well, and coordination remained the same. For shared communication and teamwork, Team 2 was on the highest shared leadership level.

Evaluating the TMLQ results, Team 2 showed high transformational leadership values for INSP as well as IS for both the samples. Regarding the transactional leadership attributes, CR and MBEA (for the second sample) showed high values. With respect to shared leadership, the decision making competence of the team for both the samples was in the quadrant of low shared leadership. For the first sample, coordination was also in the quadrant of low shared leadership; it increased to shared leadership for the second sample. Vision increased, and communication/teamwork remained stable for both samples. The team members seemed to work well together; nevertheless, with respect to decision making, the team seemed to have difficulties in finding consensus, similar to the case of Team 1.

6.3.3 Results: Team 3

The box plots in Figure 21 depict the variance for both the samples and show that the variance for the transformational leadership behaviour was low. Table 27 presents the TMLQ results for Team 3. The radar chart of the shared leadership index of Team 3 is presented in Figure 22. Shared decision making changed markedly and dropped. Shared team vision increased markedly from sample one to sample two. Overall, the scores show that the team had high shared leadership attributes. Table 28 presents the SNA results corresponding to Team 3.
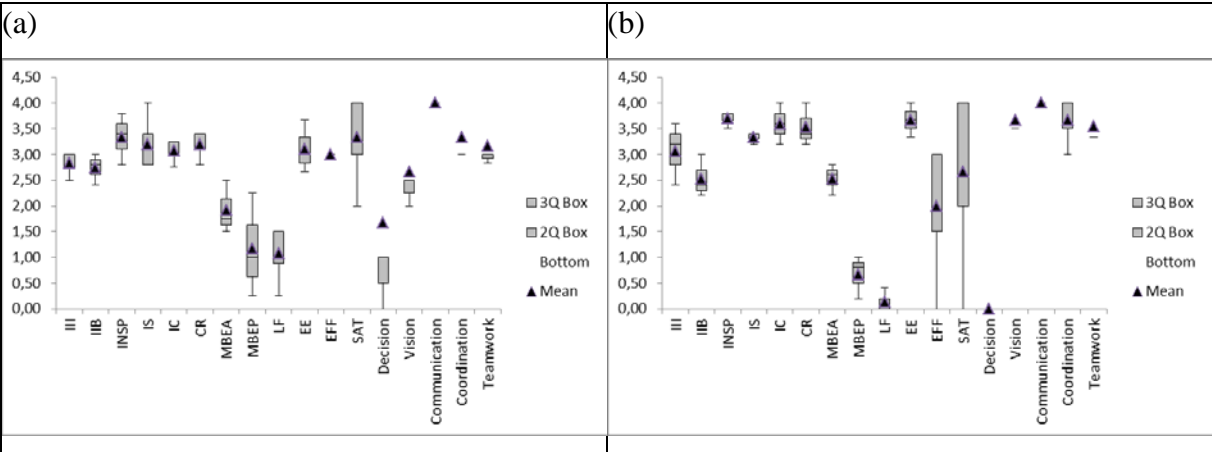

Figure 21: Box Plots for Team 3: (a) First sample; (b) Second sample

Table 27: TMLQ Results: Team 3

Comparison of TMLQ Results for Team 3 with Normative TMLQ values			
Leadership Style	TMLQ 1st sample Mean	TMLQ 2nd sample Mean	Bass &Avolio's Norm (2004) (n = 27285) Mean
Transformational Leadership			
Idealised Attributes (III)	3.17	2.73	2.94
Idealised Behaviours (IIB)	2.85	2.53	2.77
Inspirational Motivation (INSP)	3.33	3.73	2.92
Intellectual Stimulation (IS)	2.73	3.07	2.78
Individualised Consideration (IC)	2.92	2.53	2.85
Transactional Leadership			
Contingent Reward (CR)	2.93	3.40	2.87
Management-by-Exception (Active) (MBEA)	1.81	2.27	1.67
Management-by-Exception (Passive) (MBEP)	0.92	0.80	1.03
Non-Leadership			
Laissez-faire (LF)	0.83	1.07	0.65
Team Effectiveness and Satisfaction			
Extra Effort (EE)	3.00	3.11	2.74
Effectiveness (EFF)	3.33	2.67	3.07
Satisfaction (SAT)	3.33	2.00	3.08
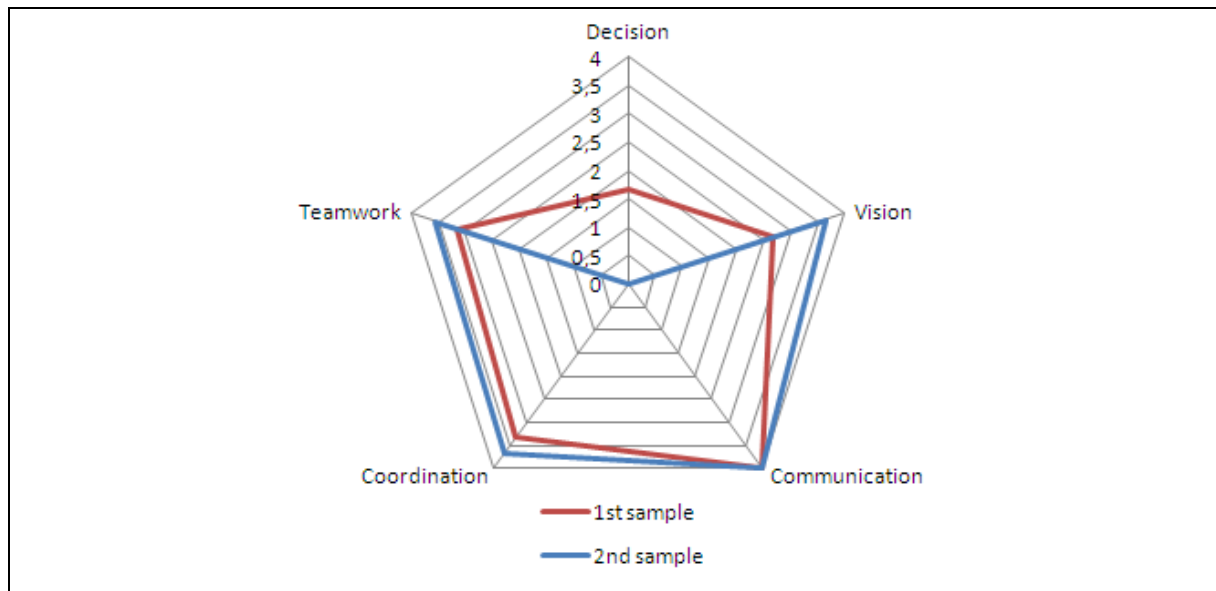
Figure 22: Radar Chart: Shared Leadership Index Team 3

For the second sample of Team 3, INSP as well as IS increased. With regards to the transactional attributes, CR as well as MBEA increased from the first to the second sample. Moreover, team effectiveness increased for the second sample.

Table 28: Social Network Analysis Results: Team 3

Shared Leadership Factor			1st sample	2nd sample
Decision Making			Hannah — Paula — Kyra	Hannah, Kyra, Paula
	Sample 1	Sample 2		
Density	0.33	0.00		
Decentralisation	0.75	0.00		
Members	3	3		
Links/Member	0.66	1.00		
Vision			Hannah — Kyra — Paula	Hannah — Kyra — Paula
	Sample 1	Sample 2		
Density	1.00	1.00		
Decentralisation	1.00	1.00		
Members	3	3		
Links/Member	1.00	1.00		
Communication			Hannah — Kyra — Paula	Hannah — Kyra — Paula
	Sample 1	Sample 2		
Density	1.00	1.00		
Decentralisation	1.00	1.00		
Members	3	3		
Links/Member	1.00	1.00		
Coordination			Hannah — Kyra — Paula	Hannah — Kyra — Paula
	Sample 1	Sample 2		
Density	1.00	1.00		
Decentralisation	1.00	1.00		
Members	3	3		
Links/Member	1.00	1.00		
Teamwork			Hannah — Kyra — Paula	Hannah — Kyra — Paula
	Sample 1	Sample 2		
Density	1.00	1.00		
Decentralisation	1.00	1.00		
Members	3	3		
Links/Member	1.00	1.00		

With regards to shared leadership attributes and the social network analysis, the decision making attribute dropped from low shared leadership to leadership avoidance. All the other shared leadership attributes (i.e. vision, coordination, communication, and teamwork) were on the highest level of shared leadership.

The transformational leadership values INSP and IS increased from sample one to sample two. All the other transformational leadership values decreased. The transactional leadership values for CR and MBEA increased from sample one to sample two. Regarding the shared leadership results, the decision making competency of the team remained on the low shared leadership level for sample one and sample two. The leadership competencies vision, communication, coordination, and teamwork were on the shared leadership level for both the samples. The team members seemed to work well together; however, with regard to decision making, it seems that Team 3 had problems in finding consensus.

6.4   Conclusion, results, and discussion of the method of application of the shared leadership instrument in the pilot study

This section discusses the method of the application of the shared leadership used for the pilot study and the results gathered from the pilot study in a university setting.

Method discussion

Bass TMLQ and the shared leadership research instrument were applied and evaluated through a social network analysis method on three teams with three members in each team. Two samples were taken with an interval of three months between the samples to see how the values for the TMLQ and shared leadership evolved. The teams were coached on leadership and course topics between the two samples. Using the TMLQ and comparing the values with normative values seemed to be suitable methods. Since the teams were newly established, the teams were expected go through the storming, norming, and performing phases (Tuckman, 1965; Lee, 2008). The values of the transformational and transactional leadership attributes at the beginning of the project and at the end of the project were expected to change. Therefore, capturing these values via the TMLQ with two samples seemed to be a suitable method.

A standard method for evaluating shared leadership behaviour and competencies is a social network analysis (SNA), which is a suitable tool to depict power and the relations in teams. However, the team size of each team was three; this is rather low for a self-organising team, which usually has a team size of six to nine members (Schwaber, 2008). Because of the small

team size, the social network approach to investigate shared leadership could deliver high values for shared leadership since the tasks are not as distributed as they are likely to be in larger networks. This might be indicated in the high shared leadership values for coordination, communication, and teamwork. With teams of three, the density and the links per member (links/member) are rather low because of the small team size, and they are not as meaningful as they are in larger networks where the team members have more connections to the other members in the team. As a suggestion and improvement for further applications of a social network analysis (SNA) in a shared leadership context, teams with a larger team size should be considered to gather more meaningful results. Even though each team in the pilot consisted of no more than three members, the leadership behaviour in the team is vulnerable and cross-pressured since there is more than one leader influencing the other, which subsequently influences the overall team leadership behaviour (Balkundi and Kilduff, 2006). Nevertheless, social network analysis appears to be a useful method for enhancing the understanding of how shared leadership is executed in self-organising teams.

The presentation of the shared leadership data as described by Pearce and Conger (2003) and Pastor and Mayo (2002) and the concept of depicting the results in quadrants of low shared leadership, shared leadership, leadership avoidance, and vertical leadership are useful to obtain a ready overview of a team's shared leadership behaviour.

Result and Discussion

For all the three evaluated teams, the values of the shared leadership attribute decision making are in the quadrant of low shared leadership. For one team, the shared leadership competence of vision/coordination increased to the shared leadership level for the second sample. For the other teams, the shared leadership behaviour (except decision making) of the teams remained at the shared leadership level for both samples. It is not surprising that all three teams showed shared leadership behaviour for communication, coordination, and teamwork because the team members had previously worked and learned together during other courses at the university. A crucial part of self-organising teams is the decision-making competence. To have an effective team, the decision-making process should be shared, and the decisions should be made collectively (Moe et al., 2012).

The core of a shared decision-making process is consensus building. The team members must share their knowledge and views, they must find an agreement, and they need to decide on actions (Bergman et al., 2012). Finding an agreement among the members of the team that

serves the team goal is a necessary condition for a good decision-making process (West, 2012). The results suggest that the teams were not able to undertake shared decisions, and the decisions were made by specific individuals in the team. A possible reason why decision making was on the low shared leadership level was the ad hoc setting of the teams; further, the teams only had a little time (three months) to build trust with the team members, which would enable shared decision-making leadership to emerge in the team. Moreover, since the study was undertaken in a university setting, the students were usually accustomed to the instructor of the course making the decisions; usually, the students only executed the instructor's decisions. Since the different team members were forced to take over the decision-making function, this might have led to a low value for the decision-making attribute. Additionally, since the groups were formed ad hoc and had to go through the whole team building process, it could be the case that the teams had never left the storming phase (Tuckman, 1965; Lee, 2008).

It might be not surprising that the TMLQ results showed high MBEA values for all the three teams because the teams were graded for the project outcome by the instructor of the course. It is interesting to note that for two teams, the values of INSP and IS were rather high, which could be explained by the fact that the teams were forced to define their research project, and that they had defined the team goal that inspired and stimulated the intellectual behaviour attribute of the team. For the mixed-gender team, all the transformational values were below the normative values. In a self-organising team, team members take over leadership according to the tasks that the team had defined on their own. This taking over of leadership has a motivational effect when the path to the goal becomes clear. In most of the cases, this journey through the path is done by removing obstacles; further, the person currently in charge of the leadership tasks coaches the other team members. This resonates with the path-goal leadership theory, which suggests that leaders in conventional settings should clarify the path to the goal and remove obstacles to goal achievement (Evans, 1970; House, 1971; Northouse, 2011). While working with the mixed team, it became visible that there was one strong character who tried to lead the team, which influenced the decision-making process of the team. According to Zaccaro et al. (2001), strong leaders generate a cognitive conflict with and among team members about the ideas and the way forward. While such conflicts can be constructive, they can slow down the decision-making process. This could explain the decrease in the shared decision-making competence of the mixed team. By using SNA to examine the team behaviour with only three team members, the results reflected the team behaviour very well and reflected the shared leadership competency of the team. The team

with the lowest transformational leadership values exhibited diverse shared leadership competencies. The teams with high transformational leadership values seemed to exhibit high shared leadership values as well.

6.5 Thesis writing reflection after evaluation of pilot study

The personal reflection cycle 2 was performed after the first application of the research instrument in a university setting to reflect on the gathered results and to evaluate whether the instrument can be used as it was developed, or whether there is a need to adjust it before applying the research instrument to the organisational problem to be solved.

6.5.1 Personal reflective pause: After pilot study

The aim of the pilot study was to test the research instrument and the chosen methodology in an environment as close as possible to verify whether the chosen approach was applicable, whether all the required tools were in place, and whether there could have been unanticipated impediments. One of the most relevant aspects of the pilot study was to test whether the chosen approach would work. What was most surprising was that even though the practitioner had considered the data collection process prior to starting the pilot, the data evaluation process was not thought through in sufficient detail. While the evaluation process of the gathered MLQ data was quite clear, it was not 100% clear how to evaluate the shared leadership data. An investigation of how to undertake a social network analysis was completed during the literature review. However, there is a significant difference in reading theoretical studies and in actually conducting the analysis using tools like NodeXL (CodePLex). With regard to the first reflective pause (section 5.7.1), there seemed to be a pattern: The practitioner sometimes underestimated the work or did not think through the entire methodology. However, the increased workload did not lead to discouragement; instead, it motivated the practitioner to generate a generic evaluation routine. It can be said that the pilot study was one of the most exhaustive preparation activities for the doctoral research work because the pilot study paved the path for the final core action research projects; all the required tools and methods were now available. One major finding of the pilot study was related to the size of the group, which is discussed further in the next Kolb reflection cycle.

6.5.2   Description: Concrete experience

The aims of the pilot study were:

a) To find out whether the chosen methodology could be practically applied using the TMLQ and the research instrument with 65 questions;

b) To generate evaluation routines for evaluating the shared leadership competencies;

c) To figure out whether there were any other organisational or practical obstacles associated with the chosen methodology.

6.5.3   Reflective observations

One of the main concerns during the planning of this research study was whether the chosen research approach could be applied in a real-life environment. Therefore, it was decided to undertake a pilot study that was close to the final setting. The university groups seemed to be a well-suited population group because of their openness and their excitement to be part of the study. During the preparation of the paper-based survey, it became apparent that the research participants were a well-suited group because the group was not too large, and it should be easy for the participants to judge the other team members since they did not have to answer too many questions. If there were too many team members, and they had to evaluate one another, the risks were that the number of questions would increase significantly, and the participants would not be willing to answer the survey. However, this was not the case in the pilot study.

The methodology of taking two samples (one during the team formation stage, and the second when the group was settled) seemed to be a good action approach. While the teams were quite willing to answer the survey the first time, getting them to undertake the survey a second time was difficult, and it took some time for all the team members to complete the survey the second time. Nevertheless, it seems that these difficulties were unrelated to the research methodology per se; the difficulties were the result of an increase in the workload at the end of the semester for the students engaged in the pilot study.

Once all the data had been collected, data evaluation started. It became obvious, however, that a general idea of how the data would be evaluated was not sufficient; practically speaking, the tiny details made the task difficult. For instance, how should a survey that was not filled in completely be handled? How should the threshold values for the SNA (e.g. whether or not a person undertakes shared leadership) be set? Moreover, during the evaluation, it became clear that the group size of three team members was too low for undertaking SNA because the

threshold value was too low when one person perceived another person in the team as a leader. At least two of the three team members should perceive another member as a leader for shared leadership to happen (Hoppe and Reinelt, 2010).

Another concern was that since the pilot study was undertaken in a German university, the participants' proficiency in English might not have been good enough to understand the questions well. These concerns were not confirmed because the English proficiency of the participants was very good; moreover, some of the courses at the university are taught in English.

6.5.4   Conceptualisation

Since agile teams usually include up to nine team members, the chances of the team size being three is rather low. While choosing a team to which the research study can be applied, a team with at least six team members should be chosen, and the size of nine should not be exceeded. Choosing a team with more than nine team members would mean that the number of questions that the research participants have to answer would be too large. This was not the case for the chosen teams under investigation in the pilot study.

Moreover, the creation of the evaluation routines was a useful result of the pilot study. The evaluation routines were set up in such a way that the routines could be customised according to the size of the team, which would hopefully save some time during the evaluation of the final research data. Overall, it could be concluded that the pilot study fulfilled its need: it was shown that the proposed methodology could be applied in an industrial organisational environment.

6.5.5   Action plan

From a methodology perspective, i.e. to gather the data via the survey and to evaluate the data via SNA, there is no need to change the methodology. For future investigations, teams with at least six team members should be chosen; otherwise, it would not be meaningful to evaluate them via SNA. As the next action, the developed and created evaluation routines for the social network analysis with NodeXL (CodePLex) and UCINET (Borgatti) should be applied in a larger organisational setting to determine how data evaluation is performed in a larger setting.

7 Core Action Research Projects

The core action research projects are the heart of this doctoral thesis work because the newly developed shared leadership research instrument was applied here. As was indicated previously (section 4), data gathering, presentation and the suggestions for changes/improvements during the evaluation took place at specific, pre-defined occasions as described in section 7.1. On each of these occasions, background information about the evaluated results on shared leadership (SNA) and TMLQ was given to the teams via presentation and discussion; thus new knowledge on shared leadership in self-organising teams was generated. This chapter describes the different core action research projects on shared leadership that were undertaken. The data evaluation was done at the shared leadership and TMLQ levels, and the observations from the two different leadership models were compared.

7.1 Introduction

The core action research projects for the application of the shared leadership instrument took place at the large research and development (R&D) centre of a Swedish telecommunication company based in Germany. This telecommunication R&D centre develops and tests software for the telecommunication systems of the next generation. Traditionally, the telecommunication industry was driven by standardisation in a highly regulated form at the national level. Software development cycles were long. Because of the business landscape and in an attempt to move away from slow-moving development so as to be competitive in the market and to keep pace with newcomers in the market, the telecommunication company introduced agile principles and identified Scrum and Kanban as suitable methods for overcoming these challenges. In 2010, the R&D centre transformed the whole organisation to an agile way of working, which included the organisation's physical seating arrangement as well as the organisation's culture and competence profile. As a result, the newly developed and maintained telecommunication software is developed by small, agile, self-organising teams (Mikkonen et al., 2012). The management, which were responsible for the transformation, expressed interest in assessing the leadership capabilities of their self-organising teams a few years after the transition to agile methodology. This motivated the core action research project undertaken in this agile setting. The investigated teams had been working in a self-organising manner for around three years at the time of the investigation.

7.2 Sampling method and action research process

The timeline of the study is presented in Figure 23. On 13 December 2013, the first sample was taken. During an introductory session, all the teams were introduced to the nature of the study. The teams were informed that (a) participation was voluntary, (b) anyone could drop out any time without specifying a reason, and (c) all data would be pseudonymised/anonymised. After the introduction session, some team members decided they did not want to participate because they felt that the questions were too personal, and they did not want to judge the other team members. Each member was asked to sign the participant consent form. Subsequently, the team members completed the survey; the completed questionnaires were collected by the researcher. The main purpose of taking the first sample was to understand the status quo of the teams' leadership behaviour with regard to the research instrument.

The next step involved the evaluation of the gathered data. On 31 January 2014, the evaluation results and the status quo information about the transformational leadership behaviour and the shared leadership practice of each team were presented to four different teams in four different team sessions. Some hints were given to the teams as to how to improve certain values.

In mid-February 2014, the management team was evaluated and asked to complete the leadership survey. The evaluation of the management team's results took place from mid-February till the end of February 2014. The research results were given to the management team on 12 April 2014.

Since all the teams had been rather busy, and two teams had been reorganised, only two teams were left for the second sample. The second sample was taken during May 2014. There was a gap of five months between the two samples. The results of the second sample were presented to the teams on 27 June 2014.
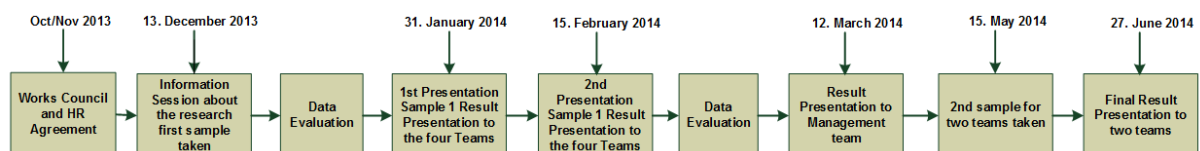
Figure 23: Overview of Timeline for Core Action Research Project

The results of the core action research project as well as the comparison and the discussion of the method are presented in the following sections. Further, the applicability of the shared leadership research instrument is evaluated.

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7.3   Observations: TMLQ and shared leadership (Teams E1–E3)

Before the research at the R&D centre could be undertaken, the survey instrument had to be sent to the works council and the HR department to obtain their approval for undertaking the study in the organisation. Both departments agreed and allowed the researcher to undertake the study. The participation of the teams in the study was voluntary, and the data was pseudonymised to comply with data privacy and ethical regulations.

In total, five agile teams agreed to take part in the study. The size of the teams varied from 6 to 14 team members. The teams had been together for around three years; they were mixed-culture and mixed-gender teams working in a self-organising manner. The company language is English; therefore, a language barrier was not to be anticipated since the survey questions were in English.

7.3.1   Results: Team E1

Team E1 consisted of nine team members and was a mixed-gender team (six male and three female team members); two of the female team members worked part-time. It was possible to take only one sample for Team E1 because the team members were subsequently reorganised and assigned to other tasks and teams in the organisation.

The box plot in Figure 24 shows the mean variation for the different transformational and transactional behaviours as well as for the shared leadership values.
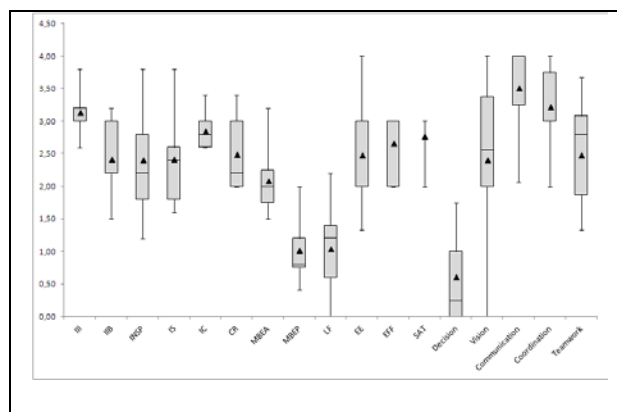
Figure 24: Box Plot for TMLQ of Team E1 (first and only sample)

The TMLQ results for Team E1 show a high value for transformational leadership values for the idealised attributes (III) (see Table 29). The attributes IIB, INSP, and IS have below average values compared to the normative values. For the transactional attributes, MBEA is above the normative value, and CR is below the normative value.

Table 29: TMLQ Results: Team E1 (first and only sample)

Comparison of TMLQ results for Team E1 with Normative TMLQ values		
Leadership Style	TMLQ 1st sample Mean	Bass & Avolio Norm (2004) (n = 27285) Mean
Transformational Leadership		
Idealised Attributes (III)	3.13	2.94
Idealised Behaviours (IIB)	2.51	2.77
Inspirational Motivation (INSP)	2.41	2.92
Intellectual Stimulation (IS)	2.42	2.78
Individualised Consideration (IC)	2.84	2.85
Transactional Leadership		
Contingent Reward (CR)	2.49	2.87
Management-by-Exception (Active) (MBEA)	2.09	1.67
Management-by-Exception (Passive) (MBEP)	1.02	1.03
Non-Leadership		
Laissez-faire LF	1.04	0.65
Team Effectiveness and Satisfaction		
Extra Effort (EE)	2.48	2.74
Effectiveness (EFF)	2.67	3.07
Satisfaction (SAT)	2.78	3.08

The radar chart of the shared leadership index of Team E1 is presented in Figure 25. The radar chart depicts the average ratings of the team members for the different shared leadership attributes. Decision making is rather low, whereas all the others are above the mean (2). Table 30 presents the SNA results corresponding to Team E1.
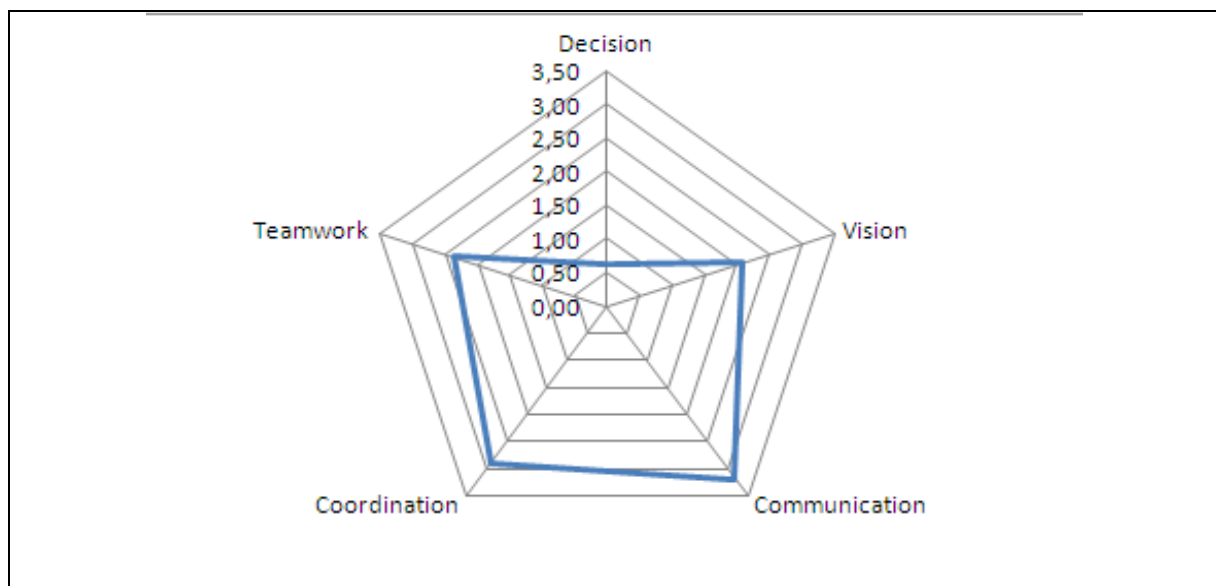
Figure 25: Radar Chart for Shared Leadership Team Index: Team E1 (first and only sample)

Table 30: Social Network Analysis Results: Team E1

Shared Leadership Factor		1ˢᵗ sample

Decision Making

	Sample 1
Density	0.09
Decentralisation	0.82
Members	9
Links/Member	0.77

Vision

	Sample 1
Density	0.96
Decentralisation	0.84
Members	9
Links/Member	7.66

Communication

	Sample 1
Density	0.93
Decentralisation	0.92
Members	9
Links/Member	7.44

Coordination

	Sample 1
Density	0.93
Decentralisation	0.92
Members	9
Links/Member	7.44

Teamwork

	Sample 1
Density	0.72
Decentralisation	0.92
Members	9
Links/Member	5.77

The decision-making competence of Team E1 was at a low shared leadership level; it seemed that only a few members were taking decisions. With regard to the decision-making attribute, half of the team members were not perceived as a leader or as people who take decisions. Three members (Helga, Silke, and Norbert) of the team were isolated and had no connection at all with the other members. Vision, communication, and coordination were found to have good values for the links/member and density. Teamwork was good on shared leadership; the links per member have a value of 5.77, with a maximum value of 8.

7.3.2 Observations: TMLQ and shared leadership (Team E1)

The transformational leadership results in Table 29 show that Team E1 had high values for III, and the leaders were highly respected in the team. The INSP/IS values were below the normative values. The MBEA value was above the average normative value. Similarly, LF was above the normative value; it seemed that the team members neglected to assume leadership as long as everything worked fine. For the shared leadership attribute of decision making, the SNA revealed that three members (Helga, Silke, and Norbert) of the team did not have any connection to the others in the team. This means that these three people did not take part in the decision-making process at all. Although these three team members did not take over shared leadership for the decision-making attribute, they were fully integrated for all the other attributes. This is an excellent example of how it is important to evaluate a team for the different attributes along with the relation of a member with other team members for that attribute.
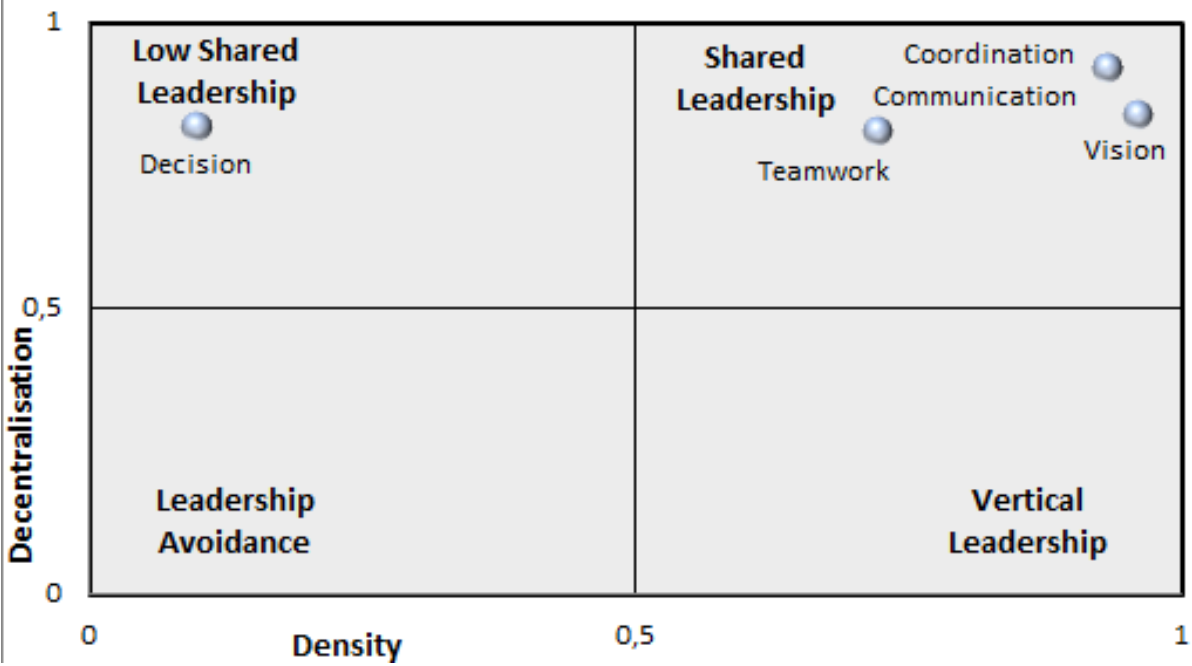
Figure 26: Overview of Shared Leadership Behaviour of Team E1

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7.3.3 Results: Team E2

Team E2 consisted of six team members and was a mixed-gender team (four female and two male team members). The majority of the team members were female. The box plot in Figure 27 shows the variation in the answers given to the different questions of the TMLQ and the shared leadership survey.
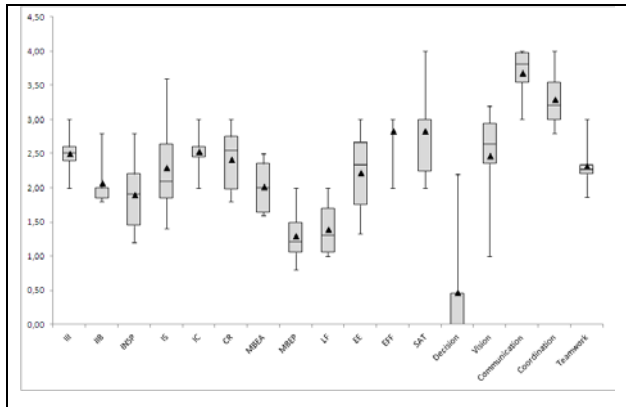
Figure 27: Box Plot for TMLQ of Team E2 (first and only sample)

The values of all the transformational leadership behaviour attributes were below the mean normative values (see Table 31). Among the transactional leadership attributes, MBEA was above the normative values. Moreover, LF had a very high value for Team E2. The radar chart of the shared leadership index of Team E2 is presented in Figure 28. The radar chart depicts the mean values of the shared leadership capabilities of Team E2. Only coordination and communication have high values. Decision making shows the lowest value, and teamwork and vision are close to the mean values. Table 32 presents the SNA results corresponding to Team E2. The decision making attribute showed low shared leadership. Team E2 showed strong vision competencies as well as coordination and communication skills. Teamwork showed good shared leadership; however, one team member (Walter) seemed to be isolated and did not contribute to teamwork at all.
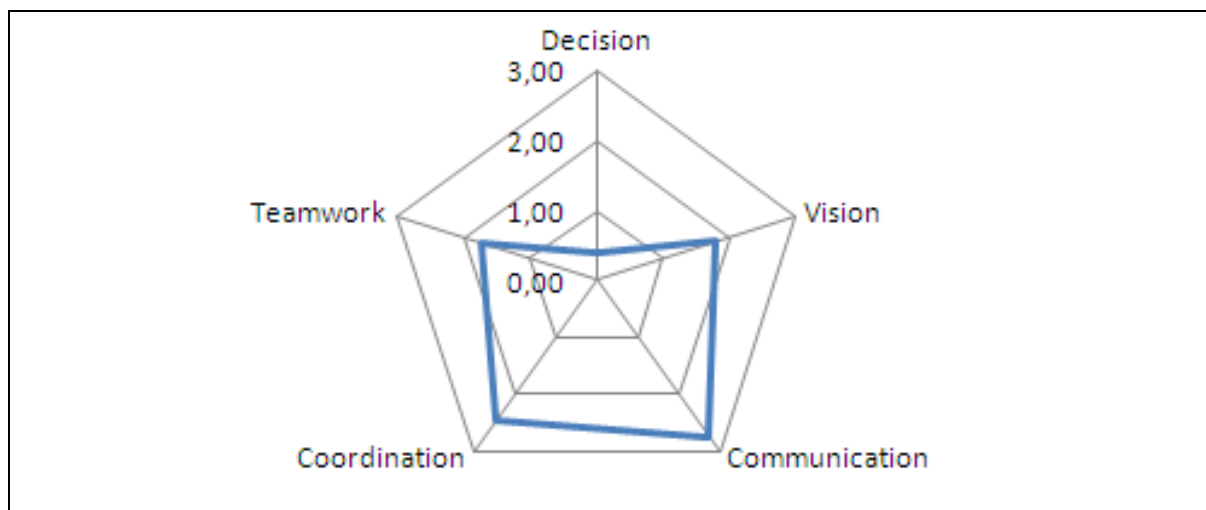
Figure 28: Radar Chart for Shared Leadership Team Index: Team E2 (first and only sample)

Table 31: TMLQ Results: Team E2 (first and only sample)

Comparison of TMLQ Results for Team E2 with normative TMLQ values		
Leadership Style	TMLQ 1st sample Mean	Bass & Avolio's Norm (2004) (n = 27285) Mean
Transformational Leadership		
Idealised Attributes (III)	2.50	2.94
Idealised Behaviours (IIB)	2.07	2.77
Inspirational Motivation (INSP)	1.90	2.92
Intellectual Stimulation (IS)	2.30	2.78
Individualised Consideration (IC)	2.53	2.85
Transactional Leadership		
Contingent Reward (CR)	2.42	2.87
Management-by-Exception (Active) (MBEA)	2.02	1.67
Management-by-Exception (Passive) (MBEP)	1.30	1.03
Non-Leadership		
Laissez-faire (LF)	1.40	0.65
Team Effectiveness and Satisfaction		
Extra Effort (EE)	2.22	2.74
Effectiveness (EFF)	2.83	3.07
Satisfaction (SAT)	2.83	3.08

Table 32: Social Network Analysis Results: Team E2

Shared Leadership Factor	1st sample
Decision Making	

	Sample 1
Density	0.16
Decentralisation	0.96
Members	6
Links/Member	1.20

Vision	

	Sample 1
Density	0.83
Decentralisation	0.80
Members	6
Links/Member	4.30

Communication	

	Sample 1
Density	1.00
Decentralisation	1.00
Members	6
Links/Member	5.00

Coordination	

	Sample 1
Density	1.00
Decentralisation	1.00
Members	6
Links/Member	5.00

Teamwork	

	Sample 1
Density	0.70
Decentralisation	0.64
Members	6
Links/Member	3.50

7.3.4 Observations: TMLQ and shared Leadership (Team E2)

The transformational leadership values for III, IIB, and ISP were below the normative values. All the other transformational values were in the range of the normative values. The value for MBEA was above the normative values. The LS value was rather high; as long as everything was working well, no corrective actions seemed to have been taken. This might be supported by the low shared leadership value for the decision-making competency of the team. Interestingly, only one team member (Natalie) in the team perceived all the other team members as a leader with regard to decision making; no other member perceived any of the other members as a decision maker in the team. This is supported by the low value for links/member for decision making. It seems that the team members took decisions on their own for their respective work area without involving others. For the shared leadership attributes of vision, coordination, and communication, all the team members showed shared leadership. The shared leadership attribute of teamwork was in the area of shared leadership. According to the SNA, there was at least one person in the team (Walter) who perceived everyone else in the team to share teamwork; however, it seems that no one in the team perceived Walter as a team worker who shared teamwork.
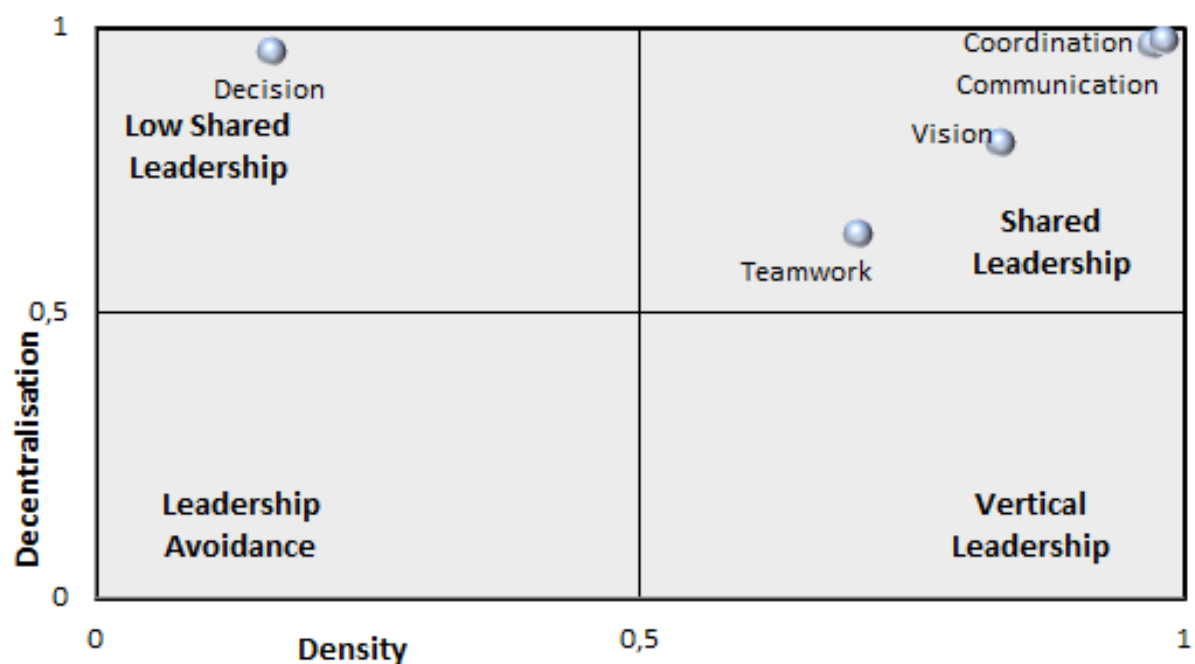
Figure 29: Overview of Shared Leadership Behaviour of Team E2

7.3.5   Results: Team E3

Team E3 consisted of seven team members. It was a mixed-gender team, with three female and four male team members. Two of the team members worked part-time. Team E3 remained stable for the two cycles with the same team members.

The box plots in Figure 30 depict the evolution of the transformational leadership behaviour of Team E3.
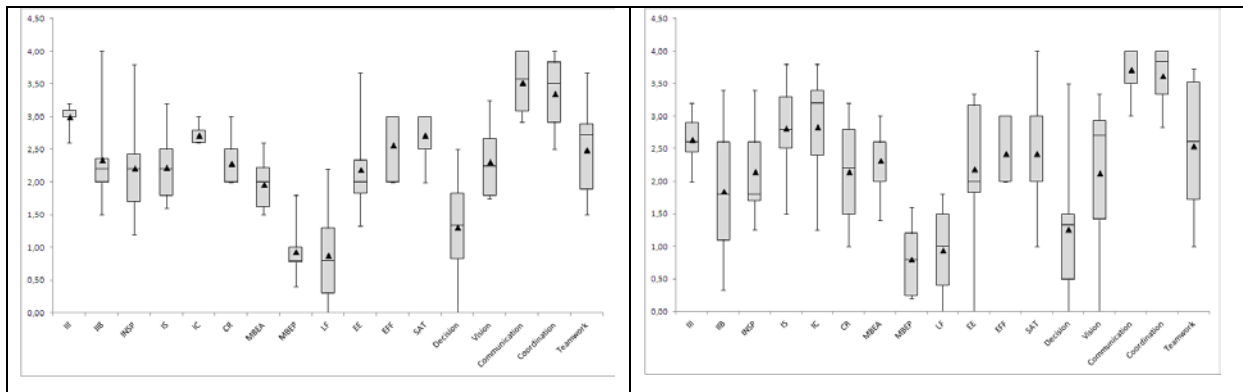
Figure 30: Box Plot for TMLQ of Team E3 (first and second sample)

For the first sample of the transformational leadership attributes for Team E3, all the attributes were below the normative values, except IC. For the second sample, IS increased and was above the normative value. All the other transformational values dropped compared to those in the first sample. Among the transactional leadership values, MBEA was above the normative value and even increased with the second sample (Table 33). The radar chart of the shared leadership index of Team E3 is presented in Figure 31. Table 34 presents the SNA results corresponding to Team E3. The radar chart depicts the mean values of the shared leadership capabilities of Team E3. The values for the decision making and vision shared leadership attributes increased slightly from sample one to sample two. The values for the shared leadership attributes coordination, communication, and team work are slightly decreased.

Table 33: TMLQ Results: Team E3

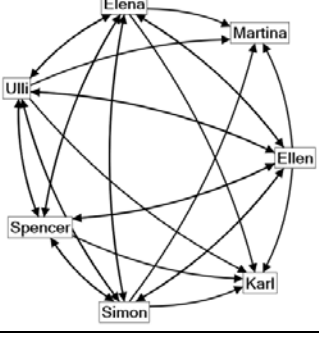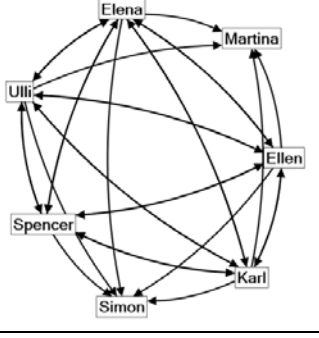| Comparison of TMLQ Results for Team E3 with Normative TMLQ values			
Leadership Style	TMLQ 1st sample Mean	TMLQ 2nd sample Mean	Bass & Avolio's Norm (2004) (n = 27285) Mean
Transformational Leadership			
Idealised Attributes (III)	2.89	2.64	2.94
Idealised Behaviours (IIB)	2.01	1.85	2.77
Inspirational Motivation (INSP)	2.11	2.15	2.92
Intellectual Stimulation (IS)	2.66	2.81	2.78
Individualised Consideration (IC)	2.94	2.84	2.85
Transactional Leadership			
Contingent Reward (CR)	2.26	2.14	2.87
Management-by-Exception (Active) (MBEA)	2.23	2.31	1.67
Management-by-Exception (Passive) (MBEP)	0.90	0.80	1.03
Non-Leadership			
Laissez-faire (LF)	0.77	0.94	0.65
Team Effectiveness and Satisfaction			
Extra Effort (EE)	2.14	2.19	2.74
Effectiveness (EFF)	2.67	2.43	3.07
Satisfaction (SAT)	2.67	2.43	3.08
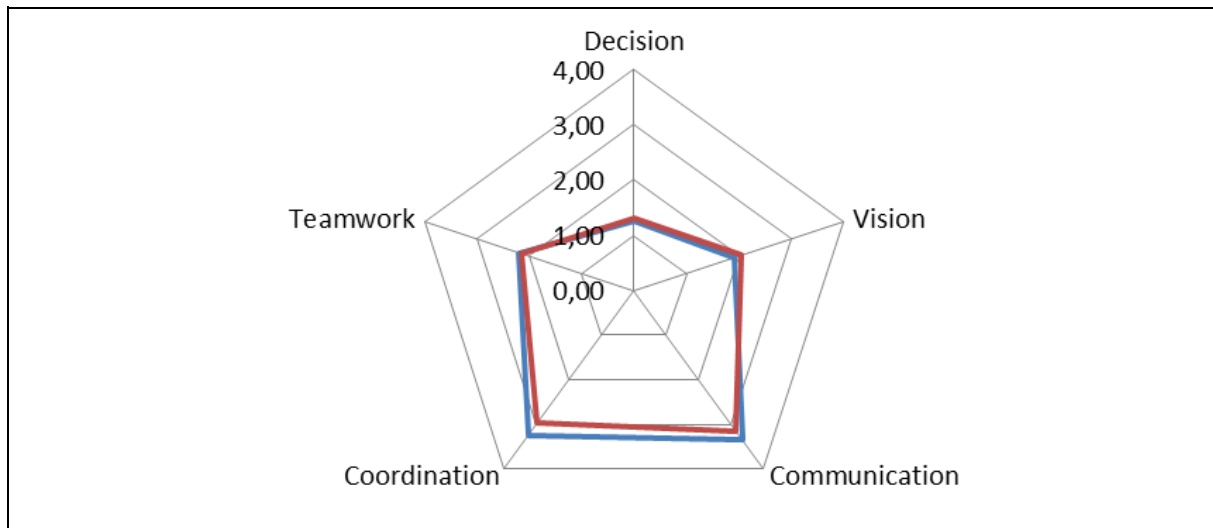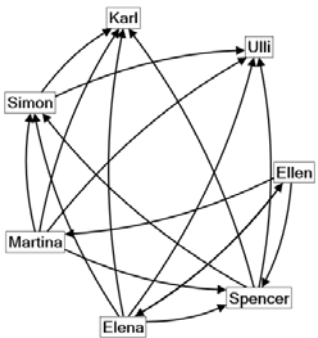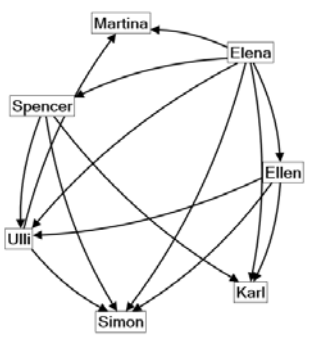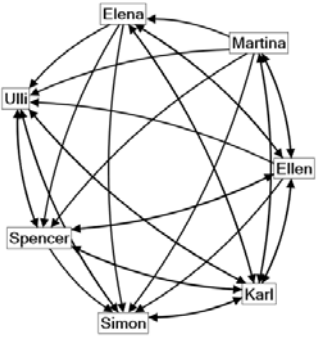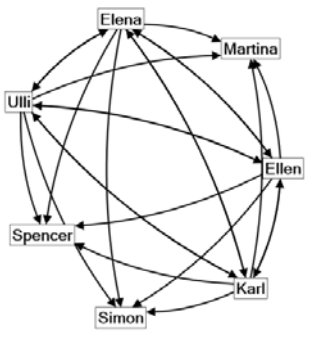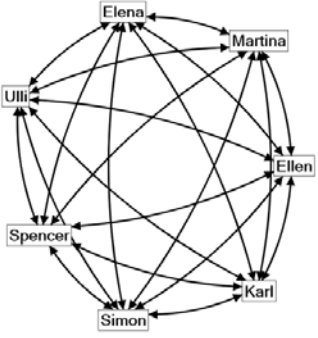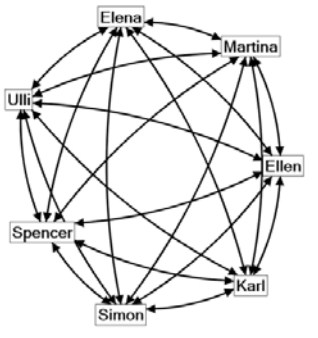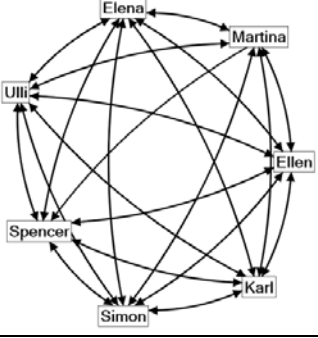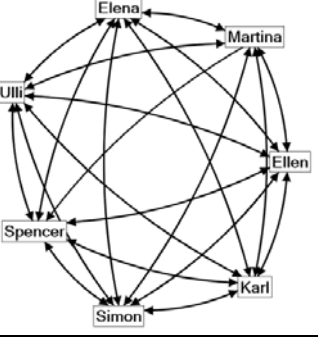
Figure 31: Radar Chart for Shared Leadership Team Index: Team E3 (first and second sample)

Table 34: Social Network Analysis: Team E3

Shared Leadership Factor	1st sample	2nd sample
Decision Making		

	Sample 1	Sample 2
Density	0.41	0.33
Decentralisation	0.69	0.61
Members	7	7
Links/Member	2.40	2.00

Shared Leadership Factor	1st sample	2nd sample
Vision		

	Sample 1	Sample 2
Density	0.76	0.57
Decentralisation	0.72	0.83
Members	7	7
Links/Member	4.50	3.40

Shared Leadership Factor	1st sample	2nd sample
Communication		

	Sample 1	Sample 2
Density	1.00	1.00
Decentralisation	1.00	1.00
Members	7	7
Links/Member	6.00	6.00

Shared Leadership Factor	1st sample	2nd sample
Coordination		

	Sample 1	Sample 2
Density	0.98	1.00
Decentralisation	0.97	1.00
Members	7	7
Links/Member	5.85	6.00

Shared Leadership Factor	1st sample	2nd sample
Teamwork		

	Sample 1	Sample 2
Density	0.69	0.69
Decentralisation	0.83	0.83
Members	7	7
Links/Member	4.10	4.10

For the shared leadership attribute of decision making, Team E3 showed low shared leadership behaviour. One team member (Elena) was isolated, and no one perceived Elena as a person who made decisions; only one person (Ellen) in the team perceived Elena as a decision maker in the first sample. In the second sample, Elena remained isolated; Elena perceived everyone else in the team as a decision maker, and no one perceived Elena as a decision maker. For the shared leadership attributes of coordination, communication, and teamwork, the team showed good shared leadership behaviour. Everyone in the team perceived one another as a shared leader with regard to coordination, communication, and teamwork. The vision attribute showed the lowest value in comparison to the other shared leadership attributes.

For the second sample, the values for the shared leadership attribute of decision making decreased, as did the links per member. The shared leadership values for communication, coordination, and team work stayed at the level of shared leadership and even improved slightly.

7.3.6   Observations: TMLQ and shared leadership (Team E3)

Team E3 was the only team that remained stable and consistent for the two cycles. Interestingly, the value for IIB decreased markedly from sample one to sample two. The IIB attribute reflects the leader's behaviour involving a charismatic leadership style with a strong vision; such leaders want others to follow their vision. There seems to be a trend because the shared leadership attribute of shared vision dropped for the second sample as well. It seems that the low transformational leadership value of IIB is reflected in the shared leadership capability for vision as well. The social network diagram shows that the decentralisation of the shared leadership attribute increased, but the density and the links per member decreased. Overall, fewer people in the team were seen as a visionary leader compared to the first sample. For the decision-making attribute, from sample 1 to sample 2, Elena was not perceived as a decision maker, which was a consistent result. Karl, Uli, and Simon seemed to be strong decision makers in the team. Figure 32 presents an overview of the shared leadership behaviour of Team E3.
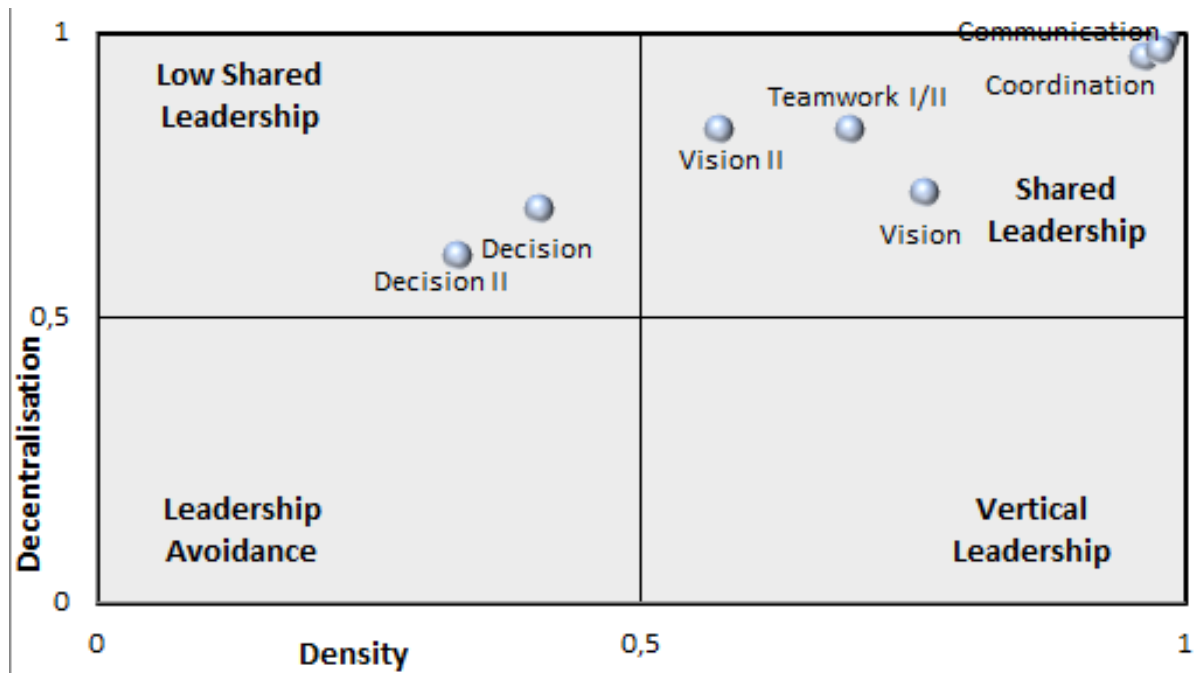
Figure 32: Overview of Shared Leadership Behaviour of Team E3

7.3.7 Team E3: Changes from sample one to sample two

Team E3 was the only team for which the researcher could gather data for a second sample with a consistent team. The changes between the two samples were that the team members were encouraged to interact more closely with one another and to interact more closely during the daily meetings. The team members who were not involved all that much in decision making tried to improve their technical competence by pairing with more knowledgeable people. This was achieved by sharing cell offices and by sharing a table that was free because a team member was on vacation. Further, the team was encouraged to ask for more background information and explanation from the team members.

7.3.8 Results: Team E4

Team E4 was the largest team under investigation. The team had 14 team members—three female and eleven male. For a self-organising team, the team was too large as per the definition proposed by Schwaber (2008). The team was aware of this fact, but they did not see any need to split the team into two.

The box plot in Figure 33 shows the variance in the answers to the TMLQ questions and the shared leadership survey. For all the transformational leadership attributes, the values were below the normative values (Table 35). The transactional value CR is below the normative value and MBEA is above the normative value.
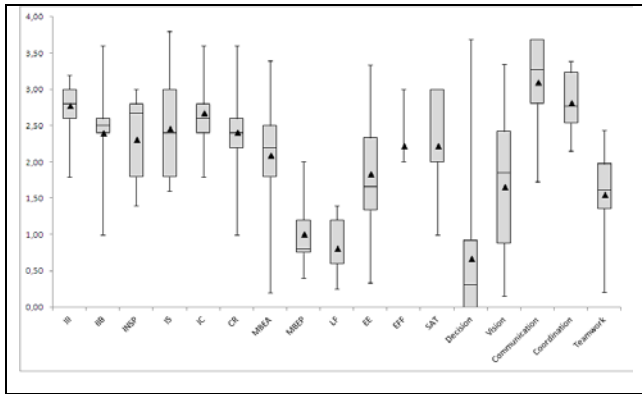
Figure 33: Box Plot for TMLQ of Team E4 (first and only sample)

Table 35: TMLQ Results: Team E4 (first and only sample)

Comparison of TMLQ Results for Team E4 with Normative TMLQ values		
Leadership Style	TMLQ 1st sample Mean	Bass & Avolio's Norm (2004) (n = 27285) Mean
Transformational Leadership		
Idealised Attributes (III)	2.69	2.94
Idealised Behaviours (IIB)	2.54	2.77
Inspirational Motivation (INSP)	2.17	2.92
Intellectual Stimulation (IS)	2.42	2.78
Individualised Consideration (IC)	2.69	2.85
Transactional Leadership		
Contingent Reward (CR)	2.47	2.87
Management-by-Exception (Active) (MBEA)	2.31	1.67
Management-by-Exception (Passive) (MBEP)	1.14	1.03
Non-Leadership		
Laissez-faire (LF)	0.78	0.65
Team Effectiveness and Satisfaction		
Extra Effort (EE)	1.70	2.74
Effectiveness (EFF)	2.22	3.07
Satisfaction (SAT)	2.22	3.08

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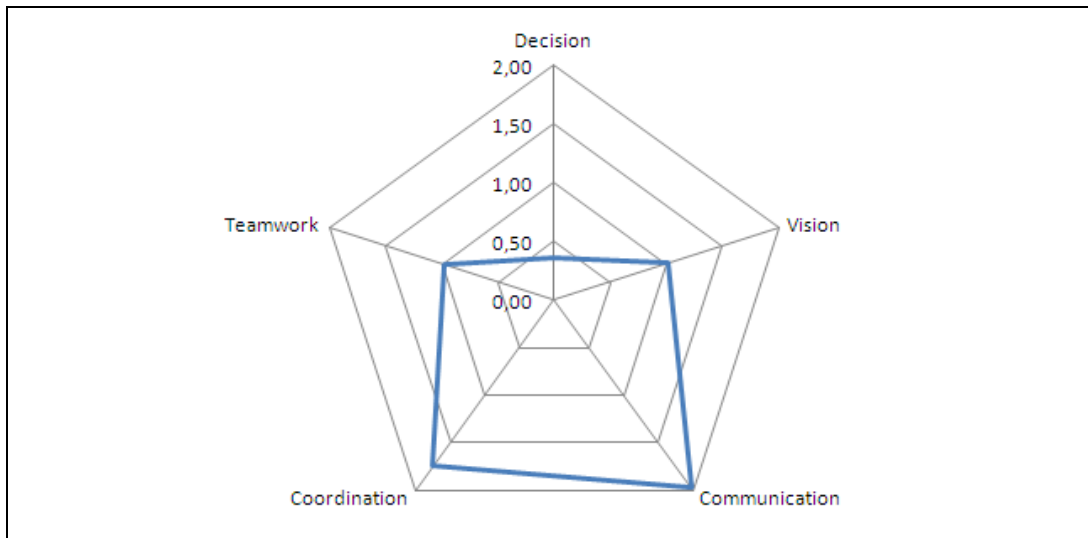
Figure 34: Radar Chart for Shared Leadership Team Index: Team E4 (first and only sample)

The radar chart of the shared leadership index of Team E4 is presented in Figure 34. The radar chart depicts the mean values of the shared leadership capabilities of Team E4. The average values for decision making, teamwork, and vision are below the average values. Coordination and communication are above the average. Table 36 presents the SNA results corresponding to Team E4.

For the shared leadership attribute of decision making, the team showed low shared leadership behaviour. Some of the team members were isolated (e.g. Sam), and some (e.g. Kilian) perceived only others as the decision-maker in the team; these people were not perceived as decision-makers themselves. Further, teamwork in this large team shows only six links per member out of the possible 13 links per member, which indicates low shared leadership capabilities. The same holds true for the shared vision attribute, which shows low shared leadership.

Table 36: Social Network Analysis Results: Team E4

Shared Leadership Factor		1st sample
Decision Making (DM)		
	Sample 1	
Density	0.16	
Decentralisation	0.73	
Members	14	
Links/Member	2.14	
Vision		
	Sample 1	
Density	0.47	
Decentralisation	0.75	
Members	14	
Links/Member	6.14	
Communication		
	Sample 1	
Density	0.76	
Decentralisation	0.87	
Members	14	
Links/Member	9.90	
Coordination		
	Sample 1	
Density	0.79	
Decentralisation	0.91	
Members	14	
Links/Member	10.28	
Teamwork		
	Sample 1	
Density	0.46	
Decentralisation	0.74	
Members	14	
Links/Member	6.00	

7.3.9 Observations: TMLQ and shared leadership (Team E4)

Team E4 was the largest team under investigation, with 14 team members. According to the definition of a self-organising team, the team size should not exceed nine team members (Schwaber, 2008). Of all the investigated teams, Team E4 had low shared leadership behaviour in terms of decision making, vision, and teamwork. The team size could be a possible explanation for the low shared leadership level for these three shared leadership attributes. All the transformational leadership attributes were below the normative values. Among the transformational leadership attributes, MBEA is above the normative values. For Team E4, the researcher had planned to undertake a second sample as well. The surveys were given to the team members. Overall, the team had changed a lot since the first sample; there were three new team members and three members had left the team. Completed surveys were received only from seven team members; three of them were new members in the team. The completed surveys had many questions that were not answered. To compare the results with the first sample in the context of shared leadership, it made no sense to evaluate the data because the completed surveys were received from only half of the total team. Therefore, the second sample was discarded. Figure 35 presents an overview of the shared leadership behaviour of Team E4.
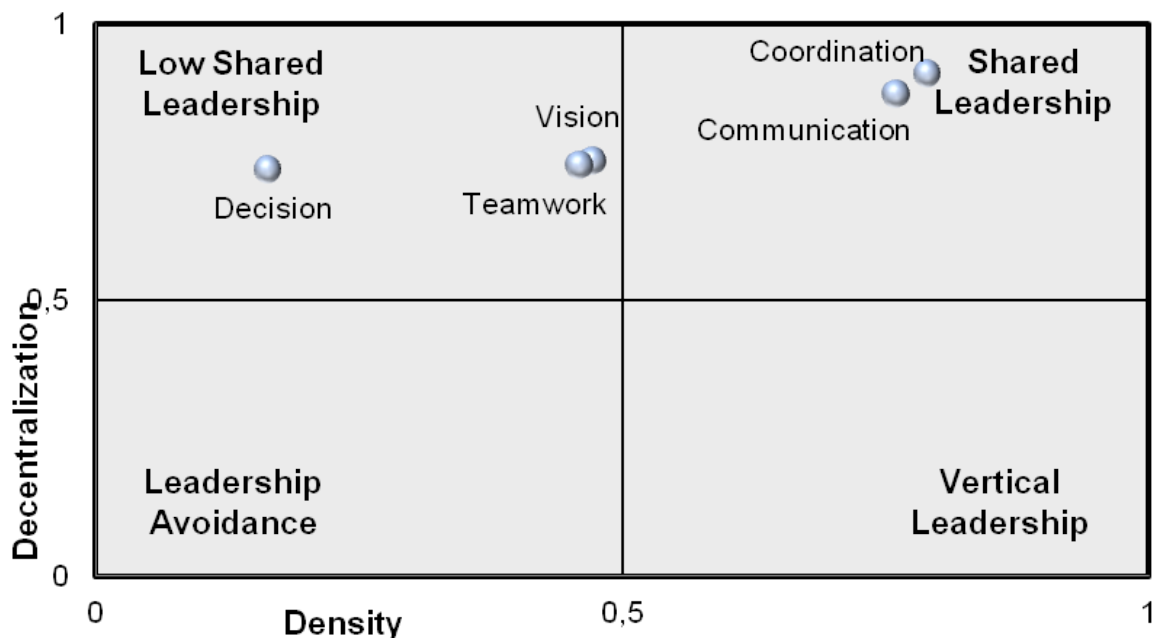

Figure 35: Overview of Shared Leadership Behaviour of Team E4

7.4 Thesis writing reflection cycle 3 after sample 1 involving Teams E1–E4

A third reflection cycle was done after the evaluation and presentation of the results for the four different teams under investigation.

7.4.1 Personal reflective pause: After data evaluation of four teams

After contacting the responsible manager in the telecommunication company via e-mail, asking whether an investigation of shared leadership would be allowed using one or perhaps two teams, it was surprising to find that six self-organising teams indicated interest in participating in the study.

An introductory session was arranged; all the teams were invited to participate. Since a large enough meeting room was not available, the canteen was booked. Over 50 people took part in the introductory session. A presentation about the practitioner's research was given, and the research study and the aims of the research as well as the benefits for the teams were illustrated. Finally, four teams agreed to take part in the study; i.e. 37 team members responded to the survey. This meant that over 2000 questions had to be evaluated. A crucial aspect of the research methodology was the number of teams to be evaluated. Initially, the goal was to evaluate one or two teams; therefore, there was no need to automate the data evaluation since it could be easily done by hand. However, with over 2000 questions, the data evaluation involved a lot more work than had been anticipated. Omitting data, i.e. evaluating only one team although four teams had volunteered would have been one option. However, the decision was made to consider all the four teams so as to strengthen the results of the study. Once the data of the first team was evaluated, the evaluation process became kind of routine since all the methods were in place; therefore, the evaluation could be completed faster for the other teams.

7.4.2 Description: Concrete experience

After evaluating the first sample of self-organised teams at the R&D centre of a Swedish telecommunication company, it became clear that all of the evaluated teams had rather low values for the shared leadership competency of decision making; some of them had low values the shared vision factor as well. All the teams showed shared leadership abilities for coordination and shared communication.

7.4.3 Reflective observations

There seemed to be a pattern in the shared leadership behaviour of the teams. It could be assumed that there is a dependency and influence from outside the organisation that

influences the self-organised teams and the behaviour and ability of the team members to share leadership. All of the investigated teams belonged to the same organisation. Even when teams are self-organised, they are embedded in an organisation.

7.4.4 Conceptualisation

Teams are part of an organisation, and they derive their objective/purpose from the organisation of which they are a part; the teams contribute to the organisation's purpose by achieving their objectives to meet the team's and the organisation's goals (West, 2012). A self-organising team is a team that exists in an organisational system; the surrounding organisational system with its operational objectives can have a significant influence on how these teams function (Tata and Prasad, 2004). According to Hackman (1986), the influence on team effectiveness and the ability to take over shared leadership depend on the team's design and the organisational resources. An organisation provides an employee with a vision, values, and beliefs that depend on the organisation's objective as well as on the rules, policies, and organisational procedures (Manz, 1986). Some prior researchers have examined the influence of organisational structure and rules on self-organising teams (Campion et al., 1993; West, 2012); they reported that organisational structure influences self-organised teams and their effectiveness. Other studies questioned whether self-organising teams are more effective than other teams are (Bergmann and De Meuse, 1996). The people in a self-organising team were found to be reluctant to make decisions, as decision making was previously executed by the leader of the team. When a self-organising team exists in an organisation, its shared leadership function would be good only as long as it is mirrored in the organisational context in which the organisation's management team lives.

With this knowledge in mind, the practitioner decided to perform the TMLQ and the shared leadership survey on the organisation's management team in order to evaluate their shared leadership behaviour and to learn more about the organisation. With this knowledge, the individual shared leadership results of the different teams might be seen in a different light and could be explained further because the team behaviour is a mirror of the organisational management team's behaviour.

7.4.5 Action plan

To investigate how the surrounding management team of the investigated self-organising teams was evaluated, the plan was to apply the evaluation on the management team as well. The result of the shared leadership, especially the result related to decision making, might be

an important indicator for interpreting the low values of decision making and for understanding whether they are potentially inherited from the management team.

7.5 TMLQ and shared leadership evaluation of Team E5 (Management team)

One of the main reasons for evaluating the surrounding organisational management team was to understand the decision making capabilities of the management team. The management team was a self-organising team; it included nine team members: seven male and two female. All the members of the management team participated in the research study. The management team was a mixed-culture team.

7.5.1 Results: Team E5

The box plot in Figure 36 depicts the mean values and the variance of the answers given by Team E5 (the management team).
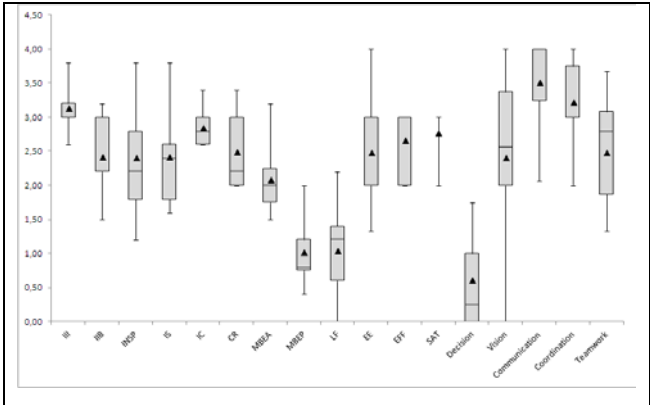
Figure 36: Box Plot for TMLQ of Team E5 (first and only sample)

For Team E5, the transformational leadership attributes III and IC were markedly below the normative values. The MBEA value was significantly above the normative value. Similarly, LS was above the normative value (see Table 37)

Table 37: TMLQ Results: Team E5 (first and only sample)

Comparison of TMLQ results for Team E5 (Management Team) with Normative TMLQ values		
Leadership Style	TMLQ 1st sample Mean	Bass & Avolio's Norm (2004) (n = 27285) Mean
Transformational Leadership		
Idealised Attributes (III)	2.53	2.94
Idealised Behaviours (IIB)	2.87	2.77
Inspirational Motivation (INSP)	3.04	2.92
Intellectual Stimulation (IS)	2.91	2.78
Individualised Consideration (IC)	1.76	2.85
Transactional Leadership		
Contingent Reward (CR)	2.44	2.87
Management-by-Exception (Active) (MBEA)	2.25	1.67
Management-by-Exception (Passive) (MBEP)	1.36	1.03
Non-Leadership		
Laissez-faire (LF)	1.13	0.65
Team Effectiveness and Satisfaction		
Extra Effort (EE)	2.30	2.74
Effectiveness (EFF)	2.56	3.07
Satisfaction (SAT)	2.89	3.08

The radar chart of the shared leadership index of Team E5 (the management team) is presented in Figure 37. The radar chart depicts the mean values of the shared leadership capabilities of Team E5 (the management team). The mean value of communication has a high value, and the decision making mean value has the lowest value. Table 38 presents the SNA results corresponding to Team E5.
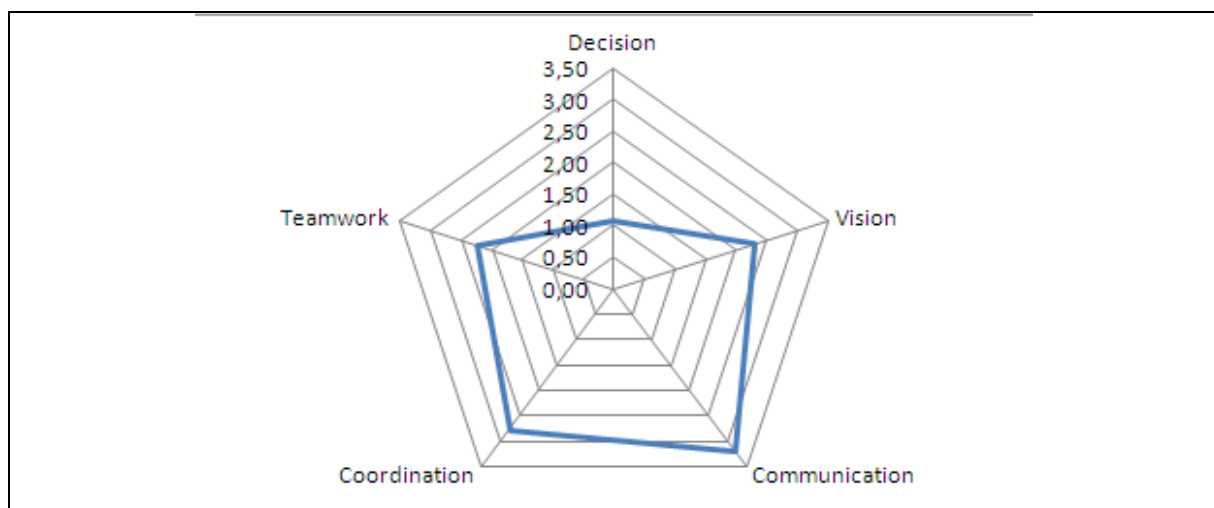

Figure 37: Radar Chart for Shared Leadership Team Index: Team E5 (first and only sample)

Table 38: Social Network Analysis: Team E5 (Management Team)

Shared Leadership Factor		1st sample
Decision Making (DM)		
	Sample 1	
Density	0.34	
Decentralisation	0.47	
Members	9	
Links/Member	2.77	
Vision		
	Sample 1	
Density	0.90	
Decentralisation	0.85	
Members	9	
Links/Member	7.20	
Communication		
	Sample 1	
Density	0.80	
Decentralisation	1.00	
Members	9	
Links/Member	8.00	
Coordination		
	Sample 1	
Density	0.94	
Decentralisation	0.96	
Members	9	
Links/Member	7.50	
Teamwork		
	Sample 1	
Density	0.74	
Decentralisation	0.75	
Members	9	
Links/Member	5.80	

The decision-making attribute of the team was low and was decentralised only a little. One team member (Erik) was perceived by all the others in the team as the decision maker, followed by Leif. Team E5 (the management team) had a strong vision, and this vision was shared among the different team members. The distribution of the vision attribute for the team was good and highly decentralised. The teamwork attribute had a low value for the links/member. For the coordination and communication attributes, the E5 management team showed shared leadership. Interestingly, for the teamwork attribute, the value of links/member was low.

7.5.2 Observations: TMLQ and Shared Leadership (Team E5)

Regarding the transformational leadership capabilities of the leadership team, INSP showed good values, which is a good indicator that the team had a clear vision. The TMLQ values for IS showed that the team questioned the status quo and developed unique ways of solving problems. The value for IC was low; it seems that the team did not take much care of the needs of others and/or their own needs in the management team.

The Laissez-faire attitude had a high value, which indicates that the team members were reluctant to take decisions as long as everything was going well. For the shared leadership value of decision making, the team showed shared leadership avoidance; only a few (low decentralisation) in the team seemed to take decisions and influence the team (low density). This is supported by the high Laissez-faire value. For vision, the team showed shared vision leadership capabilities. This is supported by the good values for INSP in the TMLQ. Moreover, the team showed shared communication and coordination capabilities; the team members coordinated, structured, and aligned their work with that of the other team members. For the teamwork of the leadership team, the team showed shared leadership capabilities. However, except decision making, this attribute had the lowest value (which was still a good value). The value of the links/member was rather low (there were no isolates, which is good). For the decision-making attribute in the social network, two people in the team were perceived as the leader. Figure 38 presents an overview of the shared leadership behaviour of Team E5 (the management team).
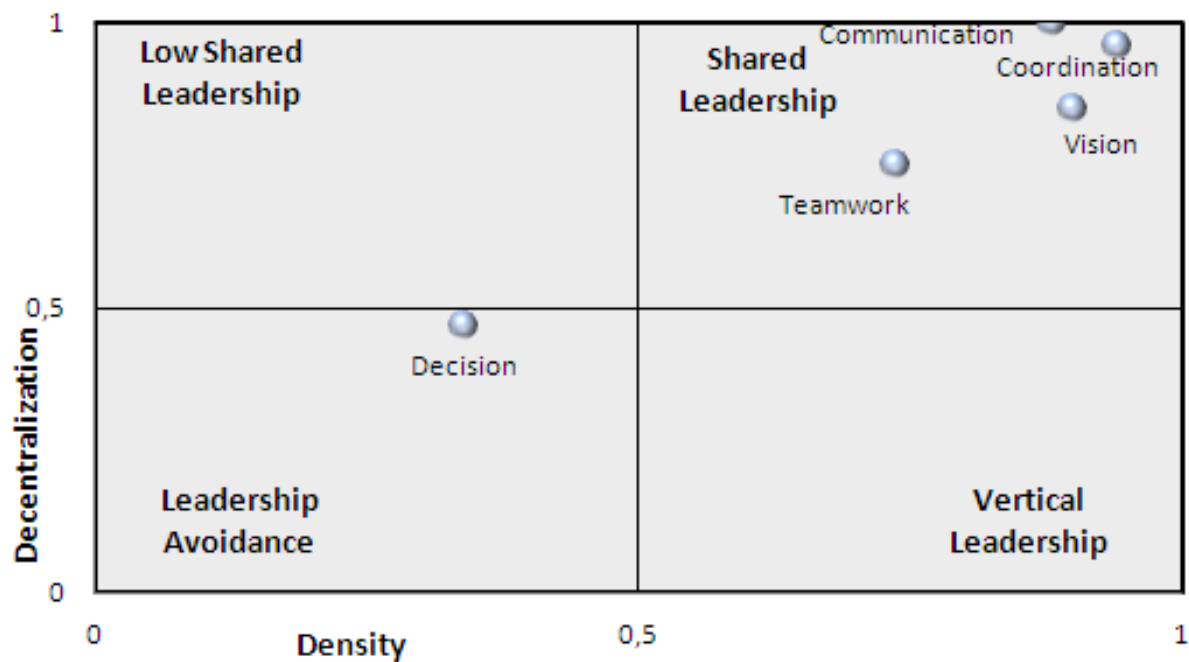
Figure 38: Overview of Shared Leadership Behaviour of Team E5 (Management team)

7.6 Thesis writing reflection cycle 4 after action cycle 1 involving Team E5

A fourth personal reflection cycle was performed after the evaluation of Team E5 (the management team).

7.6.1 Reflective pause: After core action research projects

One significant outcome of the evaluation of the shared leadership data was that the management team showed shared leadership avoidance for the shared leadership decision-making competence. Only a few members of the management team seemed to take decisions. In comparison to the other evaluated teams, which showed at least low shared leadership competence, the expectation was that the management team would be strong with regard to decision making.

The practitioner was a bit unsure as to how to deliver the message to the strong management team that the data evaluation indicated that the decision-making ability of the self-organising management team was at the level of shared leadership decision-making avoidance.

After reflection on how to deliver the bad message (bad from the practitioner's perspective) to a team of leaders, the following strategy was adopted: first show some of the good results of the team; subsequently, show the graph indicating leadership avoidance of the decision-making leadership attribute.

The feedback received was unexpected. What was most surprising was that the team knew

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that they were bad in terms of shared decision making. One of the management team members said, 'Every good decision takes at least fourteen days'. This implied that the management was aware of the situation of bad decision-making competence; the current investigation only quantified what was already qualitatively known to the team.

This experience was important: not every message that seems to be bad is really bad because sometimes, people are quite aware of their strengths and weaknesses, and they only need a trigger from outside to really work on the weaknesses. Gaining this experience helped the practitioner to grow as a leader because it gave confidence in what the researcher was doing in research, even if the expected results of the research study were not in line with what everyone expected. This experience allowed the practitioner to improve leadership knowledge and to grow as a researcher.

7.6.2   Description: Concrete experience

The outcome of the data evaluation of the management team revealed that the decision making attribute of the shared leadership for the management team showed leadership avoidance. This was different from what the self-organising teams had for the decision making attribute because all the team members had the shared leadership attribute of low shared leadership.

7.6.3   Reflective observations

The main purpose of the cycle with the surrounding management team was to figure out how organisational decision making was performed. The practitioner's expectation was that the management team would show the same behaviour as the teams in the organisation did; thus, it was expected that the decision-making competence would have been given from the management team to the self-organising teams. However, this expected behaviour was not witnessed in the observed case. It seems that the self-organising teams took decisions; the teams were not reluctant to take decisions even if not all the team members in the team were able to take decisions. Therefore, only a few members took decisions; overall, the teams were in the quadrant of low shared leadership. It can be concluded that leadership avoidance was not inherited by the teams from the management team because the teams showed shared leadership.

7.6.4   Conceptualisation

The findings do not seem to confirm what some prior studies had suggested (Bergmann and De Meuse, 1996; Bergman et al., 2012). Prior scholars found that a self-organising team might be reluctant to take decisions that used to be taken by the management team previously.

However, in the observed case, the opposite seems to be true: the self-organising teams took the decisions while the management team did not. It seems to be the case that shared leadership, especially the decision-making attribute, can be better in a self-organising team than in a surrounding management team.

Self-organising development teams focus and rely heavily on individual competencies as critical success factors for the team. A self-organising development team needs a common focus; further, a vision and a rapid decision-making process are required to be successful (Cockburn and Highsmith, 2001). There seems to be a difference between a self-organising management team consisting of managers (who might have different objectives) and a self-organising team that follows a common goal.

7.6.5   Action plan

The evaluation of Teams E1–E4 showed that all the teams had low shared leadership in the decision-making area. One possible assumption is that the research instrument did not correctly reflect the decision-making capabilities of a team. However, the result for Team E5 (the management team) clearly indicated that the team showed leadership avoidance, which was different from the leadership behaviour for decision making for Teams E1–E4. For future evaluations, it might be useful to investigate not only self-organising teams but also the surrounding organisational management team/structure.

7.7   Thesis writing reflection cycle 5 after core action cycle 2 involving Team E3

Team E3 was the only team for which it was possible to gather a second sample. The gap in time between the two samples was five months.

7.7.1   Personal reflective pause: After core action research projects' second sample

Between the first and the second sample, there was a time span of five months. It was noticed that reproducibility was an important factor when undertaking an action research study. For the evaluation of the gathered data, tools like UCINET (Borgatti) were used to measure and calculate the network decentralisation. For the social network visualisation, NodeXL (CodePLex) tool was used. These tools have several functionalities and many options that needed to be configured, depending on what is to be calculated (e.g. the complexity measure and the decentralisation calculation). It was noticed that this process was particularly error-prone if there was a long time span between the two cycles. As an outcome of the research

methods cycle, a research log and diary was created, which contained checklists and information about how the tools and the methods were used during the evaluation. For the first sample, a detailed description was written about how the first sample was evaluated. For instance, step-by-step instructions for UCINET (Borgatti, 2002) were created so that the evaluation performed for the first sample could be reproduced. Moreover, all the data files were labelled with the date and a name in order to document the results.

One of the significant learnings from this exercise was that upon starting with the evaluation of the second sample, the different evaluation steps for the data evaluation with a data set from the first sample were reproduced and subsequently compared for consistency of the results. Having applied this methodology, it could be ensured that the exact same steps as those applied for the first sample would be used for the second sample.

This knowledge is essential, to undertake a quality assurance mechanism when working as a researcher because only data that has been evaluated according to the same steps as those for the first sample taken can be compared and judged. This analytical skill will be very helpful for the practitioner's further research. Thus, the practitioner has developed significantly methodical research skills, such as using a log book and checklists.

7.7.2 Description: Concrete experience

For the core action research projects, six samples were undertaken, producing a huge amount of data that needed to be evaluated. The data evaluated included the results of the five core action research projects. For each core action research cycle, the TMLQ data and the shared leadership data were evaluated and presented during the thesis writing process and were finally discussed.

7.7.3 Reflective observations

While writing the evaluation chapter for the gathered core action research data, it became clear that the representation of the gathered data needed to be extremely well-structured because five teams were evaluated in seven cycles. For each team, the TMLQ and shared leadership attributes were presented to the different teams. Therefore, the reader might find it confusing to determine which data belongs to which team since the data was always presented in the same manner. Moreover, using 'Discussion' as the heading for the data representation and evaluation of the core action research projects might confuse the reader with the thesis discussion in chapter 8 of the thesis. Initially, the same structure was followed for data representation as was used for the pilot study. However, to use the same approach and data representation as was used for the pilot study for the core action research projects' data

evaluation and representation did not seem to be appropriate because the data needed to be discussed in more detail for the evaluation of the TMLQ and the shared leadership data.

7.7.4 Conceptualisation

To cope with the requirements of a scientific dissertation, the guidelines described by Esselborn-Krumbiegel (2010) were followed, who suggested structuring data representation into the following sections:

Result representation

Result discussion

Structuring the data evaluation chapter for the core action research projects in this way, the data will first be presented without interpretation; in the second step, the data will be discussed. In order not to confuse the final 'Discussion' (chapter 8) with the data representation, the practitioner took the liberty (in consultation with the thesis supervisor) of referring 'Result Discussion' as 'Observations' in this section.

7.7.5 Action plan

A result representation section and an observations section for the TMLQ and shared leadership evaluation was included in the core action research project (chapter 7) of the thesis document for each of the core action research projects. Moreover, the discussion of the methodology was moved to chapter 8.

7.8 Summary of core action research projects

One attribute of action research is that even if a clear plan and a methodology are proposed for the thesis work, many uncertainties could remain because the investigation is undertaken in an industrial organisation, and organisations change over time. For the core action research projects, four self-organising teams were evaluated. After evaluating the gathered data, it became clear that the decision-making attribute for all of the teams was in the quadrant of low shared leadership.

As described in the different action research cycles in chapter 7, the shared leadership decision-making attribute of a team should be only as good as the decision-making capabilities of the surrounding management team (Bergman et al., 2012). This was not confirmed by the study; with regard to the decision making attribute, the management team exhibited leadership avoidance, whereas the teams exhibited low shared leadership. At the

beginning of the study, the evaluation of the organisational management team was not planned. However, this evaluation became necessary because of the findings. The result described in section 7.5 indicates that the management team showed leadership avoidance. This might be why the decision-making attribute for the different investigated teams was in the quadrant of low shared leadership, which is still at the shared leadership level but only at a low level.

A second change during the course of the action research projects was that only two of the four teams remained in the original form; two teams were dissolved because the team members moved to other teams or were assigned to other tasks that had a higher priority in the organisation. Finally, only two teams were left for the second action research cycle (Teams E3 and E4). Of these two teams, one was restructured in comparison to the first evaluation (Team E4). During this process, three new team members were introduced, and only five members who took part in the first cycle wanted to participate in the second cycle. Thus, it made no sense to evaluate the survey data of the second sample of Team E4 as there was very little overlap in the team members' participation for both the samples. Further, for the second sample, a significant portion of the seven respondents returned survey data sheets that were incomplete. Therefore, the second sample of Team E4 was discarded because of low data quality. Only one team could be evaluated for a second cycle. This is the nature of action research, which is closely connected to business needs.

The evaluated team size ranged from 6 to 14 agile team members for the evaluated teams. According to Schwaber (2008), an optimally sized agile team is one that is small enough to remain light and large enough to finish the work in time. Teams with less than three team members decrease the interactions and will result in less productivity gains. In contrast, more than nine team members would require too much coordination and would generate too much complexity. Consistent with the extant literature, team effectiveness generally decreases with growing team size (Campion et al., 1993; Pearce and Sims, 2002; West, 2012). There was only one team that had 14 team members, and this was the only team that showed low shared leadership characteristics for the decision-making, vision, and teamwork attributes. This seems to be a clear indicator that the team was too large. For teams to show shared leadership, the optimal size is between four to nine team members (Schwaber, 2008).

All the teams that were investigated exhibited transformational leadership values that were in the range of the normative values; some were a bit higher, while others were a bit lower. Interestingly, the transactional leadership values of MBEA for all the teams were rather high

and above the normative values. One explanation could be that the self-organising teams moved away from a command and control team structure only about three years ago (Mikkonen et al., 2012); a change to self-organising teams takes time (Lee, 2008). Overall, it must not be treated as a negative sign that MBEA shows high values; it can well be a sign that the team members take on responsibility and use the changes to take corrective action when they see that the team goal is in danger.

The high MBEA attribute values might be why all the teams showed low shared leadership for the decision-making attribute. The extant literature states that it will take years to transform a team to a self-organising team (Jian'an, 2008). Another interesting finding was that coordination, communication, and teamwork had very good values for the shared leadership attributes. An explanation for this might be that if a person in the team cannot communicate and has low coordination as well as teamwork skills, this person will not be productive in a self-organising team. As shown for the second cycle of Team E3 (section 7.3.7), the shared leadership vision attribute dropped from sample one to sample two. For the second sample of Team E3, the IIB attribute related to charisma and vision dropped. There seems to be a connection between these two attributes of transformational and shared leadership. Both attributes deal with a vision of a team, and how this vision is translated in the team. A vision can come to life only when it is shared (Westley and Mintzberg, 1989).

The evaluation of the teams via SNA indicated that when a team shows shared leadership behaviour, there could still be people in the team who are not perceived as a leader; worse still, some team members are isolated in the team and are not recognised at all. Additionally, even though the SNA showed that the shared leadership competencies are on the shared leadership level, it is important to see this in conjunction with the density and decentralisation as well as the links per member. It could be the case that a certain shared leadership attribute is on the shared leadership level but has only a low decentralisation, which means that only a few links per member are decentralised. Therefore, the overall team behaviour would still be on a low shared leadership level after taking the social network view into consideration. Using the social network parameters of density, decentralisation, and links/member, a comprehensive view of the team dynamics can be given. Figure 39 presents a hypothetical example of the usefulness of SNA to depict team behaviour.

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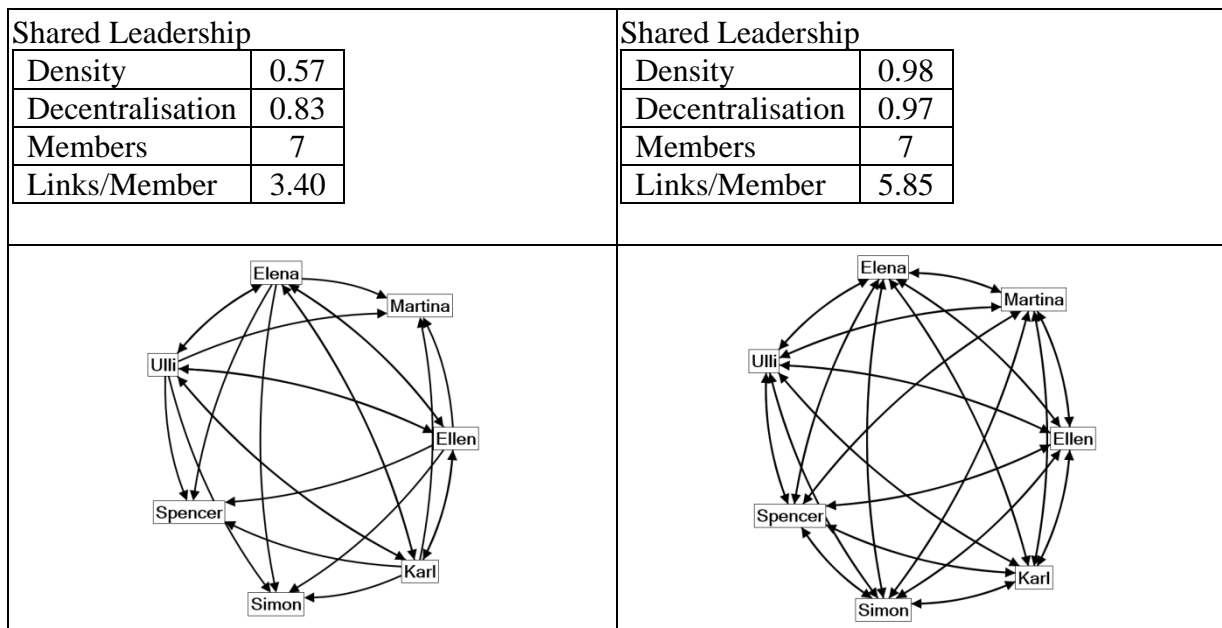| Shared Leadership			Shared Leadership	
Density	0.57		Density	0.98
Decentralisation	0.83		Decentralisation	0.97
Members	7		Members	7
Links/Member	3.40		Links/Member	5.85

Figure 39: Hypothetical social network analysis

The comparison of the two hypothetical social networks indicates that both networks are in the shared leadership quadrant, and that the team shows shared leadership behaviour. Even though both networks have decentralisation over 0.8, one network has only 3.4 links/member, and the other has 5.85 links/member. There are seven team members in the team. In conclusion, this means that the team with more links per member exhibits a stronger shared leadership behaviour compared to the team with fewer links/member. Conclusions have to be drawn carefully because even if the data depicts that the team behaviour is at the shared leadership level, there can be differences in the strength and extent of shared leadership.

Another example of the evaluation of shared leadership is to identify weaknesses and isolates in the network as well as people who might not be recognised by others as a leader. A good example of such an observation is based on the example of Teams E4 and E2 (Figure 40).

The social network diagram shows whether there were isolated team members in the team. In the example in Figure 40, there is one person (Sam) who is completely isolated in Team E4; there is no connection at all to and from Sam in the network. Interestingly, this person was isolated for all the shared leadership attributes. The decision making attributes of Team E2 indicate that there were some members who take decisions, while at least three team members were completely isolated when it came to decision making. It seems that Helga, Silke, and Norbert did not take part in the decision-making process at all.
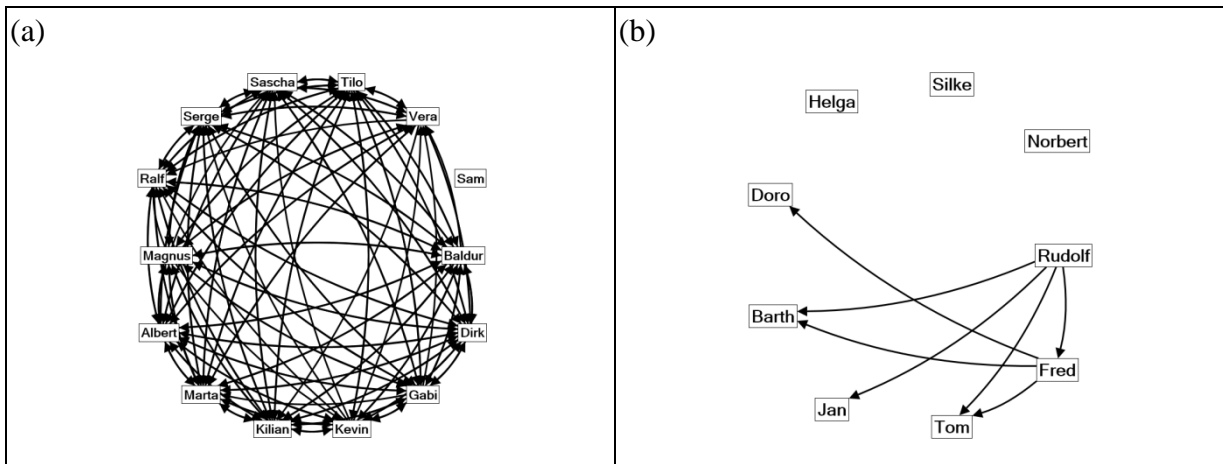
Figure 40: Exemplary Social Network Analysis of Teams: (a) Team E4; (b) Team E2

Another interesting observation regarding the use of social network evaluation is that the network diagram makes it rather easy to observe whether there are only a few strong characters in the team, and if these are the only ones who share the leadership, as depicted for the management team (Team E5) in Figure 41 for decision making. In this example, Erik and Leif are such individuals.
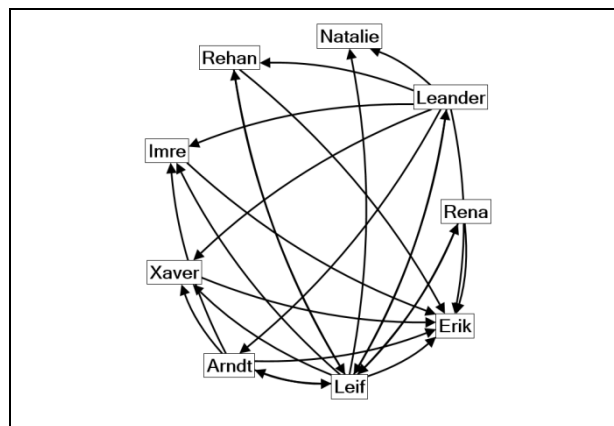

Figure 41: Social Network Analysis of Team E5 for Decision Making Attribute

8   Discussion / Contribution to Knowledge

This chapter discusses and reflects on the research study as a whole including the results (section 7.3), the development of the research instrument (chapter 5), and a discussion of the chosen methodology (chapter 4). Additionally, the contribution to knowledge is described in this section with a reflection on the learnings of the doctoral practitioner in the form of intermittent reflective pauses (sections 5.7, 6.5, 7.4, 7.6, and 7.7).

Thesis structure

For the thesis structure as described in section 4.2.3, the approach described by Zuber-Skerritt and Perry (2002) was chosen, which implies a division of the thesis into a core action research project and a thesis writing and reflection process. By doing so, the whole research project became interwoven and followed the natural flow of how things happened during the research project. In the first draft of the thesis, the chapters were separated, and the different chapters were not interwoven. It became immediately evident that such a complex thesis would not be easy to follow for a reader. It would require the reader to jump from one section to another in order to understand how the research study was undertaken. Therefore, after discussion with the supervisor, the decision was taken to structure the thesis in the order that things happened. For better clarity, an overview picture was included in the methodology section (chapter 4) to enable the reader to understand and follow the flow of how things happened. Various action research papers are available, with as many different potential structures for the final action research thesis. As of now, there is no common structure that can be followed in an action research project. It is the nature of action research that one navigates while flying. Further, one needs to draw the right conclusions via action and reflection and to write these down in a structured manner.

Kolb´s reflection

Action research involves action and reflection; however, there are several reflection methods, and there is no unique method. Therefore, a doctoral student has to use one method and define how reflection would take place in his/her action research project. Since one of the primary goals of the research project was to immediately apply the newly generated knowledge related to the revised research instrument in one of the teams, the Kolb (1984) Kolb and Kolb (2009) method of reflection and direct conceptualisation appeared to be the best method (see section 4.2.4). While considering this approach, the researcher realised that it was impressive how reflection could be conceptualised via such a method because it really helps one to think

outside the box and not to remain in one's personal thinking cycles. The use of the structured Kolb's reflection method definitely helped the practitioner to think outside the box.

Core action research projects measures - TMLQ

One of the two research measures used was the TMLQ (Bass, 1985; Bass, 1990) (see section 4.3.1). The TMLQ has been widely researched from different angles, and a content analysis of all the articles published in *Leadership Quarterly* from 1990–2000 showed that 34% of the articles were about transformational leadership (Lowe and Gardner, 2000). The TMLQ with its factors can be seen as the de facto model for transformational and transaction leadership in a team context. The TMLQ research instrument consists of 53 questions, and the transformational leadership model consists of the four I factors (*idealised influence, inspirational motivation, intellectual stimulation,* and *individualised consideration*). The transactional model consists of three factors (*contingent reward, management by exception passive,* and *management by exception active*). Tracey and Hinkin (1998) showed that there is an apparent overlap between the different I factors and the different factors are not clearly separated. Moreover, Bryman (1992) identified that transformational leadership is often used synonymously with charismatic leadership, even if charisma is only one factor in the Bass (1985) transformational leadership model. With the application of the TMLQ in this research study, similar issues were encountered. Sometimes, it was rather difficult to evaluate the data gathered by the TMLQ because of the close and maybe overlapping I factors of the TMLQ model. This was especially the case in a self-organising team that is cross-functional, with each team member taking over leadership tasks for the area in which that person has expertise. The person has to motivate and show a caring attitude in order to guide and to motivate others in his/her particular area of expertise (Cockburn and Highsmith, 2001). Therefore, it might be that clear delimitation is not possible, especially for the inspirational motivation (INSP) and the individual consideration (IC) attributes of the transformational model, since there is a significant overlap between motivation and a caring attitude (see section 3.5.1).

Core action research projects measure - SNA

As described in section 4.3.2, regarding the SNA of the shared leadership instrument, each team member had to rate the other team members on a Likert scale of 0–4. Subsequently, the values were dichotomised, i.e. values less than 2 were considered as 0, and values greater than or equal to 2 were treated as 1. This was done in accordance with the extant literature

(Sparrowe et al., 2001; Pastor and Mayo, 2002). A value of 0 means that person A is not considered to be a leader by person B. In contrast, a value of 1 assigned by person A to person B indicates that person A perceives Person B to be a leader. The threshold value was set as 2, i.e. the median of the Likert scale, as suggested in prior studies. All the teams studied in this research showed low shared leadership or leadership avoidance for the shared leadership decision-making attribute. One way to improve the shared leadership decision-making attribute would be to modify the evaluation methodology of the SNA and change the threshold values for the dichotomised matrices. Setting the threshold value to a value below 2 would mean moving away from the median and favouring values equal to or greater than 1 on a Likert scale of 0–4, for example. Thus, if this value were set to 1, it would result in an average value of 1 for perceived leadership in the decision-making attribute. This would definitely lead to much higher values for the decision-making attribute (because the decision-making attributes for all teams showed low or shared leadership avoidance); however, it would result in 100% shared leadership for vision, coordination, communication, and teamwork. One reason why changing the threshold could be necessary is that the scale dynamics could be insufficient to resolve the observed leadership attribute with sufficient granularity. However, setting the threshold value below 2 is not an option because to be perceived as a leader in the team, at least half of the team members need to perceive a particular member as a leader for a certain competence, such that shared leadership happens (Pastor and Mayo, 2002; Pearce and Conger, 2003).

Research instrument development

During the development of the research instrument (see chapter 5), the literature review helped to identify five shared leadership attributes (decision making, vision, coordination, communication, and teamwork). After the literature review, to turn the focus to the group of interest, these five attributes were verified by leaders in agile self-organising teams. They were asked to confirm or exclude some of the shared leadership attributes that were identified during the literature review. The interview partners were experts in the field of agile software development, with many years of work experience in self-organising agile teams.

As described in section 5.6, five shared leadership factors were chosen even though the CFA had recommended choosing only three factors. To verify whether the results would have been different if only three factors (instead of five factors) had been used, CFA was undertaken once again. The CFA factor was reduced to three factors, and the coefficient was set so that

all values lower than 0.63 were suppressed (as it was the case when five factors were included). The following factors were suggested after this CFA (Table 39).

Table 39: CFA Results with three factors (decision making, vision, and teamwork)

Summary of CFA with varimax rotation of items (n = 144)	Load
Scale Item: Decision Making	
x2: make important decisions without consulting other team members	0.961
Scale Item: Team Vision	
x3: present a well defined and clear team vision for their work area	0.788
x4: establish a team vision according to the team needs	0.760
x5: communicate directly with other team-members	0.878
Scale Item: Teamwork	
x9: distribute work among team-members	0.792
x10: take into account alternative suggestion from others during team discussion	0.691
x11: regularly comment on other team-members` work	0.625

Table 39 shows that the coordination and communication factors no longer exist because the CFA was limited to three factors. This might explain why all the teams had rather high and similar values for coordination and communication. However, there were some differences in the coordination and the communication part; therefore, it can be argued that these shared leadership factors are of value. As shown in Table 39 for the CFA with only three shared leadership factors, the same scale items (x2, x9, x10, and x11) were selected for the decision-making and teamwork shared leadership attributes as those that were selected when the five factors were included. Therefore, it can be argued that the decision-making and teamwork items are valid factors containing useful information. As shown in Table 39, in comparison to the CFA with five selected factors (see Table 21), for team vision, the change is that one question was added (x3, x4, and x5 were added).

The shared leadership instrument developed in this research constitutes a potentially useful tool to assess a team and to take corrective actions immediately, since it involves a combination of a team-level view and an individual-level perspective of shared leadership strengths.

Pilot study

The teams investigated during the pilot study (see chapter 6) included only German team members. As described in detail in the discussion section for the core action research projects, the leadership behaviour in Germanic Europe (House et al., 2001) is more 'autonomous'; this might be why the shared decision-making capability of the evaluated pilot study team is so low (House, 2004). As discussed in the limitations section (chapter 9), the pilot study was conducted in a Master's course in a university setting; therefore, the team members' age ranged between 20 and 25 years. Their presumably low work and teamwork experience might be another reason why the shared decision-making attribute showed low shared leadership, because the team members did not have much teamwork experience or much team experience in making decisions. This supports the findings of Vecchio and Boatwright (2002), who hypothesised an inverse relationship between job experience and degree of education with respect to directive leadership (Pearce and Sims, 2002; Northouse, 2011)

Further, as described in the pilot study in chapter 6, except Team 1 (which was a gender mixed team), Team 2 and Team 3 comprised only female team members. Prior research on gender differences with regard to transformational leadership revealed that there are small but robust differences in the leadership styles of male and female leaders. The female leadership style tends to be more transformational (Pounder and Coleman, 2002; Eagly et al., 2003). This was confirmed when comparing the data for the different pilot study teams. Team 2 and Team 3 have significantly higher transformational leadership attributes compared to Team 1. The reason for this might be that Team 2 and Team 3 consisted of female team members only.

Core action research projects

The core action research projects described in chapter 7 were undertaken in a German subsidiary of a Swedish telecommunication company. The investigated teams were intercultural teams. As pointed out by West (2012), culture has an influence on the leadership process. One of the most referenced areas of research is the classification of culture proposed by Hofstede (2001). Hofstede researched the dimensions of culture and identified five major dimensions of cultural differences. These cultural dimensions are power distance, uncertainty avoidance, individualism-collectivism, masculinity-femininity, and long-term short-term orientation (Hofstede, 2001).

With regard to culture and leadership, the work by House et al. (2001) seems to offer the best resource, which is called the Global Leadership and Organizational Behavior Effectiveness

Research (GLOBE) study (House et al., 2001). As part of the GLOBE study and its further development by House (2004) six cultural leadership dimensions were identified. These cultural leadership dimensions are: charismatic/value-based, team-oriented, participative, human-oriented, autonomous, and self-protective. The majority of the team members evaluated for the core action research projects were from Germanic Europe, followed by the Latin Europe cluster. Moreover, given that the study took place in a Swedish telecommunication company based in Germany, the influence of the Nordic Europe culture should not be neglected. Table 40 describes the four different leadership behaviours mainly used in these three cultures (Germanic Europe, Latin Europe, and Nordic Europe).

Table 40: GLOBE leadership dimensions (adapted from Northouse (2011))

Leadership behaviour	Description
Autonomous	Independent/individualistic Autonomous and unique leadership
Charismatic/Value based	Ability to inspire and motivate, high expectations from others Visionary, inspirational, decisive and performance oriented
Participative Leadership	Involve other in making and implementation of decisions
Team Oriented	Emphasizes team building and a common purpose among team members

According to the GLOBE scheme, a person from Germanic Europe exhibits strong autonomous and charismatic leadership behaviour and a low level of participative behaviour. Latin European people show strong charismatic and team-oriented behaviour and a low level of participative behaviour, which is common to people from Germanic Europe and Latin Europe. Both cultures seem to show less participative behaviour, and it seems that both cultures have a low tendency to involve others in making and implementing decision. This cultural behaviour could explain why, for all of the evaluated teams of the core action research projects (see chapter 7), shared decision making is a weak aspect of shared leadership or even moves into decision-making avoidance in the shared leadership dimension, as was the case with the management team. Another reason for the low decision-making attribute might be the high level of autonomy in a self-organising team. This was indicated by Moe et al. (2008b), who observed that high individual autonomy seems to be a hindrance in the self-organisation and decision-making processes. Nevertheless, as described in chapter 7,

the self-organising teams moved from a command and control team structure towards self-organisation only three years prior to the study. This change required the team members to cope with not only the new team structures but also the cultural dimensions associated with working autonomously. The change towards self-organisation and its associated cultural implications might be a good reason for the low decision-making shared leadership attributes. With the change towards self-organisation, the team members have to learn to work autonomously and to make decisions on their own, which is the nature of a self-organising team (section 3.1.3). This, paired with the reluctance of the German Europe and Latin Europe decision-making culture to share leadership (House et al., 2001), might be a reason for the low shared decision-making attributes of the evaluated teams.

The action-oriented research project for the evaluation of the shared leadership competencies moved in a direction that had not been anticipated because the evaluation of the shared leadership results and the sub-optimal results for the decision making of the leadership team led to significant changes in the organisation. The feedback given by the practitioner to the management team—that the management team exhibits shared leadership avoidance for the decision-making attribute—made visible what was implicitly known in the organisation: there is scope for improvement in the decision making of the teams (including the management team). The comments received, such as 'Any good decision takes at least fourteen days' showed that the management team was aware of its reluctance to take decisions, and as a consequence, it (not deliberately, but de facto) moved the decision (or a part of it) towards the different teams. This abrogation of decision making by the management team is accepted by the various teams because (as described in section 3.2.6) a Scrum team has to fulfil certain work tasks in a defined time-box (usually four weeks). Thus, when no decision was made by the management team, this study indicated that the different teams showed better decision-making capability than the management team. This finding is contrary to what was reported in Bergmann and De Meuse (1996), who stated that the teams would be reluctant to take over leadership in self-organising teams. In fact, in the current study, the teams showed low shared leadership in terms of decision making, but the management team showed leadership avoidance. One possible reason why the teams fared better on the leadership attribute compared to the management team is that the teams committed to a certain goal at the beginning of the cycle, which is the nature of a self-organising team. Moreover, it is the nature of Scrum that most requirements become clear during the actual software development execution. With the changing requirements, it could be the case that it is no longer possible to reach the team goal; therefore, the goal would need to be adjusted once the requirements

become clear. Therefore, the team and each individual in the team who takes on leadership for a certain work task need to take decisions to fulfil the goal; e.g. which tasks to execute and which task to postpone to the next iteration (see section 3.2.6). This means that selected individuals in the team take on the leadership role and make immediate decisions because of the short life span of a Scrum time-box (in general, a time-box is for four weeks). In the organisation under study, the management team seemed to slow down decisions, since every good decision took at least 14 days, which in turn put the decision-making pressure on the agile software development teams because the development team needs a quick decision on how to proceed when requirements change.

The phenomenon where teams take over leadership responsibility is supported by Karhatsu et al. (2010), who stated that a team needs to have the real possibility to influence relevant matters in order to be effective and self-organising. The software development team members showed low shared leadership capabilities for the decision-making attribute, which is better than decision making avoidance, which was the case with the management team. Nevertheless, in the organisation under study, the analysis indicated a need for the management team to move away from decision-making avoidance towards at least low decision making in the shared leadership dimension in order to relieve the decision-making pressure on the development teams.

Moreover, SNA shows promise as a suitable tool for identifying leaders in a self-organising team, i.e. members who take over leadership. Interestingly, one team member in one of the teams mentioned that she could not judge all the other people in the team because she had not been part of the team for very long. Even though this person had belonged to the team only for a short while, she was very highly rated by the other team members (section 7.3.8). During the life span of the thesis work, because of some re-structuring of the teams, this person received more tasks and took over responsible tasks. This is an indicator that potential leaders might be identified early via the social network approach, based on the perceptions of others in the leadership network. The early identification of possible leaders will help to develop these potential leaders and to prepare these identified leaders effectively for new roles and challenges in the long term. The risk that potential leaders, in case their leadership potential is not identified, might move to another company can be minimized. Another result of the early identification might be an increase in the morals of the identified leader; this, coupled with a low risk of turnover, might enhance the sustainable success of the team. With the development of a shared leadership scale in conjunction with SNA, the core action research

projects showed that the shared leadership capabilities of a self-organising team can be identified. For instance, the key players in a team can be distinguished by the fact that many members perceive these people as leaders for certain shared leadership competencies. Further, isolates can be identified, and following specialised training, these people can be better integrated with the team. Using the shared leadership competency areas, the weak core properties of a team can be identified and worked on so that the team's competencies (e.g. decision or vision competencies) can be improved.

A review of the prior literature indicates that there is hardly any measure available today to analyse a self-organising team in a more detailed and interactive manner. Thus, this study is one of the first to measure the shared leadership effectiveness of self-organising teams. Since faster release cycles are becoming increasingly important, more self-organising teams will be established in the future, even in domains other than software development. This means that people with a long work history and competence in command and control teams will need to be integrated into self-organising teams. Having a tool and a method to easily evaluate teams that might be mixed teams (comprising team members with a long shared leadership experience and team members with less experience) would help to improve the effectiveness of these teams.

This study investigated shared leadership and the competencies required in a self-organising team for shared leadership to happen. This was an innovative study in that it applied the TMLQ (Bass, 1990; Bass, 2002) in conjunction with a self-developed and validated research instrument and undertook an evaluation via SNA.

Prior research indicated that shared leadership happens in self-organising teams (Manz, 1986; Manz and Sims, 1986; Cockburn and Highsmith, 2001; Craig et al., 2009; Karhatsu et al., 2010). However, only a few studies examined how shared leadership is measured, and how the influence process for a specific competence takes place in a self-organising team (Carson et al., 2007a; Small, 2010; Karhatsu et al., 2010). With a social network approach, the individual perception and the influence of a single person (team member) as seen by another team member can be made visible, and the strengths and weaknesses of the team can be identified.

Using SNA, how the team members are perceived by the other members of the team (Borgatti, 2005; Balkundi and Kilduff, 2006; Small, 2010) can be made obvious via a social network diagram, using which isolated team members can be identified, for example. Further,

it can be used to identify whether there are a few strong characters in the team who take the decisions. Even better, in conjunction with the social network parameters of density, decentralisation, and links/member, a good evaluation of the team's capability on shared leadership can be given. The advantage of this social network approach to shared leadership and competency is that weak areas can be easily identified, and a goal-oriented training programme can be established to improve the weak spots. Although there is a dearth of commonly accepted models of shared leadership and studies in the field (Pearce and Sims, 2002; Hoegl and Parboteeah, 2006; Moe et al., 2009b; Hoch, 2013), the present study suggests that for an effectively performing team, it is desirable to show high values in all aspects of shared leadership.

For the Swedish telecommunication company, which had moved from a command and control structure towards agile self-organising teams, this research study added value, since they could obtain a status report on how well they were doing in terms of shared leadership. The evaluated teams received information about which shared leadership areas they were good in and on areas that required improvement. This changed the way of working: the team members were asked to report in more detail about their respective work area in order to support the decision making process. Another change resulting from this study was the pairing of more experienced and inexperienced team members in order to foster communication and teamwork further. An additional change was the awareness of the management team that they were not good (slow) at decision making and that they were passing on the decision to the teams. At that point in time, the researcher could only speculate whether the management team had changed with regards to decision making. A second sample of the management team was not taken, because they didn't have the time to define specific actions based on the findings and results even though they acknowledged that they should do so. Finally, with the evaluation method, the company was introduced to a tool that could be used for evaluating agile software development teams.

Contribution to knowledge

This study's contribution to knowledge is that a stringent research instrument was developed, validated, and scientifically applied in the core action research projects. Thus, the shared leadership behaviour and shared leadership competencies of self-organising teams can be made visible. This is a research area to which little attention has been paid so far. Moreover, this study contributes to the literature on shared leadership characteristics and to the understanding of how shared leadership can happen in emergent self-organising teams in the

software engineering area. While Pastor and Mayo (2002) proposed a methodology to measure shared leadership, this study applied a self-developed research instrument in an industrial sector where shared leadership can happen. The practitioner applied and adapted the method suggested by Pearce and Sims (2002) and Pastor and Mayo (2002). This adapted method was applied to an industrial setting. While Carson et al. (2007a) applied a social network approach for the first time in a university setting, this doctoral research study applied the social network approach and evaluated shared leadership via SNA in an international telecommunication company.

The developed model was combined with the well-known and accepted TMLQ model developed by Bass (1985) Bass (1990); Bass and Bass (2013). Using the new stringently developed research survey to measure shared leadership at the team level, a new method was developed, validated, and tested for reliability. This will add to the body of knowledge for further investigations on shared leadership. Using SNA, this study made visible the relational dimensions of shared leadership. The practical implication is that the stringent survey with its evaluation method of SNA is a useful tool for self-organising teams to identify strong and isolated members in the team. Further, employing SNA in a shared leadership context (separated into core team capabilities of decision making, vision, communication, coordination, and teamwork) enables the teams to receive feedback about the areas in which a team is performing well, and the areas in which the team needs improvement.

9 Limitations

While this study provided insights for further research in the area of shared leadership, it should be noted that there were some limitations to this study.

Social Network Analysis (SNA)

The beauty of social network analysis (SNA) (section 4.3.2) is that each team member rates the other team members; this approach highlights how the team members are perceived by their peers. The data evaluation that was part of the social network approach revealed the decision-making structure (e.g. who is perceived as a decision maker in the team) via the social network diagram with its corresponding parameters, i.e. the network density. Thus, it was clear to the survey respondents that the question refers to the individual decision-making competence, since the visualisation via a social network diagram makes the decision-making capability of the team transparent. This could lead to embarrassment for the survey participants, since with an average team size of eight members, the pseudonymised data would probably still allow the individual to be identified, which may hinder future participation in analyses that employ the methodology developed in this study.

The low decision-making competence or avoidance of decision making in self-organising teams is supported in the extant literature (Bergmann and De Meuse, 1996; Bergman et al., 2012). In this study, both the management and the software development teams were self-organising teams. However, despite the research support for the findings of this study, there is the risk that the decision-making survey questions were misinterpreted or differently interpreted vis-à-vis the original meaning that the questions were intended to convey. Nevertheless, the results of low shared leadership competencies are supported by the feedback from the teams and the extant literature. For instance, Carmen et al. (2007) and Bergmann and De Meuse (1996) observed low or reluctant decision-making competence in self-organising teams. Thus, the risk of misinterpretation can be safely considered to be low.

Measurement approach

The advantages and disadvantages of the measurement approach used for shared leadership (section 4.3) needs to be highlighted. The logic of using a questionnaire-based research design is that all the participants face the same questions. In this case, any differences among the people are indicated by the real differences in their responses. During the development of the survey questions, ambiguity was avoided. However, for the scale item 'decision making', one

question was used to determine the decision-making capability; which was *'make important decisions without consulting other team members'*.

The intention of this scale item was to determine whether the team members were able to make decisions on their own for their respective work area, without consulting others. It was not intended to mean that decisions were not made collaboratively. The study was undertaken in an agile context of self-organising teams. The typical assumption in an agile team is that all the team members jointly share the decision-making authority; thus, a centralised decision structure (where one person makes all the decisions) is not appropriate (Hoegl and Parboteeah, 2006; Moe et al., 2009a). Although the question related to decision making avoids ambiguity, in the context of agile and self-organising teams, the question might be confusing for research participants. A research participant could believe that it is not good to make decision on his/her own because one key value of agility is shared decision making. This might be why all the evaluated teams showed either low shared leadership or leadership avoidance for the decision-making attribute. This particular question was intended to focus on the decision-making capability of the individual person, not on shared decision making in the team.

Research instrument development

The results of the confirmatory factor analysis (CFA) for the research instrument developed in this study suggested the use of three factors instead of the proposed five-factor model. Choosing the number of factors is a crucial part of factor analysis. If too few factors are chosen, the risk is high that important information is lost because relevant factors are neglected. Choosing too many factors might lead to a focus on minor factors at the cost of major factors (Zwick and Velicer, 1986).

In conclusion, there is a risk in selecting too few or too many factors, and the decision will have a significant influence on the reduction and interpretation of the data set (Norris and Lecavalier, 2010). As shown in the discussion section (chapter 8), the CFA was repeated with three factors to verify the loading. The results showed exactly the same loadings for decision making as the earlier results, which suggests the use of the same items that were suggested for the five-factor model. The results suggested a combination of coordination and communication; for vision, the results suggested the addition of one item. The results of the factor analysis indicated that the values for communication and coordination were rather high, which might indicate that the questions touched upon the same area. Nevertheless, justifying

the separation and selection of these two factors (communication and coordination) is important because in a self-organising team, the team members usually sit in one room in order to facilitate good communication (Highsmith and Cockburn, 2001; Schwaber, 2008).

Additionally, coordination is an important factor in a self-organising team because coordination moves to the team members, away from the team leader (Jyi-Shane and Sycara, 1997; Moe et al., 2010; Moe et al., 2012). There is a close connection between coordination and communication because there can be no coordination without communication. Because of the structure of a self-organising team, communication is a vital part of the team as a result of the change-driven approach and the resulting re-planning. Each team member who is responsible for a certain area in the team needs to be able to coordinate and communicate changes made to the developed system because it might affect the work of other team members; subsequently, this might trigger re-planning (Schwaber, 2008; Friis et al., 2011).

In self-organising teams, the effectiveness of the team strongly depends on the coordination capabilities of the team members, paired with their communication capabilities. Team members should have a 'can do' attitude via coordination, together with effective communication skills (Spreitzer et al., 1999). Therefore, it would make no sense to combine coordination and communication. The added value of the study with its contribution to knowledge would be greater if communication and coordination are maintained separate because a team member with good communication skills might be bad at coordination. Since coordination is only one vital part of the mind set in agile teams, the added value of this study is greater when these two factors are kept separate.

Pilot study

The pilot study (chapter 6) was conducted on a sample of three self-organising teams, with nine participants in all. Each team consisted of three team members. The subsequent core action research project was undertaken on a sample of five self-organising software development teams with a total of 36 individuals, which might be considered a relatively small sample size because the evaluation was undertaken at the team level. However, this sample size is similar or smaller compared to a number of other team samples found during the literature review. For instance, Sparrowe et al. (2001) used a sample of 38 teams comprising 190 participants. Moe et al. (2012) and Baranski et al. (2007) used 16 teams with 64 team members. Since the sample size used in this study is smaller than those in prior studies, the generalisability of the results may be limited. Although the sample is smaller than

others found in the extant literature, the samples included field data rather than the often-used student samples that are used in university research. Since it is theoretically grounded and anchored on a well-established leadership model, i.e. the Bass leadership model (Bass, 1990; Bass and Bass, 2013), the research should be judged in terms of its innovation and contributions to practical knowledge.

As described by Gehlbach and Brinkworth (2011), a pilot study should be conducted for a newly developed research scale. The main purpose of a pilot study is to learn how a potential respondent would understand and respond to a certain item in order to understand the distribution of answers. This is achieved by applying the research instrument to a smaller population similar to the final study group (Gehlbach and Brinkworth, 2011). The chosen pilot study group in this research study was a group of university students in a Master's programme. The teams were newly assembled, and the students heard about self-organising teams for the first time during the course of the programme.

Since the teams were newly assembled, they were expected to run through the storming, norming, and performing phases (Tuckman, 1965; Paris, 2002). Whether the pilot study results are applicable to the final research study is questionable. The main purpose of the pilot study as described by Gehlbach and Brinkworth (2011) was to pilot the survey questions together with the TMLQ to ensure practicability and to practice the SNA evaluation method. Because of the small group size and the willingness of the university students to take part in the research study, undertaking this pilot study was possible. The fact that the research questions went through a thorough process of validation via a web survey as well as face validity and reliability tests as described by Gehlbach and Brinkworth (2011) argues strongly in favour of the survey questions addressing the right issue.

Because of the willingness of the student population to engage in the development of the research instrument, it was possible to gather a larger sample of data the first time, which could then be evaluated with the chosen methodology, such as evaluation via SNA. It was an advantage that the student teams were self-organised. Therefore, even though they were not working in the software industry, the student teams were reasonable subjects of study because the main purpose was to validate the evaluation method. This approach is common in research in order to ensure that one does not run into problems with regard to evaluation issues during the actual core action research projects, as described by Rattray and Jones (2007).

Core action research projects

The research projects were conducted in the field at a Swedish telecommunication company, during full operation of the company. Therefore, some limitations were imposed by the HR department and the works council; their main intention was to ensure the teams were interrupted as little as possible. Consequently, the researcher was not allowed to undertake additional interviews with individual team members in order to keep disruptions of operations at a minimum. Such interviews could have provided an extra insight into the team dynamics. Instead collaboration with the team members took place only during at the predefined measurement dates during the presentation and information session at the beginning of the research project and during the presentation of the TMLQ and SNA results. During these sessions, researcher had the chance to gather feedback and to obtain the teams' view about the results. Moreover, during the result presentation session, the researcher could interact with individual team members. Each presentation session with the researcher and the research participants lasted one day, for which the researcher was present on the Swedish telecommunication company's premises. This gave the researcher the chance to gather "informal" views and information from the research participants. Because of the limitations imposed on the researcher, an action-oriented approach was chosen instead of a pure action research approach, which - in the tradition of a positivist research study - measured the shared leadership out there via TMLQ and SNA on predefined measurement points. In the thesis writing project however, action research took place during the personal reflective cycles.

10 Scope for further study

This study has highlighted issues in the area of shared leadership in self-organising teams and opened up questions and scope for further research.

As described in chapter 7, the core action research projects involved teams focusing on software development in a Swedish telecommunication company. To generalise the results of this study, it would be useful to apply the research instruments to self-organising teams in other research sectors or to the same industry sector, but to a larger population. Self-organising teams are found today in the website development and maintenance industry as well in the area of developing social media tools. Future research could apply the developed method in one of these sectors. Moreover, self-organising teams originated in the automotive industry (Ohno, 1988), and the concept was developed during the 1970s in the context of car production. Therefore, it would be interesting to apply the evaluation method developed in this study to self-organising teams in the automotive sector to examine whether the teams in the automotive industry behave differently compared to the teams evaluated in this research, which were from the telecommunication industry.

Another area of interest seems to be the cultural differences and the influence of culture on self-organising teams with regard to decision-making capabilities. Further studies could focus on mono cultural teams in order to evaluate the developed shared leadership tool and to verify the shared leadership decision making attribute; e.g. in a country that seems to have a high decision-making capability according to the GLOBE study. This could be a team in an Anglo country, for example, which is highly participative. Another interesting intercultural study would be to evaluate intercultural teams from different countries and to use the methodology developed in this study to ascertain whether there is an ideal mix of members from different countries to reach the best possible shared leadership capabilities in a team.

As the pilot study showed, in self-organising teams, all-female teams seem to have higher transformational leadership values compared to mixed-gender teams. Future research could investigate either only all-female self-organising teams or male and mixed-gender self-organising teams in order to enhance the knowledge of the relationship between transformational leadership in self-organising teams and gender.

11 Final narrative reflection

Using the narrative approach for the final reflective pause section has the advantage of bringing in even more my own practice and reflections not only as the researcher of this study but also as a theme of examination in this research study. The advantage of a well-told final narrative reflective pause section, in addition to the reflective pause sections (section 5.7, 6.5, 7.4, 7.6, 7.7), is that it leaves room for interpretation about my learning as a doctoral practitioner (Ramsey, 2014), in addition to all the TMLQ and SNA values presented in chapter 7. The story I have to tell about my journey as doctoral practitioner and management learner provides additional background information to the reader of this thesis. It also provides space for dialogical and reflective conversation between the researcher of this study and the reader (Ramsey, 2014). This final narrative reflective pause should give the reader the opportunity to draw his/her own conclusions or to situate certain findings in a larger or potentially different context. It also illustrates why some approaches were chosen, shedding light on the boundaries and limitations the researcher had to commit to, and faced, in order to undertake this research study.

Setting the scene and defining the scope

My doctoral thesis research journey started with the writing of my doctoral development plan. In this document I planned what I wanted to accomplish during my thesis research project, in accordance with the researcher development framework (Vitae, 2012). It was already clear for me that I wanted to investigate the leadership competencies of team members in agile teams. I was interested in this subject because the research I had undertaken during the DBA residencies revealed that agile leaders seem to have and need different competencies compared to the leaders working in classical command and control teams. Additionally, as I am currently working as a management consultant and helping teams transition from command and control towards agile self-organising teams, the findings of the research study might be helpful for my professional career. Until I started my thesis, I had limited experience with qualitative methods such as interview techniques and transcribing the gathered qualitative data. Therefore, my aim was to enhance this knowledge during the thesis research project. The first thing I did (as I had learned during the different DBA modules) was to keep a research diary to note down important procedures and findings that happened during my research journey.

The thesis research project started with the supervisor matching process. I wrote my research proposal, in which I mentioned the standard models used for the investigation on shared

leadership, namely, the transactional and transformational leadership model (Bass, 1985). Because of these keywords, my supervisor (who is based in Hong Kong; I am in Germany) contacted me and said, 'We have something in common, the interest in transformational leadership'. We arranged a Skype meeting, as I was in Liverpool at that point in time for the DBA residency. During the meeting I explained my proposal in detail and stated that I wanted to investigate leadership competencies in agile software development teams via transformational leadership and the team members' interconnection in such self-organising teams (at that point, I was not aware of SNA). My supervisor told me that it seemed to him that I am not Mr. Hyde, because you never know who is behind a proposal and that the research proposal as I explained it to him was worth studying. I was happy to have found a supervisor rather early in the process of my thesis project.

At that point, I was still alone with the ideas in my head about investigating the competencies of the team members in self-organising software development teams. I started with a literature review. I recognized very quickly that there were some common patterns about how to investigate shared leadership competencies in self-organising teams. What also became visible rather quickly was that shared leadership is a rather novel field in the area of leadership, with growing research interest (the number of research papers in the last year has grown). Nevertheless, I was unsure about how to tackle the problem and how to investigate shared leadership competencies. So I arranged yet another Skype meeting with my supervisor (because of the time difference, early in the morning for me, and late afternoon for him). I prepared an overview diagram with my findings from the literature review. I wanted to discuss these findings in order to figure out how to plan out my research problem and which model to use (I used Figure 42 for explaining my findings during this meeting).
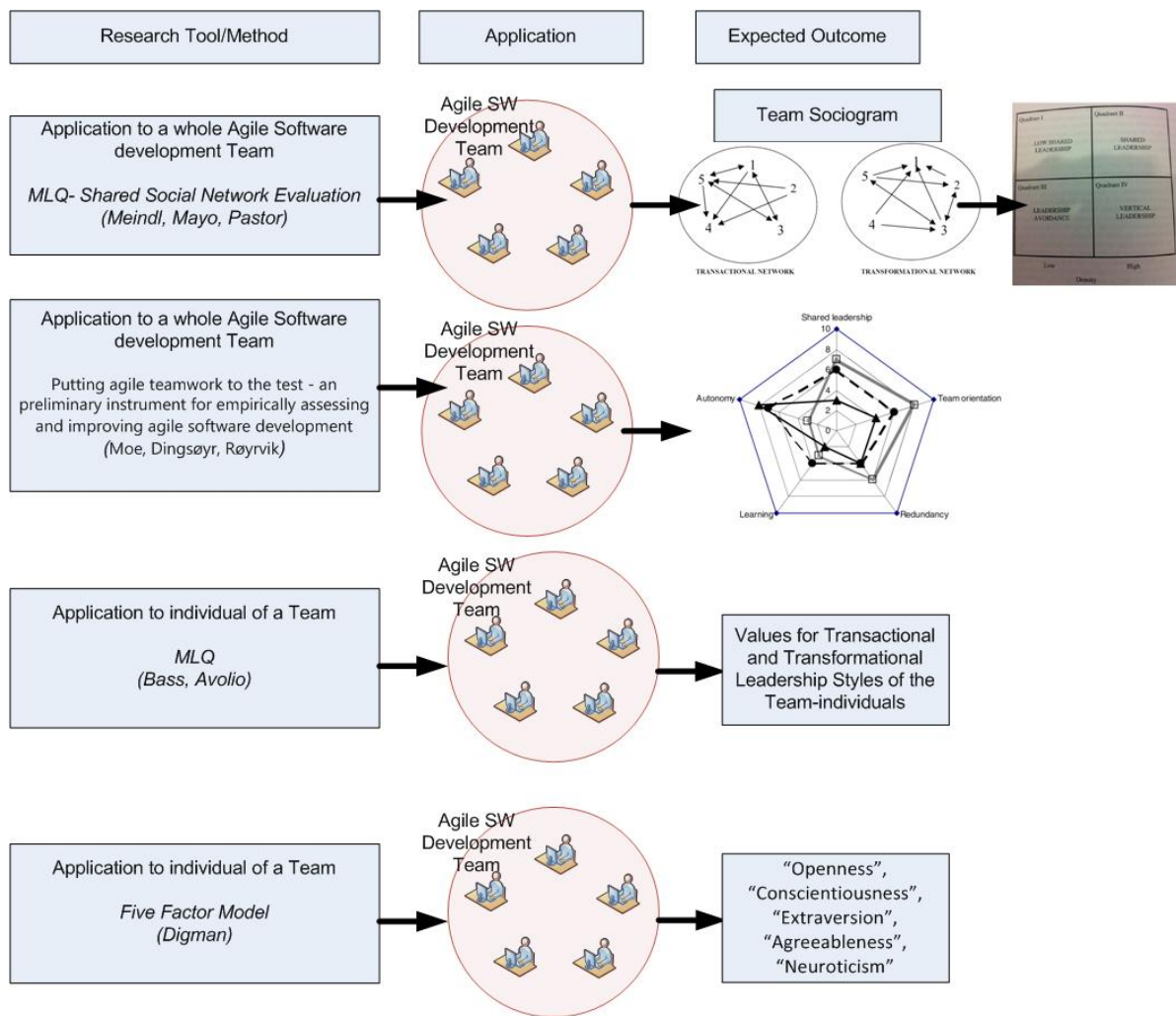
Figure 42: Proposed research on leadership models

I suggested four models and explained the models to my supervisor; at that point in time, he believed that I wanted to consider all the models (which would have been far beyond the scope of my doctoral research study). We discussed the advantages and disadvantages of each approach and, finally, we decided to use the Bass TMLQ (a well-known model) together with the team sociogram framework, because this seemed to be an innovative approach.

Moreover, my supervisor suggested that I develop my own research instrument to evaluate the agile leadership competencies via this sociogram method. It sounded rather easy to develop some questions for the sociogram method. I looked up the relevant literature in the field and examined how questions were developed by prior researchers, and I followed the same procedure (Gehlbach and Brinkworth, 2011). I then sent my questions to my supervisor, so that he could review the questions for the five identified competency areas. He wrote back as he usually did, stating that 'the questions sound reasonable'. 'You have to make sure that the scale items are validated and tested on reliability. You need at least a sample of one hundred

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participants'. He also mentioned that I should look up the extant literature to learn how to test reliability and validity, and how to undertake an EFA/CFA. In my diary, I noted the terms 'validity', 'reliability', 'Crobach's alpha', 'EFA and CFA', and 'one hundred participants' without knowing the consequences. So I started another literature review, and I also went to the local university library to find some books about SPSS and statistics (Bryman and Cramer, 2001).

My shared leadership research journey took a detour into the world of statistics, diving into tools such as SPSS for statistical calculation. For social network calculation, I became familiar with UCINET and NodeXL (Borgatti, 2002; CodePLex) This was another learning of tools and methods, which I did not know before. After reading the literature and the appropriate chapters in the SPSS books, it seemed there were some common procedures to follow, and terms that sounded cryptic earlier like 'Cronbach's alpha' and 'EFA/CFA' became meaningful. I got scared thinking about what would happen or how I would proceed if the statistics showed that my scale items were not good enough. In the first place, I had to set up a web survey, and administer this web survey to the right user groups (in my case, agile practitioners). A student I met during the DBA residency had a customized Lime web-software, similar to SurveyMonkey, which I could easily customize to set up the survey with my questions. So I distributed the survey. Eventually, 144 participants took part in the survey, enough to do conduct statistical analysis.

I gathered all the statistical values and descriptive statistics via SPSS; my research scale seemed to be sufficient. Personally, I was rather proud, as I had developed my very first validated and reliability tested research scale. In the next step, I needed to pilot the scale. At that point in time, I had the opportunity to take over a lectureship at a private university in Munich. As part of the course, the teams had to undertake a small project. My plan was to test the developed scale items on these teams. This approach went well; the teams filled out the survey, and I gathered my first university field data.

Even though the TMLQ (Mindgarden, 2015) came with a clear description about how to evaluate the data and gather the transactional or transformational values, there were only vague descriptions available about how to undertake the social network analysis and how to calculate characteristic measures such as network density. None of the studies on teamwork that I had reviewed until then explained SNA data evaluation in sufficient detail to enable me to conduct such an SNA myself. Further research investigation was needed. I investigated some more studies, and it seemed that the studies by Borgatti (2005) were the key to success

with the SNA. I learned how to use new tools like UCINET and NodeXL. Retrospectively, I would say that the pilot study paved the path for the core action research projects.

Delivery and participation in learning

During the research study, I held the position of a management consultant, so I was not part of a self-organising team. Therefore, I needed to search for alternative companies and/or teams. I contacted a former colleague, who is now a department manager at the Swedish telecommunication company, and I told him that I had developed a tool to evaluate the competencies of agile teams. He was very interested in such an evaluation because the company had changed from a command and control structure towards self-organisation three years before, and the company was keen to find out how their agile self-organisation was functioning. I briefly described my research scale items, and how I could evaluate the teams. I also elaborated that I would ensure the privacy of each participant and about the added value for the company. I later met with the HR leader, the works council representatives, and the responsible department manager in person. They were fine with the questions, and with the matter of privacy and ethics (participant consent form). However, they imposed the condition that the teams should be interrupted as little as possible. So I told them that I would do two samples in a frame of five months, with presentations in between. I was rather happy that I was allowed to undertake the study in such an interesting company. I knew through my previous work experience with this company that they are very open to new things/ideas and feedback. During my previous assignment with the company, I had worked in a different area, so I did not know the team members or the team structure.

I consulted with the department manager and decided on a date for a short presentation on what the research is about, and how the information would be secured and anonymized. The department manager asked different teams if they were willing to participate in the study. I had stipulated that no team was to be forced to take part by the management; each team should voluntarily participate. Before the introductory session, I needed the names of the team members so that I could prepare the paper survey (for the SNA, each team member needed to judge the other team members). The department manager called and told me that for the introductory session, they did not have a large enough meeting room, and asked me if it was OK to book the 'open' canteen. I had not really anticipated that I would be giving a presentation about my research to 70 possible research participants. During the introductory session, the participants used the chance to ask questions and gave enthusiastic feedback.

First inquiry and participation for learning

A first initial presentation session to the teams was performed, and four teams agreed to take part and completed the survey. I assisted in this process because some participants had questions about the meaning of certain survey questions. After the session, I had data from four teams—my first real industry data sample collected using my own research instrument. After I had collected all the completed surveys, I was overwhelmed with the amount of data collected on paper. In total, only for the core research projects, I had to evaluate 2600 questions manually. As I had already evaluated 1170 questions manually for the pilot study of the research instrument, I knew how much work was involved.

For a whole week, I spent every evening entering the data into an Excel sheet; a further week was spent evaluating the SNA. Then the long-awaited first shared leadership results were there, right in front of me, about the four teams, in the form of tables and social network diagram. Some obvious conclusions could be drawn, e.g. all the teams showed low shared leadership for decision making, and one team for vision as well. Questions arose: Is my instrument measuring correctly? How do I connect TMLQ data with SNA? Do the SNA networks really reflect the team structure? Now, I was in the data sense-making process.

Making sense out of the data and learning about the data

At that point, I was in the sense-making process, but the word-count of my thesis had not increased, so that I had the impression that I made no progress. A further literature search enabled me to justify my interpretation of the data findings, e.g. the low decision making attributes. In fact, I found some prior studies that reported similar observations of teams with low decision making attributes.

In the next step, I needed to prepare the raw data in such a way that the data would have meaning and could be presented to the teams in a non-academic manner. I achieved this with one simple example, by which I explained the values for the TMLQ and the SNA. In the second step, I presented the data for each respective team.

Result presentation and participation in discussion

One of the aspects of learning for me was when I prepared presentations with scientific data for a broader audience. The presentation should be simple enough so that the results could be understood by each team member. The presentations to the teams ended up being interactive discussions where I first asked the team members to interpret the social networks themselves.

Subsequently, I gave my interpretation, and an open discussion followed. The feedback I gathered was that the social networks for the respective competency seemed to reflect the team's behaviour very well. All the teams were surprised about the low values for decision making. Further feedback that I gathered was that the teams were just a mirror of the organizational behaviour. Reflecting a day after the extensive interactions with the members of the teams and after discussing their results gave me the confidence that the instrument measured what it was supposed to measure. I determined that as a next step, I needed to evaluate the management team.

Second inquiry and remote interaction and participation

I got in touch with a manager of the management team who was willing to coordinate all the surveys that were completed by the management team. This time all the surveys were completed electronically and were sent to me directly via e-mail, which made it easier for me to evaluate the data. However, I missed direct contact with the different management team members. Some of the team members asked for clarification about certain questions (via e-mail). Since all the data was now available in an electronic form for the first time, the data evaluation proceeded rather quickly. I could instantly give feedback to the management team. This time, the feedback was given to the management team via a videoconferencing system (my hometown is located at a distance of 650 km from the Swedish Telecommunication company). With the feedback I gave, it became clear, very quickly, that the team was well aware of its weaknesses, such as decision making avoidance and low vision capabilities.

Third inquiry and interaction in learning

The final interaction with the teams took place in person once again, when I collected the second sample for teams E3 and E4. This time, I managed to take part in the daily stand-up meeting, where I could see how each team member reported his/her work. The meeting was to a large extent driven by the scrum-master. As an "external" observer, it was difficult for me to understand what they were talking about from a technical perspective. This, I felt must resemble what a new team member must feel.

I used the opportunity to promote my survey, hoping that the teams would complete the survey a second time. However, by the end of the daily stand-up meeting, I noticed that the team members were not very supportive, because they promised to complete the survey and send it to me later. Nevertheless, for team E3, I managed to gather a second sample. I guess this was possible because the scrum master of that team pushed his team members to

complete survey. I must say that this scrum master was very keen on improving his team's performance.

The data evaluation did not take very long for team E3, and I went with a similar presentation but different results to the customer premises. The team members were surprised that the decision making capabilities had not improved. One reason might be that some members had been on long-term leave to another research site; however, they were still part of the team and had completed the survey. With the last interactive presentation given for the second sample for team E3, my direct contact and the field work ended. Over the course of the action projects (9 months in total), I met with the teams four times in person and two times via videoconference. On the last occasion, I even participated in the daily sync meeting with two teams. In total, the results were presented to the teams six times; the results were then used by the scrum master for further development of the teams.

Identifying my learning

In the previous section, I outlined my scholarship of practice, from defining the scope of my research up to inquiring about practice in the Swedish telecommunication company. It was fascinating to observe how the sense-making process proceeded, from defining the research instrument until its final application in an industry setting. The sense-making process involved a combination of participant involvement on predefined measurement dates followed by an analysis and understanding phase every time. I undertook a literature review in the university library to validate my findings. I was supported by internal discussions with agile experts in my company. I was hindered in my action because I was not allowed to undertake interviews with the team members of the different teams, because it was prohibited by the HR department and the works council.

In the final data gathering process, I had a taste of how much additional information could have been gathered by taking part in a daily sync meeting, as I did for the second sample. My sense-making approach was rather analytical. It involved me dealing with a lot of data, trying either to prove/disprove an assumption and answering questions like "Does the research instrument measure the right thing?" "Why do all the teams have low values for decision making?" "Are the developed questions sufficient to answer the question about the competencies in self-organising teams?" The answers to these questions were never 100 percent clear and left room for speculation. Seeking answers to these questions, I explored areas such as leadership and culture, leadership and gender, and leadership and team size.

As was described in the introduction of this final narrative personal pause reflection, the main purpose was to give the reader the chance to get into a discussion with the author of this thesis and to open the space for any conclusions that the reader might want to draw. This research study and my dialogue with the examiners during my viva voce brought up areas of improvement. Although this was an action research study, the approach taken was positivist, searching for "shared leadership" out there and measuring it via TMLQ and SNA. Undertaking interviews with the team members might have added another flavour to this study, besides the number crunching of the TMLQ and SNA. Additionally, I believed (and still believe) that self-organising is a good thing, and that no one is harmed in a self-organisation setting in general. I also believe that self-organisation is the future, at least in software development teams. Nevertheless, there is the risk that I could have been biased, and that I examined the self-organisation in these teams only partly. If that is the case, I apologize, and I will not make such a mistake in future studies. However, I believe that since I had used TMLQ and SNA measures, my personal bias should have been kept low, and the judgements were made on values that were compared to normative values.

Acknowledgements

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Appendix

A Ethical Approval documents

UNIVERSITY OF
LIVERPOOL

COMMITTEE ON RESEARCH ETHICS

**APPLICATION FOR APPROVAL OF A PROJECT INVOLVING
HUMAN PARTICIPANTS, HUMAN DATA, OR HUMAN MATERIAL**

This application form is to be used by researchers seeking approval from the **University Committee on Research Ethics** or from an approved **School Research Ethics Committee**.

Applications to the University Research Ethics Sub-Committees, with the specified attachments, should be **submitted electronically to ethics@liv.ac.uk**. Applications to an approved School / Departmental Committee should be submitted to their local address, available at http://www.liv.ac.uk/researchethics/deptcommittees.htm.

RESEARCH MUST NOT BEGIN UNTIL ETHICAL APPROVAL HAS BEEN OBTAINED

**This form must be completed by following the guidance notes, accessible at
www.liv.ac.uk/researchethics.**

Please complete every section, using N/A if appropriate.

Incomplete forms will be returned to the applicant.

BEFORE COMPLETING YOUR APPLICATION PLEASE CONFIRM WHAT APPROVAL YOU ARE
SEEKING (please check):
a) Expedited review of an individual research project   ☒
b) Full committee review of an individual research project   ☐
c) Expedited generic* approval   ☐
d) Committee review generic* approval   ☐
*to cover a cohort of projects using similar methodologies. Boundaries of the research must be defined clearly. Approval may be granted for up to 3 years and will be subject to annual review.

Office Use Only (for final hard copies)

Reference Number: RETH

Date final copy received:

Approval decision:

Approved – no conditions	☐
Committee	☐
Chairs Action	☐
Expedited	☐
Approved with conditions	☐
Committee	☐
Chairs Action	☐
Expedited	☐

Research Ethics Application Form
Version 4.2   1
March 2012

Declaration of the:

Principal Investigator ☐   **OR**   **Supervisor and Student Investigator** ☒
(please check as appropriate)

- The information in this form is accurate to the best of my knowledge and belief, and I take full responsibility for it.

- I have read and understand the University's Policy on Research Ethics

- I undertake to abide by the ethical principles underlying the Declaration of Helsinki and the University's good practice guidelines on the proper conduct of research, together with the codes of practice laid down by any relevant professional or learned society.

- If the research is approved, I undertake to adhere to the study plan, the terms of the full application of which the REC has given a favourable opinion, and any conditions set out by the REC in giving its favourable opinion.

- I undertake to seek an ethical opinion from the REC before implementing substantial amendments to the study plan or to the terms of the full application of which the REC has given a favourable opinion.

- I understand that I am responsible for monitoring the research at all times.

- If there are any serious adverse events, I understand that I am responsible for immediately stopping the research and alerting the Research Ethics Committee within 24 hours of the occurrence, via ethics@liv.ac.uk.

- I am aware of my responsibility to be up to date and comply with the requirements of the law and relevant guidelines relating to security and confidentiality of personal data.

- I understand that research records/data may be subject to inspection for audit purposes if required in future.

- I understand that personal data about me as a researcher in this application will be held by the University and that this will be managed according to the principles established in the Data Protection Act.

- I understand that the information contained in this application, any supporting documentation and all correspondence with the Research Ethics Committee relating to the application, will be subject to the provisions of the Freedom of Information Acts. The information may be disclosed in response to requests made under the Acts except where statutory exemptions apply.

- I understand that all conditions apply to any co-applicants and researchers involved in the study, and that it is my responsibility to ensure that they abide by them.

- **For Supervisors**: I understand my responsibilities as supervisor, and will ensure, to the best of my abilities, that the student investigator abides by the University's Policy on Research Ethics at all times.

- **For the Student Investigator**: I understand my responsibilities to work within a set of safety, ethical and other guidelines as agreed in advance with my supervisor and understand that I must comply with the University's regulations and any other applicable code of ethics at all times.

Signature of Principal Investigator ☐   **or**   **Supervisor** ☐:   ....
Date: (dd/mm/yyyy)
Print Name:

Signature of Student Investigator: ....
Date: (dd/mm/yyyy)
Print Name:

SECTION A - IDENTIFYING INFORMATION

A1)   **Title of the research** (PLEASE INCLUDE A SHORT LAY TITLE IN BRACKETS).

EVALUATION OF LEADERSHIP COMPETENCIES IN A SHARED LEADERSHIP TEAM ENVIRONMENT

A2)   **Principal Investigator** ☐   **OR**   **Supervisor** ☒ (please check as appropriate)

Title:		Staff number:	
Forename/Initials:		Surname:	
Post:		Department:	
Telephone:		E-mail:	

A3)   **Co-applicants (including student investigators)**

Title and Name	Post / Current programme (if student investigator)	Department/ School/Institution if not UoL	Phone	Email
Mark Menzel	Doctor of Business Adminstration (DBA)	University of Liverpool Managment School	+49 173 543 1921	mark.menzel@my.ohecampus.com

SECTION B - PROJECT DETAILS

B1)   **Proposed study dates and duration** (RESEARCH **MUST NOT BEGIN** UNTIL ETHICAL APPROVAL HAS BEEN OBTAINED)

Please complete as appropriate:

EITHER

a) **Starting as soon as ethical approval has been obtained** ☐   **(please check if applicable)**

Approximate end date:	

OR

b) **Approximate dates:**

Start date:	April 2013	End date:	September 2014

B2)   **Give a full lay summary of the purpose, design and methodology of the planned research.**

Purpose:
Gaining a larger understanding on how shared leadership in an agile team works and what kind of competencies are needed.

Design/Methodology:
The proposed methodology will be a mixed research method for data gathering. This will include the definition of a quantitative web-survey, distributed to appropriate groups on linkedin, xing and researchgate to reach a larger sample as a reference group as well to the members of my company. Another sample will be a qualitative one, applied via face to face interview questions to one agile team in my company as well to agile experts from outside of my company. Data analysis will be done by coding for the qualitative aspects, while the SPSS package will be used to analyze the quantitative. With the usage of structured interviews of members of an agile team, personal traits will be uncovered.

B3)   **List any research assistants, sub-contractors or other staff not named above who will be involved in the research and detail their involvement.**

B4)   **List below all research sites, and their Lead Investigators, to be included in this study.**

Research Site	Individual Responsible	Position and contact details

B5)   **Are the results of the study to be disseminated in the public domain?**

YES ☒   NO ☐

> ➤ *If not, why not?*

B6) **Give details of the funding of the research, including funding organisation(s), amount applied for or secured, duration, and UOL reference**

Funding Body	Amount	Duration	UoL Reference

B7) **Give details of any interests, commercial or otherwise, you or your co-applicants have in the funding body.**

SECTION C - EXPEDITED REVIEW

C1)

a) Will the study involve recruitment of participants outside the UK?	Yes
b) Does the study involve participants who are particularly vulnerable or unable to give informed consent? *(e.g. children, people with learning or communication disabilities, people in custody, people engaged in illegal activities such as drug-taking, your own students in an educational capacity) (Note: this does not include secondary data authorised for release by the data collector for research purposes.)*	No
c) Will the study require obtaining consent from a "research participant advocate" (for definition see guidance notes) in lieu of participants who are unable to give informed consent? *(e.g. for research involving children or, people with learning or communication disabilities)*	No
d) Will it be necessary for participants, whose consent to participate in the study will be required, to take part without their knowledge at the time? *(e.g. covert observation using photography or video recording)*	No
e) Does the study involve deliberately misleading the participants?	No
f) Will the study require discussion of sensitive topics that may cause distress or embarrassment to the participant or potential risk of disclosure to the researcher of criminal activity or child protection issues? *(e.g. sexual activity, criminal activity)*	No
g) Are drugs, placebos or other substances (e.g. food substances, vitamins) to be administered to the study participants or will the study involve invasive, intrusive or potentially harmful procedures of any kind?	No
h) Will samples (e.g. blood, DNA, tissue) be obtained from participants?	No
i) Is pain or more than mild discomfort likely to result from the study?	No

j) Could the study induce psychological stress or anxiety or cause harm or negative consequences beyond the risks encountered in normal life?	No
k) Will the study involve prolonged or repetitive testing?	No
l) Will financial inducements (other than reasonable expenses and compensation for time) be offered to participants?	No

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C2)

a) Will the study seek written, informed consent?	Yes
b) Will participants be informed that their participation is voluntary?	Yes
c) Will participants be informed that they are free to withdraw at any time?	Yes
d) Will participants be informed of aspects relevant to their continued participation in the study?	Yes
e) Will participants' data remain confidential?	Yes
f) Will participants be debriefed?	Yes

If you have answered 'no' to all items in SECTION C1 and 'yes' to all questions in SECTION C2 the application will be processed through expedited review.

If you have answered "Yes" to one or more questions in Section C1, or "No" to one or more questions in Section C2, but wish to apply for expedited review, please make the case below. See research ethics website for an example "case for expedited review".

C3)   Case for Expedited Review – *To be used if asking for expedited review despite answering YES to questions in C1 or NO to answers in C2.*

I am an online student enrolled in the Doctor of Business Adminstration programme. My company is located in Germany and I plan to interview teams in my company and therefore participants outside the UK.

SECTION D - PARTICIPANT DETAILS

D1)   How many participants will be recruited?

25

D2)   How was the number of participants decided upon?

For the interviews I want to interview one to two agile teams, which usually consists out approx. nine team members. For a pre-study, I want to interview approx. seven different agile experts for instrument development.

D3)

a)   **Describe how potential participants in the study will be identified, approached and recruited.**

In my company we have an agile software development team. Each member of the team will be

individually asked if she/he will participate in the interview. For the pre-interview participants will be selected dependent on their knowledge in agile software development methods

b)   **Inclusion criteria:**

Software developers working in an agile team, which are familiar with agile methodology

c)   **Exclusion criteria:**

No experience wih the agile ethodology

d)   **Are any specific groups to be excluded from this study? If so please list them and explain why:**

n/a

e)   **Give details for cases and controls separately if appropriate:**

n/a

f)   **Give details of any advertisements:**

n/a

D4)

a) State the numbers of participants from any of the following vulnerable groups and justify their inclusion

Children under 16 years of age:	0
Adults with learning disabilities:	0
Adults with dementia:	0
Prisoners:	0
Young Offenders:	0
Adults who are unable to consent for themselves:	0
Those who could be considered to have a particularly dependent relationship with the investigator, e.g. those in care homes, students of the PI or Co-applicants:	0
Other vulnerable groups (please list):	n/a

b) State the numbers of healthy volunteer participants:

Healthy Volunteers	**25**

D5)

a)   **Describe the arrangements for gaining informed consent from the research participants.**

[ ]

b) **If participants are to be recruited from any of the potentially vulnerable groups listed above, give details of extra steps taken to assure their protection, including arrangements to obtain consent from a legal, political or other appropriate representative in addition to the consent of the participant** *(e.g. HM Prison Service for research with young offenders, Head Teachers for research with children etc.).*

n/a

c) **If participants might not adequately understand verbal explanations or written information given in English, describe the arrangements for those participants (e.g. translation, use of interpreters etc.)**

n/a

d) **Where informed consent is not to be obtained (including the deception of participants) please explain why.**

n/a

D6) **What is the potential for benefit to research participants, if any?**

Findings from the study could be used for individual training purposes

D7) **State any fees, reimbursements for time and inconvenience, or other forms of compensation that individual research participants may receive. Include direct payments, reimbursement of expenses or any other benefits of taking part in the research?**

n/a

SECTION E - RISKS AND THEIR MANAGEMENT

E1) **Describe in detail the potential physical or psychological adverse effects, risks or hazards (minimal, moderate, high or severe) of involvement in the research for research participants.**

no adverse effects are anticipated

E2) **Explain how the potential benefits of the research outweigh any risks to the participants.**

n/a

E3) Describe in detail the potential adverse effects, risks or hazards (minimal, moderate, high or severe) arising from this research to the researchers or anyone else.

n/a

E4) What precautions will be in place to minimise the risks identified in E1 and E3?

n/a

E5) Will individual or group interviews/questionnaires discuss any topics or issues that might be sensitive, embarrassing or upsetting, or is it possible that criminal or other disclosures requiring action could take place during the study (e.g. during interviews/group discussions, or use of screening tests for drugs)?

YES ☐   NO ☒

> ➤ *If Yes, give details of procedures in place to deal with these issues.*

E6) Describe the measures in place in the event of any unexpected outcomes or adverse events to participants arising from their involvement in the project

n/a

E7) Explain how the conduct of the project will be monitored to ensure that it conforms with the study plan and relevant University policies and guidance.

The supervisor of the doctoral thesis will take care. The current status will be captured in progress reports to be sent to the University of Liverpool

Completing section E fulfils the requirement for risk assessment, provided that this section is reviewed if circumstances change, or new information makes it necessary. A copy of this form should be given to your departmental safety coordinator to enable monitoring of risk assessments. The findings of the risk assessment, especially the precautions required, must be communicated in a user-friendly way to all those doing this work.

SECTION F - DATA ACCESS AND STORAGE

F1) Where the research involves any of the following activities at any stage (including identification of potential research participants), state what measures have been put in place to ensure confidentiality of personal data (e.g. encryption or other anonymisation procedures will be used)

Electronic transfer of data by magnetic or optical media, e-mail or computer networks	Yes
Sharing of data with other organisations	No
Export of data outside the European Union	No
Use of personal addresses, postcodes, faxes, e-mails or telephone numbers	No
Publication of direct quotations from respondents	No
Publication of data that might allow identification of individuals	No
Use of audio/visual recording devices	Yes
Storage of personal data on any of the following:	
Manual files	No
Home or other personal computers	Yes
University computers	No
Private company computers	No
Laptop computers	Yes

F2) **Who will have control of and act as the custodian for the data generated by the study?**

Mark Menzel (Doctoral Student)

F3) **Who will have access to the data generated by the study?**

Dr. James Pounder (Supervisor)

F4) **For how long will data from the study be stored?**

36 months

SECTION G – PEER REVIEW

G1)

a) **Has the project undergone peer review?**

YES ☐   NO ☒

b) **If yes, by whom was this carried out?** (please enclose evidence if available)

SECTION G - CHECKLIST OF ENCLOSURES

Study Plan / Protocol	Yes
Recruitment advertisement	N/A
Participant information sheet	Yes
Participant Consent form	Yes
Research Participant Advocate Consent form	N/A
Evidence of external approvals	N/A
Questionnaires on sensitive topics	N/A
Interview schedule	Yes
Debriefing material	Yes
Other (please specify)	N/A
Evidence of peer review (If G1 = Yes)	N/A

B Sample participant consent form

UNIVERSITY OF
LIVERPOOL

CONSENT TO PARTICIPATE FORM (Including Information Sheet)

Research Project:
"Evaluation of leadership competencies in a shared leadership team environment"

Dear Participant,

The following information is provided to you to help you decide whether you wish to participate in the above study or not.

Voluntary Nature of the Study: This study is voluntary and you may choose not to participate without any repercussions.   If you decide to join the study now, you can still change your mind during the study. You may stop participating at any time.

Purpose of the Study
The purpose of this study is to evaluate leadership styles in a shared leadership environment, this usually happens in a self-organized team. An agile team is such a self-organized team. For the purpose and relevance of this research, the intended research participants have been selected according to their knowledge of agile methodologies and the years of working in an agile team.

Many studies have been investigating leadership styles in a team environment to be successful. Only a few have been investigating the shared leadership styles and the respective shared leadership competencies in a self-organizing agile team.

The main focus of the study is on developing a research instrument for the evaluation of shared leadership competencies which will complement the Bass MLQ/TMLQ.

Media used for the interview

The doctoral student investigator will use the following media to collect the data:
- Pencil and Paper
- Audio (Voice) Recording
- Taking notes

The interview will take approximately 20 minutes.
It might be that a second interview session is needed dependent on the participant responses for further investigation.

Privacy
Any information you provide will be kept anonymous. The researcher will not use your personal information for any purposes outside of this research project and scholarship. Also, the researcher will not include your name or anything else that could identify you in the study reports. Data will be kept securely for a period of at least 5 years, as required by the university.

Title of Research Project:	*"Evaluation of leadership competencies in a shared leadership team environment" Working Title*		
Researcher(s):	Mark Menzel		**Please initial box**
	Prof. Dr. James Pounder		

1. I confirm that I have read and have understood the information sheet for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. ☐

2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason, without my rights being affected. ☐

3. I understand that, under the Data Protection Act, I can at any time ask for access to the information I provide and I can also request the destruction of that information if I wish. ☐

4. I agree to take part in the above study. ☐

_____   _____   _____
Participant Name   Date   Signature

_____   _____   _____
Name of Person taking consent   Date   Signature

_____   _____   _____
Researcher   Date   Signature

The contact details of lead Researcher (Principal Investigator) are:

Mark Menzel
Preziosastr. 18
81927 Munich Germany
+49 (0) 173 5431921
Mark.Menzel@my.ohecampus.com

Prof. Dr. James Pounder
Director of Teaching and Learning Centre
University of Liverpool / Lingnan University Hong Kong
(+852) 26167578
pounder@ln.edu.hk

C Ethical approval confirmation

Von: Ellwood, Paul [mailto:Paul.Ellwood@liverpool.ac.uk]
Gesendet: Dienstag, 24. September 2013 18:12
An: post@mmenzel.de; Evangelia Katsikea
Cc: Pascale Hardy; paul.ellwood@liverpool.ac.uk; James Pounder; James Pounder
Betreff: RE: Ethics application

Dear Mark

Your revised documents have been reviewed by the DBA research ethics committee. They provide the necessary detail and clarifications that we needed, and this e-mail is to confirm that you are now authorised to proceed with your research.

Best wishes for a successful research project.

Paul

Dr Paul Ellwood
Senior Lecturer in Management (DBA)
University of Liverpool Management School

D Online Survey

A Survey about Shared Leadership

This survey evalutes how members in the teamyou are working in use the competence areas need to enable shared leadership!

The survey consisits of fourteen questions.
Shared Leadership competencies can be categorized into the following areas:

- Decision making
- Vision
- Coordination
- Communication
- Teamplay / Sociability

Please rate the following questions on a scale
- Not at all (0)
- Once in a while (1)
- Sometimes (2)
- Fairly often (3)
- Frequently or always (4)
for the teammembers of the teamyou are currently working in.

General

You are:

☐ Female
☐ Male

Which Agile Method do you apply in your current project?

☐ Scrum
☐ Kanban
☐ Extreme Programming (XP)
☐ Feature Driven Development

Make a comment on your choice here:

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Shared Leadership

Members of my Team ... are actively involved in the decision-making process

☐ Not at all
☐ Once in a while
☐ Sometimes
☐ Fairly often
☐ Frequently or always

Members of my Team ... make important decisions without consulting other team members

☐ Not at all
☐ Once in a while
☐ Sometimes
☐ Fairly often
☐ Frequently or always

Members of my Team ... have a well defined and clear team vision for their work area

☐ Not at all
☐ Once in a while
☐ Sometimes
☐ Fairly often
☐ Frequently or always

Members of my Team ... establish a team vision according to the team needs

☐ Not at all
☐ Once in a while
☐ Sometimes
☐ Fairly often
☐ Frequently or always

Members of my Team ... communicate directly with other team-members

☐ Not at all
☐ Once in a while
☐ Sometimes
☐ Fairly often
☐ Frequently or always

Members of my Team ... share openly information with the team-members

☐ Not at all
☐ Once in a while
☐ Sometimes
☐ Fairly often
☐ Frequently or always

Members of my Team ... structure their own work independently and harmonize work with others

☐ Not at all
☐ Once in a while
☐ Sometimes
☐ Fairly often
☐ Frequently or always

Members of my Team ... structure their work task with the team to achieve the team goal

☐ Not at all
☐ Once in a while
☐ Sometimes
☐ Fairly often
☐ Frequently or always

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Members of my Team ... distribute work among team-member

☐ Not at all
☐ Once in a while
☐ Sometimes
☐ Fairly often
☐ Frequently or always

Members of my Team ... take into account alternative suggestion from others during team discussion

☐ Not at all
☐ Once in a while
☐ Sometimes
☐ Fairly often
☐ Frequently or always

Members of my Team ... regularly comment on other team-members` work

☐ Not at all
☐ Once in a while
☐ Sometimes
☐ Fairly often
☐ Frequently or always

Members of my Team ... link their work to the tasks of other team-members

☐ Not at all
☐ Once in a while
☐ Sometimes
☐ Fairly often
☐ Frequently or always

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E Example Participant consent form pilot study, shared leadership and TMLQ survey

UNIVERSITY OF LIVERPOOL

CONSENT TO PARTICIPATE FORM (Including Information Sheet)

Research Project:
"Evaluation of transformational shared leadership in a university classroom setting"

Dear Participant,

The following information is provided to you to help you decide whether you wish to participate in the above study or not.

Voluntary Nature of the Study: This study is voluntary and you may choose not to participate without any repercussions. If you decide to join the study now, you can still change your mind during the study. You may stop participating at any time.

Purpose of the Study

The purpose of this study is to evaluate transformational leadership styles in a shared leadership environment, this usually happens in a self-organized team. For the purpose and relevance of this research, the intended research participants have been selected according to their working in a self-organizing team. Many studies have been investigating leadership styles in a team environment to be successful. Only a few have been investigating the shared leadership styles and the respective shared leadership competencies in a self-organizing team. The main focus of the study is on evaluating a research instrument for the evaluation of shared leadership competencies which will complement commonly accepted leadership models (the Multi Factor Leadership and the Team Multifactor Leadership questionnaire (MLQ/TMLQ)). The Multi Factor Leadership survey is a tool to empirically validate the leadership model of transformational and transactional leadership. Its scales are based on factor analysis on a five point Likert scale. The MLQ leadership survey can be regarded as the standard tool to evaluate transformational/transactional leadership styles.

Media used for the interview

The investigator will use the following media to collect the data:
- Pencil and Paper
- Audio (Voice) Recording
- Taking notes

Two samples will be taken consisting of the Bass TMLQ and the shared leadership research instrument. Filling out the survey will take approximately twenty minutes.

Privacy

Any information you provide will be kept anonymous. The researcher will not use your personal information for any purposes outside of this research project and scholarship. Also, the researcher will not include your name or anything else that could identify you in the study reports. Data will be kept securely for a period of at least 5 years, as required by the university.

Title of Research Project:	*"Evaluation of transformational shared leadership in a university classroom setting Title*	
Researcher(s):	Mark Menzel	Please initial box

1. I confirm that I have read and have understood the information sheet for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. ☒

2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason, without my rights being affected. ☐

3. I understand that, under the Data Protection Act, I can at any time ask for access to the information I provide and I can also request the destruction of that information if I wish. ☒

4. I agree to take part in the above study. ☒

███████████	11.10.13	███████████
Participant Name	Date	Signature

M. MENZEL	11/10/13	*signature*
Name of Person taking consent	Date	Signature

M. MENZEL	11/10/13	*signature*
Researcher	Date	Signature

The contact details of lead Researcher (Principal Investigator) are:

Mark Menzel
Preziosastr. 18
81927 Munich Germany
+49 (0) 173 5431921
Mark.Menzel@my.ohecampus.com

Prof. Dr. James Pounder
Director of Teaching and Learning Centre
University of Liverpool / Lingnan University Hong Kong
(+852) 26167578
pounder@ln.edu.hk

Directions:

The Team Multifactor Leadership Questionnaire (TMLQ) describes the average or typical leadership behaviors exhibited by your team members. Following are descriptive statements about the team you are rating. Please evaluate each statement in terms of your team's overall leadership behavior. For each statement, judge how frequently, on average, your team displays the behavior described. On this answer sheet, circle your rating for each statement. Leave the response blank if you are uncertain, if the statement is irrelevant, or if it does not apply to your team. Use the scale below for the first 65 questions.

Team name: Ausland

Date: 11.10.2013

Use the following scale:

- **0** = Not at all
- **1** = Once in a while
- **2** = Sometimes
- **3** = Fairly often
- **4** = Frequently or always

Members of my Team	0	1	2	3	4
1. ███████████████████	X				
2. ████████████			X		
3. ████████████████████████		X			
4. ██████████████████					X
5. ████████████████████		X			
6. ████				X	
7. clearly communicate what each member needs to do to complete assignments					X
8. ██████████████				X	
9. ████████		X			
10. ██████████					X
11. delay taking actions until problems become serious		X			
12. ████████████			X		
13. closely monitor each other's performance for errors				X	
14. ████████████				X	
15. work out agreements about what's expected from each other		X			
16. ████████					X
17. ████████████████				X	
18. ████████████████████				X	
19. ██████████	X				
20. ██████████					X
21. ██████████████			X		
22. ██████████████			X		
23. ████████				X	
24. ██████████				X	
25. ████████████████				X	
26. ████████				X	
27. ██████				X	
28. ██████████				X	

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Use the following scale:	0	1	2	3	4
0 = Not at all					
1 = Once in a while					
2 = Sometimes					
3 = Fairly often					
4 = Frequently or always					
Members of my team …					
34. ██████████████████████████				X	
35. ███████████████████████				X	
36. ██████████			X		
37. ████████████████████████				X	
38. ██████████████████				X	
39. █████████████	X				
40. ████████████████████████████				X	
41. ██████████████████████		X			
42. ██████				X	
43. █████████████████					
44. ██████████████████████		X			X
45. ███████████████				X	
46. ███████████				X	
47. ████████████		X			
48. ███████████████			X		

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Members of my Team	0	1	2	3	4
49. are actively involved in the decision-making process					
Daniela ▮▮▮					X
Kati ▮▮▮▮					X
Teresa ▮▮▮					X
4.					
50. make important decisions without consulting other team members					
Daniela ▮▮▮		X			
Kati ▮▮▮		X			
Teresa ▮▮▮		X			
4.					
51. present a well-defined and clear team vision for their work area					
Daniela ▮▮▮				X	
Kati ▮▮▮				X	
Teresa ▮▮▮				X	
4.					
52. establish a team vision according to the team needs					
Daniela ▮▮▮			X		
Kati ▮▮▮			X		
Teresa ▮▮▮					
4.					
53. communicate directly with other team-members					
Daniela ▮▮▮					X
Kati ▮▮▮					X
Teresa ▮▮▮					
4.					
54. share openly information with the team-members					
Daniela ▮▮▮					X
Kati ▮▮▮					X
Teresa ▮▮▮					
4.					
55. structure their own work independently and harmonize work with others					
Daniela ▮▮▮					X
Kati ▮▮▮					X
Teresa ▮▮▮					
4.					
61. structure their work task with the team to achieve the team goal					
Daniela ▮▮▮					X
Kati ▮▮▮					X
Teresa ▮▮▮					
4.					

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Members of my Team	0	1	2	3	4
56. distribute work among team-member					
Daniela ▮▮▮▮					X
Kati ▮▮▮▮					X
Teresa ▮▮▮▮					
4.					
57. take into account alternative suggestion from others during team discussion					
Daniela ▮▮▮▮					X
Kati ▮▮▮▮					X
Teresa ▮▮▮▮					
4.					
58. regularly comment on other team-members` work					
Daniela ▮▮▮▮				X	
Kati ▮▮▮▮				X	
Teresa ▮▮▮▮					
4.					
60. link their work to the tasks of other team-members					
Daniela ▮▮▮▮				X	
Kati ▮▮▮▮				X	
Teresa ▮▮▮▮					
4.					

61. The overall effectiveness of the team can be classified as:
    A. Not effective
    B. Only slightly effective
    C. Effective
    D. Very effective
    E. Extremely effective

62. In all, how satisfied are you with the leadership abilities of the team that you are rating?
    A. Very dissatisfied
    B. Some what dissatisfied
    C. Neither satisfied nor dissatisfied
    D. Fairly satisfied
    E. Very satisfied

63. The gender mix of your team:
    A. All male
    B. Majority male
    C. Equally mixed male and female
    D. Majority female
    E. All female

64. Your own ethnicity:
    A. African American
    B. Alaskan Native
    C. Asian or Pacific Islander
    D. Caucasian
    E. Hispanic
    F. Native American
    G. Other (please specify): Europa

65. Your own gender:
    A. Female
    B. Male

F Example Participant consent forms core action research projects, shared leadership and TMLQ surveys

UNIVERSITY OF LIVERPOOL

CONSENT TO PARTICIPATE FORM (Including Information Sheet)

Research Project:
"Evaluation of transformational shared leadership in an agile team setting"

Dear Participant,

The following information is provided to you to help you decide whether you wish to participate in the above study or not.

Voluntary Nature of the Study: This study is voluntary and you may choose not to participate without any repercussions. If you decide to join the study now, you can still change your mind during the study. You may stop participating at any time.

Purpose of the Study
The purpose of this study is to evaluate transformational leadership styles in a shared leadership environment, this usually happens in a self-organized team. For the purpose and relevance of this research, the intended research participants have been selected according to their working in a self-organizing team. Many studies have been investigating leadership styles in a team environment to be successful. Only a few have been investigating the shared leadership styles and the respective shared leadership competencies in a self-organizing team. The main focus of the study is on evaluating a research instrument for the evaluation of shared leadership competencies which will complement commonly accepted leadership models (the Multi Factor Leadership and the Team Multifactor Leadership questionnaire (MLQ/TMLQ)). The Multi Factor Leadership survey is a tool to empirically validate the leadership model of transformational and transactional leadership. Its scales are based on factor analysis on a five point Likert scale. The MLQ leadership survey can be regarded as the standard tool to evaluate transformational/transactional leadership styles.

Media used for the interview

The investigator will use the following media to collect the data:
- Pencil and Paper

Two samples will be taken consisting of the Bass TMLQ and the shared leadership research instrument. Filling out the survey will take approximately twenty minutes.

Privacy
Any information you provide will be kept anonymous. The researcher will not use your personal information for any purposes outside of this research project and scholarship. Also, the researcher will not include your name or anything else that could identify you in the study reports. Data will be kept securely for a period of at least 5 years, as required by the university.

Title of Research Project:	"*Evaluation of transformational shared leadership in a university classroom setting*	
Researcher(s):	Mark Menzel	Please initial box

1. I confirm that I have read and have understood the information sheet for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. ☒

2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason, without my rights being affected. ☒

3. I understand that, under the Data Protection Act, I can at any time ask for access to the information I provide and I can also request the destruction of that information if I wish. ☒

4. I agree to take part in the above study. ☒

13.12.2013

Participant Name	Date	Signature
▇▇▇▇▇▇▇▇▇	13.12.2013	▇▇▇▇▇▇▇
Mark Menzel	13.12.2013	
Name of Person taking consent	Date	Signature
Mark Menzel	13.12.2013	
Researcher	Date	Signature

The contact details of lead Researcher (Principal Investigator) are:

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Directions: **Team Mainzelmaennchen**

The Team Multifactor Leadership Questionnaire (TMLQ) describes the average or typical leadership behaviors exhibited by your team members. Following are descriptive statements about the team you are rating. Please evaluate each statement in terms of your team's overall leadership behavior. For each statement, judge how frequently, on average, your team displays the behavior described. On this answer sheet, circle your rating for each statement. Leave the response blank if you are uncertain, if the statement is irrelevant, or if it does not apply to your team. Use the scale below for the first 65 questions.

Date:

Use the following scale:
- 0 = Not at all
- 1 = Once in a while
- 2 = Sometimes
- 3 = Fairly often
- 4 = Frequently or always

Members of my Team	0	1	2	3	4
1.				X	
2.				X	
3.		X			
4.			X		
5.			X		
6.				X	
7. clearly communicate what each member needs to do to complete assignments					X
8.			X		
9.				X	
10.				X	
11. delay taking actions until problems become serious				X	
12.			X		
13. closely monitor each other's performance for errors			X		
14.			X		
15. work out agreements about what's expected from each other				X	
16.		X			
17.			X		
18.		X			
19.		X			
20.			X		
21.			X		
22.				X	
23.			X		
24.			X		
25.				X	
26.				X	
27.				X	
28.				X	

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Use the following scale:
- 0 = Not at all
- 1 = Once in a while
- 2 = Sometimes
- 3 = Fairly often
- 4 = Frequently or always

Members of my team …	0	1	2	3	4
29. avoid making decisions			X		
30. ▮▮▮▮▮▮▮▮▮▮▮▮				X	
31. ▮▮▮▮▮▮▮▮▮▮▮▮▮			X		
32. ▮▮▮▮▮▮▮▮▮▮▮				X	
33. ▮▮▮▮▮▮				X	
34. ▮▮▮▮▮▮▮▮▮▮▮▮▮▮				X	
35. ▮▮▮▮▮▮▮▮▮▮▮▮			X		
36. ▮▮▮▮▮▮▮			X		
37. ▮▮▮▮▮▮▮▮▮▮▮▮▮				X	
38. ▮▮▮▮▮▮▮▮▮▮			X		
39. ▮▮▮▮▮▮▮		X			
40. ▮▮▮▮▮▮▮▮▮▮▮▮▮▮			X		
41. ▮▮▮▮▮▮▮▮▮▮▮			X		
42. ▮▮▮▮▮▮			X		
43. ▮▮▮▮▮▮▮▮▮▮		X			
44. ▮▮▮▮▮▮▮▮▮▮▮▮			X		
45. ▮▮▮▮▮▮▮▮▮				X	
46. ▮▮▮▮▮▮▮▮			X		
47. ▮▮▮▮▮▮▮▮▮				X	
48. ▮▮▮▮▮▮▮▮▮▮				X	

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Use the following scale:
- **0** = Not at all
- **1** = Once in a while
- **2** = Sometimes
- **3** = Fairly often
- **4** = Frequently or always

Members of my team …	0	1	2	3	4
49. are actively involved in the decision-making process					
Alexander	X				
Annika					X
Bjoern				X	
Elisabeth			X		
Karl-Friedrich					X
Olga					
Wenpan			X		
Norma				X	
50. make important decisions without consulting other team members					
Alexander	X				
Annika	X				
Bjoern	X				
Elisabeth	X				
Karl-	X				
Olga					
Wenpan	X				
Norma	X				
51. present a well-defined and clear team vision for their work area					
Alexander		X			
Annika				X	
Bjoern				X	
Elisabeth				X	
Karl-Friedrich				X	
Olga					
Wenpan				X	
Norma					X
52. establish a team vision according to the team needs					
Alexander		X			
Annika				X	
Bjoern				X	
Elisabeth				X	
Karl-Friedrich				X	
Olga					
Wenpan				X	
Norma					X

Use the following scale:

- 0 = Not at all
- 1 = Once in a while
- 2 = Sometimes
- 3 = Fairly often
- 4 = Frequently or always

Members of my team ...	0	1	2	3	4
53. communicate directly with other team-members					
Alexander			X		
Annika					X
Bjoern					X
Elisabeth					X
Karl-Friedrich					X
Olga					
Wenpan					X
Norma					X
54. share openly information with the team-members					
Alexander			X		
Annika				X	
Bjoern				X	
Elisabeth				X	
Karl-Friedrich					X
Olga					
Wenpan				X	
Norma					X
55. structure their own work independently and harmonize work with others					
Alexander			X		
Annika					X
Bjoern					X
Elisabeth					X
Karl-Friedrich					X
Olga					
Wenpan					X
Norma					X
56. structure their work task with the team to achieve the team goal					
Alexander		X			
Annika				X	
Bjoern				X	
Elisabeth				X	
Karl-Friedrich					X
Olga					
Wenpan				X	
Norma					X

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Use the following scale:
- **0** = Not at all
- **1** = Once in a while
- **2** = Sometimes
- **3** = Fairly often
- **4** = Frequently or always

Members of my team ...	0	1	2	3	4
57. distribute work among team-member					
Alexander ▮▮▮	X				
Annika ▮▮▮			X		
Bjoern ▮▮▮		X			
Elisabeth ▮▮	X				
Karl-Friedrich ▮▮				X	
Olga ▮▮					
Wenpan ▮▮		X			
Norma ▮▮				X	
58. take into account alternative suggestion from others during team discussion					
Alexander ▮▮		X			
Annika ▮▮				X	
Bjoern ▮▮				X	
Elisabeth ▮▮				X	
Karl-Friedrich ▮▮				X	
Olga ▮▮					
Wenpan ▮▮			X		
Norma ▮▮					X
59. regularly comment on other team-members` work					
Alexander ▮▮	X				
Annika ▮▮			X		
Bjoern ▮▮			X		
Elisabeth ▮▮			X		
Karl-Friedrich ▮▮			X		
Olga ▮▮					
Wenpan ▮▮			X		
Norma ▮▮				X	
60. link their work to the tasks of other team-members					
Alexander ▮▮		X			
Annika ▮▮				X	
Bjoern ▮▮				X	
Elisabeth ▮▮			X		
Karl-Friedrich ▮▮				X	
Olga ▮▮					
Wenpan ▮▮				X	
Norma ▮▮				X	

61. The overall effectiveness of the team can be classified as:
   A. Not effective
   B. Only slightly effective
   C. Effective
   (D.) Very effective
   E. Extremely effective

62. In all, how satisfied are you with the leadership abilities of the team that you are rating?
   A. Very dissatisfied
   B. Some what dissatisfied
   (C.) Neither satisfied nor dissatisfied
   D. Fairly satisfied
   E. Very satisfied

63. The gender mix of your team:
   A. All male
   B. Majority male
   (C.) Equally mixed male and female
   D. Majority female
   E. All female

64. Your own ethnicity:
   A. African American
   B. Alaskan Native
   C. Asian or Pacific Islander
   D. Caucasian
   E. Hispanic
   F. Native American
   (G.) Other (please specify):   *European*

65. Your own gender:
   (A.) Female
   B. Male

Transformational leadership and shared leadership in self-organizing teams

Mark Menzel
University of Liverpool
Management School (ULMS)

November 2013

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Outline

1. Aim of the Project

2. Burns' Leadership Model

3. Avolio's Team Multi Factor Leadership Questionnaire (TMLQ)

4. Shared Leadership Competencies

5. The Survey

6. Ethics / Privacy

7. Added Value

8. Proposed Timeline

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Introduction & Motivation

Mark Menzel

- Private
  - 43 Years old, married, 14 month old son
  - electrical engineering, FH Aachen
  - M.Sc. in Information Technology, UoL 2005
- Business
  - current position Managing Consultant at imbus AG
  - 15 years experience as tester, testmanager for Ericsson, Allianz, and 1&1
  - experience in agile and classical projects

Motivation for this Study

- since 2010 part-time doctoral student with University of Liverpool – Doctorate in Business Administration (DBA)
- DBA thought with 8 Modules (each ten weeks long), with F2F residencies in Liverpool and one conference paper and a finale doctoral thesis (exp. 2014)
- thought via action learning (Action and Reflection)
- Thesis topic: Transformational Shared leadership in agile teams

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Aim of the shared leadership project
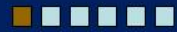
- The purpose of this study is to evaluate transformational leadership styles in a shared leadership environment (Agile Team)

- The main focus of the study is on evaluating a research instrument for the evaluation of shared leadership competencies

- The research instrument is complement with commonly accepted leadership survey (The Team Multi Factor Leadership survey)

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Leadership Model (Burns 1978)

1978 James McGregor Burns developed a leadership model describing
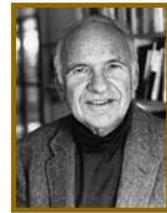
Transactional Leadership

Transformational Leadership

Laissez-faire Leadership

*J. M. Burns: ''Leadership''. Harper & Row: New York 1978

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Transactional Leadership

Style of leadership in which the leader promotes compliance of his followers through performance and rewards

Leadership Style	Factor	Description
Transactional	Contingent reward	Defining the exchanges between what is expected from the follower and what the follower will receive in return
	Management-by-exception (active)	In order to maintain current performance status the focus is on detecting and correcting errors, problems or complaints
	Management-by-exception (passive)	Addressing problems only after they have become serious

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Transformational Leadership

Transforming (Transformational) Leadership is a process in which leaders and followers help each other to advance to a higher level of morale and motivation.

Leadership Style	Factor	Description
Transformational	Idealized influence charisma	Instilling pride in and respect for the leader; the followers identify with the leader
	Inspirational motivation	Articulation and representation of a vision; leaders show optimism and enthusiasm
	Intellectual stimulation	Followers are encouraged to question established ways of solving problems
	Individualized consideration	Understanding the needs and abilities of each follower; developing and empowering the individual follower

Team Multi Factor Leadership Questionnaire

1985 Bernard M. Bass and Bruce J. Avolio developed the Team Multi Factor Leadership Questionnaire (TMLQ)

- Tool for empirical validation of leadership model (Burns)

- 53 questions on 5-point Likert scale

- >50 case studies since 1995

- Supports tendency that leaders applying Transformational Leadership are more successful

- So far only applied in classical project setting

Multi-Level Framework for Leadership Measurement

*Avolio, B. J. and Bass, B. M., Multifactor Leadership Questionnaire, Manual, Third Edition, Lincoln, 2004

Conceptual Framework

- The conceptual framework takes as a base the standard TMLQ and is complemented with the SLQ
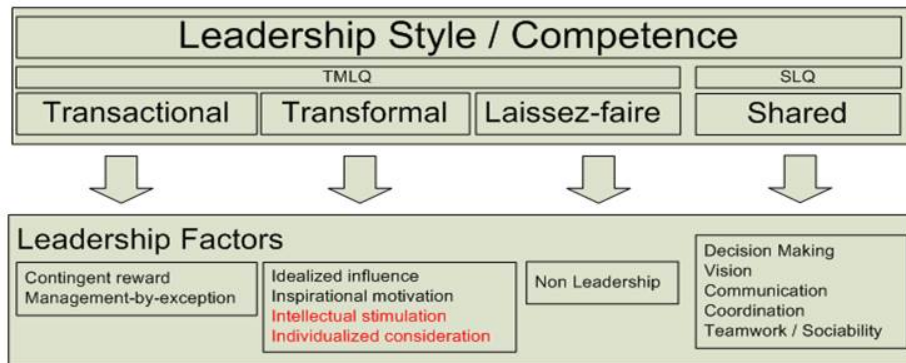
- Evaluation will be done on TMLQ, and on individual shared social network analysis

The Survey

- A survey consisting of 65 questions is given to the agile team

- The research participant needs to answer on a five point Likert scale from "Not at All" - "Frequently or Always"

- The data of the team survey is evaluated according to the three different leadership styles "Transactional", "Transformal" or "Laissez-faire"

- For the shared leadership competencies the participants are asked to judge how they perceive their respective team peers on "Decision Making", Vision", Communication", "Coordination" and "Teamwork" again Likert scale

- Any information provided by the research participant will be kept anonymous.
- No personal information will be given to the outside or to management.
- No names or personal information will be included in any report generated with this study.
- All the data will be kept securely for a period of five years.
- Each research participant needs to sign "participant consent" form which is part of the ethical process of the University of Liverpool.

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Evaluation

- Box Plot of Transformational Leadership of the Team
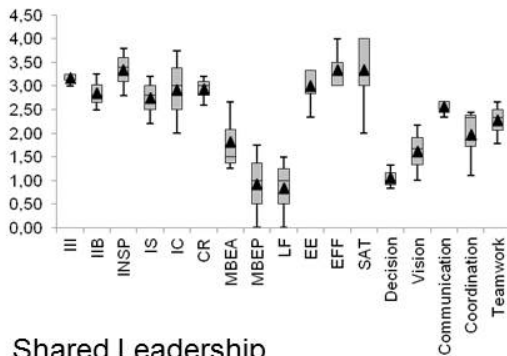
- Shared Leadership
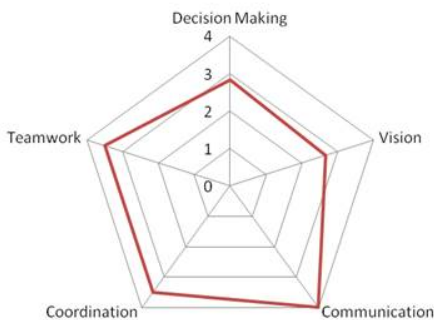
- Sociogram of the agile team

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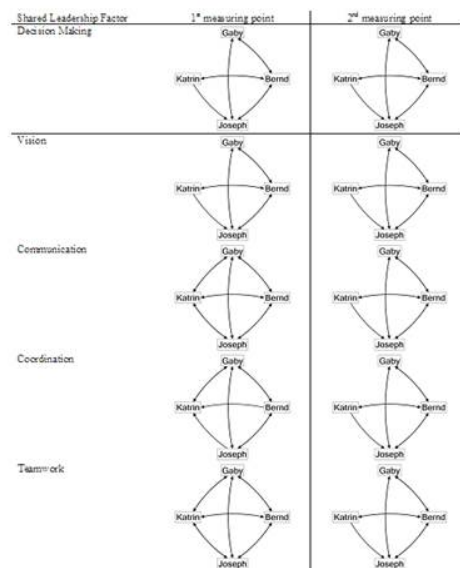
The added value

- Ericsson receives a method to evaluate shared leadership in agile teams
- Methodology to train agile teams to apply shared leadership
- Larger understanding of shared leadership
- Feedback on team behaviour
  - Shared Leadership Competencies
  - Transformational/Transactional
  - Social Network Analysis for Shared Leadership
  - Interpersonal relationship among team-member

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Proposed Timeline

Time	Action
13 Dec 2013	first sample taken
Dec 2013 / Jan 2014	data evaluation first sample, recommendations for actions
Feb 2014	scrum masters to coach agile teams on shared leadership
April 2014	second sample taken
May / June 2014	report out

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The Researcher

■ ■ ■ ■ ■ ■

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H Team evaluation presentations Core Action Research Projects

H.1   Team evaluation presentation team E1

E1: Evaluation Transformational Leadership

Comparison of TMLQ Results for Team Scrumtrek with Normative TMLQ values		
Leadership Style	TMLQ 1st sample Mean	Bass &Avolio Norm (2004) (n=27285) Mean
Transformational Leadership		
Idealized Attributes III	3.13	2.94
Idealized Behaviors IIB	2.51	2.77
Inspirational Motivation INSP	2.41	2.92
Intellectual Stimulation IS	2.42	2.78
Individualized Consideration IC	2.84	2.85
Transactional Leadership		
Contingent Reward CR	2.49	2.87
Management-by-Exception (Active) MBEA	2.09	1.67
Management-by-Exception (Passive) MBEP	1.02	1.03
Non Leadership		
Laissez-faire LF	1.04	0.65
Team Effectiveness and Satisfaction		
Extra Effort EE	2.48	2.74
Effectiveness EFF	2.67	3.07
Satisfaction SAT	2.78	3.08

- III – Leaders are deeply respected, with a high moral and standard

- INSP – Leaders have high expectations on followers or other leaders,
  - Leaders should share the vision more and make clear their expectations on others

- IS – Leaders to inspire others to be creative
  - Develop unique ways of problem solving

- MBEA – Leaders monitors peers for mistakes and then take corrective actions
- LF – Delay decision and gives no feedback
  - Moderate feedback culture, use the daily meetings for this

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E1: Evaluation Shared Leadership

Shared Leadership Factor	1st sample
Decision Making Density: 0,097 Decentralization: 0,82 Members: 9 Links/Member: 0,77	
Vision Density: 0,958 Decentralization: 0,84 Members: 9 Links/Member: 7,66	
Communication Density: 0,930 Decentralization: 0,92 Members: 9 Links/Member: 7,44	

- Decision Making – Low shared leadership only a few make decisions
  - Strengthen decision making and let others be part of the decision making process

- Vision – Shared Leadership Leaders have strong Vision of the team goal and their work area. Vision is shared among team members

- Communication – Shared Leadership Team members communicate with each other

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E1: Evaluation Shared Leadership

Shared Leadership Factor	1st sample
Coordination Density: 0,930 Decentralization: 0,92 Members: 9 Links/Member: 7,44	
Teamwork Density: 0,72 Decentralization: 0,92 Members: 9 Links/Member: 5,77	

- Coordination – Shared Leadership Team member coordinate their work tasks with other team members

- Teamwork – Shared Leadership some team members seem to be isolated ?

E1: Summary Shared Leadership

Shared Leadership Factor	Links/Member
Decision	0,77
Vision	7,66
Communication	7,44
Coordination	7,44
Teamwork	5,77

Shared Leadership	
Decision	Area for Improvement
Vision	Excellent
Communication	Excellent
Coordination	Excellent
Teamwork	Excellent

Proposed Timeline

Time	Action
13 Dec 2013	first sample taken
Dec 2013 / Jan 2014	data evaluation first sample, presentation of data
Feb 2014	scrum masters to coach agile teams on shared leadership
April 2014	second sample taken
May / June 2014	report out

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Transformational and shared leadership evaluation Team E2

Mark Menzel
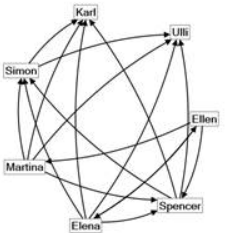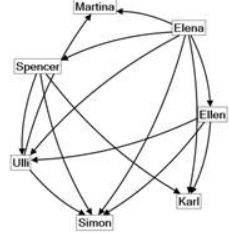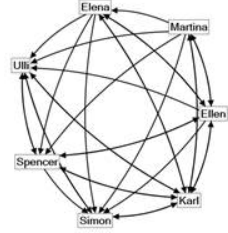University of Liverpool
Management School (ULMS)

January 2014

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E2: Evaluation Transformational Leadership

Comparison of TMLQ Results for Team Mainzel with Normative TMLQ values			
Leadership Style	TMLQ 1st sample Mean	TMLQ 2nd sample Mean	Bass &Avolio Norm (2004) (n=27285) Mean
Transformational Leadership			
Idealized Attributes III	2.50		2.94
Idealized Behaviors IIB	2.07		2.77
Inspirational Motivation INSP	1.90		2.92
Intellectual Stimulation IS	2.30		2.78
Individualized Consideration IC	2.53		2.85
Transactional Leadership			
Contingent Reward CR	2.42		2.87
Management-by-Exception (Active) MBEA	2.02		1.67
Management-by-Exception (Passive) MBEP	1.30		1.03
Non Leadership			
Laissez-faire LF	1,40		0.65
Team Effectiveness and Satisfaction			
Extra Effort EE	2,22		2.74
Effectiveness EFF	2,83		3.07
Satisfaction SAT	2,83		3.08

- III – Leaders are deeply respected, with a high moral and standard
  - Lead by example, take the lead for your work area as you want others that others lead
- IIB – Team members follow the "charismatic" behavior of the leaders
  - Team member want to see more charismatic leadership
- INSP – Leaders have high expectations on followers or other leaders,
  - Leaders should share the vision more and make clear their expectations on others
- MBEA – Leaders monitor peers for mistakes and then take corrective actions
- LF – Delay decision and gives no feedback
  - Improve feedback culture, use the daily meetings for this

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E2: Evaluation Shared Leadership

Shared Leadership Factor	1st sample
Decision Making (DM) Density: 0,16 Decentralization: 0,96 Members: 6 Links/Member 1,2	
Vision Density: 0,83 Decentralization: 0,8 Members: 6 Links/Member: 4,3	
Communication Density: 1 Decentralization: 1 Members: 6 Links/Member: 5	

- Decision Making – Low shared leadership only a few make decisions
  - Strengthen decision making and let others be part of the decision making process

- Vision – Shared Leadership Leaders have strong vision of the team goal and their work area. Vision is shared among team members

- Communication – Shared Leadership Team members communicate with each other

---

E2: Evaluation Shared Leadership

Coordination Density: 1 Decentralization: 1 Members: 6 Links/Member: 5	
Teamwork Density: 0,70 Decentralization: 0,64 Members: 6 Links/Member: 3,5	

- Coordination – Shared Leadership Team member coordinate their work tasks with other team members

- Teamwork – Shared Leadership some team members seem to be isolated ?

Summary Shared Leadership

Shared Leadership Factor	Links/Member
Decision	1,2
Vision	4,3
Communication	5
Coordination	5
Teamwork	3,5

Shared Leadership	
Decision	Area for Improvement
Vision	Excellent
Communication	Excellent
Coordination	Excellent
Teamwork	Excellent

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Proposed Timeline

Time	Action
13 Dec 2013	first sample taken
Dec 2013 / Jan 2014	data evaluation first sample, presentation of data
Feb 2014	scrum masters to coach agile teams on shared leadership
April 2014	second sample taken
May / June 2014	report out

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Transformational and shared leadership Evaluation
Team E3 (First Evaluation)

Mark Menzel
University of Liverpool
Management School (ULMS)

January 2014

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E3: Evaluation Transformational Leadership

Comparison of TMLQ Results for Team Health Angles with Normative TMLQ values			
Leadership Style	TMLQ 1st sample Mean	TMLQ 2nd sample Mean	Bass &Avolio Norm (2004) (n=27285) Mean
Transformational Leadership			
Idealized Attributes IIII	2.89		2.94
Idealized Behaviors IIB	2.01		2.77
Inspirational Motivation INSP	2.11		2.92
Intellectual Stimulation IS	2.66		2.78
Individualized Consideration IC	2.94		2.85
Transactional Leadership			
Contingent Reward CR	2.26		2.87
Management-by-Exception (Active) MBEA	2.23		1.67
Management-by-Exception (Passive) MBEP	0.90		1.03
Non Leadership			
Laissez-faire LF	0.77		0.65
Team Effectiveness and Satisfaction			
Extra Effort EE	2.14		2.74
Effectiveness EFF	2.67		3.07
Satisfaction SAT	2.67		3.08

- INSP – Leaders have high expectations on followers or other leaders,
  - Leaders should share the vision more and make clear their expectations on others

- IS – Leaders to inspire others to be creative
  - Develop unique ways of problem solving

- MBEA – Leaders monitors peers for mistakes and then take corrective actions

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E3: Evaluation Shared Leadership

Shared Leadership Factor	1st sample
Decision Making (DM) Density: 0,404 Decentralization: 0,69 Members: 7 Links/Member: 2,4	
Vision Density: 0,76 Decentralization: 0,72 Members: 7 Links/Member: 4,5	
Communication Density: 1,0 Decentralization:1,0 Members: 7 Links/Member: 6	

- Decision Making – Low shared leadership only a few make decisions
  - Strengthen decision making and let others be part of the decision making process

- Vision – Shared Leadership Leaders have strong Vision of the team goal and their work area. Vision is shared among team members

- Communication – Shared Leadership Team members communicate with each other

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E3: Evaluation Shared Leadership

Coordination Density: 0,976 Decentralization:0,97 Members: 7 Links/Member: 5,85	
Teamwork Density: 0,69 Decentralization:0,83 Members: 7 Links/Member: 4,1	

- Coordination – Shared Leadership Team member coordinate their work tasks with other team members

- Teamwork – Shared Leadership but some seem not to take part

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E3: Summary Shared Leadership

Shared Leadership Factor	Links/Member
Decision	2,4
Vision	4,5
Communication	6
Coordination	5,85
Teamwork	4,1

Shared Leadership	
Decision	Area for Improvement
Vision	Excellent
Communication	Excellent
Coordination	Excellent
Teamwork	Excellent

Proposed Timeline

Time	Action
13 Dec 2013	first sample taken
Dec 2013 / Jan 2014	data evaluation first sample, presentation of data
Feb 2014	scrum masters to coach agile teams on shared leadership
April 2014	second sample taken
May / June 2014	report out

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E3: Evaluation Shared Leadership

Decision Making
Density: 0,404 (0,33)
Decentralization: 0,69 (0,61)
Members: 7 (7)
Links/Member: 2,4 (2)

- Decision Making – Low shared leadership only a few make decisions
  - Strengthen decision making and let others be part of the decision making process
- -> Value dropped

Vision
Density: 0,76 (0,57)
Decentralization: 0,72 (0,83)
Members: 7
Links/Member: 4,5 (3,4)

- Vision – Shared Leadership Leaders, Vision dropped

Communication
Density: 1,0 (1,0)
Decentralization:1,0 (1,0)
Members: 7
Links/Member: 6 (6)

- Communication – Shared Leadership Team members communicate with each other

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E3: Evaluation Shared Leadership

Coordination
Density: 0,976 (1,0)
Decentralization:0,97 (1,0)
Members: 7
Links/Member: 5,85 (6)

- Coordination – Shared Leadership Team member coordinate their work tasks with other team members
- -> slightly improved

- Teamwork – Shared Leadership but some seem not to take part
- -> stayed the same

Teamwork
Density: 0,69 (0,69)
Decentralization:0,83 (0,83)
Members: 7
Links/Member: 4,1 (4,1)

E3: Summary Shared Leadership
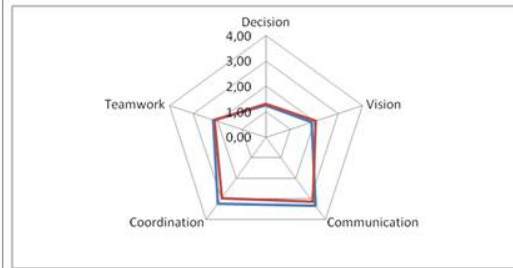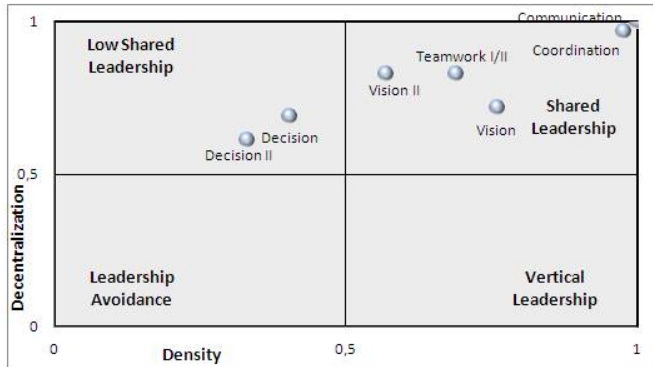
Shared Leadership Factor	Links/Member 1	Links/Member 2	Shared Leadership	
Decision	2,4	2,0	Decision	Area for Improvement
Vision	4,5	3,4	Vision	Area for Improvement
Communication	6	6	Communication	Excellent
Coordination	5,85	6	Coordination	Excellent
Teamwork	4,1	4,1	Teamwork	Excellent

E4: Evaluation Shared Leadership

Shared Leadership Factor	1st sample
Decision Making Density: 0,164 Decentralization: 0,73 Members: 14 Links/Member: 2,14	
Vision Density: 0,47 Decentralization: 0,75 Members: 14 Links/Member: 6,14	
Communication Density: 0,76 Decentralization: 0,87 Members: 14 Links/Member: 9,9	

- Decision Making – Low Shared Leadership, only a few make decisions
  - Strengthen decision making and let others be part of the decision making process

- Vision – Low Shared Leadership Leaders do not have strong vision of the team goal and their work area. Vision seems not to be shared among team members

- Communication – Shared Leadership Team members communicate with each other

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E4: Evaluation Shared Leadership

Coordination Density: 0,791 Decentralization: 0,91 Members: 14 Links/Member: 10,28	
Teamwork Density: 0,461 Decentralization: 0,74 Members: 14 Links/Member: 6	

- Coordination – Shared Leadership Team members coordinate their work tasks with other team members

- Teamwork – Low Shared Leadership some team members seem to be isolated ?

E4: Summary Shared Leadership
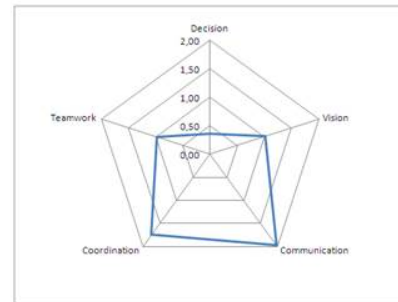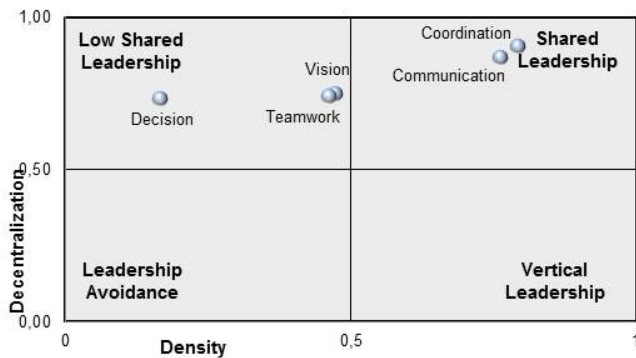
Shared Leadership Factor	Links/Member
Decision	2,14
Vision	6,14
Communication	9,9
Coordination	10,28
Teamwork	6

Shared Leadership	
Decision	Area for Improvement
Vision	Area for Improvement
Communication	Excellent
Coordination	Excellent
Teamwork	Area for Improvement

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Proposed Timeline

Time	Action
13 Dec 2013	first sample taken
Dec 2013 / Jan 2014	data evaluation first sample, presentation of data
Feb 2014	scrum masters to coach agile teams on shared leadership
April 2014	second sample taken
May / June 2014	report out

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Transformational and shared leadership evaluation Team E5

Mark Menzel
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March 2014

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Evaluation Transformational Leadership

Comparison of TMLQ Results for Leadership Team with Normative TMLQ values		
Leadership Style	TMLQ 1st sample Mean	Bass &Avolio Norm (2004) (n=27285) Mean
Transformational Leadership		
Idealized Attributes III	2.53	2.94
Idealized Behaviors IIB	2.87	2.77
Inspirational Motivation INSP	3.04	2.92
Intellectual Stimulation IS	2.91	2.78
Individualized Consideration IC	1.76	2.85
Transactional Leadership		
Contingent Reward CR	2.44	2.87
Management-by-Exception (Active) MBEA	2.25	1.67
Management-by-Exception (Passive) MBEP	1.36	1.03
Non Leadership		
Laissez-faire LF	1.13	0.65
Team Effectiveness and Satisfaction		
Extra Effort EE	2.30	2.74
Effectiveness EFF	2.56	3.07
Satisfaction SAT	2.89	3.08

- INSP – Leaders have high expectations on followers or other leaders,
  - The team has a clear vision
- IS – Leaders to inspire others to be creative
  - The Team develops unique ways of problem solving
- IC – Leaders create a supportive climate
  - Should listen more to the needs of the others and to help others as a kind of coach
- MBEA – Leaders monitors peers for mistakes and then take corrective actions
- LF – Delay decision and gives no feedback
  - Abdicates responsibility, delay decisions, low feedback culture

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Evaluation Shared Leadership

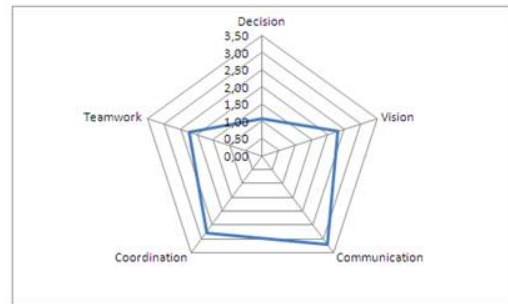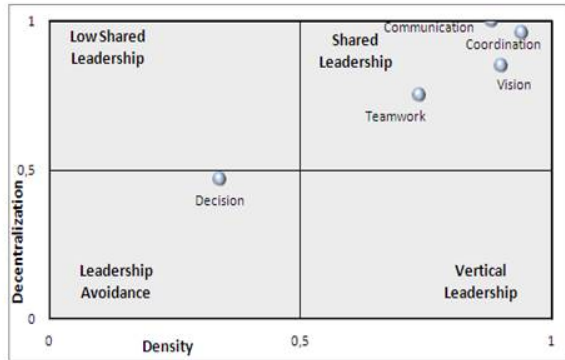| Shared Leadership Factor	1st sample	
Decision Making (DM) Density: 0,34 Decentralization: 0,47 Members: 9 Links/Member: 2,77		▪ Decision Making – Shared Leadership avoidance 　▪ There is a domination of a few, only a low level of decentralization
Vision Density: 0,90 Decentralization: 0,85 Members: 9 Links/Member: 7,2		▪ Vision – Shared Leadership Leaders have strong Vision of the team goal and their work area. Vision is shared among team members
Communication Density: 0,88 Decentralization: 1,00 Members: 9 Links/Member: 8		▪ Communication – Shared Leadership Team members communicate with each other and comment on others actions

Evaluation Shared Leadership

Shared Leadership Factor	1st sample	
Coordination Density: 0,94 Decentralization: 0,96 Members: 9 Links/Member: 7,5		▪ Coordination – Shared Leadership Team members coordinate their work tasks with other team members and align these work tasks
Teamwork Density: 0,736 Decentralization: 0,75 Members: 9 Links/Member: 5,8		▪ Teamwork – Shared Leadership Team-members have high influence on others, Links/Member could be better

Summary Shared Leadership

Shared Leadership Factor	Links/Member
Decision	2,77
Vision	7,20
Communication	8,00
Coordination	7,50
Teamwork	5,80

Shared Leadership	
Decision	Area for Improvement
Vision	Excellent
Communication	Excellent
Coordination	Excellent
Teamwork	Excellent

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