Antecedents and consequences of trust on a virtual team leader

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Abstract

Purpose – The purpose of this paper is to examine, among the possible causes, whether trust in the leader is one of the most relevant factors on the success of a virtual work team by analyzing different antecedents of the trust and its consequences.

Design/methodology/approach – The influence that certain physical and behavioral characteristics of the leader (attractiveness, empathy and justice) exert on the degree of trust is evaluated. On the other hand, the influence of trust on the efficiency of the team, in terms of organizational citizenship behavior and commitment, is analyzed. To test the model, a survey was conducted on real work teams and the data were analyzed through a model of structural equations.

Findings – The results support the hypotheses and consequently, the relevance of trust in the leader. Specifically, the leader's physical and behavioral characteristics have a significant effect on the trust in the leader. This trust results in greater organizational efficiency.

Originality/value – Despite the undisputable growth in the number of companies using virtual teams, it is also true that many of these teams fail to perform. In this sense, this paper analyzes if certain factors related to leadership can be relevant when influencing the efficiency of a virtual work team. This paper contributes to a better understanding of the internal processes within a virtual team in order to maximize the chances of success in this type of organizations.

Keywords Leadership, Trust, Justice, Empathy, Virtual team, Attractive

Paper type Research paper

1. Introduction

Virtual teams are ever more important in organizations and their growth and popularity continues to rise. However, these teams are more difficult to manage than traditional teams. Virtual team members are geographically dispersed, they interact electronically through telematic networks, have diverse roles and work in temporary systems, therefore there may be team members working in different time zones (Jarvenpaa and Leidner, 1999). They are frequently self-managed knowledge-based teams with distributed expertise and that can be formed or dissolved depending on the specific objectives of the organization (Jarvenpaa *et al.*, 2004). The management of these teams is more difficult than for traditional teams since in traditional teams working relationships are developed naturally through the face-to-face exchange of information, however, in a virtual team, where communication is carried out through electronic means, team coordination becomes much more complex and communication is less fluid. A study carried out by OnPoint (2013), found that 25 percent

of virtual teams are not fully effective, 27 percent of stakeholders involved with virtual teams perceive their overall performance to be only adequate or less than adequate and, in terms of performance, 17 percent of virtual teams are rated as less than adequate. These results coincide with another study undertaken by MIT Sloan Management (2009), according to which only about 18 percent of the virtual teams studied achieve a high degree of success. What are the reasons that explain the failure of these virtual teams?

Trust is a key factor in social and economic relationships and is therefore one of the most determinant factors of performance within an organization (Mackenzie, 2010). However, in a virtual environment, the traditional mechanisms by which trust is built may not work (e.g. the lack of face-to-face interaction and the absence of non-verbal language reduces the richness of the communication between team members). However, it is precisely in this virtual environment where trust becomes more necessary, since it helps reduce the psychological distance between team members (Jarvenpaa and Leidner, 1999) and create a sense unity in the team (Wilson *et al.*, 2006).

On the other hand, a key success factor for a virtual team is leadership (Morgeson *et al.*, 2010). The literature recognizes the challenge that managing a virtual team poses as compared to managing a traditional team (Hoch and Kozlowski, 2014). A virtual leader is someone that must use IT tools such as collaborative software and online communication tools, to manage a team of people who are geographically dispersed, to meet a specific objective. These leaders must make a greater effort to coordinate the team's tasks, build relationships among team members and facilitate team processes (Zigurs, 2003). Studies such as Gilson *et al.* (2015) cite leadership as one of the most relevant research topics in the field of virtual teams.

The study of trust in the leader is the primary objective of this research, more specifically to analyze its possible antecedents and consequences within the context of a virtual environment. Although the literature highlights trust, both between team members and in the leader, as one of the important variables in the efficiency of a virtual team (Muethel *et al.*, 2012; Lipnack and Stamps, 2000), there is a certain consensus regarding the need to revise traditional patterns of leadership in order to adapt them to what is a completely different organizational reality. However, prior research has not reached a clear consensus when it comes to establishing management patterns for virtual teams and it is still not clear that traditional control mechanisms can be applied to virtual work teams (Bisbe and Sivabalan, 2017).

For all the above, this work analyzes the physical and behavioral characteristics of the leader that have to be perceived by their subordinates in order to create trust among the members of the group, as well as the consequences of this trust in organizational efficiency refers. Although all these variables have been analyzed in traditional environments, the present work intends to broaden the work analyzing these variables within a virtual work environment, given that the literature has not analyzed in depth the characteristics that a virtual leader must possess in order to build trust in these types of environments.

To conduct this research, this paper is structured as follows: first, there is a review of the key variables of trust in the leader. The following section corresponds to the research model and the formulation of the working hypotheses. The methodology used to corroborate the hypotheses is then reviewed and, finally, the last two sections correspond to the results and conclusions of the study.

2. Theoretical and conceptual framework.
In the following section, the key variables used in this study are reviewed, as are the theories that underpin them.

2.1 Trust in the leader
Trust is a construct of great relevance and consequently numerous definitions of trust have been put forward, especially at the individual level. However, the vast majority of them revolve around

two key aspects (Dietz and Den Hartog, 2006). First, the predisposition to trust, which refers to expectations, beliefs or attitudes toward the other person and the intention to trust them. Second, the intention to accept some degree of vulnerability derived from the risk of trusting the other party (Möllering, 2006; Curras-Perez et al., 2017). Along these lines, one of the conceptualizations most used in the literature is that proposed by Mayer et al. (1995), according to which trust is 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. Furthermore, Mayer et al. (1995) take into account three antecedents on which the trustworthiness of the trustee is evaluated, ability, which refers to the competencies and skills of the trustee, benevolence, which refers to the motives and intentions of the trustee for a particular action; and integrity, which is the antecedent of the trusting process that refers to the principles governing the conduct of the trustee.

In this online context, trust is acknowledged as one of the most influential factors in allowing an efficient exchange of information and knowledge among team members to be developed (Kim et al., 2008; Guinalíu and Jordán, 2016). Trust plays a key role in the context of online decision-making, as well as in sustaining the relationships within the work team (Kim et al., 2008). Taking into account the difficulties of deploying formal and informal controls in virtual contexts, a line of research has emphasized the importance of interpersonal trust to manage interdependent tasks in overcoming the pitfalls caused by dispersion (e.g. Jarvenpaa and Leidner, 1999; Muethel et al., 2012; Staples and Webster, 2008). However, knowledge of how trust works in a traditional team cannot be transferred directly to a virtual context due to the innate structural characteristics of the latter. On the one hand, virtual teams have a much higher degree of task interdependence (Lipnack and Stamps, 2000), and on the other hand, hierarchy takes on a much more relevant role due to the continuous coordination that is necessary between leaders and subordinates in a dispersed context (Bell and Kozlowski, 2002).

Furthermore, communication in a virtual team is much more limited since communication is fragmented, it lacks non-verbal communication and the communication is not as rich. All this reduces the ability to build and maintain interpersonal trust in virtual environments (Gibson and Cohen, 2003). In this sense, the Information Richness Theory (Daft et al., 1987) postulates that communication differs in richness depending on the medium used to transmit it. These authors present a hierarchy of levels of communication that reflects the richness of their content, in order of decreasing richness: face-to-face communication, telephone, personal documents such as e-mails and electronic documents. The Information Richness Theory suggests that different communication modes have different linguistic ability to transmit social cues and capacity to elicit an immediate response to the message (Saparito and Gopalakrishnan, 2009).

2.2 Perceived attractiveness

Previous research in the area of social psychology and marketing has proven that the perception of the person who delivers a message has a clear influence on the effectiveness of that message (Reingen and Kerman, 1993). On the other hand, the effect of attractiveness has drawn the attention of social psychology for many years. In the early works of Kelman (1961), it was argued that the attractiveness of the person who delivers a message is a relevant dimension that influences whether or not the message is approved by the receiver. Studies measure attractiveness based on subjective rankings of people's physical appearances (Mocan and Tekin, 2010; Hamermesh and Abrevaya, 2013). This approach is consistent with standard dictionary definitions of beauty as "the quality or aggregate of qualities in a person or thing that gives pleasure to the senses or pleasurably exalts the mind or spirit" (Hamermesh, 2011, p. 11).

With the objective of acknowledging physical attractiveness as an objectively measurable trait, previous research has focused on the deductions made by people concerning their perception of other people's appearance. Articulated through stereotypes such as "What is beautiful is good" (Dion et al., 1972; Lorenzo et al., 2010), "You can judge the book by its cover"

(Yamagishi *et al.*, 2003) or "Beauty Pays: Why Attractive People are more Successful" (Hamermesh, 2011). One of the most renowned theories in the literature on the effect of physical attractiveness is that of Thorndike (1920); this theory acknowledges a "halo effect" which refers to a cognitive bias by which the perception of one particular attribute of a person (in this case, the attractiveness of the leader) influences the perception of the rest of that individual's traits. Thorndike (1920) was the first to demonstrate through empirical evidence that physical attractiveness is the variable that most evokes the halo effect. Physical attractiveness gives people measurable information about the halo effect, and it is some of the characteristics of physical attractiveness that best evoke it. The role of attractiveness in evoking the halo effect is supported by numerous studies. One recent study (Zhao *et al.*, 2015) revealed that attractiveness can affect the perception we have of a person's life, success and personality.

Furthermore, people often assign positive attributes to attractive people and negative attributes to less attractive people (Eagly *et al.*, 1991). In this sense, more physically attractive people are usually more successful than unattractive ones, given that there is a belief that attractive people have a series of more positive traits attributed to them in comparison to less attractive people (Riggio, 1986). The effect of physical attractiveness has also been studied in a virtual context, specifically studies such as Zhao *et al.* (2015) analyze whether individuals coordinate themselves differently based on the attractiveness of an individual in a virtual environment.

2.3 Perceived empathy
Emotions are a fundamental aspect of the psychological functioning of human beings. Affection, moods, emotions and all other aspects related to emotional intelligence have generated a wide debate in the psychology literature (e.g. Barrett, 2006; Izard, 1992). From a social functional point of view, emotions signal relevant information that can be used to understand how to interact successfully with others (Keltner and Kring, 1998). Likewise, empathy can be defined as an exchange of positive and negative emotions that fosters a connection between people (Plutchik, 1980).

Although in the literature there is some debate concerning the construct of emotional intelligence and its influence on leadership, Ashkanasy and Daus (2005) defend the idea that the relational aspects of an activity will need to draw upon the emotional intelligence of the person in charge. Therefore, leaders who have greater ability to perceive the emotions of others, and understand the impact of their actions, will be more likely to play an effective leadership role (Day and Carroll, 2004). Plutchik (1980) describes empathy as an exchange of positive and negative emotions that fosters bonding among people. The concept of empathy has also been analyzed in business management. Goleman *et al.* (2002) argue that empathy is the fundamental competence of social awareness and the condition *sine qua non* of effectiveness for all work within the company. Furthermore, they argue that effective leaders have an impact on their subordinates that leads them to have a stronger emotional response and greater efficiency in their work.

Likewise, the literature acknowledges the fact that a factor such as empathy can be perceived through a virtual environment in which there is no physical exchange of information. In this sense, studies such as those of Carrier *et al.* (2015) show that it is possible to empathize (virtual empathy) through computer-mediated communication. Furthermore, it has been proposed that electronic communication environments, such as social networks, can facilitate empathy through easy and frequent access to other people in similar situations (Caplan and Turner, 2007; Guinalíu and Jordán, 2016).

2.4 Perceived justice
The study of the perception of organizational justice has caught the attention of researchers and practitioners and has become a recurring topic of research within the fields of

organizational psychology, human resource management and organizational behavior (Cropanzano and Greenberg, 1997). Over the past 30 years, organizational justice has been a subject of social psychology research, more specifically in organizational contexts (Trevino and Weaver, 2001). Perceptions of organizational justice constitute an important heuristic in decision making within an organization. We can define organizational justice as the way in which employees perceive fairness in the workplace. Previous research has highlighted perceived justice as a significant predictor of both the employees' attitudinal reactions (e.g. commitment and trust) and their behavioral reactions (Karriker and Williams, 2009). Organizational justice is beneficial for organizations in the long-term in the sense that it can foster positive employee work attitudes and behaviors (Cohen-Charash and Spector, 2001).

In general, the literature suggests that people want to be treated fairly and consistently, and this leads them to trust (Ambrose and Schminke, 2003; Greenberg, 2003). Justice is perceived when leaders are able to take into account the point of view of their subordinates, manage personal biases and explain the decision-making process, including appropriate feedback between the parties (Whitener, 1997). Justice will increase the felling of trust between leaders and subordinates (Burke *et al.*, 2007). In addition, the perception of justice benefits the organization in the sense that employees will be willing to respond with better performance and a better attitude.

The role of perceived justice in online environments has also been studied in previous literature, for example, within the scope of virtual communities, in which users are able to form their perceptions of justice while interacting with other members of the community (Chou *et al.*, 2016). Justice in an online environment is one of the fundamental pillars for lasting and sustainable relationships (Fang and Chiu, 2010).

2.5 Organizational commitment
Organizational commitment can be defined as the intensity with which employees participate in, and identify with, an organization (Mowday *et al.*, 1982). On the other hand, Mowday *et al.* (1979) describe organizational commitment as a strong belief in the goals and values of the organization and a predisposition to work on its behalf. Bishop and Scott (2000) define it as the intensity with which the members of a team engage and identify with their work team, that is, it describes the psychological attachment that team members experience toward the team. Likewise, organizational commitment has a strong link to the variable trust. There are numerous studies, following the relationship marketing approach and the commitment-trust theory proposed by Morgan and Hunt (1994), which have considered trust as the primary antecedent of commitment. Along the same lines, the work of Flavián and Guinalíu (2006) confirm that this relationship continues to be valid in online environments.

The interest in the study of commitment at the organizational level is especially relevant, with studies such as those by Koch and Steers (1978) and Angle and Perry (1981), which show how commitment can influence the attitudes and behaviors of the organization in the workplace. Much of the research in this field was intended to establish the link between organizational commitment and employee turnover, a relationship that has received considerable empirical support (e.g. Mathieu and Zajac, 1990). Various studies emphasize organizational commitment as an output within a virtual work team along with other variables such as effectiveness and satisfaction, at both the individual and the team levels (Dulebohn and Hoch, 2007).

2.6 Organizational citizenship behavior "OCB"
OCB refers to the term that reflects the behavior of the different members of an organization, but goes beyond performing the normal functions that each individual has assigned. According to the definition of Organ (1988), OCB represents the discretionary behavior of an individual, which is not directly or explicitly recognized by the organization's or company's

formal reward system, and furthermore promotes efficiency and effectiveness in the functioning of the organization (Bagozzi *et al.*, 2016). Later, Organ (1997) perfected this definition, conceptualizing it as a form of organizational efficiency that is based on the social and psychological environment in which the task performance takes place. Contextualizing this variable within a virtual environment, numerous studies exist that have studied the OCB variable within a virtual context, in the cases of both virtual communities (Yu and Chu, 2007) and virtual work teams (Creasy and Carnes, 2017). In all cases this variable is grouped within the variables of efficiency that a team or organization achieves.

3. Research model and hypotheses

As discussed earlier in the definition of trust in the leader, the level of trust in a team leader is associated, in part, with the subordinates' perception of a set of patterns of behavior (Dirks and Ferrin, 2002). These behavioral patterns have been analyzed in broader terms through a set of beliefs related to trust; more specifically Mayer *et al.* (1995) propose three dimensions of trust based on benevolence, ability and integrity. By virtue of this conceptualization of trust, the present research model has identified a series of antecedents of trust in a virtual leader, on the one hand based on the physical attributes of the leader and on the other, on the behavioral characteristics of the leader. Furthermore, the consequences of trust in the leader of a virtual work team have also been analyzed. The model considers the consequences of trust analyzed at a global level within the group, such as OCB and commitment to the team. These variables take into account the efficiency of the team through variables that reflect the social success of the work group.

Research in the field of psychology supports the fact that people that are more attractive are more likely to possess a wide variety of positive qualities (Hatfield and Sprecher, 1986). In fact, people often attribute positive characteristics to what is attractive, and negative characteristics with that which lacks attractiveness (Eagly *et al.*, 1991). There is abundant previous literature that acknowledges that physical attractiveness plays an important role in decision making among individuals. As proof, we can cite recent studies that acknowledge that physically attractive people perform better in areas such as job interviews (Wood and Eagly, 2012) or political elections (Benjamin and Shapiro, 2009). Focusing on the study of leadership, several previous studies have substantiated the importance of the leader's physical attractiveness in the way they are perceived by their subordinates (e.g. Spisak *et al.*, 2012; Benjamin and Shapiro, 2009). Framing this hypothesis in the context of a virtual environment, we find various studies that support the importance of the physical attractiveness of the leader of a virtual team or community when it comes to influencing subordinates (Zhao *et al.*, 2015). In fact, the more attractive the virtual leader, the better he is able to transmit certain positive traits to his subordinates. This, together with the need for virtual workers to connect with other members of the workgroup, given the innate characteristics of a distributed environment, can facilitate the building of trust. Accordingly, we expect that more physically attractive leaders will be able to generate greater trust among their subordinates:

H1. The degree of attractiveness of leaders of virtual work teams directly and positively influences the trust toward them.

The works of Mayer *et al.* (1999) and Goleman (1999) stress the importance of emotional intelligence and leadership, with empathy being one of the most important components of emotional intelligence. Within the literature on team management and leadership, it is accepted that there is a relationship between personal communication and the trust that is perceived in another person (Zolin *et al.*, 2003). In fact, Feng *et al.* (2004) argue that the group's management should promote mechanisms to help members of a work team to identify with each other, adopting an empathic attitude that helps build trust. Furthermore, it has been shown that certain behaviors are capable of being transmitted through a virtual environment. While these conducts

may emerge naturally in a face-to-face environment, it is perhaps more difficult that they arise in a virtual environment due to the distance that exists between members of the group. Accordingly, empathy can emerge within a virtual team through the messages exchanged between group members and the leader (Preece and Ghozati, 2001) or through other perceptions of the leader that subordinates may develop. Due to this, we expect that an empathic virtual leader will be able to create more trust. Therefore, we expect that leaders that show more empathy toward their subordinates will result in their subordinates having greater trust in them:

H2. The perceived empathy of the leaders of virtual work teams directly and positively influences the trust in them.

Justice involves an evaluative judgment concerning the treatment of a person by others (Furby, 1986). On the other hand, trust and organizational justice are linked (Aryee *et al.*, 2002), it is expected that fair treatment will improve the social exchange relationship and, therefore, increase the level of trust between the two parties. When employees perceive that the interpersonal treatment by their leader has been fair, it is logical that a degree of trust develops between the leader and the subordinates. Employees can see organizational justice as a way for leaders to communicate care and respect, which could lead to increased trust in the leader (Thau *et al.*, 2007). Furthermore, previous studies have empirically contrasted that organizational justice is positively related to commitment and trust in the organization and its employees (e.g. Alexander and Ruderman, 1987; Folger and Cropanzano, 1998). Within a virtual team and from the perspective of building relationships within the team, when subordinates perceive fairness in the results of personal interactions with, and conduct of, their leader they tend to feel more at ease in the team and their perceptions of the integrity, benevolence, and ability of their leader increase (Fang and Chiu, 2010). For these reasons, we expect that fairer virtual leaders will be able to create more trust:

H3. The perceived justice in the leaders of virtual work teams directly and positively influences the trust toward them.

Easily observable features, such as attractiveness or gender, can be used to categorize individuals based on stereotypes (Jones *et al.*, 1998). In keeping with this, the stereotype of "what is beautiful is good" is determined by the "halo effect" (Thorndike, 1920). The halo effect refers to a cognitive bias whereby the perception of a particular trait of an individual (in this case the attractiveness of the leader) influences the perception of other traits of that person. Along these lines, Mathes and Kahn (1975) argue that people that are more physically attractive have greater empathic ability than those that are less attractive. Consequently, the perception of empathy in the leader may be influenced by their degree of attractiveness. Therefore, the same level of empathy would be perceived more intensely when the leader is more attractive in the eyes of the subordinate. The reason would be that the individual has internalized the idea that people that are more attractive are more empathic, because of the halo effect. Based on these arguments, the following hypothesis is proposed:

H4. The degree of attractiveness of the leaders of virtual work teams directly and positively influences the level of empathy perceived in them.

Prior research suggests that organizational justice has a moral foundation in the sense that unfair treatment violates people's moral standards (Folger and Cropanzano, 1998). From this moral perspective, it is to be expected that empathy serve as a way to translate these moral norms into concrete actions toward other individuals, since empathy contributes to widening the number of people who are entitled to fair treatment (Aquino *et al.*, 2005). According to Hoffman (1987), the fact that any principle of justice is applied has in itself an

empathic connotation, which is explained by the fact that the person who dispenses justice can imagine the consequences of a poor system of justice within the organization, especially for those that are the most vulnerable. Therefore, the following hypothesis is proposed:

H5. The degree of empathy perceived in the leaders of virtual work teams directly and positively influences the level of justice perceived in them.

In recent years, trust has been considered one of the primary assets for fostering the attitude toward the work and the performance of the employees of an organization (McEvily and Tortoriello, 2011). Workers with a higher level of trust in their leader and their work team will tend to adopt behavior oriented toward the success of the team (Schoorman *et al.*, 2007), while also tending to be more loyal to their organization and more active in decision-making. Furthermore, several meta-analyzes carried out by Dirks and Ferrin (2002) and McEvily and Tortoriello (2011), confirm the positive effect of trust in leaders on a variety of attitudes in the workplace; among them is the relationship between trust in the leader and organizational commitment, which indicates that trust in the leader usually translates into strong organizational commitment.

In virtual work teams, trust positively influences the exchange of information and mitigates the uncertainty concerning the behavior of others (Muethel *et al.*, 2012). In fact, it has been found that the positive relationship between interpersonal trust and team effectiveness is stronger as geographic dispersion and computer-mediated communication increase (Muethel *et al.*, 2012). By emphasizing the importance of trust to ensure the success of a virtual team, these teams experience predictable communication patterns, positive leadership, enthusiasm and an improved ability to cope with technical uncertainty. Along these lines, Staples and Webster (2008) show that trust is positively associated with the transfer of knowledge within a virtual team, which results in the team being more effective. On the other hand, it has also been shown that trust increases task completion, commitment to the organization and the willingness to assume additional roles within the team (Long and Sitkin, 2006). By virtue of all the above, we can state the following working hypothesis:

H6. Trust in the leaders of virtual work teams directly and positively influences the degree of commitment with the team.

Trust has shown to be an important predictor of certain organizational outcomes, such as OCB (Van Dyne *et al.*, 2000). OCB is understood as a measure of organizational efficiency based on the social or psychological environment in which work is performed (Organ, 1977). The trust of employees in their leader is acknowledged in the literature as an antecedent of OCB. Different previous studies (e.g. Erturk, 2007) indicate that in a work context where the social exchange is of quality, trust acquires an important weight as an antecedent of OCB. On the other hand, Deluga (1994) argues that the actions of the leader aimed at strengthening trust among his subordinates are directly related to a high level of OCB among them. Other studies by Organ (1990) affirm that subordinates have a higher level of OCB in situations where social exchange facilitates the development of mutual trust between leaders and subordinates. That is why the closer and more frequent the relationship between the leader and the subordinates, the greater the trust and the associated OCB will be.

In a virtual environment, trust plays a key role in interpersonal relationships when the people are geographically dispersed, and consequently there is asymmetric information and uncertainty (McKnight and Chervany, 2002). In this regard, the influence of trust on certain outcomes has been demonstrated, an example being OCB (Konovsky and Pugh, 1994). It is reasonable to assume that when there is trust among the team members, one will be more willing to participate in OCB (Pillai *et al.*, 1999). In addition, trust is vital to creating a culture of knowledge exchange in online teams

and organizations (Collier and Bienstock, 2006). Therefore, the following argument is set forth as a working hypothesis:

H7. Trust in the leaders of virtual work teams directly and positively influences the degree of OCB of the team.

Organizational commitment is receiving a great deal of attention in the literature, among other reasons due to the important role it plays in on-the-job attitudes, such as job satisfaction and employee behavior. There is a positive correlation between organizational commitment and performance (Fu and Deshpande, 2014), not only at the level of individual performance, but also at the corporate level. With the idea of conceptualizing performance at a global level within the company, many authors use the variable OCB to show the importance of organizational commitment to employee motivation, behavior, and effort (Johnson and Chang, 2006; Organ, 1997). Based on these arguments the final working hypothesis is stated:

H8. The commitment to the team directly and positively influences the team's degree of OCB.

4. Methodology

The data needed to undertake this study were obtained through a self-administered internet survey of people who routinely work in virtual teams. To accomplish this, a database extracted from the social network LinkedIn was used. This is a professional social network, so it is particularly useful when it is necessary to filter certain profiles, in our case, managers. First, a database of managers and team leaders was created and an invitation to participate in the research was sent by e-mail. The invitation, which was sent to 1,000 individuals, included a question about their participation in virtual work teams. A total of 320 individuals responded affirmatively to the invitation, but once incomplete questionnaires and those that did not work in virtual teams were eliminated, the sample was reduced to 241. The structural equation methodology was used to analyze the data. Since this technique is highly sensitive to cases of missing and atypical data, an exhaustive analysis of the database was necessary before proceeding with the process of statistical analysis. The sample size is considered adequate for the structural equation methodology and the model to be tested (Boomsma, 1982, 1985). Tables I and II show the sociodemographic characteristics and the economics sectors of the sample used and the respondents' sector of activity.

The validation process of the scales proposed for the measurement of the variables that constitute the research model consisted of several phases that are described below. First, the development of the measurement scales was based on a previous review of the literature (see Table III). Thanks to this literature review, it was possible to formulate an initial proposal of scales. However, the scales had to be adapted to the context of the virtual work teams. The objective of the adaptation was to guarantee face validity; face validity is defined as the extent to which the measurement scale is representative of that which is intended to

Sociodemographic data	
Sample size	241
Age (under 20)	2%
Age (between 20 and 29)	30%
Age (between 30 and 39)	31%
Age (between 40 and 49)	29%
Age (over 50)	8%
Sex (male)	71%
Level of education (above primary)	85%
Internet experience (more than 5 years)	92%

Table I.
Sociodemographic data

Sector	No. of surveys	Percentage
Cultural activities	6	2.49
Commerce	9	3.73
Communications	8	3.32
Economics-Finance	18	7.47
Services	15	6.22
Education	31	12.86
Hospitality	3	1.24
Information technology	24	9.96
Engineering	6	2.49
Law-Legal	3	1.24
Marketing	42	17.43
Environmental	3	1.24
Healthcare	5	2.07
Tourism and recreation	11	4.56
Other	57	23.65
Total	241	

Table II.
Economic sectors

Construct	Adapted from
Trust in the leader	Roberts and O'really, Korsgaard *et al.*
Level of empathy perceived	Kellett *et al.* (2006)
Level of justice perceived	Niehoff and Moorman (1993)
OCB	Allen and Rush (1998), Organ (1988)
Organizational commitment	Allen and Meyer (1991)
Attractiveness	Ohanian (1990)

Table III.
Content Validity

be measured. Face validity is often confused with the concept of content validity. However, content validity is the extent to which the items correctly represent the theoretical content of the construct and is guaranteed by a thorough review of the literature. The level of face validity was contrasted using a variation of the Zaichkowsky (1985) model in which each item was classified by a group of experts as being" clearly representative," "somewhat representative" or "not representative." Finally, in line with Lichtenstein *et al.* (1990) each item was kept if there was a high degree of consensus among experts.

The validation process included an exploratory analysis of the reliability and dimensionality of the instruments of measurement. First, the Cronbach's α method was used to assess the reliability of the scales, where a minimum value of 0.7 was considered acceptable (Nunnally, 1978). The variables under consideration easily exceeded this minimum threshold. Furthermore, the item-total correlation, which measures the correlation of each item with the sum of the rest of the items of the scale, was higher than the minimum of 0.3 (Nurosis, 1993).

Second, the degree of unidimensionality of the scales was evaluated by means of a factor analysis. The extraction of factors was based on the existence of eigenvalues greater than 1, while also requiring factor loadings to be greater than 0.5 for each item, and the explained variance for each factor extracted to be significant. By this means, a single factor corresponding to each one of the proposed scales was extracted. Confirmatory factor analysis was used to confirm the dimensional structure of the scales. EQS 6.1 statistical software was used to perform the analyses and the Robust Maximum Likelihood estimation method was used due to the fact that it provides greater security when working with samples that could present some type of multivariate abnormality. A factorial model that included all of the variables under consideration was designed following the criteria

proposed by Jöreskog and Sörbom (1993) for the possible refinement of the items: the weak convergence criterion by which all indicators that did have significant factorial regression coefficients (t-student > 2.58; $p = 0.01$) were eliminated, the strong convergence criterion, which eliminated all indicators whose standardized coefficients were less than 0.5, and the elimination of all of those indicators that contributed the least to the explanation of the model (those indicators whose R^2 was less than 0.3 were eliminated).

In this stage eight items were eliminated. The adjusted confirmatory model presented acceptable values. Comparative fit index (CFI) $= 0.908$; Bollen (IFI) Fit Index $= 0.909$; Root Mean Sq. Error of App. (RMSEA) $= 0.064$; 90 percent Confidence Interval of RMSEA (0.056, 0.072). Table IV shows the scale items and their factorial loads, means and standard deviation.

Finally, both the variables "trust in the leader" and "OCB" were measured multi-dimensionally, since working with a multidimensional view of these variables allows a much more precise understanding of the implications of the concept. Finally, to confirm the existence of multidimensionality in the variable "trust in the leader" and "OCB" a rival models strategy was developed (Anderson and Gerbing, 1988) whereby a second-order model in which various dimensions measure the multidimensional construct under consideration was compared with another first-order model in which all the items were loaded on a single factor (Steenkamp and Van Trijp, 1991). The results corroborated the multidimensional structure of the variable trust (integrity, benevolence and ability) since the second-order model had a much better fit than the alternative first-order model. Table V shows the results of the multidimensionality analysis.

Although Cronbach's α is the generally accepted indicator to assess the reliability of the scales, some authors argue that this indicator may understate reliability (e.g. Smith, 1974). Therefore, various authors such as Jöreskog (1971) recommend the use of an additional statistic, such as construct validity. The results were positive taking 0.7 as a minimum value (Steenkamp and Geyskens, 2006), as shown in Table VI.

Construct validity was analyzed using two fundamental criteria for validity: firstconvergent validity that indicates whether the items that make up the scales converge toward a single construct. Convergent validity was confirmed when it was shown that the factor loading of each indicator was greater than 0.5 and significant at the level of 0.01 (Steenkamp and Geyskens, 2006). Furthermore, the analysis of variance extracted (Ping, 2004) was also used following the criterion of Fornell and Larcker (1981) which states that the measurements with an adequate level of convergent validity should contain less than 50 percent of the variance of the error (which implies an AVE statistic value greater than 0.5). The results obtained were satisfactory as shown in Table III. Second, discriminant validity, which tests whether the construct being analyzed is significantly distant from other constructs that are not theoretically related to it. Discriminant validity was assessed using two criteria: verifying that the value of 1 was not found in the confidence interval for correlations between the different scales, and checking that the correlation between each pair of scales was not significantly greater than 0.8. The results were satisfactory since all pairs of constructs met the two criteria mentioned.

5. Results

To contrast the proposed hypotheses, the structural equations model shown in Figure 1 was developed. The fit of the model showed acceptable values: CFI $= 0.922$; Bollen (IFI) Fit Index $= 0.923$; RMSEA $= 0.049$; 90 percent Confidence Interval of RMSEA (0.043, 0.54). Focusing on the antecedents of trust in the virtual leader, we observe that physical attractiveness has a positive and significant effect on trust in the leader ($\beta = 0.078$; $p < 0.05$), therefore $H1$ is accepted. Likewise, behavioral traits of a virtual leader such as empathy ($\beta = 0.355$; $p < 0.01$) and perceived justice ($\beta = 0.381$; $p < 0.01$) exert a positive and significant effect on trust, therefore $H2$ and $H3$ are accepted. Furthermore, the results obtained reveal the existence of a positive and significant relationship between the degree of perceived attractiveness and the perceived empathy of the leader ($\beta = 0.441$; $p < 0.01$), as

Trust in the leader		CFA	Mean	Desv.
CONF1 – Integrity	My team leader is sincere in his relationships with subordinates	0.804	5.77	1.316
CONF2 – Integrity	I trust my leader because he is a person of integrity	0.875	5.84	1.32
CONF3 – Integrity	I trust my leader because he fulfills the promises he makes	0.864	5.53	1.325
CONF4 – Integrity	I feel that I can trust the determination of my leader in all circumstances	0.891	5.36	1.374
CONF5 – Integrity	I trust my leader because he has not disappointed me so far	0.876	5.39	1.529
CONF6 – Integrity	When making decisions, my leader takes the welfare of the team members into account	0.778	5.46	1.408
CONF7 – Benevolence	I can expect a positive attitude from my leader, even though sometimes I may make mistakes	0.801	5.74	1.095
CONF8 – Benevolence	I trust my leader because he provides me with all the necessary information	0.793	5.19	1.491
CONF9 – Benevolence	If I have difficulties with my job, I know my leader will try to help me	0.797	5.65	1.239
CONF10 – Benevolence	I feel safe and comfortable discussing problems and difficulties with my leader	0.766	5.56	1.33
CONF11 – Benevolence	I know my leader takes my opinions into account when making decisions that affect me professionally	0.829	5.59	1.36
CONF12 – Ability	I have confidence in my leader´s ability	0.826	5.91	1.189
CONF13 – Ability	I trust my leader for his ability to manage a team	0.931	5.62	1.418
CONF14 – Ability	I trust my leader for his reputation in managing teams	0.75	5.13	1.582
CONF15 – Ability	I think my leader has the appropriate knowledge to manage a team	0.848	5.76	1.29
Empathy				
EMP1	My leader understands the emotions that the rest of the team members experience	0.851	5.03	1.414
EMP2	My leader is able to share the felling of the rest of the team members	0.899	4.85	1.566
EMP3	My leader encourages the rest of the team members to express how they feel	0.785	4.55	1.691
Justice				
JUST1	In decisions related with my job, my leader treats me with kindness and consideration	0.903	5.98	1.069
JUST2	In decisions related with my job, my leader treats me with respect and dignity	0.957	6.12	0.969
JUST3	In decisions related with my job, my leader discusses decisions that affect my work with me	0.703	5.65	1.314
Degree of attractiveness				
ATRAC1	My leader is an attractive person	0.855	4.15	1.556
ATRAC2	My leader is a person with class	0.848	4.58	1.582
ATRAC3	My leader is handsome	.948	4.06	1.57
ATRAC4	My leader is elegant	0.841	4.26	1.582
ATRAC5	My leader is a sexy person	0.81	3.21	1.6
Commitment				
COMP1	I would like to stay part of this team for a long time	0.799	5.4	1.623
COMP2	I truly feel the problems of the team as my own	0.726	5.18	1.511
COMP3	This team means a lot to me	0.948	5.07	1.564
COMP4	I have strong sense of belonging to this team	0.907	4.98	1.692
OCB				
OCB1 – Altruism	I try to help other members of the team even though the issues are not directly related to work	0.727	5.87	1.057
OCB2 – Altruism	I help the other members of the team when they have to miss work	0.849	5.82	1.108

(*continued*)

Table IV.
Items of the scales,
CFA, means and
standard deviation

| Trust in the leader		CFA	Mean	Desv.
OCB3 – Altruism	I help the other members of the team when they have a heavy workload	0.721	5.68	1.157
OCB4 – Courtesy	I inform the other members of the team before making an important decision	0.689	6.04	1.05
OCB5 – Courtesy	If a member of the team could be affected by my decisions or actions I consult them beforehand	0.819	6.19	0.841
OCB6 – Awareness	Regarding my participation on this team, I am always at my job punctually	0.707	5.89	1.193
OCB7 – Awareness	Regarding my participation on this team, I always finish my work on time	0.804	5.74	1.168
OCB8 – Awareness	Regarding my participation on this team, I try to be orderly in my work	0.728	6.01	0.985
OCB10 – Citizenship	I keep abreast of the advances of the team´s activities	0.832	5.86	1.04
OCB10 – Citizenship	I pay attention to the messages that give information about the advances of the team's activities	0.808	6.08	0.92

Table IV.

			Trust		OCB	
		Suggested value	First order	Second order	First order	Second order
Absolute fit	χ^2	$p > 0.05$	473.355 90 df $p < 0.001$	22.558 88 df $p < 0.001$	284.897 34 df $p < 0.001$	53.187 28 df $p < 0.001$
	RMSEA	RMSEA < 0.08	0.103	0.054	0.126	0.000
	90% Confidence interval RMSEA		[0.091; 0.115]	[0.038; 0.068]	[0.107; 0.145]	[0.000; 0.047]
Incremental fit	NFI	NFI > 0.9	0.766	0.890	0.772	0.963
	NNFI	NNFI > 0.9	0.788	0.942	0.745	1.000
	CFI	Near 1	0.818	0.951	0.807	1.000
	IFI	Near 1	0.820	0.952	0.810	1.000
Parsimony fit	Normed χ^2	[1;5] o minor	5.25	2.50	8.37	1.89

Table V.
Multidimensionality
analysis

	FCC	AVE
Attractiveness	0.93	0.74
Empathy	0.88	0.72
Justice	0.90	0.74
Organizational commitment	0.92	0.74
OCB – Altruism	0.81	0.59
OCB – Courtesy	0.73	0.57
OCB – Consciousness	0.79	0.56
OCB – Civism	0.89	0.67
Trust – Integrity	0.94	0.72
Trust – Benevolence	0.92	0.70
Trust – Ability	0.91	0.71

Table VI.
Construct reliability
and convergent
validity analysis

well as the relationship between empathy and the perceived justice of the leader ($\beta = 0.477$; $p < 0.01$) allowing us to also accept *H4* and *H5*.

Concerning the consequences derived from trust in the leader, we observe that trust exerts a positive and significant influence on commitment to the team ($\beta = 0.480$; $p < 0.01$), which justifies accepting *H6*. Likewise, trust in the leader also exerts a direct and positive influence on the variable OCB ($\beta = 0.439$; $p < 0.01$), so we can accept *H7*. Finally, a direct
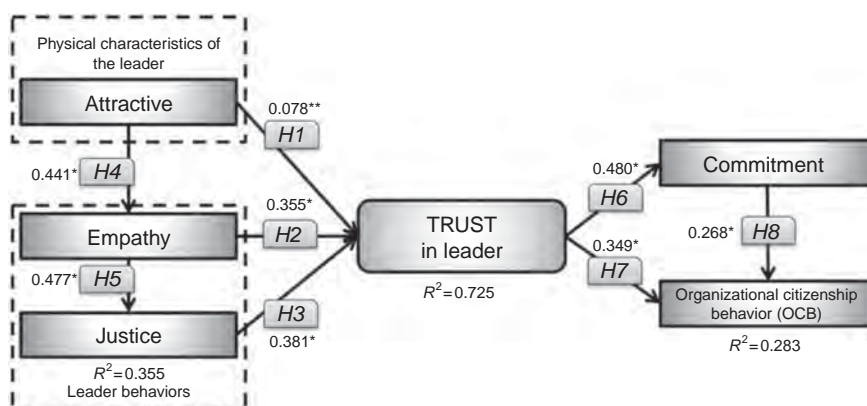
Notes: *,**Indicate that the coefficients are significant at 0.01 and 0.05 levels, respectively

and significant relationship between the commitment to the team and OCB ($\beta = 0.268$; $p < 0.01$) is also observed, so *H8* can also be accepted. The proposed model explains more than 72 percent of the variance of the variable trust in the leader ($R^2 = 72.5$).

6. Conclusions
The development of virtual work teams is a phenomenon that grows day by day. At this moment, it is not difficult to find a company where, more or less intensively, its employees work virtually. However, despite its growing importance, there are still management aspects of virtual teams that require more attention (Olaisen and Revang, 2017). The lack of physical proximity in a virtual environment makes it difficult to develop methods of control, as much in terms of direct supervision as for informal control mechanisms (culture or non-verbal messages). Previous studies corroborate that formal rules and regulations are more difficult to implement in virtual teams where the role of traditional authority is diluted by the very characteristics of the virtual environment. In keeping with this, previous studies highlight trust as a key factor in mitigating the difficulties of working online. Accordingly, the present research seeks to analyze in more detail the process of generating trust in the leader of a virtual work team and the consequences that are derived from it.

It is also possible to highlight the importance of a number of factors when the subordinates a virtual work team makes the decision to trust the leader. At this point two fundamental blocks of analysis of the antecedents of trust in the leader must de differentiated. First, we analyze characteristics of the leaders' behavior toward their subordinates, operationalized in the empathy that the leaders are able to convey to their subordinates and the justice that the subordinates perceive in their leaders. This block seeks to analyze some of the classic aspects of the analysis of trust in the leader previously analyzed for traditional contexts. Although prior studies confirm the possibility of extrapolating these variables to virtual environments, greater input is still needed when considering them in the context of a virtual work team. Second, the physical characteristics of the leader are analyzed, expressed by the physical attractiveness of the leader as perceived by the subordinates. The choice of attractiveness is based on the fact that it is considered to be the very core by which the physical characteristics of a person are evaluated (Kniffin *et al.*, 2014), and several studies have been carried out in which the attractiveness of an individual is evaluated in virtual environments through their profile picture or other electronic means (Zhao *et al.*, 2015). Therefore, it is interesting to emphasize how it is possible to communicate elements such as physical attractiveness and different aspects of behavior in a virtual environment, which gives us an idea of the richness

of the content that can be transmitted through virtual channels. In this regard, we must bear in mind that in recent decades the digital literacy of the population has increased significantly, which may mean that today's users of digital communications are capable of perceiving many of the non-verbal signals and a richness of content that years ago would only be possible through traditional communication channels.

In addition, it is interesting to highlight how this study reveals that it is possible to transmit elements such as physical attractiveness and different aspects of behavior in a virtual environment, which gives an idea of the richness of the content that can be communicated through a virtual channel. Daft *et al.* (1987) developed the theory of content richness. In principle, Daft's work developed a hierarchy of media through which greater richness of content (face-to-face communication), and less richness of content (digital communication) could be transmitted. In this respect, it should be borne in mind that in recent decades the digital literacy of the population has grown significantly, which may be the reason that digital users are able to perceive many of the nonverbal signals and a richness of content that years ago would only be possible through traditional communication channels (Zolkiewski and Littler, 2004).

Concerning the physical attractiveness of the leader in its direct and positive relationship with trust in the virtual leader, it is interesting to note that, although the role of physical attractiveness has been analyzed in other research contexts, it has not yet been analyzed in the context of virtual leadership. Accordingly, a greater physical attractiveness of virtual leaders is associated with greater trust in them. These results are consistent with previous research on the theory of stereotypes in which positive characteristics are associated with the more attractive people. It should also be noted that there is a direct and positive relationship between the degree of physical attractiveness and perceived empathy, a fact that confirms the importance that physical attractiveness plays in the leadership of a virtual team.

Furthermore, the variables empathy and perceived justice in the leader also directly and positively influence trust in the virtual leader. The management of empathy by the leader has been widely studied in traditional work environments, and is one of the most important variables to manage within a work team (Goleman, 2004). However, research on this variable in virtual work environments is still scarce. The perceived empathy of the leader is an important element in building trust in individuals who are not completely familiar with the online work environment. The results of this research endorse empathy as one of the ways through which leaders can build trust among their subordinates by displaying empathic behavior toward them. In addition, perceived justice is especially important in a work environment where people do not work face to face and have the need to believe that they will be treated fairly at all times. The results of the model corroborate this belief since the perceived justice in the leader is directly and positively related to the level of trust in the leader. It is also interesting to highlight the relationship between empathy and justice, the former being an antecedent of the latter, which reinforces the importance of perceived empathy in the leader in a virtual work environment.

The proposed model takes into account the consequences derived from trust in the virtual work leader. Along these lines, other studies analyze the results of a team from an economic point of view through economically quantifiable variables. However, taking into account the variables that have been used as antecedents and moderators of trust, it is reasonable to think that the efficiency of the team could respond more to social and group type variables, than to a mere economic figure. The use of social efficiency variables to assess behavioral models is a common practice in the literature (Morgan and Hunt, 1994). Therefore, if we analyze once again the results obtained from the research model, we can see that there are two consequences associated with trust in the virtual leader. First, it can be seen that trust in the leader favors higher levels of "OCB" as well as greater organizational commitment. There is also a direct and positive relationship between commitment to the organization and OCB. These results confirm that a high level of trust in the virtual leader favors social conduct by subordinates that goes beyond that which is formally established,

thus favoring cohesion and creating a sense of belonging to the group, which is especially important in the case of virtual teams where the members are scattered and it is more difficult to create a sense of unity within the team.

6.1 Implications for management

As a result of global competition, organizations are increasingly opting for knowledge-based production models (Townsend et al., 1998), adopting innovative strategies to ensure their survival (Miró et al., 2010), and tending toward more flexible and competency-based structures which involve an increase in knowledge management-related activities and the redistribution of their employment structures in order to design more flexible and versatile work teams (Lurey and Raisinghani, 2001). Accordingly, companies should be agile in creating virtual work teams to cope with the challenges imposed on them by the competitive environment, since virtual teams endow organizations with greater flexibility. At the same time, they foster knowledge creation, skills development and give organizations a wider perspective compared to traditional work teams (Greenberg et al., 2007). The results of this study are intended to help organizations manage their teams more efficiently, by building trust and thereby contributing to improving the results through a better understanding of the factors that affect the trustworthiness of a team leader.

The results of the model highlight several strategies aimed at building trust in the leader. First, promote empathy between leaders and their subordinates. Although face-to-face interaction between leaders and subordinates it is not common, virtual teams have communication tools available to them (e.g. chat, video conference, e-mail) that can be used by leaders to interact with their subordinates in an empathic way, trying to put themselves in their subordinate's position and taking interest in the problems that they may have in the course of their work. Likewise, it would be advisable, whenever possible, to have an initial face-to-face meeting between all team members to share first impressions; this would also help to generate trust initially and reinforce the following trust building process. Second, leaders must be able to transmit the perception that they are fair to their subordinates. Virtual team leaders can develop a sense of justice among their subordinates by applying the principles of organizational justice, treating subordinates fairly and consistently, taking into consideration their subordinates' points of view, being able to manage personal biases and explaining the decision-making process, as well as by maintaining adequate feedback loops between the leader and the subordinates. Furthermore, the results of this study also show that the more attractive leaders are the ones who generate the greatest trust. Therefore, it is recommended that the virtual leader pay maximum attention to the visual signals they give to their subordinates through electronic media (e.g. profile images) so that the subordinates perceive of their leaders to be as attractive as possible and thereby increase their level of trust in them.

6.2 Limitations and further research

One of the primary limitations of this research is the fact that the vast majority of the individuals who have participated in it are Spanish speaking. Although the diversity of the economic sectors analyzed makes it possible to establish certain generalizations from the results obtained, it would be advisable to re-validate the proposed model with a more extensive sample of work teams, especially in cultural terms. This would confirm the appropriateness of the factors selected as well as their independence in relation to the cultural context.

Another possible limitation of the study refers to not including some variables that could be relevant in explaining the process of generating trust the leader of a virtual team. There are many variables that can influence the process of creating trust in the virtual leader. Likewise, it is also possible that other consequences related to trust in the leader have not been included in this study. Therefore, a future line of research would be to expand the list of antecedents of trust by analyzing other physical and behavioral characteristics of the

leader (Van *et al.*, 2017), as well as to include variables of the personality of leader himself in the analysis (Won Kim and Makana, 2017). As an example, a new future research could test if the gender of the leader and the gender of the respondent (the same or different) have any influence on trust or if it mediates the relationship between attractive and trust.

Another interesting line of research would be to analyze the leader's facial features in order to analyze their levels of trustworthiness. A recent study indicates that those with female-looking or happy-looking faces are perceived to be more trustworthy, while competitiveness, dominance and kindness are associated with specific facial features such as larger foreheads, prominent noses and strong chins (Olivola *et al.*, 2014).

Some research suggests that the problems of leadership in virtual teams lie in the fact that the leaders do not possess specific skills that differ from those required to manage traditional teams (Kayworth and Leidner, 2002). Future research should investigate what specific skills are needed to lead and manage a virtual work team compared to a traditional team (Vallejo, 2009)

An interesting line of additional research could be to analyze the frequency of communication between the leader and the subordinates in order to establish ranges of communication frequency. This could be operationalized as a control variable in the analysis of the primary variables of the research; trust, empathy, justice […] or other related variables.

Likewise, it would also be interesting to undertake a mediation and moderation analysis of the variables of the actual model, or to introduce new variables into the model in order to broaden existing knowledge. The new variables could include variables related to the leader (e.g. leadership style), traits of the subordinate (e.g. risk aversion, extroversion) or of the work atmosphere of the virtual team (e.g. stress level).

Finally, this research has only taken into account whether or not a work team performs its functions virtually, however, it is possible that, depending on the team, the virtuality of the work may be more or less intense and may be combined with face-to-face meetings or other methods of collaborative working. Therefore, an interesting future line of research would be to analyze how trust in the leader develops depending on the degree of virtuality of the team.

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