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The Impact of Leadership on Virtual Team
Satisfaction and Viability: the Role of
Performance Monitoring and Team Work
Engagement

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Abstract

Title: The Impact of Leadership on Virtual Team Satisfaction and Viability: the Role of Performance Monitoring and Team Work Engagement

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This master thesis was conducted to better understand the factors of team effectiveness, especially the relationship between two team leadership functions (promotion of team self-management and promotion of a good social climate) and two components of team effectiveness: satisfaction and viability of team members. Monitoring and back-up behaviours (two action processes) were thought to have a mediating role in these relationships, under the moderation of Team Work Engagement. The results only partially supported these hypotheses. Back-up behaviours were found to be a mediator of the relationship between team self-management and satisfaction, and team work engagement does moderate the relationship between social climate and viability, but no moderated mediation appeared to be significant.

Key-words: Team Effectiveness, Leadership, Team Processes, Satisfaction, Viability

Resumo

Título: Título: O Impacto da Liderança na Satisfação e Viabilidade de Equipes Virtuais: o Papel do Monitoramento de Desempenho e o Envolvimento do Trabalho em Equipe

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Esta tese de mestrado foi realizada para entender melhor os fatores de efetividade da equipe, especialmente a relação entre duas funções de liderança de equipe (promoção da autogestão da equipe e promoção de um bom clima social) e dois componentes da eficácia da equipe: satisfação e viabilidade dos membros da equipe. Acompanhamento e back-up de comportamentos (dois processos de ação) onde se pensa ter um papel mediador nesses relacionamentos, sob a moderação do Team Work Engagement. Os resultados suportaram apenas parcialmente essas hipóteses. Constatou-se que os comportamentos de apoio são um mediador da relação entre autogestão e satisfação da equipe, e o engajamento do trabalho da equipe modera a relação entre o clima social e a viabilidade, mas nenhuma mediação moderada pareceu ser significativa.

Palavras-chave: Eficácia de Equipe, Liderança, Processos de Equipe, Satisfação, Viabilidade

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I. Introduction

Teams. For better or worse, we've all been and will be a part of one at some points during our education, extra-scholar activities, or job. "L'enfer, c'est les autres" ("Hell is other people") wrote Jean-Paul Sartre in his play *Huis Clos*. Because others are mirroring us a twisted, sometimes negative image of ourselves, it can be hard to cope with them. But living, or working completely alone, is not a viable option in the long term (have you ever watched *Into the Wild*?). Relying on others, regrouping individuals to perform certain tasks, allows better efficiency. In big organizations, such as hospitals, that run 24h/7, teams became a necessity to allocate and manage human resources. When a group of people gets together and overcomes the potential initial disagreements of living in society, they can reach their final objectives quicker than a series of individuals that would each accomplish a fraction of the work on their side. Teams can also, in theory, accomplish more complex tasks than individuals, foster creativity and productivity (Salas, Sims, & Shawn Burke, 2005). Yet, because they are full of non-robotic human with feelings, personalities and side lives, to the great displeasure of managers, teams are imperfect and complex to manage. No perfect team exists.

And virtual teams add a level of complexity. De Lisser noted already in 1999 that more than half of the companies that employ over 5000 employees use virtual teams (VTs). With the intensification of globalisations and spread of multinational corporations, helped by new medium of communications, their development has continued over time. These teams, in which the members are geographically distant and use technology to overcome this obstacle, have become common within any organisation (Gibson & Cohen, 2003). The emergence of this new kind of teams has generated growing research on the academic side. Several aspects of VTs have been discussed, regarding its costs and benefits in comparison to regular teams or even its definition (Martins, Gilson, & Maynard, 2004). But virtual teams are a reality, regardless of their nature, weaknesses and strengths. And their mechanisms need to be better understood to, if not to reach the "perfect virtual team", try to create the conditions that will maximise their effectiveness.

Despite the thorough full research and academic framework on leadership and virtual teams, only seldom studies have empirically studied the specificities of leadership in virtual teams, and the impact of leadership functions on team's outputs and effectiveness, its

mechanisms, still need to be explained in more details (Bell & Kozlowski, 2002a; Ilgen, 2006; Marks, Mathieu, & Zaccaro, 2001; Morgeson, DeRue, & Karam, 2010). A part of this impact might be explained by team processes, defined as the interactions between team members happening while the team is at work (Hackman & Morris, 1975). Among team processes, monitoring and back-up behaviour are crucial to teams (Salas et al., 2005) and difficult to develop efficiently in virtual teams (because of obstacles in communication, distance, and asynchronicity that will be developed in the body of this study). This paper seeks to determine the links between team leadership functions and two components of team effectiveness, satisfaction and viability, supposing monitoring and back-up behaviours processes will have a mediating role on this relationship, while the overall mediation will be moderated by team work engagement.

The first part of this work will focus, through a literature review of main academic papers on the topic, on the definition of above mentioned (and other) elements of virtual teams' effectiveness. This allow the development of our 4 hypotheses, after which the reader will find a description of the sample used for this study. The second part of this master thesis focuses on the methods used for data collection, the results from the quantitative survey and their limitations. The last part contains the discussion over the results and the practical implications they have.

II. Literature review

A. Team & team effectiveness

Before modern times and the invention of internet and new technologies communication, teams already existed and were used extensively within every organization (Katzenbach & Smith, 1993). Their size, tasks and objectives are diverse and can range from changing the wheels of sport car during a race in less than 10 seconds to completing a school assignment. It is thus necessary to define what a team is. We will define team as “*a distinguishable set of two or more people who interact dynamically, interdependently, and adaptively toward a common and valued goal, who have been assigned specific roles or functions to perform, and who have a limited life-span of membership*” (Salas, Dickinson, Converse, & Tannenbaum, 1992, p. 4). In addition to the regular face-to-face teams, we find virtual teams. The multinational enterprises (MNEs), defined as organisations implemented in two locations or more, with a shared decision-making system (Ethier, 1986, Ghoshal, &

Westney, 1993, Caves, 1996), benefited from the development of new communication technologies, such as computer-mediated communication (CMC) (Salmon, 2000), to expand at lower cost and develop these teams that were more flexible and dynamic, and could also source talents at a lower cost (Bergiel, E. B., & Balsmeier, 2008; Hertel, Konradt, & Orlikowski, 2004). These virtual teams can be defined as “*interdependent individuals physically separated from one another and relying on information technologies to communicate, collaborate, and coordinate work to achieve a common goal*” (Caya, Mortensen, & Pinsonneault, 2013, p.1; Cramton, 2001; Maznevski & Chudoba, 2000). Because of their nature and the limited communication tools they have, virtual teams needed dedicated research to be fully understood. Research has shown for example that despite their advantages regarding flexibility and building a competitive advantage in a competitive environment (Jarvenpaa & Leidner, 1999), the use of CMC might impact negatively the communication within the teams and thus its effectiveness in reaching its goal (Chidambaram & Jones, 1993; Cramton, 2001).

One of the first things to do, when looking to compare the advantages and disadvantages of one type of team vs the other, or if one wants to study the *best practice* in teams, is to look at the overall *effectiveness* of each team. Effectiveness is not limited to the team reaching its goal; it is assessed through three dimensions: the *performance* of the team, the *satisfaction* of team members, and finally, its *viability*. The *performance* of the team is, surprisingly, rarely defined in the papers reviewed that try to measure it and develop teamwork frameworks to improve it (see Chidambaram & Jones, 1993; Gully, Incalcaterra, Joshi, & Beaubien, 2002; Hackman & Morris, 1975; Malhotra & Majchrzak, 2014). Teams can perform a very large variety of task and can be of various size, type or present different organizational structure, hence the difficulty in finding a common definition of performance. The *Oxford dictionary* states that performance is: “*a task or operation seen in terms of how successfully it is performed*”. Still we see there how vague this definition is and how little it tells us about the way the team is working. Let’s consider two teams of 5 members that have for mission to each move a box from point A to point B. They both do it in ten minutes. We could consider the team as having an equal performance. However, if in one team the work has been done by one person only, and in the other by equally dividing the work between each team member, we can assume that in the long run the two teams won’t perform equally. It becomes even harder to compare the performance of two teams or more when their task differs slightly or when the conditions in which they perform are not equal. The definition

of performance is linked to the team and its context (Mathieu, Maynard, Rapp, & Gilson, 2008). Hackman (1983) noted that the performance of the team was a subjective measure, and proposed that team effectiveness should be assessed as follow: “*does the output produced [meets or] exceeds the performance standards of the people who receive and / or review the output*” (p.21). If yes, the team can be considered effective.

The two other dimensions mentioned, *satisfaction* and *viability*, allow us to gain a deeper and more global understanding about the team effectiveness. These two dimensions are also important because they allow us to consider the team under other aspects. Satisfaction, is according to the *Oxford Dictionary* definition, the: “*fulfilment of one's wishes, expectations, or needs, or the pleasure derived from this*”. The team members are *satisfied* if their own work, but also the work of the team as a whole, feels their expectations. Moreover, Hackman (1983) noted that the cost of entering the group (the frustration linked to the abandonment of certain individual needs and desires) should not exceed the benefits of belonging to the group. Several known variables impact team members satisfaction, such as conflicts, to which it is generally negatively correlated (De Dreu & Weingart, 2002; Jehn, 1994) or team *potency* – how the team is perceived regarding its capabilities to perform any task given-, that is positively correlated with satisfaction (Shea & Guzzo, 1987a; Gully et al., 2002).

Finally, *viability* is the willingness of the team to stay together, without turnover within its members (Balkundi & Harrison, 2006; Barrick, Stewart, Neubert, & Mount, 1998). It is a good proxy for performance and satisfaction. If performance is low, the team has no reason to stay as it is since it does not fulfil its purpose. Either the processes or the members need to be changed. Likewise, if the individual satisfaction low, it is unlikely that team members will want to remain part of the team indefinitely, without affecting their performance and / or engagement.

Salas et al. (2004) identified the five key elements impacting team effectiveness: *team leadership, team orientation, mutual performance monitoring, back up behaviours, and adaptability*. We will come back later to the definition of these elements. These 5 elements affect the team, and thus the performance of the team, and are performed during different phases of the team's lifecycle. They are present when the team is at work (*action phase*), in a *transition period*, or cover both periods (Marks et al., 2001).

B. Team processes

1. IPO

The usual framework Inputs-processes-outcomes (IPO) allows to study teams actions thorough fully (Hackman & Morris, 1975). *Inputs* can be defined as the base state of the team, e.g. the individual characteristics of its members or its resources. The *processes* can be defined as the ensemble of interactions happening among the team members while the team is working on its task. Finally, *outcomes* are the results or consequences induced by the team's work (Barrick et al., 1998).

2. Interpersonal & Action processes

Team processes appear in each team, when team members use resources to perform their task and “convert inputs to outcomes” (Marks et al, 2001, p.357). These processes are influenced by the emergent states of the team (*mediators* between the inputs of the team and its outputs, such as its cognitive, motivational, and affective states) and the *traits* (“relatively enduring characteristics” (Kerlinger, 1986 p.453)) of the team members. As developed by Marks et al. (2001), the team's work can be divided as the alternation of “episodes” (“distinguishable periods of time over which performance accrues and feedback is available” (Marks et al., 2001 p.359)). Episodes regroup two periods; *transition* and *action* periods. During action periods, the team is accomplishing task work to achieve its goals, whereas during transition periods, it is reflecting on its action and performance and planning future action. As noted by Marks et al. (2001), the lengths of each phase depend highly on the type of task the team faces, and the processes at work during each period are not the same.

Team processes can be classified under 3 dimensions: *action*, *transition* and *interpersonal* processes (Marks et al., 2001). The *interpersonal processes* are defined as the interactions between team members that occur during both transition and action phases and that are related to the management of interpersonal relationships. They include conflict management, motivation and confidence building, and affect management. These processes happen both when a team is working specifically on its task and when it is not. Within a working team, the members can meet outside working hours and exchange on other matters. The relationships between the members and trust are built both when the team is at work and

when it is not, affecting the way the team works together during the action phases. For example, a conflict between two members can arise during an action phase and be resolved during a transition phase, or appear for reasons unrelated to the execution of the task itself. *Transition* processes include mission analysis, formulation, and planning, as well as goal specification and strategy formulation (Marks et al., 2001). As suggested by their denomination, they mostly occur during transition periods. This is the period the team uses to identify its resources, set and prioritize its goals and define several courses of action in order to reach them. Finally, the *action processes* mostly take place when the team is performing its assigned task(s). They include coordination and monitoring of the group progress (Marks et al., 2001; Martins et al., 2004; Salas et al., 2005).

Team processes are at the core of team performances (Gladstein, 1984; Hackman & Morris, 1975; Salas et al., 2005). Therefore, they have been studied both in regular and virtual teams (VT). Because VTs are mainly set apart from “regular” teams because of their use of specific communication tools, the research on virtual teams had an extended focus on how communication affects some of these processes, demonstrating for example that VTs were usually facing communication of lower quality and were more focused on work related matters (Lebie, Rhoades, & Mcgrath, 1995). However, this negative effect has been shown to decrease over time, and virtual teams tend to use less formal ways of communicating (Walther, 1994; Tidwell & Walther, 2002). The use of IT solutions has allowed the development of virtual teams, palliating the distance and time differences between the team members, allowing them to communicate through different channels that allow direct or indirect interactions (e-mails, direct messaging systems, phone or video conference systems). These interactions cannot have the same depth than face to face one as some elements, such as body language or voice intonation are, for most communication channels, not expressed fully. It thus may require more time to exchange full information when it is achieved through computer mediated communication (CMC) rather than face-to-face communication (Martins et al., 2004; Tidwell & Walther, 2002). The different channels are not used with the same purpose and present different characteristics, being more or less rich and more or less personal or impersonal. For instance, e-mails could be used to obtain data, seek answers to explicit questions, whereas video-conferencing could be used to clarify some specific points or reach an agreement (Chidambaram & Jones, 1993). The use of CMC also includes time constraints for the teams, especially those operating across several time zones, with different working hours. E-mails or voice messages can allow members to communicate

across those boundaries but won't be answered in the moment, whereas direct messaging is only available when the team members are working at the same moment and are available, and conferencing requires planning and must be limited in time duration. If one team member faces doubt and needs clarification regarding some elements of the projects, he might not be able to move on with his task because of this, and thus needs to ask for the help of his colleagues, but he might not get it immediately. These leads to asynchronicities in knowledge sharing and discrepancies between team members' level of information. Especially when team members are separated over two locations or more. The level of formal or informal interactions between team members at the same location will be higher than the level of interactions between the different geographic subgroups of the team (Chidambaram & Jones, 1993; Jarvenpaa & Leidner, 1999; Suchan & Hayzak, 2001; Tidwell & Walther, 2002; Warkentin & Beranek, 1999). These differences in communication means affect the quality and quantity of interactions between team members at a global level and thus the other processes in the team. Asking and providing help within a virtual team for example is harder because teams' communication often presents a certain lead-time between the first contact and the answer. And when help is needed but not directly asked, it is harder for team members to identify which task their colleagues are working on and if it is done as required, and engage in corrective action if need be.

Research on either *monitoring* and *back-up behaviour*, as pointed out by Martins et al. (2004), is still insufficient, although these two elements are essential in teams and they might be challenging to implement in VT. This because the difficulties in communication and lack of information regarding one's teammates actions impact the ability of VTs to perform efficiently these aspects (Arnison & Miller, 2002; Jarvenpaa & Leidner, 1999). We will thus focus on these two dimensions.

3. Mutual Performance Monitoring process

Monitoring process regroups 3 sub-processes occurring during the action phase, as identified by Marks et al (2001): *Monitoring progress towards goals*, *Systems monitoring*, and *team monitoring and back-up behaviours*. *Monitoring progress towards goals* is defined as "tracking task and progress toward mission accomplishment, interpreting system information in terms of what needs to be accomplished for goal attainment, and transmitting progress to team members" (Marks et al., 2001 p.366). *Systems monitoring* refers to the

“tracking [of] team resources and environmental conditions as they relate to mission accomplishment” (Marks et al., 2001 p.367). This monitoring of the team’s environment allows it to adapt to external changes. If the task of the team is for example to launch a new product on the market but a competitor launches a similar product just a bit before, the team will need to adapt its strategy.

Since, as noted by Bilin, Sadacca & Martinek (1965), Doten, Cockrell & Sadacca (1966), and Salas et al. (2005), individuals may not be aware of their performance deficiencies, these processes are necessary to make sure the team performs its task to the utmost quality. Our cognitive attention is limited. Any team member could make a mistake that will prevent the task to be unfulfilled perfectly. Depending on the task of the team, this could have dire consequences (e.g.: medical emergency teams where the doctor would administrate the wrong doses of some medication, or fireman team where the on-call member falls asleep). Monitoring process impact the effectiveness of the team because it allows members to perform back-up behaviours when needed (Salas et al., 2005).

According to Salas et al (2005), performance can be positively impacted by the implementation of a good monitoring process, because it will favour *back-up behaviours* and this monitoring process will be more effective when the team has a proper identity and a climate of trust. Without trust, members will be less likely to let others observe their performance freely by fear of judgement and criticism. Likewise, they won’t be inclined to ask for help from other teammates, preventing the apparition of back-up behaviours.

4. Back-up behaviour process

Back up behaviour process can be defined as:

“the ability to anticipate other team members needs through accurate knowledge about their responsibilities. This includes the ability to shift workload among members to achieve balance during high periods of workload pressure” (Salas et al., 2005, p. 560).

It is, simply put, the ability of one teammate to assist or replace another one in his work or task. Marks (2001), identified three types of assistance: providing coaching or verbal feedback to a teammate, helping a teammate to complete his action, or completing the task for a teammate from beginning to end. Back-up behaviours can only occur within a team

where each team member has a deep understanding not only of what the other's role is, but also if they are performing it correctly during the *action phase* (Marks et al., 2001; Salas et al., 2005; Zaccaro, Rittman, & Marks, 2001). They will most often be needed and provided when one of the team member faces a work overload and at least one other is under-utilized and can spare its capacity to help its colleague (Porter et al., 2003). This effect is moderated by the various orientation of the "big five" model of personality (Costa, McCrae, & Kay, 1995) of each team member, as it will affect both the demand of back-up behaviour and the tendency to provide help (Porter et al., 2003). When the need for back-up is legitimate and the recipient has a high level of *conscientiousness* or *extraversion* it is more likely that back-up behaviour will appear in the team. Examining the links between the personality of the provider of back-up behaviour and the frequency to which they appear, Porter et al. (2003) have shown that the more emotionally stable individuals are in a team, the more likely back-up behaviours are to be provided. This shows how the construction of a team can impact the implementation of back-up behaviours and thus the effectiveness of the team. And the effect of personality traits on the amount of back-up behaviour asked or provided might be even more important in virtual teams. Because virtual team members cannot communicate as directly and as richly than in "regular" teams, team members can experience difficulties to get to know each other and adapt their behaviours to their colleagues. On a regular team, a member known as an *introvert* might benefit from more support from his more extrovert colleagues as they will be able to more easily connect with him than in a virtual team, and could more easily check on his work, providing assistance when needed.

Back-up behaviours are one of the central elements of the teams, as noted by McIntyre and Salas (1995). Without them, team members would only be dividing one assigned task and would act as separate entity. Working in a team implies that it is possible to submit your work to the review of others and ask for help on your task.

C. Tasks:

Some tasks are more subject to back-up behaviours than others and benefit from different types of monitoring. Two types of tasks can be identified : *collaborative tasks* and *coordination tasks* (Mathieu, Goodwin, Heffner, Salas, & Cannon-Bowers, 2000; Salas et al., 2005). The first ones are tasks that need to be executed by all team members throughout the *action phase*. The second ones are executed separately by each team member in a

sequential order. In this case, monitoring process will be *ad hoc*, done after the task has been executed by the team member. In an industrial kitchen, for example, each cook might be in charge of putting one ingredient to make the final dish. The process can clearly state that each member needs to make sure that the previous ingredient has been added, and then, if not, provide a back-up behaviour by adding the missing ingredient. For collaborative tasks, monitoring processes needs to be performed over time, while the task is being accomplished. It requires real time feedback and adjustments from the team member performing the task or assistance from the others.

We see that both monitoring and back-up behaviour processes appear and are more effective under certain conditions. If they can emerge naturally within a team, they are more efficient when given a specific structure, proper to the environment in which the team evolves. To shape these processes as well as others, teams can designate (or be created with) a *leader*, that will supervise the work of the team to make it reach its maximum efficacy. The leader will exercise *leadership* functions.

D. Leadership

As noted by Morgeson, DeRue and Karam (2010), because leadership is about satisfying needs, the *leadership* functions can be shared among team members, without designating a specific member as “leader”. Anyone who could answer to the specific needs of the team can be a leader. We could thus have several leaders spanning across time and / or functions. The leader doesn’t have to be specifically designated. Thus, it seems more relevant to talk about the *leadership functions* as a whole than of a leader in particular (Morgeson et al., 2010). The leadership functions impact several characteristics for the team. It includes coordination process, cognitive process (facilitate problem solving) and managing teams collective behaviours and motivations (Salas et al., 2005; Zaccaro et al., 2001). The leadership functions can be split over the lifecycle of the team. During *transition phases*, the main tasks linked to these functions will be to align objectives and goals, create a shared understanding of the team needs, tasks and resources, provide feedback, and forge a common identity (Derue & Morgeson, 2005; Morgeson et al., 2010; Salas et al., 2005). The common identity is particularly important and relevant for virtual teams, since it allows the team to be more efficient and makes up for the loss of face to face communication (Mathieu et al., 2000) .

During *action phases*, the leader needs to monitor teams, manage boundaries, challenge the team to perform better, perform team tasks when needed or requested, solve problems, provide resources, and support social climate (Derue & Morgeson, 2005; Yukl, 1989). Supporting social climate is about promoting a good team social environment. This can be achieved through different means, but it is mainly about solving interpersonal conflicts and facilitate team member's expressions of ideas or concerns by displaying empathy and kindness. Overall, the leadership functions can be regrouped in two categories : *performance management* and *team development* (Bell & Kozlowski, 2002a). Performance management includes functions such as monitoring the behaviour of team members as well as their actions, and identification and solution of emerging problems (Mc Grath, 1962; Hackman & Walton, 1986). Team development is mainly about team cohesion; how to build a collective bond, and about the capability for the team to self-manage (Kozlowski et al, 1996; Kozlowski, Gully, Salas & Cannon-bowers, 1996; B. S. Bell & Kozlowski, 2002).

As noted by an increasing number of authors, the *leader* position is more and more discussed, leaving place for self-managing teams. This is especially relevant for virtual teams, where the leader, even when designated, may not be the same location or time zone than his/her team members and thus cannot always be performing his/her function properly, solving problems as they come up. This is why encouraging teams self-management through reinforcing self-control and social learning among members is especially important (Bandura, 1971; Bell & Kozlowski, 2002a; Manz & Sims, 1980). The leadership function has to set routines to reinforce teams patterns and state clear objectives both individuals and collective (Bell & Kozlowski, 2002a; Ebrahim, Ahmed, & Taha, 2009; Gersick & Hackman, 1990; Hertel, Geister, & Konradt, 2005; Kayworth & Leidner, 2002). This way the team could perform its task even when cut from its leadership.

As developed above, two of the leader's functions are related both to task accomplishment and to managing relationships, through promoting team self-management and a good social climate. This paper deliberately focuses on the study of these two areas, because of their importance for the team's overall effectiveness. And they are especially important for the specific sample surveyed in this paper (see page 18 for a presentation of the sample).

Since it may happen that the leader is temporarily unavailable to perform its task, especially in virtual teams, it becomes primordial for him to encourage the team to self-manage. The leader should, while promoting team-self management, put in place routines and trainings for the team to perform a constant monitoring of its own activities, coping for its absence. If the team is able to monitor itself because its leader promoted self-engagement, including routines around monitoring process, the team should be able to identify flaws in its actions or a defective team member, and thus perform back-up behaviours when needed. This should ultimately allow the team to perform better since it should reduce the occurrence of errors or bad quality work by team members (Salas et al., 2005). Therefore, individuals will feel more satisfied with their team and more willing to continue working with the team in the future. Hence H1. a and H1. b:

- *H1. a: Promoting self-management by the leader will lead to more satisfaction through increasing monitoring and backup behaviours.*
- *H1. b: Promoting self-management by the leader will lead to more team viability through increasing monitoring and backup behaviours.*

As noted by Fleishman et al. (1991) and other authors, a team with a leader that promotes a good social climate (i.e. respects ideas, exhibits warmth, demonstrates concern for personal issues, or “engages in caring actions that validate team members and their individual needs and concern” (Fleishman et al, 1991; Hackman & Walton, 1986; Campion, Medsker, 1993; Druskat & Wheeler, 2003; Marks & Mathieu, 2001; Schminke, Peyrefitte, & Sebor, n.d.) tends to be more productive. A good social climate improves the satisfaction of team members since, as defined, it allows them to meet their needs. It can also affect the behaviour of the team members regarding their co-workers and the impact it thus has on back-up behaviours (that are influenced as we saw by individual characteristics and task complexity) and monitoring process. If a team member doesn't feel like he's being listened to, cannot talk about his needs or cannot get them satisfied, he might not express the need for back-up behaviour when he faces difficulties in its task or a work overload. Because of the physical distance and limited means of communication, particularly in of virtual teams, it can be harder to identify and express the “needs and concerns” of team members within virtual teams (Hertel et al., 2004; Kayworth & Leidner, 2002), and this function could not be performed correctly, impacting the quality or frequency of back-up behaviours within the teams. Since back-up behaviours are crucial to team effectiveness and, as developed above,

a bad social climate can decrease the occurrence of back-up behaviours, this will impact negatively team members' satisfaction and their will to continue their work with the team. We will thus explore *H2. a* and *H2. b*:

- *H2. a: a leader that **support the social climate** will allow more frequent monitoring and back-up behaviours and improve the satisfaction of team members*
- *H2. b: a leader that **support the social climate** will allow more frequent monitoring and back-up behaviours and improve the satisfaction of team members*

E. The moderating role of engagement

Work engagement, defined as a positive and fulfilling state of mind related to work that manifests through 3 dimensions – absorption, vigor and dedication (Rodríguez-Muñoz, Alfredo; Derks, 2012; Costa, Passos, & Bakker, 2014; Torrente, 2012)- has long been studied at individual's level and only started to be studied at team level recently. *Absorption* refers to a high level of concentration in one's task, *dedication* to a deep commitment and identification to one's job and *vigor* stands for a “willingness to invest high levels of energy and mental resilience while working” (Torrente, 2012 p. 107). Individuals that feel engaged tend to perform on average better than others. Team work engagement has been shown to exist as an emergent state, correlated to individual engagement but still coexisting with it. It can be defined as “a shared, positive and fulfilling motivational emergent state of work-related well-being” (Costa et al., 2014 p.418). The level of team work engagement is dependent on several variables such as conflicts, team resources, team culture and individual characteristics (Costa et al., 2014; Torrente, 2012). As noted by Costa et al., (2014) team work engagement theoretically impacts interpersonal processes (affect management, conflict management, and motivation building) and can lead to changes in inputs, outputs, processes. Following Ilgen, Hollenbeck, Johnson & Jundt (2005) and their Input-mediator-output-input framework, Costa et al. (2014) have demonstrated that team work engagement is impacted by team processes, but team inputs, outputs, processes and emergent states are as well impacted by team work engagement. However, to our knowledge, no author has already looked into the specificities of this impact, neglecting which processes it affects especially and how its effect manifests in virtual teams. Because virtual teams face specific constraints and difficulties to build a good cohesion and team identity, the effect of team work engagement might be even more important. Furthermore, monitoring and back-up

behaviours demand extra resources from team members, and can only be performed willingly, as it adds to the initial workload of each team member. That's why we will consider that team work engagement might have a moderating role in the hypotheses developed above, strengthening the proposed relationships. We will first examine the role of the moderator on the relationships between promotion of self-management and viability / satisfaction, and between support of social climate and the same outputs. We will thus explore H3 and H4:

- *H3. a: **promoting self-management** by the leader will lead to **more satisfaction**, especially in teams with high levels of TWE.*
- *H3. b: **promoting self-management** by the leader will lead to increased **viability**, especially in teams with high levels of TWE.*

- *H4. a: a leader that **support the social climate** will improve the **satisfaction** of the team, especially in teams with high levels of TWE.*
- *H4. b: a leader that **support the social climate** will improve the **viability** of the team, especially in teams with high levels of TWE.*

In case these relationships appear to be verified, we can consider that the mediation in H1 and H2 can also be subject to a moderation. We will thus explore H5. and H6, if the simple mediation and / or the simple moderation are verified:

- *H5. a: **promoting self-management** by the leader will lead to **more satisfaction** through increasing backup behaviours, especially in teams with high levels of TWE.*
- *H5. b: **promoting self-management** by the leader will lead to increased **viability**, through increasing backup behaviours, especially in teams with high levels of TWE.*

- *H6.a: a leader that **support the social climate** will allow more frequent back-up behaviours and improve the **satisfaction** of the team, especially in teams with high levels of TWE.*
- *H6.b: a leader that **support the social climate** will allow more frequent back-up behaviours and improve the **viability** of the team, especially in teams with high levels of TWE.*

F. Virtual Teams & E-sport teams

Past research on virtual teams can be criticised because of its focus on laboratory experiments and students' teams assigned to short term tasks (Martins et al., 2004). These methods can quickly be limited as the data collected always depends on specific conditions set by the researchers. To avoid this bias, the research on this paper is focused on amateur and semi-professional e-sport teams. E-sports teams are a group of video game players that gather to compete against another team of players of equal size over various objectives. E-sport itself is competitive video gaming. To benefit from a harmonized sample, this paper focuses on the study of E-sport teams playing MOBA games. MOBA games are video games in which two teams of usually 3 to 5 members fight within a restricted area, each player controlling one character with specific characteristics and role (Yang, Harrison, & Roberts, 2014). The objective of each game is to take over the enemy base, by killing one's opponent and destroying intermediary objectives. To do so, most games will see in the beginning the players fight 2vs2 or 1vs1, with one team member roaming around the battle area and coming to the help of his teammates as needed. As time goes by, players start moving around the map to surprise the enemy team and outnumber them. The team task is therefore limited in time and its performance is easy to assess (the game is either won or lost).

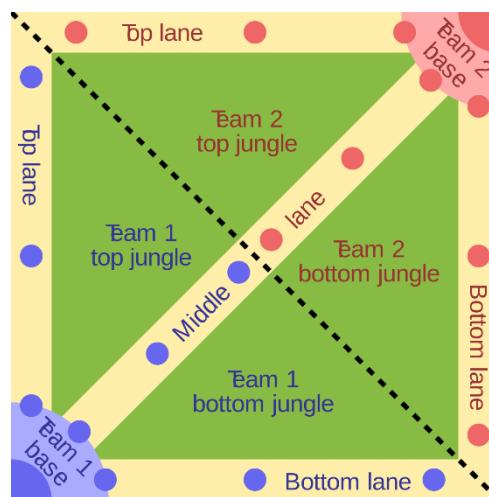


Figure 1. A Typical MOBA field of battle

As pointed out by several studies, the boundaries between “fun” and “work” is thinner than ever (Witkowski, 2012; Yee, 2006). The players surveyed often practice hours together, sometimes late at night and despite a feeling of sickness. The pressure to reach your objective (win the game) is heavy, and requires a strong engagement from the player.

Strategies are built for hours, with training, rehearsing and finally, victory or lost. As in a working team, each player will have its unique role, characteristics, and personality. E-sport teams have a common goal, reached through the interaction of team members accomplishing their designated task and working together. Thus, they can be designated as team in the sense that was previously defined. Because of the dynamic nature of the video game and the direct contact with an opposing team, the level of interaction between team members is high.

If a match opposing 2 teams follows up to some point a simultaneous series of individual actions, as players evolves in their own lane, the work of the team is mostly *collaborative*, as defined earlier (Mathieu, Goodwin, Heffner, Salas, & Cannon-Bowers, 2000; Salas et al., 2005). Players need to diagnose the situation constantly, adapt their strategies and changes intermediary objectives while coordinating the action to insure perfect synchronicity (Bell & Kozlowski, 2002; Ven, Delbecq, & Koenig, 1976). E-sports teams, for the time of the game, are most often entirely virtual. Even during a professional competition, team members never communicate face to face but only through the game chats and signals tools, and are most of the time connected through a direct communication oral system equivalent to Skype. And the communication within the team must be constant. On a MOBA map, teams mostly follow the same pattern. 2 players gather at the right lane, one in the middle, one on the left lane and one roaming on the map to help his teammates. Each player has a limited field of vision and, if not for the knowledge shared by his teammates, is only aware of this. But, with 6 to 10 players constantly interacting and thousands course of action possible, communication is not always simple, yet essential. The player needs to monitor his own environment at all time and be aware of the position of his teammates and of the opponents'. If his direct opponent disappears from his vision, he might be attacking allies and the player needs to both signal it and come support his teammates. When the character of one player is killed, the player cannot act for a certain period before coming to life again, and someone needs to cover his role during this time. If none of these actions are performed (monitoring of the environment and constant communication, support to teammates), the team will lose the game in a few minutes. We thus see the utmost importance to have a team able to self-manage and perform autonomously monitoring and back-up behaviour process within e-sport teams. The leader in the team, if explicitly designated, can only handle so much information at once and cannot control his teammates' action nor detains the full information. And when his character is killed, he cannot intervene in the game. Thus, the team needs to set routines in place and train so it can still function without

explicit indications. Furthermore, since their action is delimited within a precise timeframe (one game), it makes it also easier to study their action periods. And the performance of teams during action periods is easy to analyse, MOBA games providing hard metrics (number of games win or lost, number of enemies killed, number of death, gold generated, duration of each game...). Because they are mostly played during free time, e-sports also require a strong engagement from team members. In addition, it seems unlikely that players will stick with a team that doesn't provide a good social climate. Players (especially amateurs) first play because they want to have fun, not to be in a negative environment. For e-sport teams, self-management, monitoring and back-up behaviour processes as well as social climate are key elements of their overall effectiveness.

Finally, video games and e-sports are not just a kid's fantasy and playtime. It's a whole industry that generates hundreds of millions of dollars in revenues, with, just as football or any other competitive sport, its own rules, sponsors, and star players.

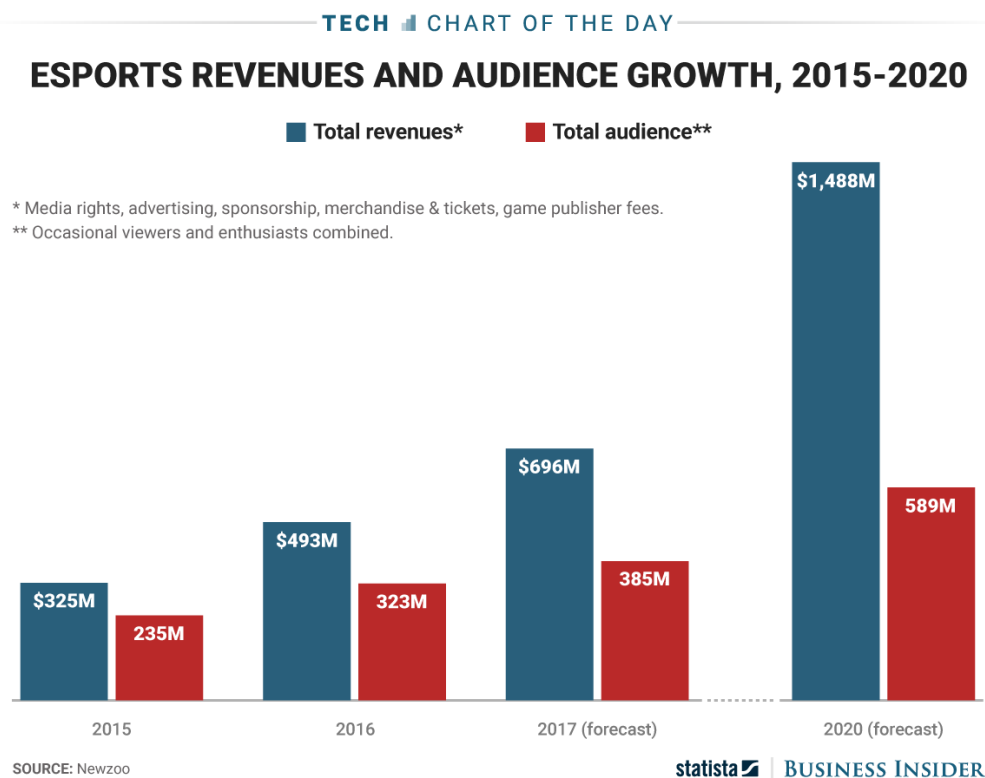


Figure 2 E-sports revenues and audience 2015-2020.

<http://uk.businessinsider.com/esports-popularity-revenue-forecast-chart-2017-3>

E-sport teams present all the characteristics of virtual teams, can be concrete study objects to escape the laboratory bias, and, finally, have a real economic impact. Hence their use in this study.

III. Methodology

A. Procedure and sample

1. Procedure

This master thesis was written as a sub-topic of Team Effectiveness Seminar. Five students were part of the seminar, each working on a specific topic. Some could collect the data through a common survey. However, I wished to focus on the specific sample of e-sport teams, and built specific hypotheses that made a group collection impossible.

Answers were collected through a survey powered by Qualtrics, making it easy to gather data and export it for an analysis on SPSS. The first goal was to collect answers at team level. However, not knowing personally a sufficient number of e-sports team (neither amateur nor professional), it was necessary to widen the base of potential respondents, posting the survey on social media and anonymous forum. It would have been thus impossible to ensure that answers were collected for all the teams in a trustworthy way. Even if the answers were really filled by all the team members, most amateur teams don't have an official name, making it hard to average the individual answers at team level. For these reasons, this paper analyses the answers at individual's level, not team level.

Even with this option, collecting answers was not easy. Daily posts were made on several MOBA players social networks over a 3 weeks period (Facebook and LinkedIn groups, forums...), and the chance to win a targeted reward was advertised (25€ gift card on Steam, a digital retailer for PC-based video games) in each post. However, about 2/3 of respondents only started the questionnaire without finishing it, probably because of its length and very specific questions. Unlike employees or students, respondents were potentially not used to this kind of scale questions nor had the sufficient background to understand the subtleties of each subscale. Thus, the survey was opened 128 times, the first question gathers 82 answers and the last mandatory one 62, for an overall filling rate of 48%.

2. Sample

Overall, 62 answers were collected (n= 62), with 66% male, 18% female and 16% of participants with unknown gender (demographics were non- mandatory questions). For most teams, the leader was internal (76%) and was not the respondent (77%). The sample was young with an age ranging from 11 to 37 years and an average respondent aged of 23,46 years (SD 3,94). The tables below summarise the main characteristics of the sample.

Variable	N	Min.	Max.	Mean	SD
Age	52	11	37	23,46	3,94
How long have you worked with this team (in months)	52	1	36	9,42	8,48
What percentage of your team do you know in real life?	50	0	100	67,98	31,89
What % of your team would you consider to be friends with?	50	0	100	67,62	30,07

Table 1. Demographics.

Variable	Item	N	Percent
Gender	Male	41	66%
	Female	11	18%
	NS	10	16%
I am the leader of this team	Yes	12	23%
	No	40	77%
The leader of this team is	internal (e.g. is part of the team)	47	76%
	external (e.g. a coach)	5	8%

Table 2. Demographics (2) and others.

B. Measures

The data analysis was made using SPSS Statistics Software. Answers with non-completed scales were ignored, but answers with completed scales and no demographics were included. All scales were tested for reliability with Cronbach's Alpha (results below). The questionnaire itself was a combination of several scales that allowed to test our hypotheses. Team work engagement was the first measured according to the 9-point scale developed by Costa et al. (2014), and covered the view the respondents had about the feelings experienced by the team in a game (e.g. "While we are playing we feel bursting with energy"). This scale showed a good reliability (Cronbach's $\alpha = 0,93$).

The second variables measured for this study were part of the Action Phase Leadership Functions, as developed by Morgeson et al. (2010). The first one was promotion

of team self-management, on a 6-point scale, which measured the degree to which the leader pushed the team to be autonomous (e.g. “the leader encourages the team to make its own decisions regarding who does what tasks within the team”). The scale also shows good reliability (Cronbach’s $\alpha = 0,86$). The second one support social climate, on a 5-point scale, with items such as “the leader does things to make it pleasant to be a team member”. The scale shows good reliability (Cronbach’s $\alpha = 0,90$).

Then was measured the supposed mediator monitoring progress towards goals and team monitoring & back-up behaviours, on a 10-point scale (Mathieu & Marks, 2006). The first five were more related to monitoring (e.g. “our team clearly defines metrics to asses our progress”), the last five to back-up behaviours (e.g. “we assist each other when help is needed”). The scale showed a reliability of $\alpha = 0,91$.

Finally, the two outcomes satisfaction and viability were the last scales measured. Satisfaction was measured on a 9-point scales with items such as “rate your satisfaction level regarding the decisions made by the team”, and showed a reliability of $\alpha = 0,95$. Viability was measured on a 4-point scale (e.g. “If possible, I would have switched to another team”) and a reliability of $\alpha = 0,64$.

The variables were measured on with different ranges:

-Action phase leadership function; Team engagement and Viability: 1- Strongly disagree ;2- Disagree; 3- Somewhat disagree; 4- Neither agree nor disagree; 5- Somewhat agree; 6- Agree; 7- Strongly agree

-Satisfaction: 1 - Completely dissatisfied; 2 - Mostly dissatisfied; 3 - Somewhat dissatisfied; 4 - Neither satisfied or dissatisfied; 5 - Somewhat Satisfied; 6 - Mostly satisfied; 7 - Completely satisfied

-Team processes: 1= Not at all; 2= Very Little; 3= To Some Extent; 4= To a Great Extent; 5= To a Very Great Extent

IV. Data analysis

The tables below summarize the main findings from the data analysis. Table 3 summarizes the descriptive statistics and correlations between the variables. Table 4 sums up the mediation results for H1 and H2, table 5 the moderations and table 6 the moderated mediations.

The analysis was conducted as follow; using the work and macro by Preacher and Hayes (2004), we tested the effect of the mediator (monitoring process and back-up behaviours) in the relationship between the two leadership functions (self-management promotion and supporting social climate) and team members' satisfaction and viability. We used the same macro for the moderator. The moderated mediation was then tested on the variables that were affected either by a significant mediation or moderation, still using Preacher and Haye's macro (2004).

Variable	N	Mean	SD	Team Work Engagement	Encourages self-management	Promotes social climate	Process monitoring	Satisfaction
Team Work Engagement	62	4,98	1,29					
Encourages Self-Management	62	4,89	1,20	0,14				
Promotes Social Climate	62	5,13	1,31	0,05	0,52*			
Process monitoring	62	3,57	0,83	0,40*	0,35*	0,33*		
Satisfaction	62	5,05	1,35	0,37*	0,63*	0,58*	0,66*	
Viability	62	4,64	1,20	0,33*	0,36*	0,36*	0,38*	0,601*

Table 3. Descriptive statistics and correlations (* $p < 0,01$)

All variables were significantly correlated at the 0,01 level, except Team work engagement that was not correlated neither with promoting team self-management promotion ($r = 0,14$, $p = 0,28$) nor supporting the social climate functions ($r = 0,05$, $p = 0,695$).

Mediations						
Variables			Hyp	Indirect effect		
X	Mediator	Y		Coeff.	bootLLCI	BootULCI
Self management	Monitoring	Satisfaction	H1. a	0,44	0,02	0,42
		Viability	H1. b	0,1	-0,01	0,24
Social climate		Satisfaction	H2. a	0,19	-0,01	0,37
		Viability	H2. b	0,09	-0,01	0,20

Table 4. Simple mediations

The mediation analysis was computed using bootstrapping, a procedure that allows resampling and estimates the indirect effect on each sample created from the data. In this case, we used a bootstrapping of 1000 samples as allowed by the process macro, with a confidence interval of 95%.

H1.a is the only mediation hypothesis supported (CI = {0,021; 0,412}. The mediation effect of monitoring and back-up behaviours was not supported for H1. b (CI = {-0,007; 0,248}), H2. a (CI = {-0,011; 0,378}), or H2. b (CI = {-0,014; 0,206}).

Moderations						
Variables			Hyp.	Effect		
X	Moderator	Y		Int_1	LLCI	ULCI
Self-management	TWE	Satisfaction	H3. a	0,04	-0,07	0,15
		Viability	H3. b	0,10	-0,01	0,22
Social climate		Satisfaction	H4. a	0,02	-0,10	0,13
		Viability	H4. b	0,11	0,01	0,22

Table 5. Simple moderations

Despite the previously significant correlations, TWE only had a moderation effect on the relationship between social climate and viability ($p < 0,032$, $0 \notin [0,101; 0,221]$). All other moderation effects were not significant. The significant moderation is represented on the following graph. The better the support to social climate, the higher the viability, especially if the team is engaged.

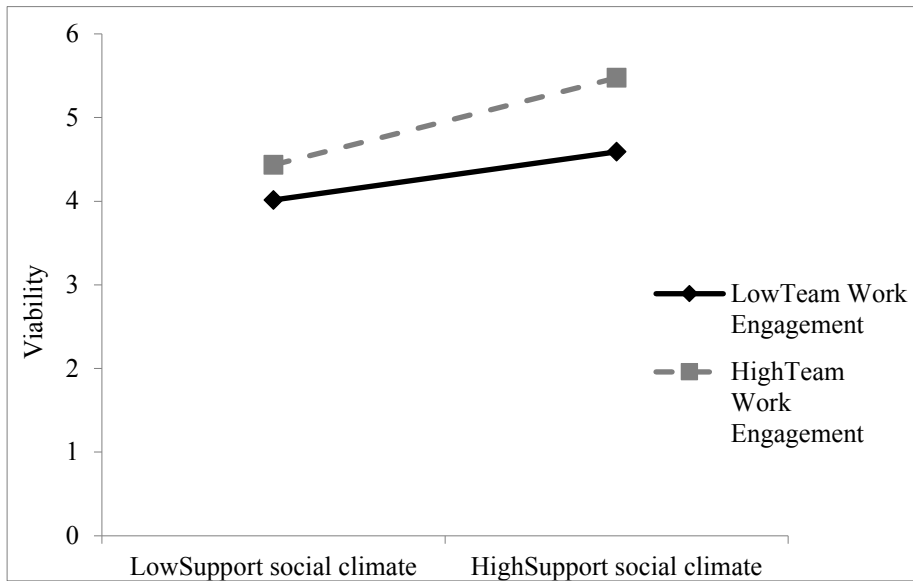


Figure 3. Moderation from TWE on the Social Climate / Viability relationship

If neither the simple mediation nor simple moderation was significant, we excluded it for the test of the moderated mediation. H3. b (CI = {-0,01; 0,22}) and H4. a (CI = {-0,10; 0,13}) were not supported, therefore, neither could H5. b and H6. a be. But H5. a and H6. b remained to be tested for the moderated mediation hypotheses.

Moderated Mediation							
	Variables			Hyp.	Effect		
X	Mediator	Moderator	Y		Index	BootLLCI	BootULCI
Self-management	Monitoring and back up behaviour	TWE	Satisfaction	H5.a	0,10	-0,048	0,367
Social climate			Viability	H6.b	0,04	-0,038	0,181

Table 6. Moderated mediations

The moderated mediation happened to also be insignificant for both H5.a (CI = {-0,048; 0,367}) and H6.b (CI = {-0,038; 0,181}). Neither hypotheses was supported.

V. Discussion

The hypotheses were not all supported. As predicted and developed in the literature review, the correlations support that monitoring and back-up behaviour processes are positively related to both team satisfaction and team viability. The correlations also confirm the positive relationship between two leadership functions (promotion of team self-management and social climate) and viability and satisfaction, as already noted by several authors (Cordery, Mueller, & Smith, 1991; Wall, Kemp, Jackson, & Clegg, 1986). Most

authors noted an effect of these leadership functions on satisfaction, but viability also appears to be affected by these two functions.

This study also allowed explaining a bit further the links between some leadership functions and team satisfaction, putting in light the mediating role of monitoring process and back-up behaviour between team-self monitoring and satisfaction. Authors had in the past pointed out the absence of a mediating role of *interpersonal* processes on the relationship between leadership self-management promotion and team performance itself (Stewart, Barrick, Spaar, Mickan, & Rodger, 2000), but it seems that *action* processes could have a role to play here, as H1. a was supported.

The mediation between the promotion of team self-management and viability appeared to be non-significant (H1. b). However, the size of the sample could have played a role here, as the test is close to significance (with LLCI = -0,0077). A few extra answers could have made this mediation effect significant. The absence of mediating effect on the self-management / viability relationship might also have to do with the nature of amateur e-sport teams, that have overall a short and inconsistent lifespan from one team to the other (mean = 9,4 months, SD = 8,4). They may not consider viability as a major factor.

But winning a game is particularly rewarding for players, along with their individual performance. This partly explain why the mediation significantly affects our first hypothesis (H1. a). Self-managed teams with a good monitoring process and high occurrence of back-up behaviours might get more wins and thus experience higher satisfaction levels. As stated before, support to teammates is essential in the dynamic environment that is a MOBA game. Team members depend highly on each other to complete their own task and cannot win the game alone. In consequence, the deficiency of only one member can hurt the whole team if coping mechanisms are not put in place to complete the teammates' action. A known phenomenon in e-sport team is called "snowballing". A player that is outnumbered at some points by the enemy team and receives no assistance from his teammates can easily fail to defend is lane. The enemy teams progress faster in the games (as times goes by, characters unlock new characteristics and equipment that make them stronger, and these are accessible quicker if the teams destroy objectives or kills enemies), and increase its chances to kill its opponents. And a team that manages to kill a part of the enemy team in the in the beginning of the game has a strong chance to win the game, because it outnumbers the rest of the

opposite team and unlock new characteristics even faster. This leads to a quicker end of the game. No matter how one's team performs usually, this kind of episode highly impacts the perceptions of players regarding their satisfaction. A team that is able to self-manage and whose members autonomously perform monitoring process and back-up behaviours will avoid this snowballing effect and increase their chances of winning the game and doing so their average satisfaction. Furthermore, e-sport teams can "easily" benefit from the three different types of back-up behaviours as defined by Marks et al. (2001). They can provide coaching or verbal feedback to a teammate, because most team play using a vocal communication system and the game itself allows sending individual or group written messages as well as visual indications (called "pings"). Players can also help a teammate to complete his action (coming on his lane to destroy the intermediary objective faster), or completing the task for a teammate from beginning to end (go on his lane to palliate his death or his disconnection from the game – MOBAs mostly require to be connected to internet-, palliating his temporary or permanent inaction). A team that has all of these processes well set up can increase its chances of winning and thus satisfaction.

The relationship between supporting the social climate and both outcomes (satisfaction and viability), appeared to not be mediated (H2) by monitoring and backup, despite significant correlations between all of the variables. However, supporting the social climate is slightly less correlated to monitoring & back-up behaviours processes ($r = 0,33$) and satisfaction ($r = 0,58$) than self-management promotion is ($r_{\text{monitoring}} = 0,35$, $r_{\text{satisfaction}} = 0,63$). This might be because teams are in majority composed of groups of friends where overall the support to social climate (mean = 5.13) is slightly higher than the promotion of self-management (mean = 4.89), and this is specific to the sample. The mediation doesn't appear to be significant because a good social climate, by itself, leads to a good level of satisfaction and viability. And, as for the mediation between the promotion of team self-management and viability, the size of the sample might have played a role as the test is once again close to significance for both H2. a and H2. b (LLC = 0,01). The small differences in correlations and initial levels of social climates vs self-management, combined with the size of the sample, could explain the non-significance of the mediation.

The moderation from teamwork engagement significantly affects the social climate / viability relationship (validation of H4. b), and it especially makes sense in the case of e-sport amateur teams. If they are engaged in the game, it is likely they play "ranked" games,

and take part in more games than non-engaged teams. Ranked games allow players to get a ranking among all other players of their regions, with different “tiers” that offers specific rewards to the player. Since a good social climate allows teams to be more productive and efficient (Fleishman et al. 1991), the better it is, the higher are the team’s chances of winning and going up the ranks, so the longer players will stay in their team. And when players are not really engaged in the game, they might not play as often nor take the game seriously. The social climate, even if important because teams are mostly composed of groups of friends (on average respondents consider to be friend with 68% of their team), doesn’t affect the viability of the teams as much in this case since players care less, or don’t care at all, about the results of their games.

More surprising was the absence of a significant moderation effect of Team Work Engagement on the other relationships (self-management and both outcomes, and social climate to satisfaction), despite an apparent support from the literature (Costa et al., 2014). But once again, the size of the sample might have affected the results, especially for the moderation between self-management promotion and viability (H3. b), with a confidence interval close to significance (CI = {-0,01; 0,22}). The simple and mediated moderations might not have been significant in the case of satisfaction because it is driven by a more or less objective measure: the games are either won or lost. A player is, overall, satisfied with his team when it wins its games often enough, and dissatisfied if they lose too often. This regardless of the fact that she or he feels engaged in their games, or, up to some point, if the social climate his good or not. The satisfaction scale indeed only contains one item linked to the relationship climate among members, the others being more linked to what impacted the performance of the team (see appendix I) but the variables satisfaction and social climate remain significantly correlated with ($r = 0.58$).

If we look at the overall results, we have a validation of H1. a. (mediation from monitoring & back-up behaviours on the self-management / satisfaction correlation) and a validation of H4. b (moderation from TWE but no mediation on the social climate / viability correlation). The satisfaction and viability, despite being highly correlated ($r = 0,60$), seem to be influenced by different factors. The “affective” dimensions that are the support for social climate and team work engagement affect the viability of the team to stay together, while the satisfaction is apparently more linked to task-related mechanisms such as the ones that are self-engagement and monitoring process & back-up behaviours. Thereby, a team

member with more freedom in its work and help from teammates will be more satisfied because the crucial role played by back-up behaviours will allow the whole team to reach its objective (winning a game in the case of e-sport teams). But a team where the social climate is not supported, where team members cannot express their needs and concerns, nor are engaged in their work, will likely face a higher turnover. One can be satisfied with the overall output of his / her team, because it objectively reaches its goals, but still want to stop the collaboration with the team at some point because of a non-optimal social climate and a non-engagement from the team towards its work. On the contrary, even if the team is not functioning properly and improvements need to be made to create an output that will be satisfactory, team members might be willing to stay longer in the team and try to improve the team processes.

VI. Practical implications

This study has several practical implications. As others, it confirms the importance of leadership functions for team overall effectiveness and puts in light the role of monitoring process and back-up behaviours in this relationship.

Self-managed teams, if not adapted to every environment and every co-worker, seem to be a good way to improve team members' satisfaction. Self-managed and empowered individuals have more control over the work, better perceive their impact and, in the end, feel more satisfied with their team. The distance and asynchronicity imposed by virtual teams makes it hard for team members to communicate in real time and this creates an extra obstacle to process monitoring and back-up behaviours. Not knowing your teammates and not being subject to direct indications from a leader or a manager, it is harder to know when to step up to help your co-workers. Encouraging your team to self-manage, training it to autonomously and proactively perform monitoring process and back-up behaviours will likely allow more consistency in the team's output (avoiding mistakes or delays for example) and by this way improve the overall satisfaction of team members. As supported by the correlation analysis, and as teams' activity is cyclic, it is likely that satisfied team members also produce perform more back-up behaviours and produce better output. If you feel satisfied with your team, you will probably be more willing to help your co-worker and take in some extra work than when you are not. Especially if other team members already helped you. Workers should thus by themselves be more open to teammates and spontaneously offer

assistance, with a special care for introvert colleagues that will be by nature not inclined to express the need for back-up.

As expected, supporting the social climate is also important. A virtual team can be tough to manage because of the distance between team members it involves. But creating a positive climate where members are free to share their concerns and express their needs will positively impact the teams' viability. And acquiring new talents or swapping team members from one team to another in the same company is expensive. For new talents, the HR process is long and requires dedicated resources, from the job offer creation, publications, candidates contact and selections, rounds of interviews and integration and training of the new co-worker. There also is a cost when the new team member is already part of the company. For an optimal level of performance, team members need to share a common understanding of the team's missions and culture, that the new comer will need time to assimilate in addition to its operational job. This also has a cost of opportunity for the managers that spend time interviewing the candidates rather than actually managing their team. A good social climate could also allow the teams to stay together in spite of bad performances that brings low level of satisfaction, especially when team members are engaged in their work. It becomes thus crucial for managers to engage their co-workers and answer their needs and concerns.

VII. Limitations and leads for future research

A. Limitations

As every study, this one presents a few limitations. Firstly, the sample is really specific, even though e-sport team present all the characteristics of other virtual teams. As stated in the methods and above, e-sport amateur teams and the thus the respondents of the survey do not consist of a uniform sample. Respondents don't necessarily have a common education or culture. And as per the work of Porter et al. (2003), we know that personality of team members affects the occurrence of back-up behaviours and other team processes. The orientation of the individual on these scales are affected by its life experience and thus make the perception of each scale subjective.

About a third of answers also come from French respondents that I directly know, and who did not follow a business track nor were confronted to this scale measurements in the past. The same might go for other respondents. Most respondents are young (Mean(Age)

= 23, Maximum = 37). Most teams are also composed of group of friends that know each other in real life, even though some teams are composed of groups of strangers (Mean(Friendship) = 67,6%; SD = 30,06). This might affect the judgments of respondents. Moreover, the sample is also mostly composed of male respondents (66%).

All answers were collected in a three-week period, and the surveyed mostly answered in a one shot, not really smoothing the time impact on data collection. Respondents might just have had a negative or positive experience with their team, creating a bias in the interpretation of results (a longitudinal design was not possible for this study because of the time constraints).

Finally, the size of the sample is the main limitation of the study. With 62 respondents, the results cannot be extrapolated with a high confidence interval; the answers' distribution might be slightly biased and the bootstrapping method loses a bit of its impact.

B. Leads for future research

Team effectiveness is affected by many factors; team member personality, organizational structure in which the team evolves, type of task, type of leadership... The dynamic nature of teams makes it hard to study them at one point in time with self-evaluation of team members. Further research needs to be conducted to elaborate the conditions of the "perfect team" (if it exists).

The use of self-managed teams keeps on growing, and this despite of some unsuccessful experiences (Tata & Sameer, 2004). Self-managed teams are not only developed because they could make the workers more satisfied with their teams and work, but because they could and should perform better, while offering a significant reduction in costs for companies. Less hierarchy in companies could help reduce headcounts, opportunity cost of reporting to a manager, and in the end overall payroll cost. Further research remains thus necessary to understand by which mechanisms self-management affects team's effectiveness, to draw practical conclusions that will allow to maximise the efficiency of this type of teams when they are put in place.

It could also have been interesting to look at team empowerment instead of team self-management. Empowerment is an “increased task motivation resulting from an individual’s positive orientation to his or her work role” (Kirkman & Rosen, 1999, p58). Team empowerment is defined on four dimensions, meaningfulness (how important is the task perceived to be), autonomy (degree of freedom and such in their work), potency (capacities to achieve a certain action), and impact (importance of the work done for the organisation that commanded it) (Kirkman & Rosen, 1999). The last dimension would have been hard to evaluate with e-sport teams, since amateur ones only play on their own behalf, with no real incentive and it is mostly about “having fun” for the players. However, it could have been perfectly evaluated with professional teams, that bear an important pressure from sponsors during professional competitions. Empowered team and their positive outcomes on proactivity, job satisfaction, and commitment (Kirkman & Rosen, 1999) could owe their performances to increased back-up behaviours.

Finally, since we determined the importance of back-up behaviours, it might interesting to look deeper into their determinant factors. Teams are often build for a repetitive task and will share several episodes in their lifecycle. With a longitudinal design, we could look at the ways to build step by step a strong monitoring & back-up behaviour process with direct and indirect improvement measures. For example, looking at ways to increase the overall satisfaction of the team members (by other means than the leadership functions here explored) could in turn lead to more back-up behaviours. A team member satisfied with his teammates work and willing to stay will be more likely to cope for one of his colleague’s absence or mistakes.

VIII. Appendix

A. Appendix I: Variable Dictionary

Q#	Variable: Teamwork Engagement			
Q1.1		While we are playing we feel bursting with energy.	1- Strongly disagree 2- Disagree 3- Somewhat disagree 4- Neither agree nor disagree 5- Somewhat agree 6- Agree 7- Strongly agree	Costa, Passos & Bakker (2014)
		While we are playing we feel strong and vigorous.		
		We are enthusiastic about playing.		
		Our games inspires us.		
		We are enthusiastic about starting a new game		
		We feel happy while we are playing		
		We are proud of playing		
		We get immersed in the games.		
		We get carried away when we are playing		
Variable: Team Leadership				
Q2.2	Encourage team self-management	Encourages the team to be responsible for determining the methods, procedures, and schedules with which the work gets done	1- Strongly disagree 2- Disagree 3- Somewhat disagree 4- Neither agree nor disagree 5- Somewhat agree 6- Agree 7- Strongly agree	Morgeson, DeRue e Karam (2009)
		Urges the team to make its own decisions regarding who does what tasks within the team		
		Encourages the team to make most of its own work-related decisions		
		Encourages the team to solve its own problems		
		Encourages the team to be responsible for its own affairs		
Q2.3	Support social climate	Encourages the team to assess its performance		
		Responds promptly to team member needs or concerns		
		Engages in actions that demonstrate respect and concern for team members.		
		Goes beyond own interests for the good of the team		
		Does things to make it pleasant to be a team member		
		Looks out for the personal well being of team members.		

Variable: Team processes – Action				
Q3.1	Monitoring progress toward goals	Regularly monitor how well we are meeting our team goals	1= Not at all 2= Very Little 3= To Some Extent 4= To a Great Extent 5= To a Very Great Extent	
		Use clearly defined metrics to assess our progress		
		Know whether we are on pace for meeting our goals		
		Let team members know when we have accomplished our goals		
		Your team regularly evaluates to what extent it is accomplishing the defined goals.		
	Team monitoring and backup	Develop standards for acceptable team member performance		
		Balance the workload among our team members		
		Assist each other when help is needed		
		Inform team members if their work does not meet standards		
		Seek to understand each other's strengths and weaknesses		
Variable: Satisfaction				
Q4		Team you were in	1 – Completely dissatisfied 2 – Mostly dissatisfied 3 – Somewhat dissatisfied 4 – Neither satisfied or dissatisfied 5 – Somewhat satisfied 6 – Mostly satisfied 7 – Completely satisfied	
		Team functioning		
		Participation in the task		
		Decisions made by your team		
		Communication among members of the team		
		How the team leader acted		
		Strategy defined by the team		
		Relationship climate among members of your team		
All in all, and considering every aspect of your participation in the team you would say you are				
Variable : Viability				
Q5		I would not hesitate to participate in another task with the same team.	1 – Completely dissatisfied 2 – Mostly dissatisfied 3 – Somewhat dissatisfied 4 – Neither satisfied or dissatisfied 5 – Somewhat satisfied 6 – Mostly satisfied 7 – Completely satisfied	
		If possible, I would have switched to another team. (R)		
		If I had had the opportunity, I would rather work with a different team, instead of working with this one. (R)		
		This team would work well in future projects.		

Demographic & Others			
Q6		Age	
Q7		How long have you worked with this team (in months)	
Q8		The leader of this team is	Internal / External
Q9		I am the leader of this team	Yes / No
Q10		Sex	Male / female
Q11		What % of your team do you know in real life?	
Q12		What % of your team would you consider to be friends with?	

IX. References

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