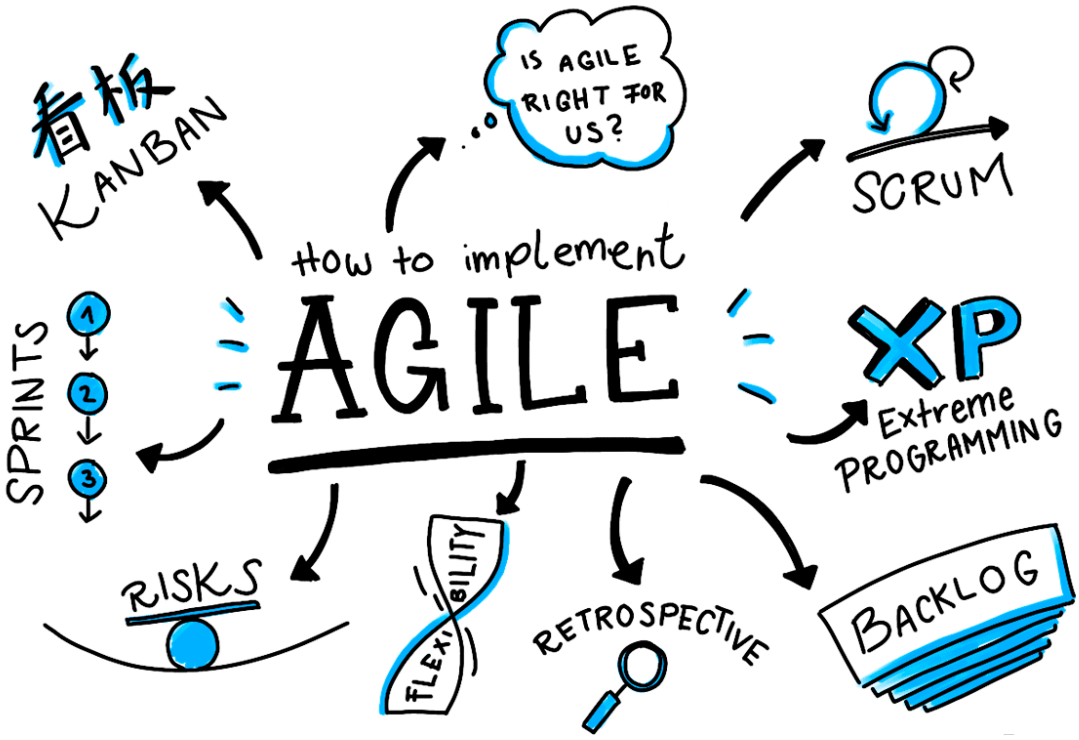
Leadership behaviour in agile squads



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Pre-face

Before you lies the thesis about effective leadership in agile squads. This research was conducted for the department Change Management and Organizational Behaviour of the University of Twente and was written for the purpose of graduating from the Master Business Administration. The graduation process has been hard at times, but with the help my supervisors and especially Desirée van Dun I managed to answer my research question. I would like to thank both my supervisors for the opportunity of graduation under their tutelage and their help during my graduation process. I would also like to thank Rianne Kortekaas who helped me with my data collection, together with student assistants and fellow students. And last but not least I would like to thank all my family and friends who supported me during the difficult moments in this graduation process.

Summary

In recent years the interest in alternative leadership styles has increased. Companies are experimenting with less hierarchal leadership forms such as shared and distributed leadership. Because of this increased interest in other leadership practises the agile methodology has been rapidly growing in popularity. This research looked into how four dimensions of effective leadership (task-, relation-, change and external-orientation) take form in agile organized squads and how this effect performance and effectiveness. In theory there is no appointed leader in an agile squad and the squad leads itself. But is this also the case in practise? And if so, do we still find the same basic principle of effective leadership in these squads? The following research question was developed: How does (effective) leadership take form in agile squads and how does this effect squad performance?

To answer this question nine agile squads from a large Dutch commercial organization were observed. This was done via a mixed method approach with word for word transcriptions, video coding, video observations and surveys. First, the observed meetings were transcribed to record the conversations. Second, two independent researchers coded the behaviour of every squad member using a special verbal behaviour code book. Third, the researcher observed the squads with field note observations to see what aspects of effective leadership they showed. Last, performance and effectiveness measures where obtained via surveys.

With this research we found two different kind of leadership behaviours styles in the squads. A more hierarchal leadership behaviours style and a shared leadership behavioural style. In the hierarchal squads there seemed to be one person with a certain dominance. In the squads with a shared leadership approach the leadership was managed by the whole team. However, the shared leadership squads have distributed some leadership aspects to team members, such as the Product Owner and the agile coach. So, within these squads there is a mixed method approach towards leadership with both shared and distributed leadership. This is a different view than suggested by Fitzsimons et al. (2011), who describe that these are two separate approaches.

In terms of effective leadership it was found that half of the hierarchal squads did not show signs of relation-oriented behaviour. So a distinction was made between hierarchal squads that have a complete spectrum of effective leadership dimension and squads who do not. Within squads who use a shared approach to leadership we found that relation-oriented behaviour was present most of the time. Based on these three categories (shared leadership squads, complete hierarchal squads and incomplete hierarchal squads) the squads where compared in terms of performance. Here we found that the shared leadership teams scored lower on meeting effectiveness, sprint effectiveness, squad performance and job satisfaction. Which contradicts earlier studies (Ensley, Pearson, and Pearce (2003); Spillane et al., 2001; Harris, Leithwood, Day, Sammons, & Hopkins, 2007) who showed that shared leadership squads should score higher on performance. When looking at these results two things should be taken into consideration. First, the sample size is not large enough to make definitive statistical conclusions. Second, the performance data is perceived performance data and might not be objective. The outcomes do however show that in these cases a shared leadership approach is not necessarily increasing performance. When more squad data is obtained these results can be validated trough statistical analysis.

To make these outcomes more generalizable, there is a need for more squad data. So the main recommendation is to continue and expand this research when more squad data is obtained. By obtaining more data the performance outcomes can be validated with statistical analyses and the leadership patterns can be made more robust.

Contents

1. Introduction

In recent years there has been a growing interest in alternative approaches in leadership in which a hierarchal leader is not necessarily required (Fitzsimons, James and Denyer, 2011). Shared leadership and distributed leadership are seen as alternative approaches. Shared leadership is the approach where all team members share equal responsibility for all leadership aspect (Fitzsimons et al., 2011). Whereas, in distributed leadership, leadership tasks are distributed among some or all team members, with the key difference being that the individual chosen for a certain task is solely responsible (Fitzsimons et al., 2011). Many studies have confirmed that teams with shared leadership or distributed leadership have a positive effect on, for instance, task effectiveness, subordinate satisfaction or team performance (Ensley, Hmielski, & Pearce, 2006; Bowers & Seashore, 1966; Yukl, Mahsud, Prussia, & Hassan, 2019; Fitzsimons et al., 2011). But what makes these leadership forms effective?

Most effective leadership studies and the studies concerning behaviour of leaders have been focused on individuals. However with a trend toward self-managing teams or self-organizing teams these studies seem less relevant because the team's performance is not managed or lead by specific individuals. That raised the question if the studies conducted for effective leadership are in fact still relevant or not? For instance, Yukl (2012) described the hierarchical taxonomy of leadership behaviours consists of four concepts: task-oriented behaviour, relations-oriented, change-oriented and external-oriented behaviour. Do we observe the same four concepts in teams that are not led by individuals but share leadership among all team members? Agile squads are good examples of shared leadership teams and it might be that in agile squads the Product Owner (PO) or agile coach makes sure that all these concepts are still somehow at work. It could also be that agile squads have multiple people who all focus on some aspects of these four concepts. But it could also be that someone (PO or other squad members) shows signs of all four leadership behaviours and without consciously knowing be the effective leader the squad. This then raises the question what form of team leadership increases team performance. Does a diverse team where different people showing different kind of effective leadership behaviour perform better than teams where a leader rises from the ranks. Or do self-managing teams perform better because they show different effective leadership behaviour than we have currently identified? These questions have led to the following research question: How does (effective) leadership take form in agile squads and how does this effect squad performance?

Fitzsimons, James and Denyer (2011) show that many scholars have studied leadership in shared leadership teams or self-managing teams. For instance, Spillane (2005) studied, who takes responsibility for leadership work and how individuals get constructed as leaders in teams. Spillane found that collaborated, collective and coordinated leadership were concepts that show how individuals taking on a leadership roles. Most studies have used questionnaires as their main evidence to support their outcomes. Which according to Behrendt, Matz, & Görtitz (2017) has led to problems, because most outcomes of studies (in shared leadership studies but effective leadership studies as well) do not make a distinction between perceived leadership behaviour and actual leadership behaviour. Behrendt et al. (2017) plead for more observation-oriented studies that are more valid than the studies done with the questionnaires. They do mention that observations studies have been conducted but they suspect that many studies have fallen victim to either the halo effect or the confirmation bias and therefore they think that the validity of these studies may also be insufficiently guaranteed.

In this research a mixed-method approach of video observations, transcriptions and surveys are used to give a more complete and objective perspective on how leadership takes form in these agile squads. By using observations in combinations with transcripts we try to minimize the observation errors (halo effect and confirmation bias) and moreover try to correct for differences in

perceived and observed leadership behaviour. The video observation method is seen as a highly relevant approach to organizational behaviour studies, either quantitative or qualitative (Asan & Montague, 2014; Waller & Kaplan, 2016; Christianson, 2016). In combination with transcripts the qualitative data can be strengthened by more qualitative evidence for the observations.

The surveys will shed light on the team perceived team performance. The amount of squad data that is retrieved during this research, however does not yet allow for statistical analysis to check for causality with performance measures. However, the performance measures of the squads will be reported to find patterns for new propositions. The agile squads which participated all came from one large commercial organization in the Netherlands, which will be elaborated on in the methodology and literature review.

This research adds to the current literature by identifying how leadership takes shape in agile squads and how it might lead to better performing squads. Moreover, it provides more robust evidence compared to most papers on this topic, by using a mixed-methods research approach as described earlier. The practical relevance of this research is the knowledge for upper management levels on how to instruct their squads to implement shared or distributed leadership to increase team performance. This paper will increase the knowledge of how agile squads should lead themselves to increase their performance.

This thesis is structured as follows: first the literature will be reviewed about agile management theory, effective leadership theory, shared leadership theory and distributed leadership theory. The second chapter contains the methodology of this research, the measures taken to ensure its validity and reliability and describe the data collection that is used for this research. In third chapter the results are described and in the fourth chapter these results will be discussed. The final chapter discusses the limitations and recommendations of this research.

2. Literature review

2.1. Agile management

The agile management theory originates from the IT/ software development world and is seen as a way of working that increase agility (flexibility) for software developers (Dönmez, Grote, & Brusoni, 2016). It was started as an alternative approach for developing software and was quickly seen as a way of achieving operational excellence (Powell & Strandhagen, 2012). It was quickly widely spread and implemented in IT and software businesses and has now found its way to other organizations. Back et al. (2013) wrote an agile manifesto and this manifesto describes the four dimensions where the focus should be in agile software development. They stated that there is more value in:

- people and interactions than processes and tools
- working software than comprehensive documentations
- customer collaboration than contract negotiation
- responding to change than following a plan

Back et al. (2013) believe that these four items are key for a better way of software development and this has led to the agile methods as we know it. Agile management can be seen as a method on how to become more adaptive to fast changing environments (Dönmez et al., 2016). Adopting agile management enables software developers act more quickly on new development ideas, access information more quickly, make faster and smarter decisions. The agile squads are multidisciplinary teams that manage themselves and work in short development cycles (sprints) (Dönmez et al., 2016). Customers are very involved in these quick cycles and generate continuous feedback. The short sprints have certain phases: the sprint planning phase, the sprint re-planning and the sprint retrospective. The sprint planning is the phase where the squads talk about their goals for the next sprint. What is everybody going to do and what can be completed? In the sprint re-planning phase the squads look back at what is actually delivered and the products will be demoed to the client. This is a key difference when looking at the retrospective phase. The sprint re-planning is looking back at the product, but the retrospective is focussed on the squad's processes. How did the last sprint go? What went wrong? How can we make sure that this doesn't happen again (Dönmez et al., 2016)? These three phases combined lead to a highly effective way of software development

Birkinshaw (2018) reported on a case study done for a Dutch bank. Birkinshaw described that this bank, but also other fast growing technology companies, have adopted agile not just as a software or IT methodology but as a way of working. At those growing technology companies (such as Spotify, Amazon and Zappos) adopting agile as a way of working has led to improved customer orientation and employee engagement. There are many different agile models developed over the years, the "Spotify model" is among the popular ones. The Spotify model is organized as set of multidimensional matrixes, where agile squads are the main team structures who create value. Every squad has a PO and several squad members with different skills or functions. The combination of multiple relatable squads is called a tribe, every tribe has one or several agile coaches who coach the squads in their teamwork. Next to the agile coach, every tribe has a tribe leader who leads the tribe but not the individual squads. The combinations of tribes is called a guild. Figure 1 shows a schematic overview of this organizing structure based on Bäcklander (2019).

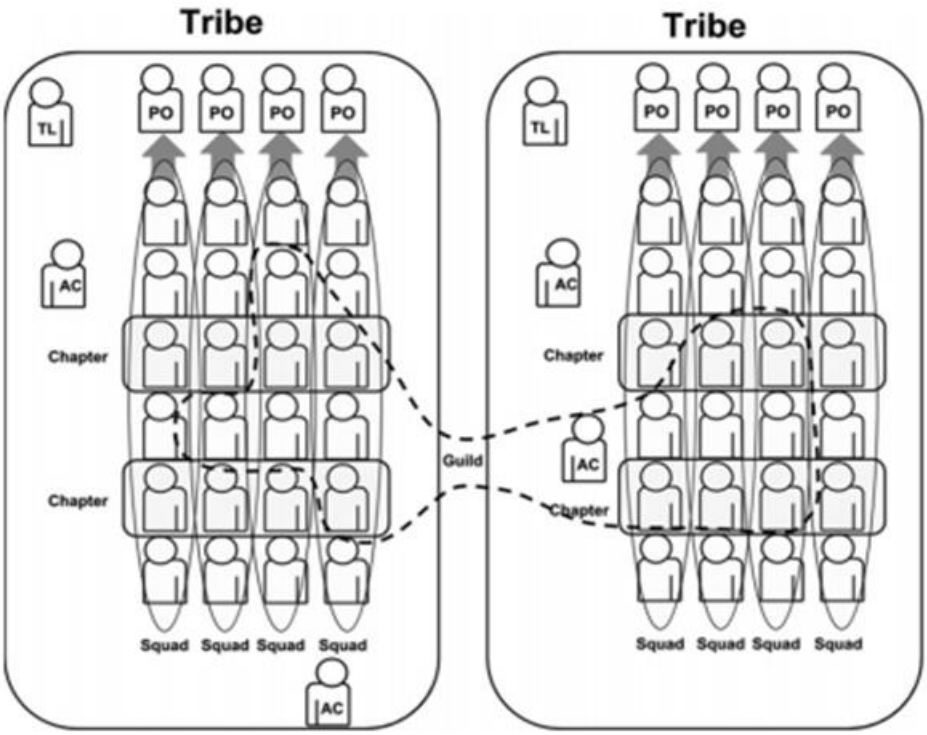

Figure 1: Spotify model organization schematic (Bäcklander, 2019, p.45)

As we can see in this figure squad members are also part of a chapter, because squads are usually build up from people with different skills and competencies. A chapter is the combination of squad members with the same skill set, so they can collaborate with each other. Such a chapter may also have a chapter lead. For this research we will focus on the three specific roles that are part of every individual squad: the agile coach, the product owner and individual squad members.

The agile coach's main role is supporting the squads by: teaching, facilitating, one-on-one coaching with squad members, squad coaching, arranging training sessions and helping in adapting and maintaining the agile philosophy (Bäcklander, 2019; Birkinshaw, 2018). In the end every agile coach's approach to his/her role might differ slightly in practice, because of specific team needs or personal preferences. For this research it might be interesting to see if the agile coach really enables leadership in others and makes sure all aspects of leadership are considered.

The role of product owner (PO) focusses more on what a squad is building and helps the squads build the right things (Bäcklander, 2019). Therefore the role of PO is making sure that what the developers build adds value for all stakeholders. The PO is not seen as a manager but as a squad member who makes sure that the managements concerns are addressed in the squads (Bäcklander, 2019; Birkinshaw, 2018). This is an interesting role in this research, because the PO might in practice not necessarily only help the squad in building the right things. But it might be that a PO starts making the decisions for the squad. Especially when a PO has previous experience in a non-agile hierarchal environment. Therefore, Bäcklander (2019) states that some unlearning might be needed when a PO has previous experience in a non-agile hierarchal environment, to ensure that the PO does not make decisions for the squad, but the whole squads can decide. Moreover, this way the PO is forced to share all information with team members. This raises the question: which aspect of effective leadership does a PO have and which aspect are found in other squad members?

2.2. Effective leadership

As described in the introduction, Yukl's (2012) taxonomy consists of four concepts. Task-oriented, relations-oriented, change-oriented and external-oriented effective leadership behaviour. Yukl (2012) describes how all these behavioural concepts are divided into different sub-behaviours. These sub-behaviours show how these concepts are used in practise. Task oriented behaviour consist of clarifying tasks, planning, monitoring and problem solving. Relations-orientated behaviour consist of supporting, developing, recognizing and empowering employees. Change orientated behaviour focusses on advocating change, envisioning change, encouraging innovation and facilitating collective learning. The external leadership behaviour surrounds the sub-behaviours networking, external monitoring and representing. Yukl (2012) claims and later Yukl et al. (2019) confirmed that in order to an effective leader, a leader should show behaviour on all the main behavioural concepts. The sub-behaviours are the practical and more observable dimensions of those larger concepts. For example, an effective leader is task-orientated and shows this by clarifying task, planning task, monitoring the progress of those tasks and helps in solving any problems that may arise. So according to Yukl an effective leader is a leader who is task-, relations-, change- and external-orientated.

Table 1: Yukl's (2012) taxonomy (P.68)

Task-oriented	Clarifying
	Planning
	Monitoring operations
	Problem solving
Relations-oriented	Supporting
	Developing
	Recognizing
	Empowering
Change-oriented	Advocating change
	Envisioning change
	Encouraging innovation
	Facilitating collective learning
External	Networking
	External monitoring
	Representing

In Table 1 all concepts and their sub-behaviours are displayed. For this research it could be relevant if someone shows signs of any of these sub-behaviours and would therefor show signs of effective leadership. Yukl et al. (2019) already showed that relations of these sub-behaviours having significant positive effect on performance. Could this also be seen in non-hierarchical teams, such as agile squads? This research will show if these concepts are also useful when describing leadership in non-hierarchical teams. Other scholars (Behrendt et al., 2017) have argued that Yukl's (2012) taxonomy is based on the perception of leadership instead of real leadership behaviour, because the data used in this research comes from questionnaires. So this is a limitation of Yukl research which needs to be taken into account for this research

Behrendt et al. (2017) however do believe that task-orientated and relations-oriented behaviour are two very important concepts. They show that a lot of studies have a consensus about these two concepts. That's why Behrendt et al. (2017) constructed the Integrative Model of Leadership Behaviour (IMoLB): as we can see in figure 2 this model surrounds these two concepts task-oriented and relation-oriented behaviour. They also mention external and change-orientation, but they see it

as part of the two main concepts. Relations-oriented can be internally focussed or externally focused. Task-oriented can be routine tasks or tasks concerning change. This is a different view on external and change-oriented behaviour than Yukl's (2012) view. Where relations-oriented is purely internal and tasks-oriented behaviour is about routine tasks. Yukl (2012) therefor says that the relations-oriented behaviour is different for internal and external. Where Behrendt et al. (2017) do not make a distinction that internal and external behaviour could be different. They only say that relations-oriented can be internal or external. The same goes for task-oriented behaviour, the IMoLB model shows that tasks can be routine or focused on change, but does not describe that routine task-oriented behaviour could be different than change task-oriented behaviour. Yukl's (2012) model really describes the differences between routine task behaviour and change task behaviour.

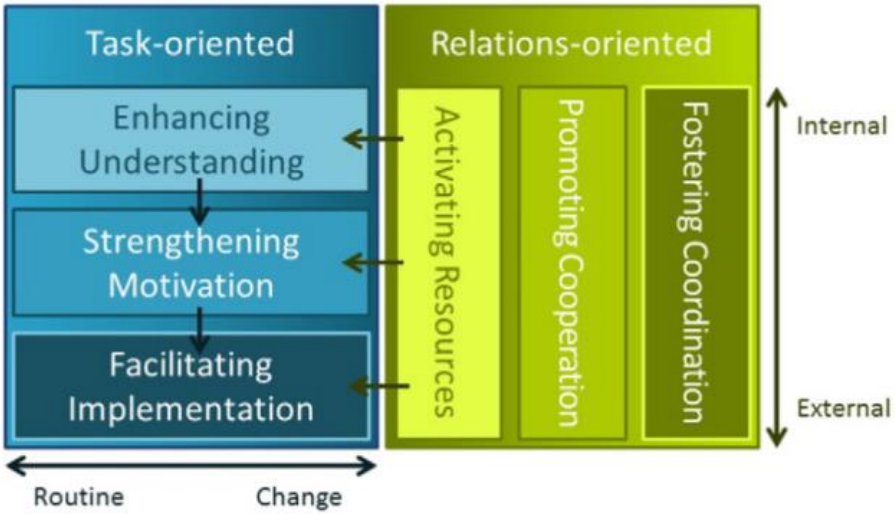

Figure 2: Behrendt er al. (2017) IMoLB (p.11)

DeRue et al. (2011) also shows the same concepts (task- and relations-orientation) and also included change-oriented behaviour in their model, but there are differences. The first key difference is that DeReu et al.'s (2011) model also includes the concept of passive leadership, which the previous models do not. The passive leadership concept is about leading teams by passive behaviour. Laissez faire translates to letting things run its course, this passive leadership approach consist of facilitating the team but never steering or interfering in any decisions. A leadership approach where a leader does not lead could be hard to observe, because it's hard to see if somebody is not interested or purposely being passive. It is hard to observe the intentions of the leader.

The second difference is the sub-behaviours of the other concepts: task-, relations and change-orientation. The differences in sub- behaviours between Behrendt et al. (2017) and DeRue et al. (2011) are that the sub-behaviours of DeRue et al. (initiating structure, empowerment, enabling, etc.) are already more specific than those of Behrendt et al. (fostering coordination, enhancing understanding, etc.). However, the sub-behaviours of DeRue et al. are still broader than those of Yukl (2012). For instance, the sub-behaviours of task-oriented behaviour are according to DeRue et al (2011): initiating structure, contingent reward, and management by exception-active, boundary spanning and directive. But these sub-behaviours are still broad, because initiating structure can be done in many ways: clarifying task helps creating structure and so does planning tasks. These are sub-behaviours described by Yukl (2012) and are more specific. It can also be argued that not all sub-behaviours mentioned are truly behaviours of a leader. Take contingent reward for example, this is a motivational system to give rewards when goals are completed. The leadership behaviour is motivating your employees and the contingent reward is an example how leader could do it in practise.

The third difference is that the model of DeRue et al. (2011) does not only take leadership behaviour in consideration, but also leadership traits and attributions. DeRue argued that prior to their research there where studies concerning specific traits but not a study who combined the traits into one model and show if these traits are in fact independent from one another. Eagly, Johannesen-Schmidt and van Engen (2003) for instance did a study on gender and leader effectiveness and Judge, Bono, Ilies, and Gehrardt (2002), Judge, Piccolo, and Ilies (2004) and Bono and Judge (2004) did studies on how personality and intelligence influence leadership effectiveness. However, those studies did not compare or control the outcomes with one another. Thus by integrating behaviour, traits, personality and attributes DeRue et al.'s (2011) model gives a more complete overview of the complexities of effective leadership. The model from DeRue et al. (2011) is very broad and analysing all the different aspects of this model is too extensive. In later stages when enough data is available this could be done.

Concluding, for this research it is important to focus on the behavioural aspect of leadership and Yukl's (2012) taxonomy is for that reason very important. The IMoLB from Behrendt et al. (2017) and the integrated model of DeRue et al. (2011) show a lot of promise but the dimension used in these models are broad and therefore make it harder to identify specific behaviour. When certain behaviour is observed it could be hard to place them in certain behavioural concepts or sub-behaviours that these models use. Yukl's (2012) taxonomy is more specific because the identification of sub-behaviours. This makes observing and coding more specific and that will result in better data. That's why for this research Yukl's (2012) taxonomy will be used. The concerns addressed by Behrendt et al. (2017) about the taxonomy will be taken into account by doing real observations and not only conducting questionnaires.

2.3. Shared leadership and Distributed leadership

Fitzsimons et al. (2011) state that "interest has grown within management and organization studies in alternative models of leadership in which leadership is not limited to one formally appointed leader" (p.313). In their study Fitzsimons et al. (2011) give two alternatives to this new approach in leadership styles: Shared and distributed leadership. The key differences and characteristics are summarized in Table 2.

Table 2: Fitzsimons et al. (2011) differences and characteristics in shared and distributed leadership (p.319)

Shared leadership	Distributed leadership
Leadership often emanates from the designated leader plus other group members who share leadership roles (e.g. Strongman, Transactor, Visionary hero and Super-leader).	Leadership is not only held by those with designated, formal leadership roles but is enacted by multiple individuals in the organization.
Leadership involves several individuals leading themselves and allowing others to lead them through a reciprocal influence process.	Leadership practice is constituted and shaped by the interactions between leaders and followers and the organizational context.
Cognition is shared by members of the group.	Cognition is 'stretched over' both human actors and aspects of the context they are in.
Advantage is offered through the aggregate of attributed influence in a group (collective influence).	Advantage is offered by developing a capacity to act by means of 'concertive action', 'co-performance' or 'conjoint agency'.

For this research these two approaches are further looked into, because it could be interesting to see how agile squads have implemented certain leadership approaches.

Shared leadership is according to Spillane, Halverson and Diamond (2001) a leadership form where every team member is a leader and has the same democratic rights. According to Bligh, Pearce and Kohles (2006) it starts with self-leadership and according to Fitzsimons et al. (2011) shared leadership can partly be traced back as a transition in self-leadership and super-leadership constructs (Manz and Sims, 1987, 1991). Bligh et al. (2006) hypothesized that good self-leadership can lead to better shared leadership and eventually to more knowledge creation. They argue that individual trust leads to team trust, individual commitment leads to team commitment and self-efficacy leads to team potency. This suggests that in poorly performing shared leadership teams there might be a problem in team trust, team potency or team commitment. As a result, in order to create a better performing squad there should be more focus on the self-leadership aspects mentioned by Bligh et al.'s (2006) model.

Burke, Fiore and Salas (2003) suggested something similar as Bligh et al.'s (2006) model, when they said that teams do not always reach their potential because they're not able to smoothly coordinate team members. Ensley, Pearson, and Pearce (2003) proposed that shared leadership eventually might lead to new venture effectiveness and financial performance by creating a shared

vision and creation a higher cohesion level between team members. This suggests that behaviour that leads to a shared vision or high team cohesion might be sign of effective leadership in teams.

Distributed leadership is defined by Spillane et al. (2001) as a social distribution of leadership, where the leadership function is divided as the work of a number of individuals. In the research of Spillane and others (Spillane et al., 2001; Harris & Spillane, 2008) the leadership function is divided among more stakeholders in a school setting, such as teachers and students. Making them responsible for their part of the leadership function. This can be seen as the main difference between shared and distributed leadership. Shared leadership does not dictate who is responsible for a certain part of leadership. Distributed leadership however, gives the responsibility of certain leadership aspects to a certain team members, and thus allows for autocratic and not necessarily democratic decision making (Spillane, 2005; Gronn, 2008). Spillane, 2005 describes three forms of distributed leadership: collaborated, collective and coordinated. Collaborated leadership is the form where people together discus and decide who does specific tasks making one person responsible for that part. Collective leadership is the one who relates to shared leadership, here everybody is equal and everybody is responsible for the outcomes. Coordinated leadership is similar to collective leadership, however, the tasks are divided by someone in the group who takes the lead. Distributed leadership studies have shown that there are positive effects of distributed leadership on performance and organisational change (Spillane et al., 2001; Harris, Leithwood, Day, Sammons, & Hopkins, 2007). Anderson and Sun (2017) do say that most distributed leadership studies are conducted in a school or education sector. So the interaction of distributed leadership with business performance has not been proven so far.

The theories mentioned above show that in a non-hierarchal team there are still differences in leadership. These differences could be important when looking at the effective leadership of the squads. That's why there is a need to know what kind of approaches to leadership the squads in this research are using. Do these squads show signs of either using a shared or distributed leadership form?

3. Methodology

3.1. Research design

The goal of this research is to see how (effective) leadership takes form in agile squads and to see how this influences performance. This goal can be divided into different sub questions: Can we still identify a leader, even though there is no appointed leader? If we can't identify a leader do the squads use shared leadership or distributed leadership? Can all effective leadership dimensions of Yukl (2012) be found in the squads? And how do the different leadership forms, if there are any, influence performance?

To answer these questions nine agile squads of a large Dutch commercial organization have been studied through a mix-method approach of video observations, transcriptions and surveys. The video observations are the main data source with the transcript and surveys as useful extensions. The video observation method is a widely used approach to observe behaviour and is seen by many scholars as a very valuable data collection method (Asan & Montague, 2014; Waller & Kaplan, 2016; Christianson, 2016). With the transcripts as support data, real examples of behaviour can be found to strengthen the observations and the surveys gives quantitative support to the observed data.

The video observations were held during three regular sprint meetings in one sprint: the sprint planning, re-planning and the retrospective. The sprint planning is a meeting about which tasks will be done in the upcoming sprint. The sprint re-planning is a meeting where the tasks are adjusted based on new experiences while working on these tasks. And the sprint retrospective is a reflection meeting of the last sprint. After these three meetings an entire sprint is finished, which means that it's expected that all leadership aspects should have been observable.

The observations are conducted via a camera and the squad members gave their consent for being recorded. The researcher was not physically present during the meetings to minimize obtrusion and morally good behaviour. The recorded meetings are also used for different studies so the squads are not aware of the specific topics the observations are being used for. To make sure the observations section 3.2 elaborates more on how possible biases will be minimized and how reliability and validity will be ensured.

The videos were observed in two different ways. By video coding and field note observations. The video coding was done to systematically code behaviour and leadership behaviour from all squad members. The field note observation were held to specifically check for Yukl's (2012) effective leadership dimensions together with the transcripts for the examples. The transcripts were also used to make a quantitative speech analyses of all the squad members. How much they talked and how many words they used. The surveys were analysed for the sample description and performance measures. These data collection methods and how they are being used is described in more detail in section 3.3.

3.2. Sampling and sample description

The sample exists of nine agile squads. The squads are all from the same large Dutch commercial organization, but not from same departments necessarily. The nine squads volunteered to be studied and observed, so there might be some sampling error, because it could be that this sampling is not completely random. It might be that better performing squads are more eager to join this study, because they don't mind to be observed. Squads that are not performing well might not want to spend time on this research or don't want to be observed. So this possible sampling error is a result of the volunteered based recruitment method.

To check our sample and to check for abnormalities, some demographics and effectiveness measures were studied. These demographics and effectiveness measures were obtained via surveys done by the CMOB department (see section 3.3.1. for more information on the survey) Table 3 shows some squad demographics, and a number of things stand out. The average age of squad 14001 is quite high and furthermore, the team size is relatively small compared to the other squads. When looking at gender we can see that there are no teams who have more female members than male members. Squads 2001, 3001, 8001 and 14001 only have Dutch team members. The educational levels of the squad do not vary much and the squad members are fairly high educated. Only squad 14001 seem to have some differences, maybe this is also because of the age of the team members. For team 2001 and 14001 there is no survey data for identifying the PO. Or the PO was not present during the meetings and did not fill out a survey or the PO didn't fill in this part of the survey.

Table 3: demographics.

demographics									
squad number	team size	average age	male team members	Female team members	Dutch team members	other nationality	Highest completed level of education	lowest completed level of education	PO
1001	10	42	9	1	8	2	University master	bachelor applied sciences	F7
2001	9	41	6	3	9	0	University master	bachelor applied sciences	missing data
3001	8	36	6	2	8	0	University master	bachelor applied sciences	F4
4001	8	33	6	2	2	6	PHD	master applied sciences	F5
6001	7	33	7	0	4	3	PHD	University master	F2
7001	8	42	5	3	2	6	University master	bachelor applied sciences	F1
8001	7	45	7	0	7	0	University master	bachelor applied sciences	F6
12001	9	32	8	1	1	8	Univeristy master	bachelor applied sciences	F2
14001	5	58	4	1	5	0	University Bachelor	high school	missing data

In terms of performance the squads also answered questions in the surveys. Questions about meeting effectiveness, sprint effectiveness, squad performance and job satisfaction. These questions however, measure the squad's perception of their own effectiveness, so these measures are prone to have some biases, and therefore might have reliability issues. Even though these perceived performance measures might have biases they still might show patterns that in further research can be verified. So, the performance measure are used in this study and are explained in more detail in section 3.3.1.

A table with the performance results is reported in section 3.4. Squad 14001 does not have the performance data for these measures. This is because the survey concerning these topics was held after meeting 3. However, due to the corona crisis this meeting never took place and so the survey was never held.

It seems that squad 8001 gave their sprint effectiveness a low score of 3.5 on a 7 point scale. The score of 3.5 means that their team effectiveness is somewhere between slightly ineffective and neutral. But this is the only score that is below the neutral score of 4. Based on these performance measures it seems that the squads who participated in this study are all quite high performing.

3.3. Data collection

3.3.1. Surveys

The surveys that were held were used for three purposes: sample description, performance measurement and reliability measurement. In section 3.2 the survey outcomes were used to describe the sample. This was done with both demographics and performance measures. The performance measure are also used in this research to compare squads performances (see section 4.3). The reliability is of the observations were checked by checking if these meetings and sprint were representative for normal meetings of these squads. The squads were aware that they were being observed and therefore, squad members answered questions if the sprint and meetings are still similar to the meetings that these squads normally have (see section 3.4).

The surveys that are being used in this research are part of a larger survey held by the CMOB research team. The surveys are structured as follows: there is a general survey for after every meeting and three specific surveys for after each videotaped meeting. Not every aspect of this survey is used for this research. In this section all constructs that will be used are described. With every construct is a time code mentioned to address in which survey this construct will be asked, TG is the general survey, T1 the survey after meeting one, T2 survey two and T3 the third and last survey.

Demographics (T1)

The demographics of this survey consist of the following aspects: age, gender, nationality, native language, the period of time someone has been working agile, the period of time someone has been part of this squad, primary area of expertise, if you are the PO of the squad and if so how long? The demographics are used to check for sample diversity and sample characteristics.

Meeting representativeness (TG).

This construct is used to research the representativeness of the meetings in comparison with others. There are four questions underlying this construct: Compared to similar meetings with your squad how different was, (Q1) this meeting, (Q2) your behaviour during this meeting, (Q3) the behaviour of your colleagues and (Q4) the composition of the squad? The answers options were on a seven point Likert-scale from very different to not at all different.

Sprint representativeness (T3).

Sprint representativeness is similar to the meeting representativeness construct, the difference is that this construct does not look at the individual meetings but the entire sprint. Therefore, the questions are phrased as “Compared to similar sprints with your squad how different was (Q1) this sprint, (Q2) your behaviour during this sprint, (Q3) the behaviour of your colleagues and (Q4) the effectiveness of this sprint?”. These answers are given on a seven point Likert-scale varying from very different to not at all different.

Meeting Effectiveness (TG)

This construct is a construct about meeting effectiveness designed by Rogelberg Leach, Warr and Burnfield (2006). It consists of four questions about if the meeting was effective, productive, worth my time and efficient. Respondents can answer based on a seven point Likert-scale from strongly disagree to strongly agree.

Sprint effectiveness (T3)

This construct was based on two questions. Question one: “To what extent do you agree or disagree with this statement? This past sprint was very effective.” And question 2: “To what extent do you agree or disagree with each statement? In this past sprint, we accomplished our sprint goals.” The answer possibilities were given on a Likert scale from one to seven, with one being strongly disagree and seven strongly agree.

Squad performance (T3)

This construct was designed by Gibson, Copper and Conger (2009) and was constructed based on four questions: this squad is consistently high performing, this squad is effective, this squad makes few mistakes, and this squad does high quality work. The answers were given on a seven point Likert scale with one being very inaccurate and seven being very accurate.

Job satisfaction (T3)

The last measure is the job satisfaction measure designed by Thompson and Phua (2012). This construct consists of the following questions: I find real enjoyment in my job. I like my job better than the average person. Most days I am enthusiastic about my job. I feel fairly well satisfied with my job. Answers are also based Likert scale from one to seven from strongly disagree to strongly agree respectively.

3.3.2. Video observations

All the squads are recorded on three different occasions as mentioned before. During the sprint different aspects of leadership surface. The sprint planning gives insights in operational and planning aspect of leadership, where the re-planning focusses more on feedback and external feedback. The retrospective deals with internal relations and innovation. To check if we can observe these aspect the video observations were coded via a confidential verbal behavioural code book. This code book was made by Prof. Dr. Wilderom, head of the CMOB department of the University of Twente. To make sure the researcher uses this code book correctly in combination with the coding software a training was followed at the University. The Software that is being used is called "The Observer", it plays the video and lets you flag certain events (in this case behaviour) at certain times. The start and end time of the events are recorded, so when the coding is finished the software gives an overview of the coded behaviour shown in the video. It shows which team member showed the most coded behaviours, which could help in identifying if a squad uses shared or distributed leadership or not. If everybody shows more or less the same amount of coded behaviour, there is not one leader in the squad. Therefore, the coded observations shed light on actual leadership behaviour of individuals in an agile squad. However, the video code book does not allow for external-oriented behaviour observations, limitedly allows for change-orientation and not all aspects of task-oriented behaviour. This makes it difficult to use the coding for a complete overview of the effective leadership dimensions of Yukl's (2012). Therefore, transcript analyses and field note observations are used to show how the effective leadership dimensions take form in the squads.

3.3.3. Video transcripts and field note observations.

Every video from every squad was transcribed by the researcher. These are word-by-word transcription of all the conversations in the video. These transcripts were used for two purposes. The first purpose is to identify speech patterns in the squads. If there is a leader among the team members, we would expect to find signs of a dominant squad member. This dominant squad member could be identified based on the speech patterns in the transcripts.

The second use for the transcript is for the qualitative analysis on the effective leadership behaviour. Every squad was observed by the researcher to identify which dimensions of Yukl's taxonomy can be identified within a squad. The transcripts helped to show practical examples of how effective leadership takes form within the squads. The observations will be done by making field notes for every squad. See Table 4 for a template in which the field notes and examples will be placed during the observation. These field note observations were a useful extension on the video observation coding, because the codebook of CMOB does not (or only limitedly) allow for all the behaviours of Yukl's (2012) taxonomy to be observed. Hence, some or all effective leadership behaviours will need to come from a qualitative analysis of field note observations.

Table 4: template for field note observations.

	observations
Task-orientation	Example 1: Example 2:
Relation-orientation	Example 1: Example 2:
Change-orientation	Example 1: Example 2:
External	Example 1: Example 2:

3.4. Validity and reliability

For this research there are a few validity and reliability concerns which need to be addressed: the halo effect, confirmation bias, sample size and the obtrusiveness of the observations. We try to minimize these possible effect and biases to makes sure the outcomes of this research are valid and reliable.

The halo effect is the bias that occurs when we attribute certain positive qualities to someone based on other perceived behaviour (Thorndike, 1920). For example, when we see a leader smiling a lot, people might tend to say that this person is a very empathetic. Even though, smiling is not the same as being empathetic. So this halo effect might let observers attribute certain positive leadership behaviour to someone, based on other positive feeling toward someone. To control for this effect the observer uses software to code the video observations, other researchers (student assistants, master thesis students and bachelor thesis students) will also do this (independently) and the two outcomes will be discussed in case the outcomes differ in any way. The difference between the two will be calculated via the inter-rater reliability, this will show if the coded observations are reliable. After the reliability check and the differences are uncovered, the researchers will make a common file based on both observations. So the differences will be discussed and changed to make a "golden file" which is the most reliable. This should minimize the change of the halo effect. Furthermore, the researcher has not been in contact with any of the observed people, so the researcher has no previous knowledge of someone's behaviour that might influence the observed behaviour.

The confirmation bias is the bias that we tend to overly observe certain things if we expect to find them (Nickerson, 1998). This can be negative of positive behaviour. For example, if we expect that a good leader always smiles a lot, we tend to notice that more and thus confirming our own believes. The second observation method as described by the halo effect should also minimize the confirmation bias.

Because of the sample size of this research it is not possible to perform a broad statistical analysis. It is however sufficient for finding possible patterns and making propositions for further research. If the patterns show certain promising outcomes other studies might find the statistical prove. This can be done when more video observations are done and ideally also in different companies to control for different environments.

Obtrusiveness during the observations may lead to the effect that the observed party will display morally good behaviour. The squads are aware that they are being filmed so they might act differently than they normally would. To control for this, questions in the survey address this effect as mentioned in section 3.3.1.

Table 5 shows that the squads find their observed meetings and sprint to be representative for other meetings and sprints they had. When looking at the total scores we can see that there are no squads who score below 4, which is the neutral answer. So on average the squads didn't find their meetings and sprints to be different. However when we look at the meetings we can see that not every meeting was scored the same. Squad 7001 scored their third meeting and their sprint between slightly different and neutral and squad 8001 also scored their sprint between slightly different and neutral. For squad 7001 this can be explained because of events in the third meeting, but for squad 8001 this cannot necessarily be explained. However, both squads do not seem to score low in the first two meetings, even though these would be meetings were people are not that familiar with the cameras. Considering this it is assumed that these differences are not caused by obtrusion of the observation. Based on table 5 there is no evidence to suggest that the meetings and sprints were not representative. Appendix 8.4 shows the scores for every survey question of related to meeting and sprint representativeness.

Table 5: meeting and sprint representativeness.

sprint representativeness					
	meeting 1	meeting 2	meeting 3	sprint	total
1001	5,3	5,9	5,5	5,6	5,5
2001	5,8	5,3	4,4	4,7	5,0
3001	5,2	5,7	5,9	4,5	5,3
4001	5,3	5,3	4,7	4,6	5,0
6001	5,1	4,5	5,0	4,2	4,7
7001	5,5	5,0	3,0	3,4	4,2
8001	4,4		5,2	3,3	4,3
12001	4,8	4,9	4,9	5,6	5,0
14001	5,2	5,5			5,3

Another way in which this research controls for obtrusiveness is, that the squads are not aware of the specific research questions. They do know the broader context but not the specifics. So the squad members are not aware what the researchers are looking for, which makes it difficult start behaving in the fashion they deem right.

All the data that has been used is anonymized and confidential. Only people who have signed confidentially agreements and are in some way connected with the CMOB department have access to this data. This research is also checked and approved by the ethics commission of the University of Twente, who have looked at the ethical issues that might arise (the request number that was approved is 200169). The people who have been observed have all consented to being observed for research purposes. Only teams where all members have consented to being observed we asked to join this study.

3.5. Data analysis

The data of the observations and transcripts are counts of how many times certain things occur on the following subjects: How many times do the team members speak? How many words do the team members use? How many times do the team members show leadership behaviour? How many different kind of leadership behaviours do team members show?

In order to determine if there is a leader within the squads, every time the leadership behaviours are observed in either the transcripts or the video's it will be noted who showed the behaviour: the PO, agile coach or another squad member. When this is done, these counts can be analysed if the leadership behaviours are mainly executed by the PO, agile coach or team members. In this case, proportions will be created by dividing the counts for everyone by the total. If the PO or agile coach show significantly more effective leadership behaviour this could be a sign that the leadership function is not fully shared or distributed.

Another aspect to show if the leadership function is shared, distributed or neither, is the decision making about leadership aspect such as planning, changes, etc. From the transcripts and the field note observations, it was observed who makes the decisions for the squad, is everybody involved, does one person make all the decisions or do the same people make decisions about the same subjects? It could be that the counts show that only the PO makes the decisions, this would then be an indication that the squad does not use shared or distributed leadership. When a squad uses shared leadership the squad uses democratic voting or agreement tools to makes decisions, so if everybody makes the decision it is a sign of shared leadership. Distributed leadership lets a certain individual make the decisions on the subjects he is responsible for, so observing different people making decisions about their specific leadership topic shows signs of distributed leadership.

To see if all effective leadership dimensions are present the field note observations were used and the meetings were analysed. In Appendix 8.3 all the field notes were made into a coherent story for every meeting and every squad. Then a Table was made to give an overview of which leadership dimensions were observed at what meeting and an overall overview was created to show which squads show all the dimensions and which squads do not.

The final phase of the research is the cross comparison among the squads. Here the differences in leadership behavioural style and the completeness of the effective leadership dimensions were compared. The squads were divided in three categories: shared leadership squads, hierarchal squads with all effective leadership dimensions and hierarchal squads without all effective leadership dimensions. For all these squads, performance measures were taken from the surveys and these were compared for every category to see if differences could be found.

4. Results

4.1. Quantitative results

To answer the first part of the research question we need to look at the leadership behavioural styles of the squads that are part of this research. And we need to determine whether they really use a shared or distributed leadership behavioural style. In order to check this the transcript and coding data was used to see if there was not one dominant person as you would aspect in hierarchal teams with an appointed leader. For all the transcript data per squad and per meeting see appendix 8.1. And for all the coding data per squad and per meeting see appendix 8.2.

First a speech pattern analysis was done for every squad. How many times does someone speak and how many words do they use. In a team with shared or distributed leadership we would aspect that there is not one dominant speaker in the squads. Table 6, shows the average outcome of how many times someone spoke during the three observed meetings. The yellow marked cells are the PO's of the squads, and the bold numbers are the highest scores. For every squad the highest score is compared to their group average. The lowest row of Table 6 shows how many standard deviation the highest score is away from the group average. Scores around 1.7 to 1.9 are semi-high and scores above 1.9 are quite high. Teams 6001, 8001 and 14001 are the only teams where the person who talked the most was relatively close to the average. Teams 2001 and 12001 have semi-high scores and teams 1001, 3001, 4001 and 7001 are relatively far from their group average. For squads 1001, 3001 and 7001 this is also the PO of the squad.

Table 6: Number of times someone talked during the meetings.

squad member ⇩	**Times spoken**								
squad number ⇨	**1001**	**2001**	**3001**	**4001**	**6001**	**7001**	**8001**	**12001**	**14001**
F1	9%		9%	6%	**25%**	**37%***	4%	12%	19%
F2	9%	5%	14%	13%	20%*	14%	1%	19%*	24%
F3	8%	8%	5%	10%	3%	18%	17%	**24%**	9%
F4	6%	13%	**28%***	2%	16%	9%	21%	4%	23%
F5	9%	13%	19%	21%*	11%	8%	17%	7%	**25%**
F6	7%	4%	9%	**32%**	20%	2%	**22%***	10%	
F7	**25%***	8%	10%	4%	6%	9%	17%	5%	
F8	7%	16%	6%	13%		2%		4%	
F9	11%	**20%**						16%	
F10	9%	13%							
standard deviation	6%	5%	8%	10%	8%	11%	8%	7%	6%
average	10%	11%	13%	13%	14%	13%	14%	11%	20%
number of standard deviations away from average for the highest score	2,74	1,71	2,00	1,97	1,28	2,16	0,96	1,79	0,83

* markd cells are the PO's

bold faced cells are the highest score

Looking at how many times someone spoke during a meeting is not enough to say that someone was very dominant during a meeting. Therefore, a similar table was made to check how many words a person used during a meeting, because some people maybe talk less, however, when they do they might say a lot. When looking at Table 7, we can see that the pattern stays more or less the same. Team 6001, 8001 and 14001 still have scores relatively close to the group average. The scores of teams 2001 and team 12001 are semi far from their group average and the scores of teams 1001, 3001, 4001 and 7001 are quite far away from their average. Also in this table the PO's of squads 1001, 3001 and seem to be the dominant characters.

Table 7: Number of words someone used during the meetings.

squad member ⇩	number of words used								
squad number ⇨	**1001**	**2001**	**3001**	**4001**	**6001**	**7001**	**8001**	**12001**	**14001**
F1	5%		7%	4%	19%	**53%***	3%	9%	16%
F2	7%	5%	10%	13%	16%*	13%	1%	28%*	**25%**
F3	6%	4%	10%	7%	2%	8%	17%	**30%**	13%
F4	5%	14%	**33%***	1%	19%	10%	**21%**	1%	21%
F5	9%	12%	17%	19%*	12%	6%	17%	6%	**25%**
F6	9%	6%	10%	**41%**	**28%**	2%	**21%***	7%	
F7	**30%***	9%	10%	5%	4%	7%	19%	4%	
F8	7%	20%	4%	10%		1%		1%	
F9	15%	**23%**						13%	
F10	7%	7%							
standard deviation	8%	7%	9%	13%	9%	17%	9%	11%	5%
average	10%	11%	13%	13%	14%	13%	14%	11%	20%
number of standard deviations away from average for the highest score	2,62	1,70	2,29	2,22	1,54	2,41	0,83	1,74	0,99

* markd cells are the PO's

bold faced cells are the highest score

Talking a lot does not necessarily mean that someone also shows more effective leadership behaviour. To check if the person who talked much also show signs of more leadership behaviour the same sort analysis was done for the behavioural coding data. Table 8, shows the average frequency of leadership behaviour shown during the three meetings. We can see almost the same patterns as the previous tables, but there seems to be one exception. Team 12001, follower 3 seems to be less far from the average compared to the other two tables. The scores from Table 6 and Table 7 were 1.79 and 1.74 respectively, however, the score in table 8 is 1.56. It could be the case that follower 3 is dominant in this team, but is not the leader of this team. The other teams that showed potential signs of having a leader (1001, 2001, 3001, 4001 and 7001) still have this pattern in Table 8. This table shows that the dominant speaker in these teams is also displaying more leadership behaviour.

Table 8: average frequency of leadership behaviour during the meetings.

squad member ⇩	Average frequency of leadership behavior								
squad number ⇨	**1001**	**2001**	**3001**	**4001**	**6001**	**7001**	**8001**	**12001**	**14001**
F1	7%		8%	6%	23%	**29%***	4%	17%	19%
F2	12%	7%	14%	13%	**24%***	18%	1%	18%*	22%
F3	10%	12%	6%	7%	3%	14%	14%	**21%**	11%
F4	5%	18%	**24%***	4%	15%	8%	20%	5%	23%
F5	8%	12%	15%	21%*	11%	7%	17%	7%	**25%**
F6	6%		10%	**33%**	20%	4%	**23%***	9%	
F7	**21%***	10%	11%	3%	4%	13%	20%	4%	
F8	9%	12%	10%	13%		6%		5%	
F9	11%	**23%**						14%	
F10	10%	8%							
standard deviation	5%	5%	6%	10%	9%	8%	8%	7%	5%
average	10%	13%	13%	13%	14%	13%	14%	11%	20%
number of standard deviations away from average for the highest score	2,47	1,94	2,08	2,01	1,01	2,04	1,00	1,56	0,87

* markd cells are the PO's

bold faced cells are the highest score

The codebook used for identifying behaviour is a verbal codebook which means that it's not uncommon that the person who talked most also shows signs of having more leadership behaviour. However, team 12001 is an example that, that's not necessarily the case. To see if the most dominant person in the team does not only show sign of more leadership behaviour but also shows signs of more different kinds of leadership behaviour another Table is made. However, there is no standard deviation analysis done because the differences from the average are always minimal because of the coding process. Codes like listening, agreeing and factually informing are almost impossible not to score. Which results in standard deviations of 1. This would then mean if you score 2 different behaviours more than your team mates this would already have a great impact on the results. Therefor a visual analysis is done to check if there are differences.

Table 9, shows that the most dominant person is not always the person who shows the most different kind of leadership behaviours. Team 01001 has until now shown that follower 7 is the most dominant but he does not seem to show a lot more different kind of leadership behaviours, compared to the other team members. The same goes for follower 9 of team 2001. Team 3001, 4001 and team 7001 still show the same pattern as before, the same person who is dominant in the previous tables (7, 8 and 9) also shows a broader spectrum of leadership behaviour. Team 6001 and 8001 also depict the same pattern as in the previous tables. These teams where balanced based on their speech and the amount of leadership behaviour shown. This pattern continues in Table 9, because nobody exhibits that one person shows more different leadership behaviours than others. Team 12001 has shown that dominant person follower 3 might be more dominant based on the speech analysis but does not show more signs of leadership behaviour, follower 3 is even surpassed by follower 2 in this regard and follower 2 is also the PO. Team 14001 shows signs that even though the contributions of all team members are balanced there is still a person who is showing a broader spectrum of leadership behaviour, this is follower 4.

Table 9: the average frequency of different leadership behaviours.

squad member ⇩	**Average frequency of differrent leadership behavior**								
squad number ⇨	**1001**	**2001**	**3001**	**4001**	**6001**	**7001**	**8001**	**12001**	**14001**
F1	9%		11%	10%	**17%**	**19%***	7%	11%	19%
F2	10%	9%	14%	12%	**17%***	15%	4%	**19%***	19%
F3	9%	14%	10%	10%	11%	14%	15%	13%	17%
F4	9%	14%	**17%***	10%	14%	12%	**20%**	9%	**26%**
F5	10%	12%	14%	14%*	16%	10%	18%	9%	19%
F6	10%		10%	**18%**	15%	7%	16%*	9%	
F7	**12%***	12%	12%	10%	11%	14%	**20%**	9%	
F8	9%	13%	11%	15%		8%		9%	
F9	9%	**15%**						11%	
F10	**12%**	12%							

* markd cells are the PO's

bold faced cells are the highest score

Table 10 shows in conclusion which teams show real signs of shared or distributed leadership and which teams do not.

Table 10: overview of teams with and without a leader.

teams with no signs of shared of distributed leadership	teams with signs of shared of distributed leadership
1001	6001
2001	8001
3001	14001
4001	
7001	
12001	

4.2. Qualitative results

In section 4.1 squads are analysed if they really have a shared or distributed leadership behavioural style. In this section we start with the squads who have shown that they do (squad 6001, 8001, 14001) and we tried to find out if they use shared leadership or distributed leadership. The second part of this section is about the difference in effective leadership that can be found between the squads who use either shared or distributed approach to leadership and the squads who seem to have a more hierarchal leadership behavioural style.

4.2.1. Leadership behavioural style of the squads

This section shows overall conclusions and summarizations of the qualitative data of the squads 6001, 8001 & 14001. For the complete data per squad and per meeting see Appendix 8.3.

Squad 6001

This squad had a balanced analysis and did not seem to have a leader, so how does this take form? The general thing that is observed throughout the three meetings is the fact that there is one person who is in charge of the structure of the meeting and leads the team through the story points for that sprint. But after addressing a certain story point all team members participate equally in the discussion. All team members know the stories and are actively contributing to the meeting. So there seems to be a lot of cooperation and team work, where everybody is involved. The PO seems to be responsible for the external communication with upper levels of the company, but there are not really anymore distinctions between the team members.

This squad mainly uses shared leadership, but it has distributed aspects which are inherent when using the agile philosophy

Squad 8001

Follower 6 is the person who leads the team through the first meeting by providing structure and leading the team through the story points. However, Follower 6 does not always actively participate in the conversations and discussions that follow. Follower 6 seems to be the responsible for the planning so only when this is discussed he adds something to the discussion. The other team members are all very involved, except for follower 2 who seems a bit quieter than the rest. But overall this squad shows high level of shared responsibility and commitment. In the retrospective follower 5 leads the team through the meeting, why this change has occurred is not completely sure, but it could be a sign of leadership distribution among the team members. That everybody has their specific responsibilities, follower 6 the planning and follower 5 the retrospective. Identifying the PO in this squad is quite difficult. From the observations not one clear person seemed to be the PO.

As for the leadership behavioural style this would also suggest a shared leadership approach between the regular team members. Seeing that it was hard to identify it would seem that the PO is equal to the team member. There might be some form of leadership distribution, because not every meeting was led by the same person.

Squad 14001

When observing squad 14001 the roles of the different squad members could be more easily identified. There was a meeting chairman, this seemed to be the same person, but could also rotate per sprint, this was unclear. Follower 3 is the scrum master and follower 4 is the PO. In this team there seemed to be a bit more distribution of the leadership. Everybody seemed equal but everybody had in some way specific tasks and responsibility. This was also a smaller team, so when the scrum master, the PO and the chairman are distributed roles there are only two more people left. Whereas compared to other teams there were still a lot of team members with no specific role.

In conclusion, the leadership behavioural style does not differ that much from the other squads so they mainly use shared leadership with some distributed roles. However, because the squad is smaller this system has an impact on the squad, because there are more people with roles than without. That is also because this squad chose a chairman role, where other squads made the scrum master the chairman. So there seems to be a bit more distribution in this squad then the other two.

4.2.2. Effective leadership in the squads

Now that we have identified the differences in leadership behavioural styles of the squads, the differences in effective leadership were researched. Do teams with a shared or distributed leadership approach show different kind of orientations of effective leadership based on Yukl's (2012) effective leadership Taxonomy. So do we see that shared or distributed leadership team show different focus then the more hierarchal squads? Therefore the squads were observed to find the orientations in the squads (tasks-, relation-, change- and external-orientation). In this section the observations per squad are summarized. For the complete set of qualitative data per squad and per meeting see appendix 8.3.

General findings

Based on the all the observations and qualitative data a view general results are found. Because of the agile philosophy and every team aspiring to conform to this philosophy, there are certain things that all squads have in common. As mentioned in the literature review part of agile management (section 2.1) there are three main meetings during a sprint. The sprint planning, sprint re-planning and the retrospective. Much of the focus for these meetings are pre-determined. The sprint planning for instance is a meeting with the purpose of planning tasks and activities for the upcoming sprint. This meeting is by nature a task oriented meeting. That does not mean that there is no room for relation-, change- or external-orientation, but that has to be managed explicitly by the squad. The retrospective is a meeting that is by nature a meeting that focusses on reflection and change. Only the topic of the change can differ. This can be process changes, task-oriented changes or relation-oriented changes, this has to be managed by squad itself.

The way external orientation is managed in the squads is quite the same for every squad, with only slight differences and these will be mentioned in the specific team observations. The reason why it is mostly the same is because of how agile organization are structured. The squad members are also part of their chapters and in that way also monitoring operations in other squads. The PO is mainly responsible for the communication with other PO's and upper management levels, this is part of this function. Clients and other outside relations are managed by the person who is working on the stories where these third parties are involved.

Table 11: overview of the effective leadership dimensions for every squad.

		meeting 1	meeting 2	meeting 3	overall
shared leadership squads					
6001	task-orientation	✓	✓	✓	✓
	relation-orientation	⊘	⊘	⊘	⊘
	change-orientation	⊘	⊘	✓	✓
	external-orientation	✓	✓	✓	✓
8001	task-orientation	✓		✓	✓
	relation-orientation	✓		✓	✓
	change-orientation	⊘		✓	✓
	external-orientation	✓		✓	✓
14001	task-orientation	✓	✓		✓
	relation-orientation	✓	✓		✓
	change-orientation	⊘	⊘	✓	✓
	external-orientation	✓	✓		✓
more hierarchal squads with a complete spectrum of effective leadership					
2001	task-orientation	⊘	⊘	✓	✓
	relation-orientation	✓	✓	✓	✓
	change-orientation	✓	⊘	✓	✓
	external-orientation	⊘	⊘	✓	✓
3001	task-orientation	✓	✓	✓	✓
	relation-orientation	✓	⊘	✓	✓
	change-orientation	⊘	⊘	✓	✓
	external-orientation	✓	✓	✓	✓
4001	task-orientation	✓	✓	✓	✓
	relation-orientation	⊘	✓	✓	✓
	change-orientation	⊘	✓	✓	✓
	external-orientation	✓	✓	✓	✓
more hierarchal squads with an incomplete spectrum of effective leadership					
1001	task-orientation	✓		✓	✓
	relation-orientation	⊘		⊘	⊘
	change-orientation	⊘		✓	✓
	external-orientation	✓		✓	✓
7001	task-orientation	✓	✓	✓	✓
	relation-orientation	⊘	⊘	⊘	⊘
	change-orientation	⊘	✓	✓	✓
	external-orientation	✓	✓	⊘	✓
12001	task-orientation	✓	✓	✓	✓
	relation-orientation	⊘	⊘	⊘	⊘
	change-orientation	✓	⊘	⊘	⊘
	external-orientation	✓	⊘	✓	✓

empty cells are missing data

✓ observerd

⊘ not observed

In Table 11 an overview is given of all the squads and which dimension of effective leadership they have shown in their meetings. Beneath the table, the scores will be explained per squad. In the table there is a distinction between two leadership behavioural styles (shared and hierarchal). However in the hierarchal behavioural style category a distinction can be made between squads who have all four effective leadership dimensions present and the squads that do not. The order of the table is also the order in which the squads are discussed in this chapter.

Squad 6001

Follower 1 is the person who leads the squad through the meetings, but follower 1 does not actively participate in the discussions on the story points. The team members seem to all have a high level of shared responsibility. This team tends to focus on tasks-oriented behaviour only and does not show other leadership behaviour clearly. In the first two meetings this is not particularly strange because of the nature of the meetings. But the goal of the retrospective is to reflect on the last sprint. This squad chose to write positives and negatives on post-it notes. However content was mainly task-oriented. The squad members did not take the opportunity to evaluate each other, each other's work or the group dynamic. They mainly focused on their own success or things that didn't go as planned. This team seems to be a strictly business oriented team. The negatives in the retrospective did lead to some task-oriented changes, but the focus did not seem to be there. There were also not a lot of moments where there was external-oriented behaviour. Except that follower number 2 seemed to be in charge of the communications with upper management, follower 2 is the PO so this points in the direction that external-orientation is managed as described in the general findings.

Squad 8001

This team is a quite balanced team when looking at leadership, there does not seem to be a clear leader as described before. When looking at the meetings of this squad it can also be said that there is a balance when looking at Yukl's taxonomy. All aspects of leadership where in some way present. Task-orientation was there because of the nature of sprint planning. This meeting purely focuses on the planning of task and the understanding of stories and story points. But the team dynamic is friendly and fun and not purely business. So a high level of commitment could be observed. With the nature of the retrospective there is also a focus on change. And during the retrospective there is also a specific moment where it is addressed that the team should focus on complimenting each other and saying what people could do better. This shows that there is a specific focus on relation-oriented behaviour and improving team dynamics. There are some moments where there is a little focus on external parties, but nothing other than described in the general findings. So mostly discussing external parties when they are involved in certain stories. There was a moment where follower 5 seemed to go to meetings with upper level management, if follower 5 was the PO this seems inherent to the company structure, but this is not the case. So maybe this is a distributed task.

Squad 14001

This squad is a bit smaller than the other squads which makes it stand out. In smaller squads being on the background is more difficult. This is also one of the reasons why this team has a good balance when it comes to shared leadership. Another reason is that person 4 the PO does not actively participate in all conversations and discussion. This results in other team members having more autonomy to make decisions, and that has led to a team with all very involved team member who show signs of real shared responsibility.

When looking at the effective leadership aspect it is unfortunate that the retrospective data is missing. That means that the meeting which has the purpose of reflecting and changing could not be observed. It is however assumed that because of the nature of the retrospective that this team does have a focus on change. Task-oriented behaviour was observed in all the meetings mostly because of the nature of these meetings as well. Relation-oriented behaviour was also present in this team. The team has a very pleasant working environment with a lot of laughter but also a high level of team work. Team members supported each other and complimented each other a lot. So relation-oriented behaviour was present is the squad. External-orientation seemed to be dependent on the story points as described in the general findings.

Squad 2001

Squad 2001 has a team member that is somewhat dominant and can be viewed as the leader of the squad. This is follower 9 and she is the agile coach. She is structuring the meeting and providing support, but when it comes to the content she takes a more observant role instead of actively participating. The reason why she is dominant in certain meetings is also because there was a lot of focus on relation-oriented and change-oriented behaviour in the meetings. Meeting one for instance was mainly about personality tests for every team member to improve understanding of your co-workers. Follower 9 gave the test to the team and structured the different aspects of the test. Furthermore, she gives everybody a turn to chip in with their thoughts and opinion, especially the more quiet team members. Structuring and helping the team members however did require her to speak a lot and thus she was a dominant presence. This also made her seem the leader. In the third meeting there was a more task-oriented setting and follower 9 still structures the meeting and focusses on relations in the squad. Every meeting started with a quick check-in on how everybody was feeling for instance and follower 9 still took initiative. However, her presence in the third meeting is a lot less dominant. This could be the explained by the differences in the content of the meeting, which was more task-oriented and might not have been her role or field of expertise.

Considering this it can be argued that squad 2001 has a leader when it comes to change- and relation-oriented behaviour. Task-oriented behaviour was mainly observed in other team members, because they discussed the tasks and stories of the sprint. External-oriented seemed to be distributed to follower 8, but why is not entirely clear because it's not clear if he is the PO or another team member who is in charge of external communication with other squads.

Squad 3001

In this squad the PO follower 4 seemed to be really in charge, he structures the meetings and goes through the story points. With every story point he is really involved in the discussion or status update which gives him an overall dominant presence. Furthermore, he functions somewhat as a linking pin in discussions. He talks to a single team member and discusses their story points, the other team members do not, or seldom pitch in. So it seems that the team members are reporting to the PO instead of each other. The PO is also the main decision maker of the squad except for the poker session that they do.

When looking at the effective leadership dimensions however, it does seem that follower 4 takes all the aspects of leadership in account. He supports the team members and gives them autonomy, so relation-orientation seems to be present. The squad also uses techniques during the retrospective to ensure relation oriented behaviour, the squad focusses on giving compliments and improvements to each other. Furthermore, follower 4 together with follower 1 manages clients and outside relations, so also external aspects are taken into account and this does seem to differ slightly

from the way other squads manage this. And follower 4 seems to give the most feedback outside the retrospective and steers for change. The retrospective also helps with the change-orientation, because the goal of the retrospective is reflecting on the past sprint to learn and improve.

Squad 4001

When looking at this squad, a few things stand out. Follower number 6 is structuring and leading the team, but also actively contributing in the discussions. Which leads to the fact that follower 6 is more dominant than other team members. This is supported by the quantitative data as well. From this it can be argued that follower 6 is the leader of this squad. People ask permission of him to ask question and he is the main decision maker of the squad. Moreover, it is remarkable that follower 7, who is the agile, does not actively participate in the meetings unless he notices something that he deems necessary to share his thoughts on. This is mainly giving feedback on the team members.

The first meeting was mainly task-oriented, but the second one already seemed to be a bit more balanced, meaning that the other dimensions were more present. Follower 6 was more focused on letting everybody pitch in and Follower 7 started to give more feedback, so also relation- and change-oriented behaviour were more present. In the retrospective this balance could also be found. The external orientation was linked to the stories as mentioned in the general findings. An interesting observation in this squad is the distribution of the different leadership dimensions. Outside the retrospective, follower 6 seems to be the tasks oriented and relation-oriented leader, where follower 7 is the change-oriented leader and because the external-orientation is linked to stories this is managed by anyone who is involved in that story.

Squad 1001

Based on the quantitative data we can see that squad 1001 has a dominant team member, but this team member does not show signs of having a broad orientation when looking at the different leadership behaviours. The qualitative data confirms these findings. Follower 7's leadership behaviour mainly focusses on tasks and specifically on the planning aspects. Since follower 7 is very active during the discussion and also structuring the meeting, this task-oriented behaviour influences the teams focus as well. The first meeting is therefore quite tasks oriented, this is not particularly strange considering the goal of the sprint planning is to plan activities and tasks for the upcoming sprint. In the retrospective meeting there was room to also reflect on team orders and failures, however, this was scarcely done. Also in the retrospective, this squad seemed quite task-oriented. But reflecting on team orders and failures could lead to great ideas for changes in the future. This however seemed not to be the main focus for this squad. There was also limited external orientation. The external orientation that was discussed during the meeting was about dependencies of third parties, which had influences on current tasks.

Squad 7001

In squad 7001 follower 1 is the PO and the clear leader. In the third meeting there was a fierce discussion among the team members in which communications issues were addressed. This showed that the team members where not correctly communicating with each other when the PO was not there. The team was used to being directed and steered by the PO, but when she was not present the team did not communicate, which led to mistakes. There was no sense of shared responsibility or shared leadership and the team members started to blame each other. The agile coach tried to settle the argument in the end. Another example, were can be seen that the PO is clearly the leader are the poker sessions that were held. The squad used poker sessions to determine how much time certain

stories will take in the upcoming sprint. Normally everybody would vote and then a discussion would take place to come to a decision on how much time will be calculated in the next sprint. However, in this meeting the PO already tells her opinion on the subject, before a vote can be taken and then everybody just agrees without much discussion. It would seem that either they all agreed all the time, or people don't give their opinions anymore after the PO has spoken.

The focus in this team is mainly task-oriented. The PO in this squad focusses mainly on tasks and is always actively participating in every discussion. There were not really signs of people having autonomy, because it seems that they needed to do what the PO said. There were also team members who barely spoke in all the meetings. It seemed that most team members were introvert and the PO is quite dominant, maybe this is the reason they did not speak up. In a squad with a high relation-oriented focus, you would expect people to include everyone, especially the people who might need some support in order to speak their mind. The fact that the frustrations about how things are going within in the team were high, might be a sign that this was bottled up and not discussed before, so this can be seen as a sign that there is no real focus on changes, at least not internal process changes. External orientation is only limitedly mentioned and not different then described in the general findings.

Squad 12001

The first meeting starts off with follower 2 taking charge, because of changes in the organization that need to be implemented in the squad. During the first meeting no signs of shared leadership could be observed. When looking at Yukl's taxonomy it can also be observed that there is a main focus on task-orientation and change-orientation in this meeting. And it becomes clear that the external communication goes through follower 2, the PO. In the second and third meeting there still seems to be a clear task-oriented focus and still no real relation-oriented focus. Even though this squad might benefit from that, because follower 3 is a very dominant and intense character in the group and comes across as very frustrated. Other people in the squad are very quiet. So there does not seem to be a good balance in a team where the team members are supposed to contribute equally. Moreover, there is also no one who is actually trying to get this balance in the squad. In the first meeting follower 2 uses 62% of all the words used in the meeting and in the third meeting follower 3 uses 50 % of all the words. For this squad task- and change-oriented behaviour could be clearly observed and external behaviour was linked to certain story points. Therefore, all the aspects of effective leadership seem to be present except for relation-oriented behaviour.

4.3. Cross comparison

This section will describe the patterns and conclusions that can be drawn if we compare the squads. Table 11 shows that three out of the nine teams that were researched show results of true shared or distributed leadership. These squads are 6001, 8001 and 14001. Agile squads would, according to the theory, have a shared or distributed leadership behavioural style. But in practices we found that six of the nine squads showed signs of having a more hierarchal leader. These are squad 1001, 2001, 3001, 4001, 7001 and 12001. This was determined by performing a speech analysis on all team members and a behavioural analysis on all team members. In squad number 1001, 3001, 7001 the dominant character was also the PO.

Three of the squads (6001, 8001 and 14001) were further looked into to determine if these teams used a shared or distributed leadership behavioural style. All three squads seemed to have a shared leadership behavioural style because the bulk of the team members did not have specific responsibilities or leadership tasks appointed to them. However, some team members did have some specific responsibilities or leadership tasks, the PO or the agile coach for instance. But this seems inherent to being an agile squad. The PO, scrum master and agile coach are pre-determined roles which have their own responsibilities. So there are some distributed aspects found in every squad.

Now that the agile squads and their leadership behavioural styles are determined, it can be identified how effective leadership take form in agile squads. Table 11 shows that squad 6001 is the only squad of the shared leadership squads, who did not have all four dimensions present. For the hierarchal squad this goes for squad 1001, 7001 and 12001.

The reason squad 6001 lacks relation-oriented behaviour is the purely business oriented setting, squad 8001 and 14001 had more systems in place to make sure all aspect of leadership where present. Squads 6001 had in their retrospective sessions a focus on positive aspects and negative aspects, where other squads were more explicit on which aspect they would reflect. For instance, team 8001 had a specific focus on compliments and feedback towards other squad members. The approach of squad 6001 led to the team members only reflecting on their own story points. Therefore, there was a lack of relation-oriented behaviour. No compliments or feedback on team processes was given. This was also the case in the other meetings.

The teams who had a more hierarchal approach to leadership and did not show signs of all effective leadership dimensions were 1001, 7001 and 12001. These squads had very dominant leaders in their squads and because these leaders where not formally appointed, they took this leadership role more naturally. However, it was observed that these leaders where all very task- and result-oriented and had little focus on the team process, dynamic and internal relations. The hierarchal teams that did have all leadership dimensions had leaders who also listened and observed their squads and focussed also on internal relations. So when a natural leader stands up in a team with no appointed leader there should still be systems in place to focus on internal relations and team dynamic, because natural leaders might only focus on certain aspects of effective leadership and this in the end influences the whole team.

The research question is: *How does (effective) leadership take form in agile squads and how does this effect squad performance?* Now that we have identified how leadership takes form it can be clarified how this effected the performance of the squads. The performance measures that were chosen were meeting effectiveness, sprint effectiveness, squad performance and job satisfaction. The two effectiveness measures (meeting and sprint effectiveness) were not combined into one effectiveness score because of the differences in the underlying questions of these constructs (see section 3.3.1 surveys). The two constructs also did not always correlate sufficiently (see appendix 8.4 survey data, section sprint effectiveness). That's why these constructs are reported separately. Job satisfaction was also taken into consideration because studies like DeRue et al. (2011) showed that

effective leadership also influences job satisfaction, next to effectiveness and other performance measures.

Interestingly we can see in Table 11 that the shared leadership squads do not have higher performance measures than the hierarchal squads. They seem to have lower scores on every aspect, but with such a small sample size it is hard to make robust conclusion based on these numbers. Furthermore, Table 11 consists of perceived performance data. So it could be that subjectivity of the squad members might have influenced the data. However, it is interesting to see that the shared leadership squads seem to score themselves lower. It might be that squads who have more direction, perceive their performance as more efficient and less bureaucratic. This might boost their effectiveness, performance and satisfaction scores. To see if these patterns are not coincidental further research is required, with the suggestion that more objective performance measures are used and more squad data can be obtained.

Table 11: performance measures.

squad number	meeting effectiveness	sprint effectiveness	squad performance	job satisfaction
shared leadership squads				
6001	4,2	4,8	4,4	5,7
8001	5,6	3,5	4,9	4,6
14001	5,0			
average	**4,9**	**4,1**	**4,6**	**5,1**
more hierarchal squads with a complete spectrum of effective leadership				
2001	5,9	5,5	6,3	5,6
3001	5,3	4,1	5,5	5,4
4001	6,0	4,2	5,6	5,6
average	**5,7**	**4,6**	**5,8**	**5,5**
more hierarchal squads with an incomplete spectrum of effective leadership				
1001	5,8	6,0	5,3	5,4
7001	5,3	4,0	5,0	5,6
12001	6,0	6,0	5,9	6,1
average	**5,7**	**5,3**	**5,4**	**5,7**

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5. Discussion

This research revolved around the main question: *How does (effective) leadership take form in agile squads and how does this effect squad performance?* To answer this question agile squads from a large Dutch commercial organization were researched. Video observations, transcript analysis and surveys have led to the results. It made clear that six of the nine squad showed signs of a more hierarchal form of leadership, instead of a shared or distributed approach. The three squads who did not show these signs all had a shared leadership behavioural style with some distributed aspects. When looking at the effective leadership dimension the shared leadership squads showed more often that they had all leadership dimension in place, whereas the more hierarchal teams seemed to have a tendency to be really task-oriented and sometimes forgot to focus on the relation-oriented dimension. However, the performance of the shared leadership squads did not seem to be higher than the hierarchal squads. What implications do these results have for the current literature and what are the practical implications?

5.1. Theoretical implications

Even though agile literature such as Bäcklander (2019) and Birkinshaw (2018) says that the agile squads don't have an appointed leader it does seem that most squads still have a leader in practice. So the outcomes contradict the studies of Bäcklander (2019) and Birkinshaw (2018) in a way, however the leaders are not always appointed but seem to emerge in the squads. In some cases this turned out to the PO. According to the agile theory of Bäcklander (2019) and Loiro et al. (2019) a PO has the responsibility for the outcome or what the squads develops, however, he is not the leader. These two things seem to conflict with each other in some of the teams. Bäcklander (2019) describes the need for unlearning of the PO's who have previous experience in non-agile squads. It is thought that PO's might need to unlearn hierarchal behaviour. This research concurs with these finding. However, maybe unlearning is not the only solution and extra learning on how to achieve a non-hierarchical squad should also be done.

Other studies from Lorinkova and Bartol (2020) suggest that it takes time to become a shared leadership team. They have developed a model in which can be seen how shared leadership changes over time. So, it might be that the squads who were observed during this research were not all at the same stage of shared leadership development. And it might be interesting to see how performance fluctuates during this process of becoming a shared leadership team.

The effective leadership literature of Yukl (2012) says that all four dimensions should be in place in order to have an effective leader. In agile squads it can be clearly found that the structure of the meetings makes sure that task-, change- and external-orientation are there. It seems that relation-orientation is still missing sometimes. This dimension is not only used in Yukl's theory, but also in Behrendt et al. (2017) and DeRue et al. (2011). In their models this dimension has a prominent place. So, even though it is known to be an important dimension, it seems that it's sometimes difficult to put in practice in non-hierarchical teams. According to Bäcklander (2019) agile coaches are responsible for the team dynamic and process. However, the results of this research show that, considering the four effective leadership dimensions, the squads don't always focus on the relation-oriented aspects. The agile coach is not always present to make sure these aspects are still focussed on. This is because the agile coach is not always assigned to one squad. The theory suggests that companies should choose if the agile coach is deployed in more than one squad or not. Based on the results of this research other systems should be in place to make sure that teams focus on relation oriented aspects, even without an agile coach present.

The results also suggest that agile squads, when they achieve to work without a hierarchal system, tend to have a shared leadership behavioural style with distributed roles such as the PO and

the agile coach. So, (within agile squads) there is a mixed method approach which is both shared and distributed, not one or the other. This is a different view than suggested by Fitzsimons et al. (2011), who describe that there are two approaches towards leadership without an appointed leader. Other studies such as Ensley et al. (2003) proposed that shared leadership might increase venture effectiveness and financial performance. Other studies about shared and distributed leadership (Spillane et al., 2001; Harris et al., 2007) suggest that those teams positively effect performance and organizational change. However, our research contradicts these findings and propositions, because the shared leadership teams in this study did not show does improvements. The study of Anderson and Sun (2017) already suggested that the aforementioned outcomes might not be accurate, because these studies were mostly held in the educational sector and might not reflect true business performance. Our study carefully hints that those suggestions of Anderson and Sun might be correct, by showing that effectiveness and performance do not seem to be higher in a business context. However, due to limitations of this research this cannot be said with absolute certainty. It does show the need for further research to show if the effects found by Ensley et al. (2003), Harris et al. (2007) and Spillane et al. (2001) are the same in business context or not.

A reason for shared leadership not being effective is given by Bligh et al. (2006) and Burke, Fiore and Salas (2003). These scholars say that shared leadership teams do not always reach their full potential, because the coordination of team members is not smooth. So maybe the shared leadership teams in this study did not have smooth team member coordination and the more hierarchal squads did. Because the team member coordination was possibly done by the natural leader. In any case, this research shows that teams are more effective when a natural leader stands up in a squad opposed to having no leader. This does not mean that an appointed leader would be just as effective. Maybe the fact that the leader is not chosen is the reason for its success. Which suggests that emerging leadership is more effective than shared leadership and appointed leadership. Scholars have mainly looked on behaviour of emergent leaders and their character traits (Carte, Chidambaram, & Becker, 2006; Hoch & Dulebohn, 2017). But maybe the effects of emerged leadership on performance could give insight in the effectiveness of this phenomenon.

Other results of this research show that the character of the PO's of the squads who have a more shared approach towards leadership, are more observant and less dominant in discussion. It can be concluded that the character of the PO influences the leadership behavioural style of the squads. This is also confirmed by Nassif (2019), where propositions indicate that negative personality traits such as narcissism have a negative effect on shared leadership.

5.2. Practical implications

The practical implications of the results are even though companies implement a good agile based organizational structure and adopt well to the agile philosophy, it does not mean that this is enough to make sure that all aspects of agile management are automatically well executed in the squads. Two third of teams still showed signs of a more hierarchal approach to leadership. If this pattern is the same in larger samples and it seems to have an effect on the effectiveness of the squads, then agile coaches and PO's might need more instruction on how to make sure that the teams adapt a more shared leadership function. However in this study it is shown that shared leadership does not necessarily mean better performance. So, companies should be aware that pushing for a leaderless team, does not automatically positively influence performance. Letting a leader emerge in a squad within a squad seems to work better than being a team with shared leadership.

We also see that if squads don't have all effective leadership dimensions this is because relation-oriented behaviour is missing. So in practise, squads should implement methods to make sure there is a focus on this dimension. Some squads put that in practise by always starting the meeting with a short check-in on how everybody was doing. This is an example of how squads can structure themselves to makes sure this dimension is always present. So, the researched squads could maybe ask for more help from their agile coaches or make sure that every meeting has a moment reserved to talk about relation-oriented subjects and topics.

It was also mentioned in the results that the PO's of the squads who have a more shared approach on leadership, were more observant and less dominant in discussions. This could show that some character traits of the PO have influence on the leadership behavioural style of the squads. So when determining if somebody is qualified for the role as PO, these character traits can be taken into account.

For the squads who have participated in this research the practical implications are that if they have somewhat of a hierarchal leadership system, they could try to put systems in place that ensures a more equal contribution from all team members. For instance, don't let the same person structure every meeting. When people are made responsible for structuring the meeting, they might also feel more inclined to contribute more.

6. Limitations and Recommendations for Future Research

In this chapter limitations of this research and the data will be discussed and based on these limitations recommendations for further research will be given.

First, not all data were collected by the researcher due to the labour intensity of the work. Although many processes are standardized there can occur slight differences in interpreting these processes. The use of two researchers for the coding of every video, already mitigates some of this effect. But it is unavoidable that there are slight differences among the different research couples. For instance, some couples would say that somebody is showing disinterest when someone is looking at his phone, where another couple might say it was work related. These interpretation differences might have occurred between the couples who did the data collection.

Second, due to audio quality or accents of the observed people some contributions in meetings could not be identified. This might have slightly influenced the data. Meeting 3 of squad 12001 was especially hard to follow, which led to the fact that only limited conclusions could be drawn from this meeting. Different recording equipment and selection based on the fluency of speech could mitigate these effects, but this can never be entirely avoided. Setting more selection criteria's might also exclude valuable data so this should not be done lightly.

Third, the quad sampling was now done via voluntary sign up, but this might lead to some sampling errors. The squads who are performing well might be more eager to participate in studies. Different squad selection methods might remove these sampling errors. Recruiting entire tribes might be a solution.

Fourth, some people in the squads where only present for one meeting, which made it harder to see if these people would have shown similar behaviour in different meetings. This is unavoidable, however it could still have influence the data.

Fifth, determining the leadership behavioural style based on the three meetings is also something that might differ when different research methods are chosen. Now three meetings were observed in already existing squads, where certain pre-determined roles such as the PO and scrum master are already in place. So certain leadership dynamics could not be observed. How the people were chosen for certain roles is not always clear. Why do certain people always structure the meetings, where they hired to do this? Did the squad distribute those functions among the team members who they deemed suited for the task? Did they chose the functions themselves? Since these were already admitted before the observations were done some this could not be researched. But could still be valuable information on how leadership takes form in squads. Interviews with team members might give the opportunity to ask those questions.

Sixth, in the starting phase of this research the idea was to transform the data from the video coding to the dimensions of Yukl's (2012) taxonomy. However, after the coding was done and more experience with the code-book was acquired, there were some problems found with the transformation of the data. Change- and external-oriented data could not or only limitedly be found with the current codebook. Still the data were transformed, because for the other dimensions the data could still be useful. In Appendix 8.5 it is described how the transforming of the data was done and to what results it led. As an example squad 6001 was used. In Table 34 other flaws of the transformation can be seen. For instance, in Table 34 it would seem that there is a lot of relation-oriented behaviour in this squad. This is the case because the active listening code is also transformed to effective leadership behaviour. But this code is by far the most coded behaviour. So this then skews the data and does not show any similarities towards reality. Because when observing the squad there is little to no relation-oriented behaviour. So the Table did not stroke with the observed reality other than that it might identify a certain dominant character. But this could already be done with the coding data itself before transforming, and that data is more accurate. Another problem with the

transforming is that most codes are not as specific as Yukl's (2012) taxonomy. For instant, giving negative feedback can be seen as advocating change, but is this change task-oriented, relation-oriented or external-oriented? These kind of specifications cannot be made. Overall there is a certain distortion between the coding data and the transformation towards Yukl's (2012) taxonomy. Which makes it unreliable and not representative. Therefore, these results were left out of this research. Instead only field-note observations were used for the analysis of the completeness of the effective leadership. A down side to this is that this method might have given a more subjective outcome then then a fully quantitative approach. But seeing that the quantitative results were also unreliable this approach was the only one left. For the video coding two researchers combined their findings to ensure reliability, but due to a lack of time this could not be done for this part of the research. The recommendation is that if a more quantitative approach might be useful, the code-book should be altered. The code book should then be changed to become more compatible with the effective leadership dimensions. If this is done, the option for a more quantitative approach of completeness of effective leadership dimensions is open. This could lead to a more objective analysis, with more concrete evidence and results. There could also be a more specific analysis on the sub-dimension of Yukl's (2012) taxonomy.

Seventh, the generalization of the outcomes might be unreliable. There is too little data to prove that these outcomes are representative for a larger population. It is suggested that more data is obtained and ideally maybe also from other companies. So the main recommendation is continuing to obtain more squads who are willing to participate in this study. With more squads the conclusions from this research can be made more robust. The patterns that are observed now could still be incidental observations and cannot be generalized for a larger population. When more data are obtained a statistical analysis could also be done to validate the results of this research.

Eight, when the sample size has grown there is an opportunity to more extensively check performance measures of the squads. As described the performance measures used in this research are perceived performance measures and are prone to subjectivity. Other performance measures with a more objective nature, such as financial numbers or other Key Performance Indicators (KPI) might show different results. Together with more squad data a statistical analysis of the performance data could then show that certain leadership forms are indeed more effective than others.

Last, the research can be repeated with a larger sample size, but it can also be extended or slightly changed. For instance a longitudinal approach can be chosen to see how the leadership behavioural styles of teams might differ through time. Some squads might need more time to adjust to the agile philosophy. Lorinkova and Bartol (2020) also describe how shared leadership changes over time. Therefore, it would be interesting to see if the leadership behavioural style changes over time. It can also be checked if the squad's effectiveness goes up in longitudinal research. For this approach newly formed agile squads might show interesting results in how the transition takes form. Another extension subject could be to look into the effects of emerging leadership. This research has shown that even though the goal of the squads was to create squads without leaders, leaders could still be observed. These squads also seemed to perform better, so the effectiveness of emerging leadership would be an interesting extension topic.

Some questions for further research are: *Do teams with a natural or emerged leader have better performance measures than teams who use a shared or distributed approach? Do teams with a high level of shared responsibility always have a shared or distribution leadership behavioural style? Do squads develop their leadership behavioural style over time? Does the change of leadership behavioural style over time also increase the squad's performance?* The research methodology for these researches don't have to be very different. The video observations and the video coding were very useful, and if the code book has some changes also quantitative studies could use this approach very well. So these potential research questions mentioned above, can use the same approach. Other

useful approaches might be via interviews, next to the observations, interviews have room for follow up questions into the how's and why's of certain observed behaviours and teams dynamics.

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8. Appendix

8.1. Transcript data

The transcripts where analysed and the data was put in tables. In this section all the quantitative data from the transcripts is displayed for every squad and every meeting.

- **Squad 1001**

Meeting 2 is missing for this squad.

Meeting 1

person	number of times spoken	percentage	number of words used	percentage
F1	62	10%	412	5%
F2	58	9%	478	6%
F3	45	7%	487	6%
F4	34	5%	144	2%
F5	65	10%	952	12%
F6	57	9%	879	11%
F7	197	31%	2960	38%
F8	46	7%	415	5%
F9	67	11%	1164	15%
F10				
Total	**631**	**100%**	**7891**	**100%**

Meeting 3

person	number of times spoken	percentage	number of words used	percentage
F1	49	12%	403	7%
F2	44	11%	540	10%
F3				
F4	37	9%	585	11%
F5	45	11%	499	9%
F6	26	7%	599	11%
F7	107	27%	1694	31%
F8	36	9%	606	11%
F9				
F10	54	14%	582	11%
Total	**398**	**100%**	**5508**	**100%**

Average

person	number of times spoken	percentage	number of words used	percentage
F1	56	9%	408	5%
F2	51	9%	509	7%
F3	45	8%	487	6%
F4	36	6%	365	5%
F5	55	9%	726	9%
F6	42	7%	739	9%
F7	152	25%	2327	30%
F8	41	7%	511	7%
F9	67	11%	1164	15%
F10	54	9%	582	7%
Total	**598**	**100%**	**7816**	**100%**

- **Squad 2001**

Meeting 1

person	number of times spoken	percentage	number of words used	percentage
F1				
F2	58	5%	785	6%
F3	128	12%	824	6%
F4	218	20%	2632	20%
F5	104	10%	1388	10%
F6				
F7	131	12%	2028	15%
F8	97	9%	1202	9%
F9	335	31%	4482	34%
F10				
F11				
Total	**1071**	**100%**	**13341**	**100%**

Meeting 2

person	number of times spoken	percentage	number of words used	percentage
F1				
F2	36	5%	455	5%
F3	63	10%	661	7%
F4	121	18%	1686	17%
F5	110	17%	1517	15%
F6	63	10%	997	10%
F7	60	9%	1140	11%
F8				
F9	205	31%	3505	35%
F10				
F11				
Total	**658**	**100%**	**9961**	**100%**

Meeting 3

person	number of times spoken	percentage	number of words used	percentage
F1				
F2	149	7%	1307	6%
F3	177	8%	645	3%
F4	269	13%	3402	15%
F5	368	17%	3748	17%
F6				
F7	155	7%	1789	8%
F8	401	19%	5903	27%
F9	386	18%	4089	18%
F10	198	9%	1234	6%
F11				
Total	**2103**	**100%**	**22117**	**100%**

Average

person	number of times spoken	percentage	number of words used	percentage
F1				
F2	81	5%	849	5%
F3	123	8%	710	4%
F4	203	13%	2573	14%
F5	194	13%	2218	12%
F6	63	4%	997	6%
F7	115	8%	1652	9%
F8	249	16%	3553	20%
F9	309	20%	4025	23%
F10	198	13%	1234	7%
F11				
Total	**1534**	**100%**	**17811**	**100%**

- **Squad 3001**

Meeting 1

person	number of times spoken	percentage	number of words used	percentage
F1	36	6%	206	4%
F2	110	17%	613	11%
F3	36	6%	290	5%
F4	195	30%	2710	47%
F5	125	19%	810	14%
F6	61	9%	600	10%
F7	42	7%	282	5%
F8	40	6%	315	5%
Total	**645**	**100%**	**5826**	**100%**

Meeting 2

person	number of times spoken	percentage	number of words used	percentage
F1	95	11%	771	10%
F2	97	11%	500	7%
F3	0	0%	0	0%
F4	276	31%	2846	38%
F5	206	23%	1775	24%
F6	91	10%	810	11%
F7	66	8%	470	6%
F8	48	5%	276	4%
Total	**879**	**100%**	**7448**	**100%**

Meeting 3

person	number of times spoken	percentage	number of words used	percentage
F1	57	8,36%	571	6,69%
F2	110	16,13%	987	11,56%
F3	65	9,53%	1827	21,40%
F4	145	21,26%	1647	19,29%
F5	85	12,46%	1019	11,93%
F6	52	7,62%	677	7,93%
F7	116	17,01%	1434	16,79%
F8	52	7,62%	377	4,42%
Total	**682**	**100%**	**8539**	**100%**

Average

person	number of times spoken	percentage	number of words used	percentage
F1	63	9%	516	7%
F2	106	14%	700	10%
F3	34	5%	706	10%
F4	205	28%	2401	33%
F5	139	19%	1201	17%
F6	68	9%	696	10%
F7	75	10%	729	10%
F8	47	6%	323	4%
Total	**735**	**100%**	**7271**	**100%**

- **Squad 4001**

Meeting 1

person	number of times spoken	percentage	number of words used	percentage
F1	29	5%	302	4%
F2	84	16%	1121	16%
F3	50	9%	402	6%
F4	8	1%	73	1%
F5	134	25%	1369	20%
F6	217	40%	3479	50%
F7	19	4%	273	4%
F8				
Total	**541**	**100%**	**7019**	**100%**

Meeting 2

person	number of times spoken	percentage	number of words used	percentage
F1	23	5%	224	4%
F2	65	15%	766	14%
F3	44	10%	424	7%
F4				
F5	118	28%	1558	28%
F6	159	37%	2396	42%
F7	19	4%	296	5%
F8				
Total	**428**	**100%**	**5664**	**100%**

Meeting 3

person	number of times spoken	percentage	number of words used	percentage
F1	28	11%	269	8%
F2	42	16%	487	14%
F3				
F4				
F5	46	17%	560	16%
F6	86	33%	1621	46%
F7				
F8	61	23%	584	17%
Total	**263**	**100%**	**3521**	**100%**

Average

person	number of times spoken	percentage	number of words used	percentage
F1	27	6%	265	4%
F2	64	13%	791	13%
F3	47	10%	413	7%
F4	8	2%	73	1%
F5	99	21%	1162	19%
F6	154	32%	2499	41%
F7	19	4%	285	5%
F8	61	13%	584	10%
Total	**479**	**100%**	**6072**	**100%**

- **Squad 6001**

Meeting 1

person	number of times spoken	percentage	number of words used	percentage
F1	130	29%	1211	23%
F2	116	26%	1108	21%
F3	6	1%	35	1%
F4	83	18%	1163	22%
F5	33	7%	514	10%
F6	81	18%	1144	22%
F7				
Total	**449**	**100%**	**5175**	**100%**

Meeting 2

person	number of times spoken	percentage	number of words used	percentage
F1	138	22%	1668	19%
F2	127	20%	1588	18%
F3	0	0%	0	0%
F4	107	17%	1562	17%
F5	76	12%	742	8%
F6	153	24%	3115	35%
F7	26	4%	288	3%
Total	**627**	**100%**	**8963**	**100%**

Meeting 3

person	number of times spoken	percentage	number of words used	percentage
F1	81	29%	881	16%
F2	38	14%	451	8%
F3	30	11%	386	7%
F4	37	13%	1056	19%
F5	44	16%	1266	23%
F6	48	17%	1429	26%
F7				
Total	**278**	**100%**	**5469**	**100%**

Average

person	number of times spoken	percentage	number of words used	percentage
F1	116	25%	1253	19%
F2	94	20%	1049	16%
F3	12	3%	140	2%
F4	76	16%	1260	19%
F5	51	11%	841	12%
F6	94	20%	1896	28%
F7	26	6%	288	4%
Total	**469**	**100%**	**6728**	**100%**

- **Squad 7001**

Meeting 1

person	number of times spoken	percentage	number of words used	percentage
F1	155	35%	2146	51%
F2	60	14%	570	14%
F3	107	24%	555	13%
F4	49	11%	428	10%
F5	32	7%	338	8%
F6	11	2%	43	1%
F7	30	7%	115	3%
F8				
Total	**444**	**100%**	**4195**	**100%**

Meeting 2

person	number of times spoken	percentage	number of words used	percentage
F1	279	42%	5211	60%
F2	164	25%	2127	25%
F3	129	19%	639	7%
F4	16	2%	122	1%
F5	36	5%	218	3%
F6	5	1%	121	1%
F7				
F8	36	5%	210	2%
Total	**665**	**100%**	**8648**	**100%**

Meeting 3

person	number of times spoken	percentage	number of words used	percentage
F1	138	30%	3849	47%
F2				
F3	49	11%	445	5%
F4	76	17%	1620	20%
F5	65	14%	735	9%
F6	16	4%	238	3%
F7	113	25%	1279	16%
F8				
Total	**457**	**100%**	**8166**	**100%**

Average

person	number of times spoken	percentage	number of words used	percentage
F1	191	31%	3735	48%
F2	112	18%	1349	17%
F3	95	16%	546	7%
F4	47	8%	723	9%
F5	44	7%	430	5%
F6	11	2%	134	2%
F7	72	12%	697	9%
F8	36	6%	210	3%
Total	**607**	**100%**	**7825**	**100%**

- **Squad 8001**

Meeting 2 is missing for this squad

Meeting 1

person	number of times spoken	percentage	number of words used	percentage
F1	24	8%	228	6%
F2	6	2%	61	2%
F3	43	14%	545	15%
F4	89	30%	1212	34%
F5	44	15%	478	13%
F6	95	32%	1045	29%
F7				
Total	**301**	**100%**	**3569**	**100%**

Meeting 3

person	number of times spoken	percentage	number of words used	percentage
F1				
F2				
F3	156	21%	1983	21%
F4	154	21%	1868	20%
F5	161	22%	1925	21%
F6	166	22%	2057	22%
F7	102	14%	1394	15%
Total	**739**	**100%**	**9227**	**100%**

Average

person	number of times spoken	percentage	number of words used	percentage
F1	24	4%	228	3%
F2	6	1%	61	1%
F3	100	17%	1264	17%
F4	122	21%	1540	21%
F5	103	17%	1202	17%
F6	131	22%	1551	21%
F7	102	17%	1394	19%
Total	**586**	**100%**	**7240**	**100%**

- **Squad 12001**

Meeting 1

person	number of times spoken	percentage	number of words used	percentage
F1	26	13%	111	4%
F2	75	38%	1776	62%
F3	25	13%	314	11%
F4	6	3%	17	1%
F5	2	1%	2	0%
F6	6	3%	34	1%
F7	10	5%	58	2%
F8	3	2%	14	0%
F9	42	22%	528	19%
Total	**195**	**100%**	**2854**	**100%**

Meeting 2

person	number of times spoken	percentage	number of words used	percentage
F1	202	16%	2090	13%
F2	214	17%	3861	25%
F3	314	25%	4686	30%
F4	52	4%	248	2%
F5	99	8%	1160	7%
F6	115	9%	985	6%
F7	44	4%	559	4%
F8	52	4%	207	1%
F9	149	12%	1693	11%
Total	**1241**	**100%**	**15489**	**100%**

Meeting 3

person	number of times spoken	percentage	number of words used	percentage
F1	49	8%	385	5%
F2				
F3	207	35%	4019	50%
F4				
F5				
F6	96	16%	1209	15%
F7	67	11%	718	9%
F8				
F9	168	29%	1744	22%
Total	**587**	**100%**	**8075**	**100%**

Average

person	number of times spoken	percentage	number of words used	percentage
F1	92	12%	862	9%
F2	145	19%	2819	28%
F3	182	24%	3006	30%
F4	29	4%	133	1%
F5	51	7%	581	6%
F6	72	10%	743	7%
F7	40	5%	445	4%
F8	28	4%	111	1%
F9	120	16%	1322	13%
Total	**758**	**100%**	**10020**	**100%**

- **Squad 14001**

Meeting 3 is missing for this squad.

Meeting 1

person	number of times spoken	percentage	number of words used	percentage
F1	114	23%	961	20%
F2	119	24%	1273	26%
F3	48	10%	873	18%
F4	108	22%	1020	21%
F5	108	22%	700	15%
Total	**497**	**100%**	**4827**	**100%**

Meeting 2

person	number of times spoken	percentage	number of words used	percentage
F1	71	14%	825	13%
F2	117	24%	1446	23%
F3	45	9%	602	10%
F4	118	24%	1299	21%
F5	143	29%	2088	33%
Total	**494**	**100%**	**6260**	**100%**

Average

person	number of times spoken	percentage	number of words used	percentage
F1	93	19%	893	16%
F2	118	24%	1360	25%
F3	47	9%	738	13%
F4	113	23%	1160	21%
F5	126	25%	1394	25%
Total	**496**	**100%**	**5544**	**100%**

8.2. Coding data

The video's where analysed with observer software and the data was put in tables. In this section all the quantitative data from the coding software is displayed for every squad and every meeting.

- **Squad 1001**

Meeting 2 is missing for this squad.

Meeting 1

	Total Frequency of leadership behavior	precentage	Frequency of differrent leadership behavior	precentage
Follower 1	126	9%	8	9%
Follower 2	212	15%	11	12%
Follower 3	155	11%	10	11%
Follower 4	60	4%	9	10%
Follower 5	121	8%	10	11%
Follower 6	129	9%	12	13%
Follower 7	341	23%	13	14%
Follower 8	150	10%	10	11%
Follower 9	166	11%	9	10%
Follower 10				
total	**1460**	**100%**	**92**	**100%**

Meeting 3

	Total Frequency of leadership behavior	precentage	Frequency of differrent leadership behavior	precentage
Follower 1	100	9%	12	14%
Follower 2	169	15%	10	11%
Follower 3				
Follower 4	86	8%	9	10%
Follower 5	124	11%	11	13%
Follower 6	69	6%	9	10%
Follower 7	307	27%	13	15%
Follower 8	116	10%	10	11%
Follower 9				
Follower 10	157	14%	13	15%
total	**1128**	**100%**	**87**	**100%**

Average

	Total Frequency of leadership behavior	precentage	Frequency of differrent leadership behavior	precentage
Follower 1	113	7%	10	9%
Follower 2	191	12%	11	10%
Follower 3	155	10%	10	9%
Follower 4	73	5%	9	9%
Follower 5	123	8%	11	10%
Follower 6	99	6%	11	10%
Follower 7	324	21%	13	12%
Follower 8	133	9%	10	9%
Follower 9	166	11%	9	9%
Follower 10	157	10%	13	12%
total	**1533**	**100%**	**106**	**100%**

- **Squad 2001**

Meeting 1

	Total Frequency of leadership behavior	precentage	Frequency of differrent leadership behavior	precentage
Follower 1				
Follower 2	209	9%	11	11%
Follower 3	292	12%	16	16%
Follower 4	431	18%	16	16%
Follower 5	260	11%	13	13%
Follower 6				
Follower 7	314	13%	15	15%
Follower 8	200	8%	13	13%
Follower 9	721	30%	16	16%
Follower 10				
total	**2427**	**100%**	**100**	**100%**

Meeting 2

Missing

Meeting 3

	Total Frequency of leadership behavior	precentage	Frequency of differrent leadership behavior	precentage
Follower 1				
Follower 2	121	5%	11	9%
Follower 3	294	13%	17	13%
Follower 4	433	19%	17	13%
Follower 5	329	14%	16	13%
Follower 6				
Follower 7	154	7%	13	10%
Follower 8	373	16%	19	15%
Follower 9	408	18%	19	15%
Follower 10	185	8%	14	11%
total	**2297**	**100%**	**126**	**100%**

Average

	Total Frequency of leadership behavior	precentage	Frequency of differrent leadership behavior	precentage
Follower 1				
Follower 2	165	7%	11	9%
Follower 3	293	12%	17	14%
Follower 4	432	18%	17	14%
Follower 5	295	12%	15	12%
Follower 6				
Follower 7	234	10%	14	12%
Follower 8	287	12%	16	13%
Follower 9	565	23%	18	15%
Follower 10	185	8%	14	12%
total	**2455**	**100%**	**120**	**100%**

- **Squad 3001**

Meeting 1

	Total Frequency of leadership behavior	precentage	Frequency of differrent leadership behavior	precentage
Follower 1	65	7%	9	9%
Follower 2	149	15%	13	14%
Follower 3	54	5%	9	9%
Follower 4	288	29%	17	18%
Follower 5	153	15%	16	17%
Follower 6	99	10%	8	9%
Follower 7	89	9%	12	13%
Follower 8	97	10%	11	11%
total	**994**	**100%**	**95**	**100%**

Meeting 2

	Total Frequency of leadership behavior	precentage	Frequency of differrent leadership behavior	precentage
Follower 1	124	10%	14	15%
Follower 2	174	14%	14	15%
Follower 3				
Follower 4	322	25%	17	18%
Follower 5	227	18%	15	16%
Follower 6	151	12%	12	13%
Follower 7	137	11%	11	12%
Follower 8	133	10%	12	13%

Meeting 3

	Total Frequency of leadership behavior	precentage	Frequency of differrent leadership behavior	precentage
Follower 1	77	10%	10	11%
Follower 2	126	16%	13	14%
Follower 3	67	8%	10	11%
Follower 4	146	18%	16	17%
Follower 5	102	13%	11	12%
Follower 6	76	9%	10	11%
Follower 7	127	16%	13	14%
Follower 8	86	11%	9	10%
total	**807**	**100%**	**92**	**100%**

Average

	Total Frequency of leadership behavior	precentage	Frequency of differrent leadership behavior	precentage
Follower 1	89	8,5%	11	11,3%
Follower 2	150	14,3%	13	13,7%
Follower 3	61	5,8%	10	9,8%
Follower 4	252	24,2%	17	17,2%
Follower 5	161	15,4%	14	14,4%
Follower 6	109	10,4%	10	10,3%
Follower 7	118	11,3%	12	12,3%
Follower 8	105	10,1%	11	11,0%
total	**1043**	**100,0%**	**97**	**100,0%**

- **Squad 4001**

Meeting 1

	Total Frequency of leadership behavior	precentage	Frequency of differrent leadership behavior	precentage
Follower 1	73	6%	10	13%
Follower 2	198	16%	10	13%
Follower 3	92	7%	10	13%
Follower 4	41	3%	9	12%
Follower 5	295	24%	14	18%
Follower 6	502	41%	16	21%
Follower 7	33	3%	8	10%
Follower 8				
total	**1234**	**100%**	**77**	**100%**

Meeting 2

	Total Frequency of leadership behavior	precentage	Frequency of differrent leadership behavior	precentage
Follower 1	63	6%	9	14%
Follower 2	167	16%	11	17%
Follower 3	79	7%	8	12%
Follower 4				
Follower 5	313	29%	12	18%
Follower 6	418	39%	15	23%
Follower 7	33	3%	10	15%
Follower 8				
total	**1073**	**100%**	**65**	**100%**

Meeting 3

	Total Frequency of leadership behavior	precentage	Frequency of differrent leadership behavior	precentage
Follower 1	67	10%	7	13%
Follower 2	85	13%	10	18%
Follower 3				
Follower 4				
Follower 5	109	17%	10	18%
Follower 6	233	36%	16	29%
Follower 7				
Follower 8	156	24%	13	23%
total	**650**	**100%**	**56**	**100%**

Average

	Total Frequency of leadership behavior	precentage	Frequency of differrent leadership behavior	precentage
Follower 1	68	6%	9	10%
Follower 2	150	13%	10	12%
Follower 3	86	7%	9	10%
Follower 4	41	4%	9	10%
Follower 5	239	21%	12	14%
Follower 6	384	33%	16	18%
Follower 7	33	3%	9	10%
Follower 8	156	13%	13	15%
total	**1157**	**100%**	**87**	**100%**

- **Squad 6001**

Meeting 1

	Total Frequency of leadership behavior	precentage	Frequency of differrent leadership behavior	precentage
Follower 1	257	25%	11	18%
Follower 2	312	30%	16	26%
Follower 3	7	1%	3	5%
Follower 4	174	17%	11	18%
Follower 5	83	8%	10	16%
Follower 6	202	20%	11	18%
Follower 7				
total	**1035**	**100%**	**62**	**100%**

Meeting 2

	Total Frequency of leadership behavior	precentage	Frequency of differrent leadership behavior	precentage
Follower 1	172	21%	11	18%
Follower 2	191	23%	11	18%
Follower 3				
Follower 4	115	14%	9	15%
Follower 5	104	13%	12	19%
Follower 6	209	25%	11	18%
Follower 7	30	4%	8	13%
total	**821**	**100%**	**62**	**100%**

Meeting 3

	Total Frequency of leadership behavior	precentage	Frequency of differrent leadership behavior	precentage
Follower 1	113	28%	13	20%
Follower 2	59	15%	8	13%
Follower 3	38	9%	12	19%
Follower 4	63	16%	9	14%
Follower 5	70	17%	12	19%
Follower 6	62	15%	10	16%
Follower 7				
total	**405**	**100%**	**64**	**100%**

Average

	Total Frequency of leadership behavior	precentage	Frequency of differrent leadership behavior	precentage
Follower 1	181	23%	12	17%
Follower 2	187	24%	12	17%
Follower 3	23	3%	8	11%
Follower 4	117	15%	10	14%
Follower 5	86	11%	11	16%
Follower 6	158	20%	11	15%
Follower 7	30	4%	8	11%
total	**781**	**100%**	**71**	**100%**

- **Squad 7001**

Meeting 1

	Total Frequency of leadership behavior	precentage	Frequency of differrent leadership behavior	precentage
Follower 1	213	32%	15	21%
Follower 2	101	15%	10	14%
Follower 3	150	23%	12	17%
Follower 4	75	11%	9	13%
Follower 5	53	8%	10	14%
Follower 6	30	5%	6	8%
Follower 7	44	7%	9	13%
Follower 8				
total	**666**	**100%**	**71**	**100%**

Meeting 2

	Total Frequency of leadership behavior	precentage	Frequency of differrent leadership behavior	precentage
Follower 1	394	39%	17	24%
Follower 2	256	26%	15	21%
Follower 3	157	16%	10	14%
Follower 4	29	3%	10	14%
Follower 5	61	6%	7	10%
Follower 6	40	4%	4	6%
Follower 7				
Follower 8	62	6%	7	10%
total	**999**	**100%**	**70**	**100%**

Meeting 3

	Total Frequency of leadership behavior	precentage	Frequency of differrent leadership behavior	precentage
Follower 1	250	30%	15	21%
Follower 2				
Follower 3	91	11%	12	17%
Follower 4	141	17%	11	16%
Follower 5	94	11%	9	13%
Follower 6	49	6%	8	11%
Follower 7	209	25%	15	21%
Follower 8				
total	**834**	**100%**	**70**	**100%**

Average

	Total Frequency of leadership behavior	precentage	Frequency of differrent leadership behavior	precentage
Follower 1	286	29%	16	19%
Follower 2	179	18%	13	15%
Follower 3	133	14%	11	14%
Follower 4	82	8%	10	12%
Follower 5	69	7%	9	10%
Follower 6	40	4%	6	7%
Follower 7	127	13%	12	14%
Follower 8	62	6%	7	8%
total	**976**	**100%**	**83**	**100%**

- **Squad 8001**

Meeting 2 is missing for this squad.

Meeting 1

	Total Frequency of leadership behavior	precentage	Frequency of differrent leadership behavior	precentage
Follower 1	48	7%	5	10%
Follower 2	15	2%	3	6%
Follower 3	89	14%	11	22%
Follower 4	181	28%	11	22%
Follower 5	89	14%	11	22%
Follower 6	223	35%	10	20%
Follower 7				
total	**645**	**100%**	**51**	**100%**

Meeting 3

	Total Frequency of leadership behavior	precentage	Frequency of differrent leadership behavior	precentage
Follower 1				
Follower 2				
Follower 3	229	18%	11	16%
Follower 4	274	21%	17	24%
Follower 5	296	23%	15	21%
Follower 6	279	21%	13	19%
Follower 7	220	17%	14	20%
total	**1298**	**100%**	**70**	**100%**

Average

	Total Frequency of leadership behavior	precentage	Frequency of differrent leadership behavior	precentage
Follower 1	48	4%	5	7%
Follower 2	15	1%	3	4%
Follower 3	159	14%	11	15%
Follower 4	228	20%	14	20%
Follower 5	193	17%	13	18%
Follower 6	251	23%	12	16%
Follower 7	220	20%	14	20%
total	**1113**	**100%**	**71,5**	**100%**

- **Squad 12001**

Meeting 1

	Total Frequency of leadership behavior	precentage	Frequency of differrent leadership behavior	precentage
Follower 1	54	13%	6	11%
Follower 2	153	36%	12	22%
Follower 3	50	12%	6	11%
Follower 4	15	4%	4	7%
Follower 5	11	3%	4	7%
Follower 6	17	4%	5	9%
Follower 7	21	5%	5	9%
Follower 8	19	4%	6	11%
Follower 9	87	20%	6	11%
total	**427**	**100%**	**54**	**100%**

Meeting 2

	Total Frequency of leadership behavior	precentage	Frequency of differrent leadership behavior	precentage
Follower 1	405	18%	10	11%
Follower 2	343	15%	15	17%
Follower 3	536	23%	13	15%
Follower 4	118	5%	9	10%
Follower 5	167	7%	9	10%
Follower 6	224	10%	8	9%
Follower 7	98	4%	8	9%
Follower 8	109	5%	7	8%
Follower 9	306	13%	9	10%
total	**2306**	**100%**	**88**	**100%**

Meeting 3

	Total Frequency of leadership behavior	precentage	Frequency of differrent leadership behavior	precentage
Follower 1	43	9%	12	19%
Follower 2				
Follower 3	174	36%	16	25%
Follower 4				
Follower 5				
Follower 6	84	18%	12	19%
Follower 7	47	10%	10	16%
Follower 8				
Follower 9	132	28%	13	21%
total	**480**	**100%**	**63**	**100%**

Average

	Total Frequency of leadership behavior	precentage	Frequency of differrent leadership behavior	precentage
Follower 1	230	17%	8	11%
Follower 2	248	18%	14	19%
Follower 3	293	21%	10	13%
Follower 4	67	5%	7	9%
Follower 5	89	7%	7	9%
Follower 6	121	9%	7	9%
Follower 7	60	4%	7	9%
Follower 8	64	5%	7	9%
Follower 9	197	14%	8	11%
total	**1367**	**100%**	**71**	**100%**

- **Squad 14001**

Meeting 3 is missing for this squad.

Meeting 1

	Total Frequency of leadership behavior	precentage	Frequency of differrent leadership behavior	precentage
Follower 1	146	21%	13	22%
Follower 2	148	22%	9	16%
Follower 3	86	13%	11	19%
Follower 4	154	22%	15	26%
Follower 5	151	22%	10	17%
total	**685**	**100%**	**58**	**100%**

Meeting 2

	Total Frequency of leadership behavior	precentage	Frequency of differrent leadership behavior	precentage
Follower 1	108	17%	9	16%
Follower 2	142	22%	12	22%
Follower 3	62	10%	8	15%
Follower 4	154	24%	14	25%
Follower 5	176	27%	12	22%
total	**642**	**100%**	**55**	**100%**

Average

	Total Frequency of leadership behavior	precentage	Frequency of differrent leadership behavior	precentage
Follower 1	127	19%	11	19%
Follower 2	145	22%	11	19%
Follower 3	74	11%	10	17%
Follower 4	154	23%	15	26%
Follower 5	164	25%	11	19%
total	**664**	**100%**	**57**	**100%**

8.3. Qualitative data

The squads were observed via video's, for every meeting fieldnotes where placed for every dimension of Yukl's 2012 taxonomy. These were put into a correct text and can be found in this section.

In order to ensure confidentiality of the data, these transcripts (p. 71-103 of the thesis) have been removed from the public thesis.

8.4. Survey data

In this section the survey outcomes are reported on a question level. In the tables the average score per squad is reported and the correlations of these questions is calculated to see if the questions correlate so they might be combined into one score.

Representativeness

As described in section 3.2. We find low scores in table 13 for squad 7001 in meeting 3 as can be found in this table this meeting did not seem to be a meeting that was representative for how things normally go. Looking at the qualitative data this can be explained, because there were some heated conversations that made the group experience the meeting different than their normal meetings. This might also have led to the lower results for sprint representativeness because these survey question were held after meeting 3. Squad 8001 also scored low on the overall sprint representativeness, but this cannot be explained by the looking at the meeting scores. However, meeting 2 was never held, so or something happened during this meeting and the data is missing, or this meeting never to place for some reason that might have influenced the outcomes.

Table 13: Survey outcomes for meeting and sprint representativeness

sprint representativeness																
squad number ⇩	meeting 1				meeting 2				meeting 3				sprint			
question number ⇨	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1001	4,8	5,8	5,1	5,4	6,3	5,1	6,1	5,9	5,4	5,5	5,5	5,5	5,5	5,3	5,8	5,9
2001	4,7	5,8	6,4	6,2	4,7	5,0	5,5	5,8	3,5	4,5	4,6	4,9	3,5	5,0	5,0	5,2
3001	3,9	6,6	5,3	4,9	5,7	5,0	6,1	6,0	5,1	6,3	6,3	5,9	4,6	4,4	5,3	3,9
4001	4,9	4,9	5,6	5,9	4,8	4,3	5,8	6,2	5,2	3,8	5,2	4,6	4,2	4,8	5,0	4,5
6001	4,6	5,2	5,6	5,0	3,8	4,7	5,2	4,2	4,8	5,5	5,0	4,8	4,3	4,0	4,6	3,9
7001	5,1	5,3	5,9	5,9	4,7	4,6	5,3	5,3	2,3	2,8	3,2	3,8	2,8	2,8	3,7	4,2
8001	4,0	4,0	4,6	5,0					5,2	4,2	5,8	5,6	2,4	2,0	4,4	4,2
12001	4,3	5,1	4,8	4,9	4,0	5,2	4,9	5,3	4,0	4,6	5,2	5,6	4,5	5,5	6,2	6,2
14001	3,4	6,5	5,8	5,3	4,8	6,2	5,4	5,4								

meeting repressiveness
Q1:Compared to other similar meetings of your squad, how different was this meeting?
Q2: Compared to other similar meetings of your squad, how different was the composition of your squad?
Q3: Compared to other similar meetings of your squad, how different was the behaviour of your squad members?
Q4: Compared to other similar meetings of your squad, how different was your behaviour during this meeting?

Sprint representativeness
Q1: Compared to previous sprints of your squad, how different was this sprint?
Q2: Compared to previous sprints of your squad, how different was the effectiveness of this past sprint?
Q3: Compared to previous sprints of your squad, how different was the behavior of your squad members during this sprint?
Q4: Compared to previous sprints of your squad, how different was your behavior during this sprint?

Tables 14, 15, 16 and 17 show the correlation matrixes for the survey questions about meeting representativeness for meeting 1, 2 and 3 and the entire sprint. For representativeness in meeting 1, question 1 and 2 do not seem to correlate, the score is low and not significant (see table 14). In meeting 2 and 3 (tables 15 and 16) these two questions do seem to correlate. All the other questions do seem to correlate. This goes for all tables, if the score is low it still shows significance. So the 4

questions can be combined into one score for representativeness. The meetings and sprint scores are not combined, because this would cover up the low scores for squad 7001 and 8001.

Table 14: Correlation matrix for the survey questions about meeting representativeness for meeting 1

Correlations

		Compared to other similar meetings of your squad, how different was this meeting?	Compared to other similar meetings of your squad, how different was the composition of your squad?	Compared to other similar meetings of your squad, how different was the behaviour of your squad members?	Compared to other similar meetings of your squad, how different was your behaviour during this meeting?
Compared to other similar meetings of your squad, how different was this meeting?	Pearson Correlation	1	,230	,470**	,532**
	Sig. (2-tailed)		,077	,000	,000
	N	62	60	58	59
Compared to other similar meetings of your squad, how different was the composition of your squad?	Pearson Correlation	,230	1	,501**	,388**
	Sig. (2-tailed)	,077		,000	,002
	N	60	60	58	59
Compared to other similar meetings of your squad, how different was the behaviour of your squad members?	Pearson Correlation	,470**	,501**	1	,760**
	Sig. (2-tailed)	,000	,000		,000
	N	58	58	58	58
Compared to other similar meetings of your squad, how different was your behaviour during this meeting?	Pearson Correlation	,532**	,388**	,760**	1
	Sig. (2-tailed)	,000	,002	,000	
	N	59	59	58	59

**. Correlation is significant at the 0.01 level (2-tailed).

Table 15: Correlation matrix for the survey questions about meeting representativeness for meeting 2

Correlations

		Compared to other similar meetings of your squad, how different was this meeting?	Compared to other similar meetings of your squad, how different was the composition of your squad?	Compared to other similar meetings of your squad, how different was the behaviour of your squad members?	Compared to other similar meetings of your squad, how different was your behaviour during this meeting?
Compared to other similar meetings of your squad, how different was this meeting?	Pearson Correlation	1	,379**	,619**	,492**
	Sig. (2-tailed)		,005	,000	,000
	N	54	53	53	53
Compared to other similar meetings of your squad, how different was the composition of your squad?	Pearson Correlation	,379**	1	,320*	,339*
	Sig. (2-tailed)	,005		,019	,013
	N	53	53	53	53
Compared to other similar meetings of your squad, how different was the behaviour of your squad members?	Pearson Correlation	,619**	,320*	1	,748**
	Sig. (2-tailed)	,000	,019		,000
	N	53	53	53	53
Compared to other similar meetings of your squad, how different was your behaviour during this meeting?	Pearson Correlation	,492**	,339*	,748**	1
	Sig. (2-tailed)	,000	,013	,000	
	N	53	53	53	53

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 16: Correlation matrix for the survey questions about meeting representativeness for meeting 3

Correlations

		Compared to other similar meetings of your squad, how different was this meeting?	Compared to other similar meetings of your squad, how different was the composition of your squad?	Compared to other similar meetings of your squad, how different was the behaviour of your squad members?	Compared to other similar meetings of your squad, how different was your behaviour during this meeting?
Compared to other similar meetings of your squad, how different was this meeting?	Pearson Correlation	1	,491**	,714**	,619**
	Sig. (2-tailed)		,000	,000	,000
	N	51	50	51	51
Compared to other similar meetings of your squad, how different was the composition of your squad?	Pearson Correlation	,491**	1	,736**	,619**
	Sig. (2-tailed)	,000		,000	,000
	N	50	50	50	50
Compared to other similar meetings of your squad, how different was the behaviour of your squad members?	Pearson Correlation	,714**	,736**	1	,755**
	Sig. (2-tailed)	,000	,000		,000
	N	51	50	51	51
Compared to other similar meetings of your squad, how different was your behaviour during this meeting?	Pearson Correlation	,619**	,619**	,755**	1
	Sig. (2-tailed)	,000	,000	,000	
	N	51	50	51	51

**. Correlation is significant at the 0.01 level (2-tailed).

Table 17: Correlation matrix for the survey questions about sprint representativeness

Correlations

		Compared to previous sprints of your squad, how different was this sprint?	Compared to previous sprints of your squad, how different was the effectiveness of this past sprint?	Compared to previous sprints of your squad, how different was the behavior of your squad members during this sprint?	Compared to previous sprints of your squad, how different was your behavior during this sprint?
Compared to previous sprints of your squad, how different was this sprint?	Pearson Correlation	1	,683**	,590**	,468**
	Sig. (2-tailed)		,000	,000	,000
	N	52	52	52	52
Compared to previous sprints of your squad, how different was the effectiveness of this past sprint?	Pearson Correlation	,683**	1	,664**	,643**
	Sig. (2-tailed)	,000		,000	,000
	N	52	52	52	52
Compared to previous sprints of your squad, how different was the behavior of your squad members during this sprint?	Pearson Correlation	,590**	,664**	1	,678**
	Sig. (2-tailed)	,000	,000		,000
	N	52	52	52	52
Compared to previous sprints of your squad, how different was your behavior during this sprint?	Pearson Correlation	,468**	,643**	,678**	1
	Sig. (2-tailed)	,000	,000	,000	
	N	52	52	52	52

**. Correlation is significant at the 0.01 level (2-tailed).

Meeting effectiveness

Table 18 shows the survey results of the squads on a question level. And table 19 shows the combined average scores per meeting on the effectiveness. This could be done because all the questions answers seemed to correlate. When looking at the correlation matrixes of Table 20, 21 and 22 we can see that every question for every meeting has high correlation scores with significant scores at the 0,01 level.

Table 18: Survey outcomes for meeting effectiveness

meeting effectiveness												
squad number ⇩	meeting 1				meeting 2				meeting 3			
question number ⇨	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1001	6,2	6,1	6,0	6,3	6,0	5,9	5,7	5,9	5,5	5,5	5,4	5,5
2001	5,9	5,6	5,9	5,9	5,9	5,7	6,3	5,9	5,8	5,8	6,1	5,8
3001	4,6	4,4	5,5	3,9	5,7	6,0	6,1	5,3	5,6	5,6	5,8	5,6
4001	6,3	6,4	6,4	6,0	6,2	6,0	6,2	5,7	6,0	5,6	5,8	5,8
6001	4,5	4,8	5,0	3,8	3,8	3,2	4,3	3,2	4,3	4,2	4,8	4,2
7001	6,4	6,3	5,7	6,3	4,9	5,1	5,0	4,9	5,2	4,7	5,3	4,2
8001	5,6	5,6	5,6	5,2					5,6	5,8	5,8	5,2
12001	5,7	5,8	5,8	5,7	6,3	6,4	6,3	6,1	5,6	5,8	6,0	6,2
14001	4,6	5,2	5,4	4,6	5,4	5,4	4,6	4,8				

Q1: This past squad meeting was effetive.
Q2: This past squad meeting was productive.
Q3: This past squad meeting was worth my time.
Q4: This past squad meeting was efficient.

Table 19: Combined average meeting effectiveness scores for every meeting

meeting effectiveness				
	meeting 1	meeting 2	meeting 3	total
1001	6,2	5,9	5,5	5,8
2001	5,8	5,9	5,8	5,9
3001	4,6	5,8	5,7	5,3
4001	6,3	6,0	5,8	6,0
6001	4,5	3,6	4,4	4,2
7001	6,2	5,0	4,8	5,3
8001	5,5		5,6	5,6
12001	5,7	6,3	5,9	6,0
14001	5,0	5,1		5,0

Table 20: Correlation matrix for the survey questions about meeting effectiveness for meeting 1

Correlations

		This past squad meeting was effetive.	This past squad meeting was productive.	This past squad meeting was worth my time.	This past squad meeting was efficient.
This past squad meeting was effetive.	Pearson Correlation	1	,847**	,574**	,735**
	Sig. (2-tailed)		,000	,000	,000
	N	63	63	63	63
This past squad meeting was productive.	Pearson Correlation	,847**	1	,711**	,763**
	Sig. (2-tailed)	,000		,000	,000
	N	63	63	63	63
This past squad meeting was worth my time.	Pearson Correlation	,574**	,711**	1	,577**
	Sig. (2-tailed)	,000	,000		,000
	N	63	63	63	63
This past squad meeting was efficient.	Pearson Correlation	,735**	,763**	,577**	1
	Sig. (2-tailed)	,000	,000	,000	
	N	63	63	63	63

**. Correlation is significant at the 0.01 level (2-tailed).

Table 21: Correlation matrix for the survey questions about meeting effectiveness for meeting 2

Correlations

		This past squad meeting was effetive.	This past squad meeting was productive.	This past squad meeting was worth my time.	This past squad meeting was efficient.
This past squad meeting was effetive.	Pearson Correlation	1	,866**	,750**	,840**
	Sig. (2-tailed)		,000	,000	,000
	N	53	53	53	53
This past squad meeting was productive.	Pearson Correlation	,866**	1	,658**	,843**
	Sig. (2-tailed)	,000		,000	,000
	N	53	53	53	53
This past squad meeting was worth my time.	Pearson Correlation	,750**	,658**	1	,694**
	Sig. (2-tailed)	,000	,000		,000
	N	53	53	53	53
This past squad meeting was efficient.	Pearson Correlation	,840**	,843**	,694**	1
	Sig. (2-tailed)	,000	,000	,000	
	N	53	53	53	53

**. Correlation is significant at the 0.01 level (2-tailed).

Table 22: Correlation matrix for the survey questions about meeting effectiveness for meeting 3

Correlations

		This past squad meeting was effetive.	This past squad meeting was productive.	This past squad meeting was worth my time.	This past squad meeting was efficient.
This past squad meeting was effetive.	Pearson Correlation	1	,783**	,641**	,477**
	Sig. (2-tailed)		,000	,000	,000
	N	51	51	51	51
This past squad meeting was productive.	Pearson Correlation	,783**	1	,706**	,644**
	Sig. (2-tailed)	,000		,000	,000
	N	51	51	51	51
This past squad meeting was worth my time.	Pearson Correlation	,641**	,706**	1	,436**
	Sig. (2-tailed)	,000	,000		,001
	N	51	51	51	51
This past squad meeting was efficient.	Pearson Correlation	,477**	,644**	,436**	1
	Sig. (2-tailed)	,000	,000	,001	
	N	51	51	51	51

**. Correlation is significant at the 0.01 level (2-tailed).

Sprint effectiveness

For sprint effectiveness we can see that squad 7001 and 8001 score low on the first question if the sprint was effective, see Table 23. But for the second question squad 7001 did seem to score higher on accomplishing goals. So, only squad 8001 ends up with a score below the neutral score of 4. The scores could be combined because the two questions correlate with a significance on the 0.01 level (see Table 24). So, can the sprint effectiveness scores be combined with the meeting effectiveness scores to create an overall effectiveness score? The correlations from table 25, show that even though the correlations are not that high they still seem significant on the 0.01 or the 0.05 level, except for Q3 (was this meeting worth my time). Table 26, however did not show any correlation from meeting effectiveness with the two sprint effectiveness questions. Table 27 shows the same correlations as Table 25. Q3 does not correlate the other correlations are not high but still significant. Seeing that in meeting 2 there is no correlation between the questions of the two constructs and that Q3 never showed signs of correlation, it is chosen not to combine the results into one effectiveness score. So, meeting effectiveness and sprint effectiveness are reported as separate constructs.

Table 23: Survey results for sprint effectiveness

sprint effectiveness			
squad number ⇩ question number ⇨	Q1	Q2	total
1001	5,6	6,4	6,0
2001	5,0	6,0	5,5
3001	4,4	3,9	4,1
4001	4,3	4,2	4,2
6001	4,9	4,7	4,8
7001	3,3	4,7	4,0
8001	3,0	4,0	3,5
12001	6,0	6,0	6,0
14001	missing	missing	missing

average	4,77
standard deviation	0,96

Q1: To what extent do you agree or disagree with each statement? This past sprint was very effective.
Q2: To what extent do you agree or disagree with each statement? In this past sprint, we accomplished our sprint goals.

Table 24: Correlation matrix for the survey questions about sprint effectiveness

Correlations

		To what extent do you agree or disagree with each statement? This past sprint was very effective.	To what extent do you agree or disagree with each statement? In this past sprint, we accomplished our sprint goals.
To what extent do you agree or disagree with each statement? This past sprint was very effective.	Pearson Correlation	1	,754**
	Sig. (2-tailed)		,000
	N	53	52
To what extent do you agree or disagree with each statement? In this past sprint, we accomplished our sprint goals.	Pearson Correlation	,754**	1
	Sig. (2-tailed)	,000	
	N	52	53

**. Correlation is significant at the 0.01 level (2-tailed).

Table 25: Correlations between meeting effectiveness (of meeting 1) and sprint effectiveness

Correlations

		This past squad meeting was effetive.	This past squad meeting was productive.	This past squad meeting was worth my time.	This past squad meeting was efficient.	To what extent do you agree or disagree with each statement? This past sprint was very effective.	To what extent do you agree or disagree with each statement? In this past sprint, we accomplished our sprint goals.
This past squad meeting was effetive.	Pearson Correlation	1	,783**	,641**	,477**	,408**	,343*
	Sig. (2-tailed)		,000	,000	,000	,004	,016
	N	51	51	51	51	49	49
This past squad meeting was productive.	Pearson Correlation	,783**	1	,706**	,644**	,430**	,401**
	Sig. (2-tailed)	,000		,000	,000	,002	,004
	N	51	51	51	51	49	49
This past squad meeting was worth my time.	Pearson Correlation	,641**	,706**	1	,436**	,269	,187
	Sig. (2-tailed)	,000	,000		,001	,061	,198
	N	51	51	51	51	49	49
This past squad meeting was efficient.	Pearson Correlation	,477**	,644**	,436**	1	,336*	,382**
	Sig. (2-tailed)	,000	,000	,001		,018	,007
	N	51	51	51	51	49	49
To what extent do you agree or disagree with each statement? This past sprint was very effective.	Pearson Correlation	,408**	,430**	,269	,336*	1	,754**
	Sig. (2-tailed)	,004	,002	,061	,018		,000
	N	49	49	49	49	53	52
To what extent do you agree or disagree with each statement? In this past sprint, we accomplished our sprint goals.	Pearson Correlation	,343*	,401**	,187	,382**	,754**	1
	Sig. (2-tailed)	,016	,004	,198	,007	,000	
	N	49	49	49	49	52	53

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 26: Correlations between meeting effectiveness (of meeting 2) and sprint effectiveness

Correlations

		This past squad meeting was effetive.	This past squad meeting was productive.	This past squad meeting was worth my time.	This past squad meeting was efficient.	To what extent do you agree or disagree with each statement? This past sprint was very effective.	To what extent do you agree or disagree with each statement? In this past sprint, we accomplished our sprint goals.
To what extent do you agree or disagree with each statement? This past sprint was very effective.	Pearson Correlation	,193	,237	,157	,164	1	,754**
	Sig. (2-tailed)	,214	,125	,313	,295		,000
	N	43	43	43	43	53	52
To what extent do you agree or disagree with each statement? In this past sprint, we accomplished our sprint goals.	Pearson Correlation	,084	,146	-,050	,154	,754**	1
	Sig. (2-tailed)	,592	,351	,751	,323	,000	
	N	43	43	43	43	52	53
This past squad meeting was effetive.	Pearson Correlation	1	,866**	,750**	,840**	,193	,084
	Sig. (2-tailed)		,000	,000	,000	,214	,592
	N	53	53	53	53	43	43
This past squad meeting was productive.	Pearson Correlation	,866**	1	,658**	,843**	,237	,146
	Sig. (2-tailed)	,000		,000	,000	,125	,351
	N	53	53	53	53	43	43
This past squad meeting was worth my time.	Pearson Correlation	,750**	,658**	1	,694**	,157	-,050
	Sig. (2-tailed)	,000	,000		,000	,313	,751
	N	53	53	53	53	43	43
This past squad meeting was efficient.	Pearson Correlation	,840**	,843**	,694**	1	,164	,154
	Sig. (2-tailed)	,000	,000	,000		,295	,323
	N	53	53	53	53	43	43

**. Correlation is significant at the 0.01 level (2-tailed).

Table27: Correlations between meeting effectiveness (of meeting 3) and sprint effectiveness

Correlations

		This past squad meeting was effetive.	This past squad meeting was productive.	This past squad meeting was worth my time.	This past squad meeting was efficient.	To what extent do you agree or disagree with each statement? This past sprint was very effective.	To what extent do you agree or disagree with each statement? In this past sprint, we accomplished our sprint goals.
This past squad meeting was effetive.	Pearson Correlation	1	,783**	,641**	,477**	,408**	,343*
	Sig. (2-tailed)		,000	,000	,000	,004	,016
	N	51	51	51	51	49	49
This past squad meeting was productive.	Pearson Correlation	,783**	1	,706**	,644**	,430**	,401**
	Sig. (2-tailed)	,000		,000	,000	,002	,004
	N	51	51	51	51	49	49
This past squad meeting was worth my time.	Pearson Correlation	,641**	,706**	1	,436**	,269	,187
	Sig. (2-tailed)	,000	,000		,001	,061	,198
	N	51	51	51	51	49	49
This past squad meeting was efficient.	Pearson Correlation	,477**	,644**	,436**	1	,336*	,382**
	Sig. (2-tailed)	,000	,000	,001		,018	,007
	N	51	51	51	51	49	49
To what extent do you agree or disagree with each statement? This past sprint was very effective.	Pearson Correlation	,408**	,430**	,269	,336*	1	,754**
	Sig. (2-tailed)	,004	,002	,061	,018		,000
	N	49	49	49	49	53	52
To what extent do you agree or disagree with each statement? In this past sprint, we accomplished our sprint goals.	Pearson Correlation	,343*	,401**	,187	,382**	,754**	1
	Sig. (2-tailed)	,016	,004	,198	,007	,000	
	N	49	49	49	49	52	53

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Squad performance

From Table 28 we can see that the results for squad performance are all above the neutral score of 4. Squad 12 even shows average results from 6.5 and 6.7 on a 7 point scale, but it also scores a 3.8 on making mistakes. But the total of all the squads seems to be quite high. The scores could be combined because the questions correlate with a significance on the 0.01 level, as illustrated in Table 29.

Table 28: Survey results for squad performance

Squad performance					
squad number ⇩ question number ⇨	Q1	Q2	Q3	Q4	total
1001	5,4	5,1	5,3	5,6	5,3
2001	6,5	6,2	6,0	6,3	6,3
3001	5,6	5,6	5,1	5,8	5,5
4001	5,6	5,6	5,4	5,7	5,6
6001	4,6	4,1	4,3	4,6	4,4
7001	4,2	5,3	4,8	5,5	5,0
8001	4,8	4,4	4,8	5,6	4,9
12001	6,5	6,7	3,8	6,7	5,9
14001	Missing	Missing	Missing	Missing	missing

average	5,36
standard deviation	0,60

Q1: is consistently high performing
Q2: is effective
Q3: makes few mistakes
Q4: does high quality work

Table 29: Correlation matrix for the survey questions about squad performance

Correlations

		This squad is consistently high performing.	This squad is effective.	This squad makes few mistakes.	This squad does high quality work.
This squad is consistently high performing.	Pearson Correlation	1	,790**	,269	,665**
	Sig. (2-tailed)		,000	,052	,000
	N	53	53	53	53
This squad is effective.	Pearson Correlation	,790**	1	,380**	,829**
	Sig. (2-tailed)	,000		,005	,000
	N	53	53	53	53
This squad makes few mistakes.	Pearson Correlation	,269	,380**	1	,382**
	Sig. (2-tailed)	,052	,005		,005
	N	53	53	53	53
This squad does high quality work.	Pearson Correlation	,665**	,829**	,382**	1
	Sig. (2-tailed)	,000	,000	,005	
	N	53	53	53	53

**. Correlation is significant at the 0.01 level (2-tailed).

Job satisfaction

For all teams the job satisfaction scores are quite high. Only squad 8001 scored below the score of 5 on the 7 point scale. All the other squads seem to score above 5. The questions also show signs of correlation with a significance level of 0.01. So, the scores could be combined into one total score.

Table 30: Survey results for job satisfaction

job satisfaction					
squad number ⇩ question number ⇨	Q1	Q2	Q3	Q4	total
1001	5,5	5,3	5,6	5,4	5,4
2001	5,6	5,6	5,3	5,9	5,6
3001	5,6	5,0	5,5	5,6	5,4
4001	5,9	5,4	5,4	5,7	5,6
6001	5,7	5,7	5,7	5,6	5,7
7001	5,7	5,8	5,2	5,7	5,6
8001	4,8	4,6	4,6	4,2	4,6
12001	6,0	6,5	6,0	6,0	6,1
14001	missing	missing	missing	missing	missing

average	5,50
standard deviation	0,44

Q1: I find real enjoyment in my job
Q2: I like my job better than the average person
Q3: Most days I am enthusiastic about my job
Q4: I feel fairly well satisfied with my job

Table 31: Correlation matrix for the survey questions about job satisfaction

Correlations

		To what extent do you agree or disagree with each statement? I find real enjoyment in my job.	To what extent do you agree or disagree with each statement? I like my job better than the average person.	To what extent do you agree or disagree with each statement? Most days I am enthusiastic about my job.	To what extent do you agree or disagree with each statement? I feel fairly well satisfied with my job.
To what extent do you agree or disagree with each statement? I find real enjoyment in my job.	Pearson Correlation	1	,637**	,724**	,712**
	Sig. (2-tailed)		,000	,000	,000
	N	54	54	54	54
To what extent do you agree or disagree with each statement? I like my job better than the average person.	Pearson Correlation	,637**	1	,697**	,641**
	Sig. (2-tailed)	,000		,000	,000
	N	54	54	54	54
To what extent do you agree or disagree with each statement? Most days I am enthusiastic about my job.	Pearson Correlation	,724**	,697**	1	,676**
	Sig. (2-tailed)	,000	,000		,000
	N	54	54	54	54
To what extent do you agree or disagree with each statement? I feel fairly well satisfied with my job.	Pearson Correlation	,712**	,641**	,676**	1
	Sig. (2-tailed)	,000	,000	,000	
	N	54	54	54	54

**. Correlation is significant at the 0.01 level (2-tailed).

8.5. Codebook transformation

The coded observations have shed a light on leadership behaviour of individuals in an agile squad, the specific observations were linked to Yukl's (2012) taxonomy via the codebook of CMOB. In Table 32 the observation codes are linked to Yukl's (2012) taxonomy, but as can be seen not all behaviours can be observed via this code book. This code book does not have codes for all the external behaviour described by Yukl (2012) and only limited for change-oriented behaviour. Also some aspects of task- and relations-oriented behaviour are also not observable via the codebook of CMOB. Therefore, some codes were drawn up as an example of how these codes can be put in the codebook, this can be seen in Table 33. There are some other problems as well with the codebook transformation and that can be seen in Table 34. Squad 6001 was a very task-oriented squad but looking at this table the relation-oriented score is much higher. This is because scores like active listening are coded far more often than others. This skews the data. A solution for this problem also needs to be found.

Table 32: linkages between CMOB codebook and Yukl's (2012) taxonomy

CMOB codebook		**Yukl's (2012) taxonomy**			**explanation**
self-orienting	disinterest				No effective leadership behaviour
	protecting own position				No effective leadership behaviour
	giving negative feedback	advocating change			Giving negative feedback can be seen as people telling that things are not going correctly and that's why they are in some way advocating change.
steering	disagreeing	problem solving	advocating change		Disagreeing can be seen as people who do not agree with a certain solutions or opinions. Therefore, disagreeing can be seen as trying to solve problems or avoiding problems. And thus advocating a change in their solutions or opinions.
	agreeing	supporting	recognizing		Agreeing with squad members can be seen as supporting their solutions or opinions and really expressing this can be seen as recognition for co-workers.
	conducting/correcting	problem solving			Correcting can be seen as solving or correction problems that have occurred or that can occur.
	conducting/delegating	recognizing	empowering		By delegating tasks to people you are recognizing this person's skills and value. Furthermore, you can giving someone the power and

					responsibility to do things as they see fit and thus them.
	conducting/interrupting	clarifying	problem solving		Interrupting can in cases be to clarify certain things that might be unclear. Interrupting can also be a sign of correcting and therefore problem solving.
	verifying	clarifying	monitoring operations		Verifying and checking certain things when they are unclear clarifies objectives, opinions, etc. That helps understanding for all, but can also be used to monitor where current operations are at the moment.
	shaping the conversation	clarifying			Shaping the conversation or meeting by giving it structure can clarify processes and objectives.
	factually informing	clarifying			informing squad members about work related facts, creates a larger understanding of those facts for all parties involved which can lead to more clear decision making. And can therefore be presumed clarifying.
	providing direction/ own opinion	envisioning change	advocating change		By giving direction to the squad by giving you opinion about. You are envisioning and advocating change that you would like to see.
	providing direction/ long term	envisioning change	advocating change		By giving direction to the squad by looking at the long term solutions or strategies. You are envisioning and advocating changes that need to happen now to make those long term goals a success.
supporting	giving positive feedback	supporting			By giving positive feedback you are supporting your co-workers and their work.
	professional challenge/asking about ideas	supporting	recognizing	empowering	By asking someone's ideas you are supporting them to tell those ideas. You are recognizing their value and expertise. And you are

					empowering them to act on those ideas.
	professional challenge/promote cooperation	developing			By promoting cooperation you are developing the squads to create better teamwork.
	giving positive attention/being friendly	supporting	developing		By being friendly you are supporting your co-workers and by doing so developing a safe and friendly work environment.
	giving positive attention/personal attention	supporting	recognizing	developing	By personal attention you are supporting your co-worker and recognizing him as a valuable team member. And by doing so developing a personal relation with your co-worker.
	humour	supporting	developing		By making jokes and showing that humour is allowed. You are supporting and developing a nice and relaxed working environment for your co-workers.
	personally inform	recognizing	developing		By personal inform you are recognizing your co-worker and recognizing him as a valuable team member and you are developing a personal relation with your co-worker
	active listening	recognizing	developing		By actively listing to your co-worker you are recognizing the usefulness of their input. And in that way developing a comfortable working environment.
other	net task behaviour				no effective leadership behaviour
	residual category				no effective leadership behaviour

Table 33: example codebook for missing codes

Behaviour	definitions	examples
task-orientation		
planning	addressing time schedules, deadlines, etc.	'when do we need to finish this task' 'are we going to make the deadline' 'I think this deadline is too risky'
monitoring operations	accessing current standings about goals, KPI's, etc.	'Where are we on the … project' 'have we received the info we needed for ...' 'last week we discusses… how are things now'
relation-orientation		
empowering	Giving people the space, responsibility and the autonomy to their work.	'do want to take the lead this project' 'I believe you are qualified to lead this project'
change-orientation		
envisioning change	the creation of possible ideas for future changes	'I think this could be the solution' 'what if we would change it into this' 'what if we do this like this the next time'
encouraging change	stimulating ideas that change certain outcomes for the better	'yes, i believe we need to do things different' 'oh yes, that's way better than before' 'I believe our clients will be pleased with these changes'
facilitating change	helping someone who has an idea to change things	'what do we need to makes these changes happen' 'can I help you in any way' 'do you need something to realize this'
external		
networking	creating a network of external people who are in some way linked to your team	'mentioning of meeting work related interesting people' 'mentioning business partners like schools or universities'
external monitoring	monitoring external parties such as other business units in the organization, market developments, clients, etc.	'there are new developments going on in the … markets' 'I heard from the CEO that the business is doing well' 'The other squads are having trouble with…' 'Our client is experience difficulty with...'

representing	representing the squad in external business meetings, fairs, etc.	'I had a meeting with the other teams about…' 'at the fair last week we spoke with many new potential clients'

Table 34: squad 6001 effective leadership dimension scores based on the current code book transformation.

		follower 1	follower 2	follower 3	follower 4	follower 5	follower 6	follower 7	follower 8	**total**
task	clarifying	45	46	6	30	20	37	6		**190**
	planning									
	monitoring operations	16	8	2	11	10	9	1		**57**
	problem solving	14	28	2	9	7	13	2		**75**
relations	supporting	4	6	2	1	2	1	0		**17**
	developing	78	85	11	53	39	67	15		**348**
	recognizing	80	90	11	53	39	69	15		**356**
	empowering	3	6	1	1	1	2	0		**13**
change	advocating change	39	41	4	24	19	46	7		**180**
	envisioning change	36	37	3	22	17	41	6		**162**
	encouraging change									
	facilitating change									
external	networking									
	external monitoring									
	representing									