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# The Effect of Trust on the adaptability of virtual teams. The Mediator Role of Transition Processes

Maria Cura Marcos

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## **Abstract**

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### **Title**

The Effect of Trust on the adaptability of virtual teams. The Mediator Role of Transition Processes

### **Author**

Maria Cura Marcos

The purpose of this dissertation is the study of the effect of trust on team adaptation through transition processes. Data was collected from 332 questionnaires. Results show that there are differences between the levels of trust and adaptability in virtual and non-virtual teams. However, transition processes' levels do not vary significantly between both groups. Results indicate that trust has a statistically significant effect on team adaptation and that transition processes mediate the effect of trust on team adaptation. Nonetheless, the amount of Face-to-face communication does not moderate the relationship between trust and team adaptation.

**Keywords:** virtual teams, trust, team adaptation, transition processes, face-to-face communication

## Resumo

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### **Título**

O efeito da confiança na adaptação de equipas virtuais. O papel mediador dos processos de transição

### **Autor**

Maria Cura Marcos

O objectivo desta dissertação é o estudo do efeito da confiança na adaptação de equipas através dos processos de transição. Os dados foram recolhidos de 332 questionários. Os resultados mostram haver diferenças entre os níveis de confiança e adaptação em equipas virtuais e não virtuais. Contudo, tendo em conta os níveis dos processos de transição, os mesmos não variam significativamente entre os grupos. Os resultados indicam que a confiança tem um efeito estatisticamente significativo na adaptação dos membros da equipa e, que os processos de transição mediam o efeito da confiança na adaptação dos elementos da equipa. No entanto, a quantidade de comunicação face-a-face não modera a relação entre confiança e adaptação.

**Palavras-chave:** equipas virtuais, confiança, adaptação de equipas, processos de transição, comunicação face-a-face

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# 1. Introduction

## 1.1. Purpose of the study

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The present thesis focuses on the study of trust and its effects on the adaptability of virtual teams. The main goal of the present study is to understand how the levels of trust will influence the adaptation of team members, particularly in virtual contexts. Moreover, another purpose of this dissertation is to comprehend whether the level of trust is going to influence the interaction between those team members, such as share of ideas and information, on the transition processes, that, in turn, will facilitate collaborative and effective team adaptation.

## 1.2. Importance of the study

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Over the years, organizations have been suffering work environment transformations (Aubert & Kelsey, 2003; Gibson, Maynard, Jones Young, Vartiainen & Hakonen, 2015). Recent and rapid advances in information technology, have led to a growing number of teams which are working away from their company, interacting through computer-mediated communication network (Driskell, Radtke & Salas, 2003). In order to adapt and respond to these new ways of work, organizations start to create “virtual teams” (Gibson et al., 2015).

As companies expand globally, organizations are depending more heavily on virtual teams (Townsend, DeMarie, & Hendrickson, 1998; Kirkman, Rosen, Tesluk & Gibson, 2004; Gibson & Cohen, 2003), and several strategic advantages and challenges, for organizations and employees who work in these virtual contexts, have emerged (Geister, Konradt & Hertel, 2006). Furthermore, studies on team adaptation show that team members who work in virtual environments have been considered to produce an essential and growing role in many companies around the world (Wiedow & Konradt, 2010), since the levels of adaptability of these workers have to be superior, in order to face all the common threats of virtual environments (Pulakos, Arad, Donovan & Plamondon, 2000). Therefore, understanding what can foster the adaptation of these teams is important for both researchers and practitioners.

Although it is crucial to study how organizations are developing and facing new paradigms of virtual work, the importance of this study relies on recent studies about how trust can exist in virtual environments where people have not physical contact and face-to-face communication is rare to occur (Jarvenpaa, Knoll, & Leidner, 1998; Jarvenpaa & Leidner, 1999), and on how it might promote team adaptation. Trust has been considered to be an important collective state in any type of team. According to McAllister (1995), the majority of

researchers declared that trust is seemed as a “determining factor in the effectiveness of any complex system which requires coordinated action,” (Zand, 1972, p. 229) facilitating the knowledge exchange among team members. In addition to the study of how trust is related to team adaptation, it is important to understand how these two variables (e.g. trust and team adaptation), are related. In other words, we will try to understand the process by which trust will lead to team adaptation.

### **1.3. Research Questions**

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The main research question that encouraged this dissertation was: How will the levels of trust influence the levels of adaptability between team members in virtual teams, with low levels of face to face communication? Nevertheless, sub-questions occurred while the literature about these subjects was collected:

1. Can trust exist in virtual teams where their team members interact from different locations and they do not have any physical contact?
2. How does trust in team members affect the interaction in teams?
3. It is possible that high levels of trust led to high adaptability by positively influencing transition processes?
4. Are these relationships influenced by the amount of face-to-face communication?

### **1.4. Thesis organization**

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This dissertation is organized as follow. The next chapter is the literature review, where several theoretical foundations will be covered as well as the discussion of crucial concepts related to the study variables. Following the literature review, the third chapter is related to the methodology used throughout this study. The methodology is divided into three sub-titles: participants, procedure, and measures. Then in the fourth chapter, findings will be presented, where the data collected will be analyzed, showing the results. Finally, the last section is the discussion, where the major conclusions will be discussed, as well as practical implications, limitations and further developments will be presented.

## 2. Literature Review

### 2.1. Virtual Teams

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In order to understand the concept of virtual teams, it is important to describe what is meant by a team from a conceptual perspective. For the purpose of this study, we consider that a team can be defined as “two or more individuals with specified roles interacting adaptively, interdependently, and dynamically toward a common and valued goal” (Salas, Sims & Burke, 2005, p.559/562).

Nowadays, due to the increasing globalization and the global business competition, several organizational systems and structures (work process) have been modified and many organizations have been changing the way they usually work (Bell & Kozlowski, 2002). In addition, the rapid technological advancements and the spreading implementation and progress of new information, around the world, are also affecting organizations. This phenomenon has led many organizations to start working in a virtual environment (Geister, Konradt & Hertel, 2006). Consequently, in order to respond to these business globalization challenges, many organizations are establishing “virtual teams,” allowing workers to collaborate on a variety of workplace tasks based on computer-mediated communication (Hertel, Geister & Konradt, 2005; Bell & Kozlowski, 2002). According to Bell and Kozlowski (2002), dynamic advances in communication and information technology have been leading to several chances for organizations to become more flexible and adaptive, in order to be able to build and manage virtual teams. Since these communication advancements are continuously growing over the years, it is known that the number of organizations adopting the use of virtual teams is going to growth (Gibson et al., 2015; Townsend, DeMarie & Hendrickson, 1998; Aubert & Kelsey, 2003), becoming the most common type of work structure and, progressively, key role in organizations around the world (Gibson & Cohen, 2003; Hoch & Kozlowski, 2014). The cooperative work developed by teams can now be conducted across space and time, anytime and anywhere, in real space or through technology (Geister, Konradt & Hertel, 2006).

Regarding the definition of virtual teams, numerous researchers have been discussing what is considered a Virtual Team. A proliferation of varied definitions used to define virtual teams indicates similarities in the main definition but some small difference in the details (Martins, Gilson & Maynard, 2004). Several definitions understood virtual teams as working teams that depend on technology, allowing people to work together at distance (Lipnack &

Stamps, 1999), and dealing with different boundaries such as geography, time and organizational ones (Martins, Gilson & Maynard, 2004). Nevertheless, traditional definitions have limited the term “virtual team” to teams that never meet face-to-face, interacting only through electronic media (Jarvenpaa, Knoll & Leidner, 1998; Bouas & Arrow, 1995). As an example, Bell and Kozlowski (2002) stated that "it is the absence of this proximal, face-to-face interaction between members of virtual teams that make them virtual and distinguishes them from more traditional teams” (p.22). Also, Townsend and colleagues (1998) defined virtual teams as "groups of geographically and/or organizationally dispersed coworkers that are assembled using a combination of telecommunications and information technologies to accomplish an organizational task.” They also stated that "Virtual teams rarely, if ever, meet in face-to-face setting" (p.18)

On the other hand, although there are some investigators who stated that virtual teams are teams that never had physical contact with their team members, some researchers recognize that virtual teamwork may involve some level of face-to-face interaction. However, the majority of time the interaction is done through electronic media (Jarvenpaa & Leidner, 1999). Therefore, it is uncertain what would be the appropriate amount of electronic communication for a team to be classified as virtual (Martins, Gilson & Maynard, 2004).

Over the years, with the evolution of virtual teams, researchers are more focused on gauging the level of team virtuality, meaning that to define whether a team is virtual or not, team members have to be measured concerning the amount of computer-mediated technology they are using to communicate on their interactions (Kirkman & Malthieu, 2005). Thus, team virtuality is multidimensional and complex, englobing two components: geographic distribution and the amount of technology usage (Griffith & Neale, 2001; Griffith, Sawyer & Neale, 2003; Cohen & Gibson, 2003).

Kirkman et al. (2004) stated that virtuality involves, for example, “the richness of the communication media used by members to complete tasks” (p.179). For example, a highly virtual team can interact without some emotional cues such as facial expressions and tone of voice, by using only e-mail. On the other hand, a less virtual team will meet face-to-face occasionally and interact with richer computer-mediated communication (e.g. teleconferencing). Hence, as mentioned, the amount to which a team uses these technologies has an impact on the amount of virtualness (Griffith, Sawyer & Neale, 2003).

Therefore, nowadays it is difficult for organizations to have teams with all members working at the same place and using only face-to-face communication without computer-

mediated communication since completely non-virtual teams are extremely unusual (Martins, Gilson & Maynard, 2004).

Overall, “virtual teams provide an effective structural mechanism for handling the increased travel, time, coordination, and costs associated with bringing together geographically, temporally, and functionally dispersed employees to work on a common task” (Martins, Gilson & Maynard, 2004, p.806). In this study, we consider virtual teams as interdependent groups of individuals who work together on a mutual goal across time, interacting from different locations (geographically dispersed), whose members communicate and cooperate, depending upon advanced information technologies (Hertel, Geister, & Konradt, 2005, p.69; Martins, Gilson & Maynard, 2004, p.806; Geister, Konradt & Hertel, 2006, p.460 ).

According to Spitzberg (2006), computer-mediated communication (CMC) is defined as “any human symbolic text-based interaction conducted or facilitated through digitally-based technologies,” (p. 630) including internet, instant messaging, email and telephone text. The implementation of new technologies and the numerous uses of CMC have influenced human relationships and social contexts, affecting the beginning of the relationship and its maintenance. The different media used by individuals to communicate among team members provide diverse sensory information and, consequently, create diverse effects. Furthermore, team individuals should have the ability to be adaptable, in order to choose the best mode of interaction, depending on the context (Spitzberg, 2006). Hence, the model of CMC competence, studied by Spitzberg (2006) is developed based on motivation, knowledge, skills, context and outcomes, supporting that “the competence with which any given person utilizes these new technologies is likely to affect whether this person views the technology as utopian or dystopian” (p. 629). In other words, whether individuals use these new technologies competently they will view technology as utopian (bright side), while individuals who show low levels of competence, using technologies, they will view technology as dystopian (dark side) (Spitzberg, 2006). A competent individual should be able to contribute with the necessary ability, knowledge, and skill, in order, to successfully accomplish the task goals.

One of this study’s goals is to understand how the levels of trust influence the level of adaptation of team members in virtual contexts. Hence, it is important to mention relevant literature on trust and adaptability, as done in the next topics.

## 2.2. Trust

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It is known that trust is an essential component of any type of team (Jarvenpaa, Knoll, and Leidner, 1998). According to Jarvenpaa and colleagues (1998), successful and effective virtual collaboration depends on trust (Jarvenpaa & Leidner, 1999). Despite the fact that there is no a consensus in defining this concept, there are several features that appear common in almost all definitions. Since trust is dependent on different interactions and dynamics, considering its different facets has been a valuable way of clarifying the confusion over the meaning. (Costa, Roe & Taillieu, 2001). On the one hand, psychological theories (Rousseau, Sitkin, Burt & Camerer, 1998; McAllister, 1995), which views trust as a “psychological state” defined it in terms of propensities, intentions and positive expectations (e.g. states of confidence) in relation to others. On the other hand, social-economics/behavioral approaches (Cummings & Bromiley, 1996, cit. in Costa et al., 2001), define trust as “risk-taking behavior,” or as the “willingness to become vulnerable”. Since the work between team members is interdependent, they must feel able to accept the risk of believing that individuals will follow the rules and act according to what is expected without subversive intentions (Salas, Sims & Burke, 2005; Costa & Bijlsma-Frankema, 2009; Costa, Roe & Taillieu, 2001).

These two meanings are the most cited critical elements of trust and have been mentioned by various researchers, scholars, and authors (Mayer, Davis & Schoorman, 1995). Moreover, different words have been used, in other definitions, suggesting the same meaning. For example, Doney, Cannon, and Mullen (1998), define trust as the “willingness to rely on another party” and Rousseau et al. (1998), define it as the “intention to accept vulnerability.” Mayer, Davis and Schoorman (1995), provide a complete definition of trust, defined as the “willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party” (p. 712).

Afterwards and over the years, other researchers defined trust, in order to converge a common and complete meaning. As an example, Costa, Roe and Taillieu (2001), proposed that “trust is a psychological state that manifests itself in the behaviors towards others, is based on the expectations made upon behaviors of these others, and on the perceived motives and intentions in situations entailing risk for the relationship with those others” (p. 228).

The majority of researchers considered trust as a highly complex, multidimensional, and abstract phenomenon which compromised diverse but linked components (Mayer, Davis & Schoorman, 1995; Rousseau et al., 1998). The definition given by Mayer and colleagues

(1995) includes both individual and interpersonal components of trust. On the one hand, individual component refers to the trustor's propensity to trust others and the interpersonal component to the perceived trustworthiness of the trustee. On the other hand, the "willingness to become vulnerable," is related to the behavioral consequences of trust. Correspondingly, trust can be described as a "multifaceted construct" that englobe diverse but related indicators (Costa & Bijlsma-Frankema, 2009, p. 202), including propensity to trust and trustworthiness as formative indicators which lead to reflective indicators as risk-taking behaviors, such as cooperative and monitoring between team members (Costa & Anderson, 2011; Costa, Roe & Taillieu, 2001; Mayer, Davis & Schoorman, 1995).

The most mentioned and measured components of trust are propensity to trust and trustworthiness (Costa & Anderson, 2011). Propensity to trust is defined as an "expectancy held by an individual or group that the word, promise, verbal or written statement of another individual or group can be relied upon" (Rotter, 1980, cit. in Costa & Anderson, 2011, p. 124). Moreover, the propensity to trust others varies between individuals, depending on several socio-economic factors, such as life experiences, type of personalities, cultural background and education (Mayer, Davis & Schoorman, 1995; Jarvenpaa, Knoll & Leidner, 1998). Propensity to trust or also mentioned as disposition to trust is essential for the development of initial trust, mainly in contexts where members do not know each other, as an example, in virtual teams where the teamwork between members is temporary and it is difficult to create relationships (McKnight, Cummings & Chervany, 1998). The efficiency and even the survival of such teams depend on the presence of propensity to trust others (Rotter, 1980, cit. in by Costa & Bijlsma-Frankema, 2009, p. 204).

Regarding perceived trustworthiness, Costa, Roe, and Taillieu (2001), based their definition on Good (1988), defined as "the extent to which individuals expect others to be and to behave according to their implicit or explicit claims" (p. 229). According to Cummings and Bromiley (1996), cit. in Costa and Anderson (2011), perceived trustworthiness among team members can be interpreted throughout three dimensions. Regarding the first one, it is expected that an individual or group make efforts in order to "behave in accordance with any type of commitments both explicit or implicit" (p. 125). Related to the second one, individuals must be sincere in negotiations englobing these commitments. Finally, the belief that when there is a chance available, individual or group should not take excessive benefit of that.

According to Jones and George (1998), the action of trust (e.g. unconditional trust behavior), commonly, correspond to positive actions or intentions related to individuals that

together share values and reciprocate feelings, leading to the development of cooperative behaviors between team members. While such trust behaviors correspond to positive actions that reflect the “willingness of being vulnerable” to others and involve “engaging in cooperation,” exerting control (monitoring), checking and surveillance behaviors are related to low levels of trust (Zand, 1972).

Cooperative behaviors include confidence on others, the way they communicate (e.g. whether they communicate openly about their work), the identification between team members (e.g. acceptance and understand the influence of others), the high involvement of team members and information sharing which contributes to trust (Costa, Roe & Taillieu, 2001; Costa & Anderson (2011). For instance, Zand (1972) mentioned that when teams have low levels of trust between members (low-trust behavior), they are less personally engaged, hesitating to reveal relevant information, avoiding sharing ideas, facts, and feelings, executing controls when coordination is needed. All of these behaviors will be critical to information exchange and will diminish the levels of effectiveness of any organization. On the other hand, when the levels of trust among team members are high, they are more able to discuss, share relevant information, develop more innovative and original solutions and solve their task problems effectively, accepting interdependence between team members and decreasing efforts to control the behavior of others, contributing to increased satisfaction and motivation (Zand, 1972).

Concerning monitoring, such behaviors refer to “the extent team members feel a necessity to exert control on the work of other members” (Costa & Anderson, 2011, p. 125), arguing that monitoring appears when trust is not present (Costa, Roe & Taillieu, 2001). According to several researchers, the more teams trust, the fewer team members will engage in monitoring behaviors, since whether an individual trusts in the capacity of his/her colleague to perform well, there is not the necessity of used monitoring behaviors (Costa, Roe & Taillieu, 2001). On the other hand, still, there are other views about trust and monitoring which suggest that both can be beneficiate from this relationship (Costa & Bijlsma-Frankema, 2009). Likewise, Das and Teng (1998) discussed a possible relationship between trust and control, mentioned that this two processes may and should be pursued at the same time with the purpose of generating trust. Overall, it is recognized that trust initiate and promote cooperative behavior, building up relationships where team members are highly involved.

When researchers study teamwork on a virtual context, results suggest that trust positively influence virtual teams’ success, increasing confidence and security in relationships as well as promoting open information exchange (Gilson et al., 2015). Concerning the

phenomenon of trust, Lewicki and Bunker (1996), argues that the development of trust occurs progressively over time, with low levels at the beginning and increasing as relationships develop. A climate of trust for virtual teams is essential (Jarvenpaa, Knoll & Leidner, 1998) and it has been argued that, in order to achieve highly efficiency levels of teamwork, trust in virtual teams needs to develop quickly since team members will merely interact for a short period of time (Jarvenpaa & Leidner, 1999). Several researchers have been defined this form of trust as “swift trust” which has been considering to be fundamental for virtual teamwork, emphasizing the development of team trust at the beginning of collaboration (Meyerson, Weick & Kramer, 1996, cit. in Jarvenpaa & Leidner, 1999). Meyerson and colleagues (1996) were some of the first researchers to examine and developed the concept of “swift trust,” where trust appears to be temporary, like those virtual teams (Jarvenpaa & Leidner, 1999), defined as a type of trust that “is likely to be established in teams that have never worked together and do not have time to develop trust in a gradual way” (Jarvenpaa, Knoll & Leidner, 1998, p. 56). Thus, Jarvenpaa and Leidner (1999), propose that in virtual teams, trust is defined as a form of “swift trust.”

Although some researchers have doubts about whether virtual teams can work effectively, since there is no frequent face-to-face interaction, arguing that “trust needs touch” (Handy, 1995), the number of teams working in a virtual environment have been increased over the years (Geister, Konradt & Hertel, 2006), leading to more challenges, such as the development of trust (DeRosa et al., 2004). Correspondingly, and in order to help to build trust, the role of communication is critical for continued and effective interaction in virtual teams, building up relationships (Jarvenpaa & Leidner, 1999). Several theories proposed that the mechanisms used by virtual collaborations such as computer-mediated communication, may, progressively “eliminate the type of communication cues that individuals use to convey trust, warmth and other interpersonal affections” (Jarvenpaa & Leidner, 1999, p. 793). However, the used of specific and adequate mechanisms of communication as well as a sustained and continued interaction are the key elements to trust development, and the possibility of relationship improvement in virtual teams (Gibson & Cohen, 2003). According to Gibson and Cohen (2003), communication processes are core mechanisms to create trust, because communication motivates cooperative relationships and provides information about team members, allowing the development of common values.

Trust decreases the high levels of uncertainty transmitted by technological environment and can prevent the geographical and organizational distances of workers, proving a psychological distance and becoming easier the creation of interpersonal

relationships (Jarvenpaa & colleagues, 1998). In a virtual environment, according to O'Hara-Devereaux and Johansen (1994), "trust is the glue of the global workspace" (cit. in Martins, Gilson & Maynard, 2004, p. 816).

Several researchers interrogated about how it is possible to develop/exist trust in virtual teams since "trust needs touch" (Handy, 1995; Jarvenpaa, Knoll & Leidner, 1998). However, we believe that trust can be developed among team members who work in virtual environments, depending on the usage team members make of the communication tools available, and on how proficient they are on computer-mediated communication. Nonetheless, we argue that the levels of trust will always be higher in teams that spend more time interacting face-to-face, as this richer communication means that allows for more information to be conveyed, namely in what emotional cues are concerned.

Hence, we proposed the following hypothesis:

- Hypothesis 1 (H1): Trust levels will be significantly higher in teams that communicate face-to-face more often than in teams that rely mostly on computer-mediated communication

### 2.3. Team adaptation

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The challenges of globalization (e.g. new innovation and technological advancements and physical conditions changes) led to increasing environmental instability around organizations (Kozlowski & Bell, 2008), altering the current work tasks performance as well as the implementation of new ones (Pulakos et al., 2000).

Considering the interaction between team members on a virtual environment, it can be difficult for them to adapt effectively, since that on virtual teams several members are physically situated in different parts of the world, use computer-mediated communication technologies to interact and, generally, they had no previous contact of working together (Jarvenpaa & Leidner, 1999). This leads to challenges in terms of the level of motivation, relationship building, and in the process of sharing feedback between team members (Jarvenpaa and Leidner, 1999; Geister, Konradt, and Hertel, 2006).

Over the last years, in order to survive and to respond quickly and effectively to these continuous challenges, organizations have become more flexible by changing structures and reorganizing new and varied conditions at teamwork (Kozlowski & Bell, 2008). With the purpose of operating in these dynamic environments, team's members were forced to learn and adapt to new work procedures, maintaining and improving their team effectiveness (Wiedow & Konradt, 2010; Maynard, Kennedy & Sommer, 2015). According to Pulakos and colleagues (2000), it is essential that team members are adaptable, versatile and tolerant while they are facing these environments as well as develop an adaptive team performance, helping the organization to react and adapt to unexpected events, contributing to team adaptation (Maynard, Kennedy & Sommer, 2015; LePine, 2003; Burke, Stagl, Salas, Pierce & Kendall, 2006).

These types of change in organizations have led to several researchers, academics and practitioners to become progressively interested in understand adaptability at the workplace (Pulakos et al., 2000), discussing adaptability at different levels (e.g. individual, team and organizational) and adopting various terms to describe the concept (Pulakos et al., 2000), such as team adaptation, team adaptability, team role adaptation and team adaptive outcomes (Maynard, Kennedy & Sommer, 2015). For our study, we purpose define team adaptation as “a change in team performance, in response to a salient cue or cue stream that leads to a functional outcome for the entire team, resulting in the innovation of new or modification of existing structures, capacities, and/or behavioral or cognitive goal-directed actions” (Burke et al., 2006, p. 1190). Moreover, other definitions reveal interesting facts about team adaptation,

such as “...derive and use new strategies and techniques for confronting novel elements in their environment” (Marks et al., 2000, cit. in Maynard, Kennedy & Sommer, 2015, p.17) or “...includes adaptations concerning the input into the teamwork process as well as the process adaptations, that is, changes in coordination mechanism, decision making, and communication patterns in response to unexpected events” (Manser et al., 2008, cit. in Maynard, Kennedy & Sommer, 2015, p.17).

With the purpose of understanding team adaptation, Burke et al. (2006) explored this concept with other comparable constructs which are team learning, innovation, and problem management. Although antecedents to team adaptation include various constructs, the main is described as adaptive team performance. According to Burke et al. (2006), adaptive team performance is “an emergent multilevel phenomenon that compiles over time from the unfolding of a recursive cycle whereby one or more team members use their resources to functionally change current cognitive or behavioral goal-directed action or structures to meet expected or unexpected demands” (p. 1192). Moreover, Burke et al. (2006) stated that there are four fundamental processes to characterize the adaptive cycle, such as (1) situation assessment; (2) plan formulation; (3) plan execution and (4) team learning, as well as emergent cognitive states (e.g. team situational awareness, psychological safety, coordination, backup behavior). Adaptive team performance is established by these processes and emergent states (Burke et al., 2006).

Moreover, Maynard and colleagues (2015) distinguish team adaptability as an input, team adaptation as a process, and team adaptation as an outcome. Regarding adaptability as an input, team adaptability is resultant of individual-level factors that form the individual adaptation and influence adaptation of team members (e.g. cognitive ability, personal factors, past experiences (Maynard, Kennedy & Sommer, 2015). Therefore, Maynard, Kennedy, and Sommer (2015) affirm that the capacity of an individual to maintain calm and show interest for learning as well as flexibility and open-mindedness are crucial constructs that help team members to adapt. When study adaptability as a process, according to Pulakos and colleagues (2000), individual adaptive performance englobes eight dimensions. The eight dimensions are: (1) Handling emergencies or crisis situations; (2) Handling work stress; (3) solving problems creatively; (4) dealing with uncertain and unpredictable work situations; (5) learning work tasks, technologies, and procedures; (6) demonstrating interpersonal adaptability; (7) demonstrating cultural adaptability; (8) demonstrating physically oriented adaptability. For the purposes of this dissertation, we agree that (1) dealing with uncertain and unpredictable work situations; (2) learning work tasks, technologies and procedures and (3) demonstrating

interpersonal adaptability, are the main three indispensable and crucial dimensions considering teams. Once we are studying the adaptation of teams that work in virtual contexts, and since it is known how these environments are unstable and uncertain, it is essential for us to focus on these three dimensions. According to Pulakos et al. (2000), the importance of understanding how team members deal with unexpected events while they are working, and how they are able to easily adapt to these new changes (e.g. adjust plans, goals, and priorities; take effective action when the situation is ambiguous/doubtful), becomes crucial in virtual teams. Furthermore, due to technological advances and innovative techniques, teams are forced to quickly and continuously learn new ways to execute their work tasks, in order to anticipate and prepare for predicted future (Pulakos et al., 2000). Hence and lastly, since nowadays work is done by teams, interpersonal adaptability is becoming more relevant. According to Pulakos et al. (2000), “the ability of being flexible and open-minded it is crucial when dealing with others” (p. 617; Maynard, Kennedy & Sommer, 2015), “adapting interpersonal behavior to work effectively with a new team” (p. 614), it is also an important individual adaptive performance in virtual teams.

According to Pulakos and colleagues (2000), adaptive performance has become crucial as a result of the rapid technological advances. Nowadays, team members are working in virtual contexts, leading to new procedures and roles where the adaptation is fundamental (Pulakos et al., 2000). Teams are facing new changes, while working in this environment which makes it extremely important that they have a great adaptability, in order to adapt to changes in the way they usually work as well as to possible unforeseen events.

According to Bos, Olson, Gergle, Olson, and Wright (2002), in order to develop effective work, trust is a crucial component required by organizations, arguing that without the foundation of trust, team members will not be willing to openly share information, leading to loss of creative and helpful ideas. Hence, some researchers have suggested that high levels of trust among team members may also increase backup behaviors, the act of providing feedback or provide a team member with assistance while performing a task (Wildman et al., 2012; Porter et al., 2003; Sims, Salas & Burke, 2005).

Assuming that trust is an essential element when the levels of trust are high, the development of ideas among team members occurs easily and rapidly. Team members feel more able to share constructive and innovative ideas as well as to give their opinions and thoughts without being afraid to be judged by their team. Moreover, there is less need to closely control the work of team members by managers (micromanaging). Hence, when dealing with an unpredicted situation, teams with higher levels of trust will be more willing to

provide feedback to others, to suggest different courses of action and to share their perspectives with others without the fear of being excluded or punished. Therefore, based on the theoretical assumptions, we proposed trust will promote the process of team adaptation in virtual teams. Moreover, we argue that the impact of trust on team adaptation will be higher in teams that communicate mostly face-to-face, as this is the means that allows for a richer, synchronous exchange of information.

Hence, we proposed the following hypothesis:

- Hypothesis 2 (H2): The relationship between trust and team adaptation will be moderated by the amount of face to face interaction, such that for higher levels of face-to-face interaction, the association between trust and team adaptation will be higher.

## 2.4. Team Processes

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Nowadays, teamwork is crucial to any organization since much of the work is done by people working together instead of individuals working alone. It is essential to comprehend the processes that teams use to interact while they are working, in order to achieve success and effective teamwork (Marks, Mathieu & Zaccaro, 2001).

Several team studies have recognized the importance of team process in team performance, leading to an increased development of various theoretical models where team processes represent a central role (Marks, Mathieu & Zaccaro, 2001).

According to Marks and colleagues (2001), team processes are defined as the “team member’s interdependent acts that convert inputs to outcomes through cognitive, verbal, and behavioral activities directed toward organizing task work to achieve collective goals” (p. 357). Teams use different forms of processes to describe the types of interactions that occurred while they are trying to accomplish the goal, being characterized by a series of episodic cycles (Marks, Mathieu & Zaccaro, 2001). These temporal cycles of goal-directed activity can be organized into two different phases: transition and action phases (Marks, Mathieu & Zaccaro, 2001; Morgeson, DeRue & Karam, 2009). The transition phase includes planning and preparing the activities related to goal achievement, while the action phase involves teamwork activities that lead directly to attaining those goals (Morgeson, DeRue & Karam, 2009).

Once studying virtual teams, although action processes have been receiving much attention, it is not the case of transition processes. Transition processes which include mission analysis, planning and strategy formulation have been ignored, receiving limited consideration (Gibson, Maynard, Jones Young, Vartiainen & Hakonen, 2015). Therefore, for the purpose of this dissertation and since transition processes are not extensively explored by virtual team literature, we proposed to focus on the study of these processes, assuming that transition processes englobe an important opportunity and provide several benefits to virtual teams, enhancing virtual team performance.

### 2.4.1. Transition processes

Marks, Mathieu and Zaccaro (2001) stated that transition phases are “periods of time when teams focus primarily on evaluation and/or planning activities to guide their accomplishment of a team goal or objective”(p. 360) (Wildman, Shuffler, Lazzara, Fiore,

Burke, Salas & Garven, 2012; Morgeson, DeRue & Karam, 2009). Moreover, it is during the transition phase where teams register and analyzed how well they performed on the current cycle and prepare for the next one (Marks et al., 2001). Hence, the main focus of teams in this phase is on actions that establish structures and processes, allowing future effectiveness, instead of focus on direct task work (Morgeson, DeRue & Karam, 2009). There are three processes that typically occur during this phase, for example, mission analysis, goal specification, strategy formulation and planning, and other processes associated with group's efforts (Marks, Mathieu & Zaccaro, 2001; Martins, Gilson & Maynard, 2004).

Mission analysis is characterized by the “interpretation and evaluation of the team's mission, including identification of its main tasks as well as the operative environmental conditions and team resources available for mission execution” (Marks et al., 2001, p.365). The processes of mission interpretation in the task context happens cognitively, including verbal discussion, in order to ensure that all team members have a clear shared and collective vision of the team's purpose. When considering mission analysis, there are two combined foci by this process, such as backward evaluation and forward visioning. The backward visioning is responsible for the evaluation of the current team performance as well as the interpretation of the main reasons for success and failure, providing a better preparation for future effort. The forward visioning consists on the understanding of future ongoing events by team members, helping them to adapt in case of unexpected events, anticipating actions instead of merely reacting (Marks, Mathieu & Zaccaro, 2001).

Regarding goal specification, this process corresponds to “the identification and prioritization of goals and sub-goals for mission accomplishment” (Marks et al., 2001, P. 365). During this process, teams are responsible to develop and allocate general mission goals and sub-goals that specified what and how much must be accomplishment at a given time and within certain quality standards. On one hand, effective goal specification faces challenging and achievable goals that are associated with the larger vision of the organization as well as with strategies that englobe all team members. On the other hand, ineffective goal specification has devastating effects on collective performance. A team which does not follow or completely disrespects this stage (goal specification) will lead to no shared understanding of the team's purpose.

Lastly, strategy formulation and planning refers to “the development of alternative courses of action for mission accomplishment” (Marks et al., 2001, p.365), including decision making of how team members will achieve their missions, discussion about their expectations and task-related information, role assignment and communication of strategies to everyone

that belongs to the team. Concerning strategy formulation and planning process, this dimension can be categorized into three sub-dimensions, such as deliberate planning, contingency planning and reactive strategy adjustment (Marks, Mathieu & Zaccaro, 2001). Deliberate planning is a key and planned action of transition phases that happen at the beginning of cycles, corresponding to the preparation and transmission of a main course of action, in order to mission accomplishment (Marks et al., 2001).

Contingency planning, or also named plan B, corresponds to the creation and conduction of alternative plans and some strategy modifications in order to respond to expected alterations in the performance environment, delineating specific alternative courses of action and instructions. Although there is necessary to have always a plan B, for teams that perform in dynamic and unpredictable contexts (e.g. virtual environments) the urgency to have a contingency plan increases. Furthermore, when a team faces alterations in the performance environment, and both the original strategy and the contingency plan appears to be unappropriated, it has to be created a new plan. Reactive strategy adjustment is the strategy that refers to the alteration of an existing plan with the intention of responding to unexpected events, implementing new rules for collective goal accomplishment in the existing performance environment (Marks, Mathieu & Zaccaro, 2001).

Furthermore, once examining virtual environments, trust has been positively associated with superior levels of team performance, leading to more positive workplace behaviors and an improvement in team process (e.g. group participation and contribution, product quality) (McAllister, 1995). According to Wildman and colleagues (2012), trust behaviors have been considered as being essential in the performing of teamwork processes. Hence, trust is linked to sharing, transfer, and exchange of knowledge (Quigley, Tesluk, Locke & Bartol, 2007), being considered a facilitator of knowledge sharing transmission during the development of task work where team members involve interdependence (Jarvenpaa & Leidner, 1999; Jarvenpaa et al., 1998).

Based on this evidence, therefore, it is reasonable to expect that teams composed of members who have high levels of trust will be able to share more ideas and knowledge which may increase members' involvement in transition processes. By having a clear idea of their mission and well develop contingency plans, teams will be more capable of adapt in case of sudden changes. We also argue that this process will be influenced by the degree of face-to-face communication in such a way that teams where members mostly communicate face-to-face will have more opportunities to communicate faced with unpredictable events, and therefore adjust previously defined goals or strategy.

Hence, we proposed that:

- Hypothesis 3 (H3): High levels of trust will lead to higher levels of adaptation, through increased transition processes, particularly for teams with a higher percentage of face-to-face communication.

In figure 1 and 2, it is presented a schematic representation of all hypotheses.

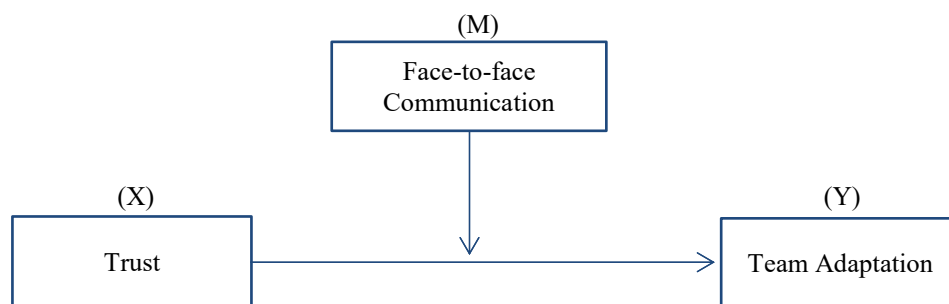


Figure 1: Schematic representation/Framework of hypothesis 2.  
(X) Independent variable; (Y) Dependent variable; (M) Moderator

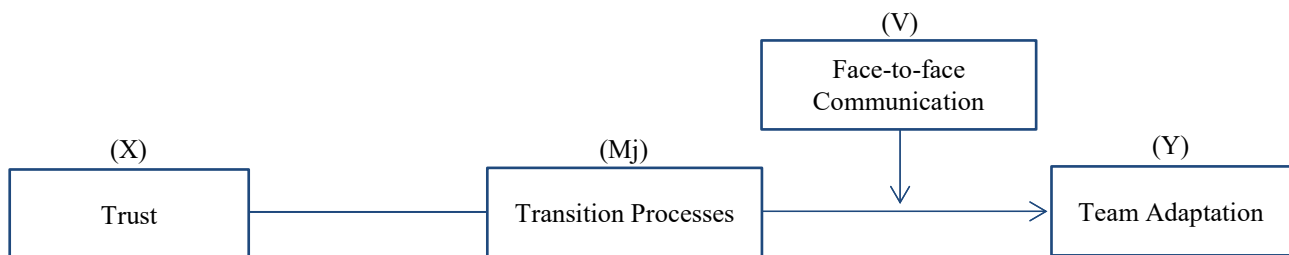


Figure 2: Schematic representation of hypothesis 3.  
(Mj) Mediator; (V) Moderator

## 3. Methodology

### 3.1. Participants

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With the purpose of this study, a total of 332 respondents (n=332) answered a questionnaire. All members responded the questionnaire individually and anonymously. The majority of the respondents (n=196) were female, corresponding to 59.4% of the total participants, while 134 were men, corresponding to 40.6%. With regard to age (mean=32,05 years; sd=11,12 years), approximately 61% were under 30 years old, corresponding to 28% between 16 to 20 years old and 33% between 25 to 30 years old. Regarding nationality, most of the participants (n=204) are from Portugal, corresponding to 61.4% of the total. The rest of respondents are from Austria (14.8%); Spain (8.1%); Germany (6%); France (2.1%) and others (7.5%). Concerning qualifications, 52.4% have a university degree and 34% are post-graduated.

### 3.2. Procedure

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The current/present study was developed by six master students from Católica-Lisbon School of Business and Economics who attended the dissertation seminar *Team Effectiveness*. They were responsible to contact/communicate with participants for this study. Moreover, in order to test the hypotheses previously stated, the methodology used in this analysis incorporated quantitative research, a questionnaire.

At the initial stage, a questionnaire was built, covering the study variables - trust, teamwork adaptation, transition processes - and demographic information. This questionnaire was used to address everyone who worked or work in a team, in this way, a printed version of several questionnaires was distributed (hand delivery) at Católica-Lisbon School. Simultaneously, an online survey link was distributed, either by email, WhatsApp groups, and social networks, where only the people involved in the study had access to check the responses.

The survey was divided into three different sections where each of them represents a study variable: (1) Transition processes; (2) Adaptation and, (3) Trust. The last section was demographic Analysis, where it was gathered demographic information about respondents such as gender, age, nationality, qualification, and occupation (See appendix 1). Additionally, in order to analyze the validity of the proposed hypotheses, specific measure scales were used. The following section identifies the measures used to analyze each of the variables.

### 3.3. Measures

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With the aim of study the proposed variables (e.g. trust, team adaptation and transition processes), specific measures were used. **Trust** was measured with selected items from Costa & Anderson (2011), including three items for each dimension of the variable to evaluate the level of trust among team members. The Trust 12-item scale is composed of the following dimensions: 3 items considering propensity to trust ('Most people in this team would not hesitate to help a person in need'), 3 items related to perceived trustworthiness ('In this team people can rely on each other'), 3 items considering monitoring behaviors ('In this team people watch each other very closely'), and 3 items considering cooperative behaviors ('In this team we work in a climate of cooperation'). Participants answered using a 7-point Likert scale from 1 to 7 (1 = *strongly disagree*; 7 = *strongly agree*), according to their level of agreement with the items.

**Team adaptation** was measured through an adapted 5-item scale from Marques-Quinteiro, Ramos-Villagrasa, Passos, & Cural (2015), using one item for each dimension of the variable: solving problems creatively ('Finding innovative ways to deal with unexpected events.'), dealing with uncertainty ('Adjusting and dealing with unpredictable situations, shifting focus, and taking reasonable action'), learning ('Periodically updating technical and interpersonal competencies, as a way to better perform the tasks in which you are enrolled'), demonstrating interpersonal adaptability ('Adjusting personal behavior to accommodate other team members' characteristics'), and handling work stress ('Remaining calm and behaving positively under highly stressful events'). Respondents answered using a 7-item scale (1 = *never*; 7 = *all the time*).

**Team transition processes** were measured through selected items, respectively, based on Mathieu & Marks (2006), including one item for each dimension of the variable: mission analysis ('We identify the key challenges that we expect to face'), goal specification ('We ensure that everyone on our team clearly understands our goals'), and strategy formulation and planning ('We develop an overall strategy to guide our team activities'). Participants answered using a 7-point Likert scale (1 = *strongly disagree*; 7 = *strongly agree*), according to their level of agreement with the items.

Before starting reviewing the data collected and in order to test the reliability analysis of each variable scale, the Cronbach's alpha was calculated for each one of them. This analyze was performed for every scale used in the questionnaire to guarantee internal

consistency. The following table shows the results, as well as the number of items for each scale:

<b>Variable Scale</b>	<b>Number of items</b>	<b>Cronbach's Alpha</b>
<b>Trust</b>	12	,880
<b>Team adaptation</b>	5	,815
<b>Transition Processes</b>	3	,777

Table 1: Cronbach's alpha calculated for each study variable.

As shown in table 1, all variables evaluated in this study are reliable. To be reliable, the presented Cronbach alpha value has to be above 0.7 (Pallant, 2005; Leech, Barrett and Morgan, 2005). As shown in the table above, all variables evaluated in this study present a reliable Cronbach alpha. According to Pallant (2005), this value shows some level of sensitivity concerning to the number of items on the scale. For example, if the items in a scale are fewer than 10 it is common to have low Cronbach alpha values (e.g. 0.5). In this case, when analyzed table 1, although team adaptation and transition processes variables have a number of items lower than 10, the Cronbach alpha values remains reliable, meaning that they will also be considered.

In order to define the two different study groups (virtual and non-virtual teams), we used the percentage (%) of face-to-face communication as a proxy for virtuality. When more than 50% of communication was face-to-face, we considered the team non-virtual, whereas, when less than 50%, we considered a virtual team.

## 4. Findings

### 4.1. Data analysis

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The analysis of data was made with *IBM SPSS Statistics* software and performed using T-tests, simple moderation and a moderated mediation analysis. At the beginning, we present the means ( $\bar{x}$ ), standard deviations ( $\sigma$ ) of each variable and, the correlations between them. Then, regarding the first hypothesis (H1), an independent t-test was made in order to compare two means from different groups of people (e.g. virtual and non-virtual teams), with the purpose of seeing whether there are significant differences in the responses of people who belong to these two teams.

To examine the second hypothesis (H2) a simple moderation analysis was conducted to evaluate whether face-to-face communication moderated the relationship between trust and team adaptation. The effect of a moderator is considered to be an interaction, affecting the strength of the relationship between trust and team adaptation. According to Hayes (2012), a moderation analysis should be used “when one is interested in testing whether the magnitude of a variable’s effect on some outcome variable of interest depends on a third variable” (p. 9).

The third hypothesis (H3) was tested with a moderated mediation analysis. Both analyses were performed using gender and how long members have been worked with the specific team as control variables (covariates). Moreover, these analyses were conducted following Field (2009), Hayes (2012), Preacher, Rucker & Hayes (2007) and Preacher & Hayes (2004) *Process Macro* for *SPSS*. This *Process* is a tool used for moderation and mediation analyses whose permits the evaluation of indirect and conditional effects. It allows for the estimation of direct and indirect effects, as well as of their significance in mediation models with several independent variables. It also allows for computing conditional effects on mediation models. Furthermore, this tool uses bootstrapping – a resampling technique – to estimate the indirect effect on a number of samples created from the data.

Respectively, in hypothesis 3, it tested the effect of the independent variable trust (X) on the dependent variable of team adaptation (Y) through transition processes as a mediator variable, using the percentage of face-to-face communication as a moderator (V) of the relationship between transition processes and team adaptation.

## 4.2. Results

The following table presents the means ( $\bar{x}$ ) and standard deviations ( $\sigma$ ) of each variable, as well as the correlations between all the variables.

	$\bar{x}$	SD	Correlations		
			1.	2.	3.
<b>1. Trust</b>	5,305	,937	1		
<b>2. Adaptation</b>	5,309	,940	,528**	1	
<b>3. Transition Processes</b>	5,755	,891	,527**	,624**	1

Table 2: Means, standard deviations of each variable and correlations between all the variables. (\*\* Correlation is significant at the 0.01 level)

In order to test the hypothesis 1 (H1), an independent sample t-test was conducted to measure whether there are differences on the continuous dependent variable by a dichotomous independent variable (independent variable with two different groups). The results are shown in the following table.

t-test for Equality of Means				
	Variables	t	df	Sig. (2-tailed)
<b>H1</b>	Trust	-2,506	321	,013

Table 3: Results of the independent samples test.

Regarding t-test, when looking at the significance of two-tailed value, trust shows a p-value of .013 ( $p=.013$ ), which means that is lower than .05, concluding that there is a significant difference between the means of these two samples (virtual and non-virtual), rejecting the null hypothesis. On average, respondents show greater levels of trust to non-virtual teams ( $M=5.41$ ;  $SE=.071$ ), than on virtual teams ( $M=5.15$ ;  $SE=.074$ ). The difference was significant  $t(321) = -2.51, p < .05$ .

Regarding hypothesis 2 (H2) a simple moderation analysis was performed, controlling for gender and for the tenure of the team. To study moderation, a multiple linear regression analysis was conducted. The independent variables of the regression were trust, the percentage of face-to-face communication (moderator), and the interaction between independent variable and moderator. The interaction was created after both variables were

centered. Team adaptation is the dependent variable. The results of the moderation analysis for H2 can be found in the table below.

	<b>Independent variable</b>	<b>Dependent variable</b>	<b>B</b>	<b>SE B</b>	<b>β</b>	<b>Sig.</b>
<b>H2</b>	Trust	Team Adaptation	,499	,049	,524	<b>,000</b>
	Face-to-face communication		,028	,047	,029	<b>,557</b>
	Gender		-,077	,095	-,041	<b>,417</b>
	How long have you worked with this team		-,001	,007	-,006	<b>,910</b>
	Interaction effect between trust and FTF		,010	,042	,012	<b>,807</b>

Table 4: Results of simple moderation analysis.

Predictors: (Constant), Sex, How long have you worked with this team, Z-score (Trust), Z-score: Face-to-face, Interaction effect

On the overall model, R has a value of .527, representing the simple correlation between the independent variables (trust, face-to-face communication, and the interaction effect) and the dependent variable (team adaptation). Moreover, we can see that the value of  $R^2$  is equal to .278, meaning that independent variables can account for 27.8% of the variation in team adaptation. In other words, independent variables can explain approximately 28% of the variance of the responses to team adaptation variable ( $R^2=0.278$ ). This means that 72% of the variation in team adaptation can be explained by other variables that they are also influencing it.

As the table shows, we can observe that trust presents a statistically significant effect on the variable team adaptation ( $\beta = 0.524$ ), since the p-value is (.000), meaning that is lower than .05 ( $p < .05$ ). The interaction effect between trust and face-to-face communication is not significant, since the p-value is .807, meaning that is superior to .05. Therefore, we can assume that whether or not the moderating variable (M) changes, it will not have any significant effects on the relationship between trust and team adaptation. Furthermore, the variable gender and how long individuals have been working with the team were added to the model in order to control for its effects on team adaptation. Both control variables are not statistically significant.

To conclude, although trust is significantly related to team adaptation since has a statistically significant effect on the variable team adaptation, the interaction effect between X and M is no significant in foreseeing Y. Therefore, we can not support our second hypothesis.

With the purpose of testing the indirect effect of trust on adaptation through the transition processes (M), using the percentage of FTF communication as a moderator of the relationship between transition processes and team adaptation, a moderated mediation analysis was conducted (H3). The variable gender and how long individuals have been working with the team were added to the model as control variables. The results of the moderated mediation were performed with a bootstrapping of 5000 samples and significance tested for a confidence interval of 95%.

When analyzed the total moderated mediation, we verified that it is not significant since the interval between the lower CI and the upper CI contains the value zero (95% CI: {-0.0016, -0.0020} with 5,000 resamples). Regarding the direct effect of trust on team adaptation, it remains significant, since the interval between the lower CI and the upper CI does not contain the value zero. A significant effect was observed (95% CI: {0.1719; 0.3778}) with a direct coefficient of (.2749).

As a post-hoc analysis, we performed a simple mediation between trust and team adaptation via transition processes. When analyzing the results, the indirect effect of the independent variable (trust) on the dependent variable (team adaptation) was found to be significant through the transition processes (mediator). A significant effect was perceived (95% CI: {0.1832; 0.3245}) with a coefficient of (.2489).

The Sobel test, also called the product of coefficients method, confirms that, since the p-value is (.000), meaning that is lower than .05 (Sobel  $Z=7.1521$ ,  $p<.000$ ).

## 5. Discussion

The results of the independent t-test support the first hypothesis (H1). Trust levels appear to vary from virtual to traditional teams (non-virtual), being verified superior levels in non-virtual teams and lower in teams where levels of virtuality are higher.

As for the moderation analysis, results do not support the second hypothesis (H2): whether face-to-face communication moderated the relationship between trust and team adaptation. Although trust has a significant effect on team adaptation, the interaction effect of face-to-face communication between X and M is not significant, then the moderation is not supported. The relationship of trust with team adaptation remains similar in both teams (virtual and non-virtual). Regardless the type of communication the team uses/used by the team, this relationship remains significant.

Regarding the third hypothesis (H3), the percentage of face-to-face communication does not influence the relationship between transition processes and team adaptation. Although trust has a significant indirect effect on the dependent variable (team adaptation) through the transition processes (mediator), this effect is not influenced by the percentage of time team members spend communicating face-to-face.

Overall, results point to the conclusion that there are differences between virtual and traditional teams in what trust is concerned. According to Jarvenpaa & Leidner (1999) the mechanisms used by virtual teams (e.g. computer-mediated communication), may “eliminate the type of communication cues that individuals use to convey trust” (p. 793). This could be an explanation of why individuals presented higher levels of trust in teams whose levels of virtuality are lower. Additionally, we can conclude that trust is positively related to team adaptation. Trust, as a crucial component required by organizations, will lead to openly share information, to contribute with constructive and innovative ideas (Bos, Olson, Gergle, Olson & Wright, 2002), as well as to share opinions and thoughts without feeling apprehensive with the judgments of other elements of the team. All these factors will significantly lead to higher levels of adaptability among team members.

Nonetheless, when we used the percentage of face-to-face communication as a moderator, this interaction did not influence the relationship between trust and team adaptation neither the relationship between transition processes and team adaptation.

The role of communication is critical for continued and effective interaction in virtual teams, building up relationships (Jarvenpaa & Leidner, 1999). Communications between individuals who work in virtual environments are, to a great extent, dependent on the use of

computer-mediated communication. Nowadays, it is difficult for organizations to have teams with all members working at the same place and using only face-to-face communication without computer-mediated communication since completely non-virtual teams are extremely unusual (Martins, Gilson & Maynard, 2004). This may lead to an increase of difficulties when team members have to communicate face-to-face. In other words, we can wonder whether, currently, teams are losing the abilities/capacities of communicating via face-to-face, since they constantly communicate through computer-mediated communication. Therefore, they may find other ways to conveying information with similar social and emotional cues as face-to-face communication.

As a result, it is relevant to question whether face-to-face communication is still the sole most efficient method of communication for teams, or if today other methods to communicate and interact, such as computer-mediated communication, can be as efficient. Since that in the daily life work of most of the team members, daily problems are solved virtually, teams preferred to communicate through computer-mediated communication because they are more accustomed to using it every day, and increase their expertise and competencies in doing so, creating alternative ways to communicate the social cues and emotional content that the literature says it lacks.

Therefore, although, it is said that face-to-face communication is the most effective method of conveying information, providing the majority of social and emotional cues that teams need to interact efficiently, the proficient use of specific and adequate mechanisms of communication as well as a sustained and continued interaction are the key elements to trust development, and the possibility of relationship improvement in virtual teams (Gibson & Cohen, 2003). Hence, it is the way teams use the media that will allow the development of confidence and, consequently, adaptability of team members, and not the type of communication means per se that the teams use to interact (e.g. face-to-face or computer-mediated communication). Even with less face-to-face communication, the adequate use of computer-mediated communication media will compensate the emotional and social cues provided throughout face-to-face communication. For example, a virtual team could meet face-to-face occasionally and most of the time interacting with richer computer-mediated communication (e.g. teleconferencing).

Currently, teams are more accustomed than before to relate and communicate via computer-mediated communication. Therefore, they learn to use other ways to convey the same social and emotional cues as face-to-face communication. The rapid technological advances force teams to change completely the way they usually communicated and force the

development and usage of other ways to communicate via other methods. Despite the fact that, in the beginning, these methods appear insufficient to provide all kind of advantages of more traditional techniques (e.g. face-to-face communication), but over the years companies may develop abilities and new manners to face this changes. Nowadays, we lived in a world where people relate to each other through technology, and face-to-face communication can be something overtaken.

Therefore, we support that the richness of communication media (Kirkman et al., 2004), and not the media per se, influences the relationship between trust and team adaptation, instead of FTF communication.

### **5.1. Practical implications**

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Concerning the results of this study, several practical implications related to the real world can be drawn. First, trust should be identified as a crucial component either in virtual teams as in more traditional teams. The promotion of trust among teams and leaders of organizations will lead to the development of other competencies, such as a higher adaptation of team members. Furthermore, transition processes should be also promoted, being addressed as an essential process within organizations. Identifying what are the main challenges companies are facing, defining and developing new plans, should be continuously improved by organizations, in order to better achieve positive outcomes.

Moreover, it is important to promote the literacy of computer-mediated communication in both virtual and non-virtual teams. The implementation of training programs and workshops will help to develop new skills and abilities among teams that, in turn, will facilitate effective team adaptation in the usage of computer-mediated communication, developing team members with high levels of CMC competence.

### **5.2. Limitations and further developments**

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Although the presented study shows several contributions, it also contains a number of limitations that should be stated. First, regarding the data collection, the data was collected from a convenience sampling due to the time constraint imposed for the writing of this dissertation.

Second, the responses to the questionnaire were self-reported, and each participant answered each item based on self-evaluation. Also, there are no guarantees that participants were honest when they answered the questionnaire. Additionally, the data collection is cross-sectional, meaning that data was collected at the same time and within the same time period, providing disadvantages as this type of data, the common method bias. In the future can also be addressed this issue by collecting data at different time points, in order to see how respondents' opinions on their leader and team vary across time and in different situations.

Finally, concerning trust and team adaptation variables, it could be interesting to maintain both variables in future developments since when study virtual teams, trust is one of the most interesting subjects to explore and to relate with other variables. However, since nowadays advances in communication are continuously growing, we proposed to replace trust by CMC competence. Regarding face-to-face communication, an idea for further development could be to replace it by the richness of communication media. We suggest using the richness of the communication media instead of FTF communication. Even with less face-to-face communication, the use of adequate computer-mediated communication media will compensate the emotional and social cues provided in face-to-face communications. Thus, the relationship between CMC competence and team adaptation will be moderated by the richness of communication, such that, the higher richness of communication media, the association between CMC competence and team adaptation will be higher.

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## Appendices

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### Appendix 1: Questionnaire

This questionnaire is part of the Master thesis of six students of The Catholic University of Portugal, whose theme is Team Effectiveness. Your participation in this study is very important to us. Please answer each question truthfully. There are no right or wrong answers. The survey is completely anonymous and the data will be treated confidentially. Neither the company nor the participants will be identified in any moment of the project. The data analysis will be statistical. For any questions about the project, please contact Prof<sup>a</sup> Dr.<sup>a</sup> Patrícia Costa (patricia\_costa@clsbe.lisboa.ucp.pt).

**Thank you very much for your collaboration!**

**Please think about your team. Choose from the following statements the option that best describes how your team usually works.**

(1 – Strongly disagree; 2 – Disagree; 3 – Somewhat disagree; 4 – Neither agree nor disagree; 5 – Somewhat agree; 6 – Agree; 7 – Strongly agree)

We identify the key challenges that we expect to face.	1	2	3	4	5	6	7
We ensure that everyone on our team clearly understands our goals.	1	2	3	4	5	6	7
We develop an overall strategy to guide our team activities.	1	2	3	4	5	6	7

**Take some time to consider whether you think your team is effective in...**

(1– Never; 2 – Rarely; 3 – Occasionally; 4 – Sometimes; 5 – Frequently; 6 – Usually; 7 – All the time)

Finding innovative ways to deal with unexpected events.	1	2	3	4	5	6	7
Adjusting and dealing with unpredictable situations, shifting focus, and taking reasonable action.	1	2	3	4	5	6	7
Periodically updating technical and interpersonal competences, as a way to better perform the tasks in which you are enrolled.	1	2	3	4	5	6	7
Adjusting personal behaviour to accommodate other team members' characteristics.	1	2	3	4	5	6	7
Remaining calm and behaving positively under highly stressful events.	1	2	3	4	5	6	7

**Please focus again on the team you work with, and identify the extent to which you agree with the following sentences:**

(1 – Strongly disagree; 2 – Disagree; 3 – Somewhat disagree; 4 – Neither agree nor disagree; 5 – Somewhat agree; 6 – Agree; 7 – Strongly agree)

Most people in this team would not hesitate to help a person in need.	1	2	3	4	5	6	7
In this team most people speak out for what they believe in.	1	2	3	4	5	6	7
People usually tell the truth, even when they know they will be better off by lying.	1	2	3	4	5	6	7
In this team people can rely on each other.	1	2	3	4	5	6	7
We have complete confidence in each other's ability to perform the task.	1	2	3	4	5	6	7
In this team people keep their word.	1	2	3	4	5	6	7
In this team people watch each other very closely.	1	2	3	4	5	6	7
In this team people check whether others keep their promises.	1	2	3	4	5	6	7
In this team most people tend to keep each other's work under surveillance.	1	2	3	4	5	6	7
In this team we work in a climate of cooperation.	1	2	3	4	5	6	7
While taking a decision we take each other's opinion into consideration.	1	2	3	4	5	6	7
Most people in this team are open to advice and help from others.	1	2	3	4	5	6	7

**Finally, please provide some information about yourself, for statistical usage only.**

**Sex:** M  F

**Age:** \_\_\_\_\_

**Nationality:** \_\_\_\_\_

**Qualifications:** Primary school  Basic education  High school  University degree   
Post-graduate

**How long have you worked with this team:** \_\_\_\_\_years \_\_\_\_\_months

**I am the leader of this team:** Yes  No

**Thank you very much for your collaboration!**