

How Team Leaders Can Use ICT to Improve Trust Among Virtual Teams to Increase Collaboration?

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Abstract—This article makes recommendations to help team leaders effectively use ICT channels to develop and improve trust within their distributed virtual teams which will allow achieving a more effective team collaboration. Based on thorough review of the literature and content analysis, we have identified 29 factors for trust-building in this environment based on Cognitive Trust and seven factors based on Affective Trust. Team leaders will be able to use these main factors to develop trust among their team members, according the team's type (short-term or long-term team). They will also know how to do so across diverse technology and communication channels. In addition, by examining the differentiation between cognitive and affective trust, they will be able to understand which ICT factors are essential for task-oriented purposes, and which are essential for social purposes.

Index Terms-Virtual Team, Distributed Team, Team Leader, Trust, Collaboration, ICT, Web 2.0.

I. INTRODUCTION

Through content analysis of professional literature, and based on academic models and articles, this article aims to propose several techniques to assist team leaders in building and developing trust among the members of their virtual teams. These techniques will be based on the principal set of communication channels of a virtual environment in Information and Communication Technologies (ICTs). This improvement in the level of team trust through proper use of ICTs will allow achieving a higher level of collaboration within the virtual team. With the Internet revolution of the 1990s, the world became a global village. The distance separating people shrank, and a new era of organization began. One of the changes that this revolution brought to organizations is the creation of a new kind of team, in addition to the conventional face-to-face team: the virtual or distributed team. Thanks to information and communication technology systems, this team can communicate across the globe. These new channels of communication, however, have created new challenges. One of these challenges is the lack of interpersonal relationships. Trust is deeply affected by this lack; it depends on interpersonal relationships and is critical to the proper functioning of the team. Team leaders need to find new techniques in order to overcome this problem. This paper will help them to find such techniques and tools. We divide our tools suggestions into two kinds of teams: the short-term team and the long-term team. "Organizations are no longer built on force, but on trust"[22]. Force can generate compliance and obedience, but these are no longer sufficient. In the current highly competitive climate, organizations must be dynamic, innovative and able to adapt quickly to new situations. Therefore, 21st century

organizations need teams to solve problems and conflicts, to share information and knowledge, to be innovative and creative. These attributes will lead to high levels of team collaboration, and this collaboration will, in turn, lead to improved team performance [71]. The question, then, is: what antecedent will be mainly responsible for triggering the process to achieve effective and productive collaboration? As Drucker [22] argues, organizations must be built on trust. Indeed, trust has been identified as a key process in team collaboration and performance [31] [21] [4] [13]. When referring to trust, Darabi and Clark [16] argue that "Such reinforcement thus leads to the partners gaining a better understanding of each other and hence may lead to more ambitious collaboration". Furthermore, researchers have shown a positive relationship between trust, collaboration and performance base on empirical findings [81] [9]. The nature of this relationship between trust and collaboration and performance is still unclear. Some scholars argue that trust has a direct, well-defined impact on collaboration and performance. In Trainer's [82] definition, "Trust, or more precisely perceived trustworthiness, is a crucial ingredient of effective and productive collaborations". Others believe that the relationship is still ill-defined. "All these studies show evidence that, in some way, the trust relationship between the members of a work team affects the performance of the team in its tasks or activities" [57]. In her research, Marguin[56] brings two different points of view held by academic studies about the relationship between trust and performance in virtual teams. The first point of view sees trust as an antecedent to success [19] [78]. The second argues that trust is a moderator-mediator factor and therefore has an indirect effect on success [20] [21] [9]. Studies suggest that the primary role of emergent leaders within the context of an empowered or self-managing team is to create a team environment that allows for understanding of differences, and an expression of emotion and trust among team members [70] [90] [23]. Similarly, Remidez and Jones [74] argue that project management requires communication practices that go beyond transaction confirmation, to include managing relationships and building trust. Trust development would therefore seem to be one of the crucial roles of a team leader. This work paper aims to study how team leaders can use ICTs to improve trust within their virtual teams and, as a result, improve the success of the project.

II. LITERATURE REVIEW

First, we will define the four main concepts of this article: virtual team, trust, team leader and ICTs. This paper deals with a particular kind of team known as a virtual or distributed team. This sort of team has been identified as

being especially problematic for trust building. One of the roles of the team leader is to help the team develop trust. In a virtual environment, the primary tools at a team leader's disposal are ICTs. For this purpose, after defining the four main concepts, we will also define links between these concepts and the different kinds of virtual teams, trust and ICTs discussed in this paper.

A. Team and virtual team

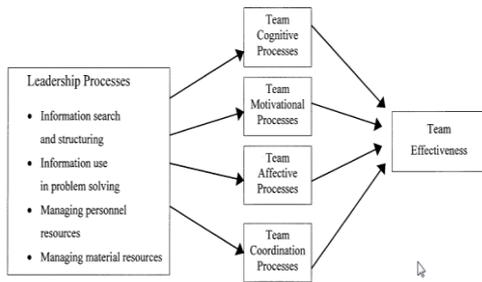
Salas et al. [77] provided a good working definition of a team as "a distinguishable set of two or more people who interact dynamically, interdependently, and adaptively towards a common and valued goal/objective/mission, who each have been assigned specific roles or functions to perform, and who have a limited life-span of membership." (p. 4) Traditional teams are known as face-to-face teams, in which the whole team is mostly working in the same space-time. Virtual teams are different in several ways. Many researchers have tried to characterize the differences between virtual teams and face-to-face teams. According to Chudoba et al. [11] there are six discontinuities – geography, time, culture, work practices, organization, and technology – that capture distinctive aspects of the virtual team environment. This environment poses some challenges for this particular type of team. In their research, Kirkman et al. [48] found five challenges to the success of virtual teams. Building trust within this kind of team is the first challenge, they declare: "Most consultants and researchers agree that building trust is the greatest challenge in creating successful virtual teams and organizations". Similarly, Grabner-Krautera and Kaluscha [28] argue that the lack of physical contact makes it more difficult to establish strong relationships and bonds that lead to high levels of trust, making the communication process more challenging.

B. Trust

There are different definitions of trust in academic literature. Marguin[56] refers to two of the most widely accepted definitions. The first is "one party's willingness to be vulnerable to another party based on the belief that the latter party is competent, open, concerned and reliable" [64]. The second widely accepted definition 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 trust or, irrespective of the ability to monitor or control that other party" [58]. These represent two definitions of trust in terms of the dyadic relationship. Cummings and Bromiley[15] observed that trust also exists in collective relationships (groups, teams, and organizational units). They defined collective trust as: "A common belief among a group of individuals that another individual or group: a) makes good-faith efforts to behave in accordance with any commitments [...] b) is honest in whatever negotiations preceded such commitments and c) does not take excessive advantage of another even when the opportunity is available".

C. Team leader

If we analyze the traditional leadership theories (leadership traits approach, behavioral approach, and the contingency or situational schools of thought), it is hard to find a theory relevant to the team leader. Most people confuse the team leader's task with leadership in general. "Corporate leaders must orchestrate the performance-driven pursuit of long-term visions and strategies by hundreds, thousands, or even hundreds of thousands of people..." [46]. These traditional theories and models have dwelt on the leader as a figure who stands out from the rest by being somehow different and "leading" everyone else [7]. This was supported by Zaccaro, Heinen, and Shuffler [92] who noted that traditional leadership models tend "not to make the distinction between leader-subordinate interactions and leader-team interactions." Therefore our definition of a team leader will be based on the functional leadership theory [60]. According to Morgeson et al. [65], this theory is the most prominent and well-known team leadership model. Bell and Kozlowsky [6] and Zaccaro et al. [93] have also supported this observation. This theory suggests that the leadership role is "to do, or get done, whatever is not being adequately handled for group needs" [60]. Morgeson et al. [65] defined team leadership as "...oriented around team need satisfaction (with the ultimate aim of fostering team effectiveness)". Several studies have focused on understanding the principal functions of the team leader. Zaccaro et al. [93] define this leadership as social problem solving, where leaders are responsible for (a) diagnosing any problems that could potentially impede group and organizational goal attainment, (b) generating and planning appropriate solutions, and (c) implementing solutions within typically complex social domains. Bell and Kozlowsky[6] split the team leader function into two primary categories: (a) the development and shaping of team processes, and (b) the monitoring and management of ongoing team performance. Morgeson et al. [65] identify 15 different team leadership functions: compose team, define mission, establish expectations and goals, structure and plan, train and develop team, sense-making, provide feedback, monitor team, manage team boundaries, challenge team, perform team tasks, solve problems, provide resources, encourage team self-management, and support social climate. Earlier, Fleishman et al. [26] also categorized the principal functions of the team leader with four superordinate functions and 13 subordinate functions. All these studies show that, on the one hand, team leaders must act as managers and be task-oriented [29], and on the other hand they must act as leaders and be people-oriented [1] in order to extract better performance and effectiveness from their teams. In their model of leader performance functions, Zaccaro et al. [93] also refer to two task-oriented processes (team cognitive and coordination process) and two relationship-oriented processes (team motivational and affective processes) as necessary for team effectiveness.



A model of leader performance functions contributing to team effectiveness [91]

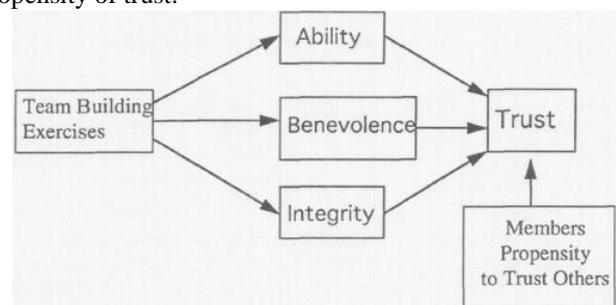
D. Information and Communication Technologies (ICTs)

For decades, the impact of technology on collaboration has been a topic for several researches including empirical findings [18] [27]. Technology is evolving at an exponential pace leading to new collaboration tools like Web2.0 tools and social media. Former research [18] suggested that use of different collaboration technology could influence outcomes differently. The different technology characteristics may influence differently the level of collaboration of the team and therefore have various impacts on the performance of the team and his outcome [84]. Information and Communication Technology refers to technologies that provide access to information through telecommunications media, such as the Internet, wireless communications and cell phones. It includes any devices, services and applications used in information systems management and processing [34]. Over the past few decades, ICT has provided a vast array of new communications capabilities that allow people and businesses to feel close proximity even when the physical distance between the communicators is large. This new kind of modern communications technology creates a "global village" where people can communicate all over the world and feel as though they are communicating with someone in the next room, or even the next cubicle. Technologies like instant messaging, Voice over IP and audio and video conferencing enable the exchange, sharing, development and management of information across the world while reducing the uncertainty and duration of many types of business transactions. ICT is considered one of the three major technological breakthroughs of the modern era, alongside steam power and electricity [24]. ICT's rate of technological development has been much more rapid than that of any other breakthrough. ICT is still in its first stages, and new technologies appear every day—including new software, hardware and services. This rate of development continues to grow exponentially, as illustrated by Moore's Law. The impact ICT has had on our lives is evident from the fact that some countries were able to take advantage of ICTs in order to accelerate their rate of growth and productivity [24]. Thomas and Bostrom[81] declare that they "found evidence that Virtual Team leaders do manage information and communication tools (ICTs) in order to affect changes in team cooperation, through trust and relationship improvements". As they argue, these four concepts have influence on collaboration and are linked within a virtual

environment. We will now, define links between these concepts and the different kinds of virtual teams, trust and ICTs discussed in this paper

E. Trust within the virtual team

Jarvenpaa et al. [39] developed a model of trust in virtual teams based on the two theories of dyadic and collective relationships, as quoted above. Their model extends the dyadic trust relationship between trust or and trustee based on perceived ability, benevolence and integrity of the trustee [58] to all team members. The baseline hypothesis of their work was that, in a global virtual team, team trust is a function of the other team members' perceived ability, integrity, and benevolence, as well as of the members' own propensity of trust.

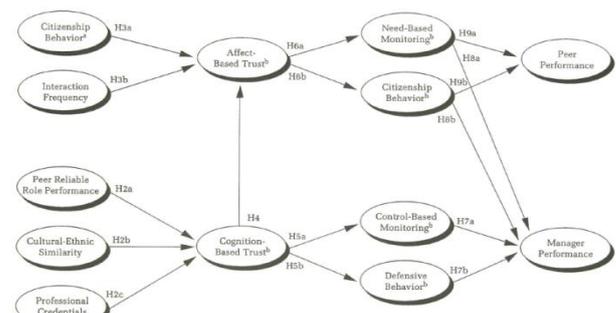


Jarvenpaa et al. [39] Research Model

In order to trust and therefore be willing to depend on another party [62], to take risks [40] and to be vulnerable [58], we must create social and interpersonal relationships with the other. One of the main challenges in virtual teams, as opposed to face-to-face teams, is "overcoming the isolation caused by the separation of the telecommuter from the social network in the traditional work space" [49]. Similarly, Grabner and Kaluscha[28] argue that the lack of physical contact makes it more difficult to establish strong relationships and bonds that lead to high levels of trust.

F. The cognitive and affective dimensions of trust

Over the years, many trust models have been developed. Based on the concept that trust may have rational and emotional roots, a model of cognitive and affective dimensions in trust has been developed by McAllister [59]. This theory was recently used by Schaubroeck et al. [80] in their research on the relationship between team performance and cognition-based and affect-based trust.



The McAllister [59] model, outlining the role of trust in interpersonal relationships within an organization

When trust is based on cognition, individuals employ rational thought in order to trust others. Cognition-based trust refers to trust that is based on performance-relevant cognitions such as competence, responsibility, reliability, and dependability [80]. We hope that other people will fill their roles, and that their actions are consistent with their speech [25]. But when the interaction between the parties is intense, the emotional and mutual investment in the relationship becomes primordial; this is where the affective side of trust comes into play [25]. The emotional attachment created by this intense interaction emphasizes empathy, affiliation and rapport, based on a shared regard for the other person [80]. In family relationships, such as spouse-partner, and even more so in parent-child relationships, the affective side is very strong and forms the basis for most of the trust in the relationship. In contrast, when we need the services of a specialist—such as a technical expert or consultant—the cognitive side is predominant. In a work environment, where colleagues work together toward a common goal, trust is initially cognition-based. However, to maintain this trust in the long run, we must develop the affective aspect of the relationship [59]. Cognitive and affective dimensions are often tightly intertwined in work relationships. Trust is assumed to develop gradually over time based on direct personal interaction and communication [58] [51]. Individuals need time in order to trust another person. We need to develop both cognitive and affective trust. Other research has gone so far as to add other dimensions, such as the "early trust" suggested by Webber [88] as an antecedent to both cognitive and affective trust, or the "intended behavior" defended by Cummings and Bromiley [15] as a third dimension. However, high levels of trust at an early stage are possible, and may be driven by cognitive cues from group membership and reputation. Affective trust has been thought to develop later in the life of an interpersonal relationship [89].

G. Short-term vs. long-term teams

Distributed (or virtual) teams are defined as: "distributed work teams whose members are geographically dispersed and coordinate their work predominantly with electronic information and communication technologies (email, video-conferencing, telephone, etc.)" [33]. Like face-to-face teams, virtual teams can be divided into two kinds: short-term teams and long-term teams. The former is more project-based, while the latter is more relationship-based. This difference will obviously impact trust building. In his research, Justrud [41] refers to three kinds of teams working in a virtual environment. The first is known as a virtual task force. This group initially forms as a result of an acute or unexpected situation. The second kind of team defined by Justrud as a virtual team is a group formed for a limited period of time in order to solve certain pre-defined tasks. Both of these kinds of teams are temporary most of the time (as we will later show). Finally, Justrud dubs the third kind of team a distributed work group. This group contains people from different geographical units within the same

organization. Such teams are usually of a more permanent nature than virtual teams (as we will expand upon below). In the last decade of the 20th century and the first few years of the 21st century, virtual teams were mostly based on temporary teams. Most of these teams were project teams [55] [73], task forces [30], or short-term project teams [12]. As we have previously shown, traditional trust is defined as a long-term relationship. Therefore, in order to find a solution for trust building in short-term teams, Meyerson et al. [63] developed the swift trust theory. This theory was used in most research conducted in the field of virtual team trust building and development [38] [68] [42]. Meyerson et al. [63] argue that virtual teams must build trust quickly. Unlike traditional trust that is usually based on interpersonal relationships, swift trust replaces the need for interpersonal dimensions with broad categorical social structures and action. Virtual communities are composed of people who do not necessarily share a common past or future, and who are different in culture, geography and skills. As a result, they cannot rely on traditional trust building. Rather, they must rely on a special form of trust that builds primarily on pre-existent stereotypes and on current action of the community [66]. In other words, this form of trust is based on cognitive elements such as role-based interaction and category-driven information processing, rather than on affective elements. Over the past few years, the second kind of team—the ongoing or long-term team—has also become more prevalent in the virtual context. This kind of team is dubbed distributed work group by Justrud [41], functional team [32], or work teams [55] [73]. These teams are typically characterized by cyclically recurring activities, and their members expect to be working together on future tasks [17]. Ongoing teams tend to be more focused on interpersonal relationships, which increase the impact of trust dynamics on team member interactions [44] [79]. Unlike swift trust, which is highly fragile and temporal, long-term teams must develop trust not only based on the cognitive dimension, but also on the affective dimension. Very little research has been conducted on virtual ongoing teams. One of these studies, conducted by Saunders and Ahuja [79], argues that virtual ongoing teams have the time needed to develop roles and norms, establish deeper trust, develop communication patterns, and resolve sources of deep-lying conflict. Therefore trust building and development will be of a different nature if we are managing a short-term team as opposed to a long-term team. In a virtual short-term team, focus must be on the cognitive dimension, whereas, in a virtual long-term team, we will need to develop both the cognitive and the affective dimensions. In the virtual long-term team, the affective dimension must play a primordial role if we wish to foster good interpersonal relationship throughout the team's lifetime.

H. The team leader as a facilitator of team trust building

Beyond the argument that having cognitive and affective trust in the team leader results in improved team performance [80], team leaders must foster a climate of trust among their

team members. In her research, Webber [88] argues that team leaders are important agents for creating a climate of trust within their teams. Several years ago, Thomas and Bostrom[81] conducted research based on the McGregor [61] Theory X and Theory Y, where Theory X describes those unmotivated employees who must be supervised, commanded and controlled by their managers. In contrast, Theory Y describes a self-motivated worker with whom the manager must improve, mentor and nurture the relationship. Their study demonstrates that Theory Y managers lead their teams by "linking actions", whereas Theory X managers lead their teams by "forcing action". They conclude that both methods have a positive impact on the trust and collaboration among team members. In other words, the most important factor for trust-building within a team is the team leader's actions toward building trust, whether the method employed is "linking actions" or "forcing action". It is therefore inevitable that some trust-building actions will be based on commands and controlling actions, whereas others must improve and nurture relationships. Several scholars have identified the traits that enable leaders to influence their environment as emotional intelligence, behavior and personality. The team leader's emotional intelligence, behavior and personality can foster a positive team climate [52] and have a positive impact on team trust, communication and engagement [23]. In a virtual environment, team leaders will need to improve the trust climate by adapting their behavior and using information and communications tools in order to express their personality and to use their emotional intelligence. It is therefore essential that they learn to master these tools.

I. ICT and virtual team communication

In a virtual team environment, face-to-face interaction is very uncommon. It is therefore critical for team leaders to master information and communication tools (ICT), as these represent almost the sole means of communication with the team. Obviously, if team leaders cannot communicate with their teams, they will be unable to build trust among team members. Kasper-Fuehrer and Ashkanasy[45] argue that, without appropriate ICT to communicate trustworthiness, trust building in a virtual organization is compromised. A study by Thomas and Bostrom[81] found a strong correlation between technology adaptation and trust and cooperation. These findings have been confirmed by the research of Adela et al. [2]. The density/frequency of ICT use and level of trust between virtual community members was confirmed by their study. Therefore, it appears to be essential for a team leader to demonstrate basic knowledge and skills in the use of ICT. As an initial step, the team leader should learn about the different methods of communication and understand how and when to use them. Next, team leaders should ensure that their team understands the principles of ICT use. However, it must be emphasized that there are other factors beyond the use of technology that should be taken into consideration in order to build and maintain trust in a virtual environment. For example, Jalali and Zlatkovic[37] argue that the team leader

will also need to evaluate teammates for their ability to work in such environments, and to promote those with experience in these environments. Assembling teams of people who are already familiar with one another is also recommended [91]. Another example is the use of outside experts to help team leaders establish an honest assessment of the cultural identity of their individual groups [54]. ICTs provide support for both synchronous and asynchronous communication [86] [3]. Synchronous systems enable interpersonal contact that simulates face-to-face contact. It has been argued that "asynchronous CMC is closer to writing due to the fact that it allows for more syntactic complexity than synchronous CMC" and that "synchronous CMC is closer to speaking than asynchronous CMC because numerous communication strategies and a wide range of discourse patterns are found in the synchronous environment" [35]. This difference will impact upon the optimal use for these channels. There are three different levels of channels, as defined by Bos et al.[8]; the first is based on text-like writing or online presentation, the second on vocal contact and the third includes vocal and visual contact. The advantage of asynchronous systems is that they allow people to think before answering and to establish the reason behind a particular decision. Asynchronous systems also have these three levels of contact. The first level lacks the vocal and visual cues, thereby increasing the risk of miscommunication and misinterpretation. The second level essentially lacks visual cues that decrease the risk of miscommunication and misinterpretation. Finally, the third level, which has vocal and visual contact, considerably decreases this risk. In their research, Bos et al. [8] show that audio and video channels facilitate cooperation far better than chat/messaging channels. However, these two channels still showed evidence of delayed trust, since they took longer to reach high levels of cooperation than face-to-face interaction. Team leaders usually use these channels for task-oriented purposes. Using these channels, they send goals, tasks, schedules, questions, requests for updates and reports to their teams. Team leaders tend to forget, however, that these channels also affect social bonds. They forget the extent to which these same channels can be used to strengthen the ties between themselves and their teams, and between team members. "We argue that these three social networking tools [instant messaging, email and knowledge sharing forums] can function as work task-oriented CMC [Computer-Mediated Communication] tools. At the same time, these three CMC tools have the capability to shape well-connected social networks for the interlocutors at work, merging interpersonal and work relationships together with the aid of CMC tools. The utilization of these tools can help establish or improve quality communication processes, interactivity and relationship networks among interlocutors, subsequently leading to enhanced individual work performance" [67]. In their research, Ou et al. [67] demonstrate that IM and emails have a significant impact on communication processes, interactivity and relationship networks. However, their research also shows that the different channels impact the communication

process, interactivity and relationship networks differently. IM has a strong impact, followed by email. Their study did not find significant bonds in knowledge-sharing forums. These findings are consistent with our previous statement about the two different kinds of channels (synchronous and asynchronous) and the three different levels (text, audio, and video) of contact. Similarly, Lau et al. [50] identified three major factors that enhance effective communication and affect channel quality. These three factors are: technology, time and space, and communication patterns. The technology factor is about accessibility, synchronicity and the richness of the medium. The time and space factor is about time zone differences and physical distances. For communication patterns, Lau et al. [50] identified three different stages these teams undergo during the course of their project: unidirectional, bidirectional and mutual communication. In the past few years, a new kind of channel has emerged: social media. Many scholars have classified ICT tools according different parameters, such as synchronous/asynchronous [50] or medium richness [75]. However, their studies, which preceded the recent development of this technology, did not take the social media channel into consideration. Thanks to Web 2.0 technology, the use of social media is becoming increasingly common within companies [14]. Some examples of social media include wikis such as Wikipedia and online social networking services such as Facebook. Kaplan and Haenlein[43] refer to social media as "Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of User Generated Content". Van Zyl[85] argues that social media accelerates the development of trust, relationship-building and effective communications among people in communities. According to Remidez and Jones [74], the main reason for this is that social media enables small talks. A study conducted by Pullin[72] suggested that small talks support familiarization, help build rapport and create a nurturing, supportive, collaborative, and trusting environment. Even if, according to Treen and Leonardi [83], "Scholarship has largely failed to explain if and how uses of social media in organizations differ from existing forms of computer-mediated communication", it seems that social media has created a new form of technology-based communication. This is largely due to the fact that it improves small talk and online creation and exchange.

III. METHODOLOGY

We used two manners of methodologies. The first methodology is based on academic papers that we analyzed and used to define a list of the common ICT channels. We then categorized these different channels according to two categorization methodologies: asynchronous/synchronous channels [86] and text-, audio- or visual-based channels [8]. We then developed a strategy for how and when to use these channels, also according to these papers. The second methodology we used was to identify those factors most critical to team leaders for developing trust within their

teams. These factors are the result of a content analysis of professional literature (including some from professional websites). Babbie[5] defines content analysis as "the study of recorded human communications, such as books, websites, paintings and laws". We analyzed more than 26 different sources, most of them articles written by organizational development consultants and executives, as well as professional books. All of the articles dealt with trust and virtual teams. Articles dealing with face-to-face teams and trust were not used in this analysis. The professional books used in this study cover the topic of management in a virtual team environment exclusively. Therefore, the factors we propose in this paper are directed at virtual teams. It is inevitable that some of the tools discussed herein are also effective for face-to-face teams, but this is not the purpose of our paper. Following our analysis, we used the cognitive and affective model [59] and the short- and long-term types of teams [41] to classify the different kinds of factors into two major groups: factors aimed at short-term teams (but not exclusively) and factors aimed at long-term teams. The second stage was then to divide these factors into subcategories. Some of the tools proposed in the literature were hard to classify in the subcategories we created; we therefore used our knowledge and professional experience to bring them into the right category. Finally, based on the common list of ICT channels and on the content analysis of trust-building factors, we proposed a virtual team type-dependent (short- or long-term) tool box for team leaders to use when developing trust among their team members. We proposed only the most relevant, principal tools. The reader can continue to develop others based on the ICT channel list and the content analysis.

IV. ANALYSIS

A. Recommended way to use ICTs

Based on nine scholarly research papers, we will review several of the common ICT channels, mention some of their strengths and weaknesses, and recommend ways to use them. We will categorize them into asynchronous and synchronous channels [86], and then divide them according to the three levels that Bos et al. [8] defined: text, audio and video.

1) Asynchronous:

Email is one of the most popular uses for asynchronous communication technology. On the one hand, it is easy to use, fast, enables the user to attach files, to send to one recipient or to many at a time, and is accessible to all [50][3][87][75][36][67]. On the other hand, it can lead to miscommunications due to the lack of nonverbal cues and communication. We can easily overload an email communication with information, or send sensitive information to a third party in error. This technology is best used for exchanging information between several people and for sending attachments. It is also useful for quick updates or short requests.

Web pages allow anyone from anywhere, at any time, to access information about their team's work and download

documents relevant to the team's work [3]. This communication channel, however, is one-way; no relationship or discussion can emerge from it. There is also a lack of transparency, since only the webmaster can publish the information and documents. It is useful for sharing knowledge and information with people both inside and outside the team, and for public relationships.

Blogs (based on Web 2.0) allow people to self-publish ideas, knowledge, facts or anything they wish to publish [3][53][85][83]. They resemble online journals that allow others to read, comment, add new ideas, and share. Unlike web pages, they allow multi-way communication¹. Organizations can use blogs not only for problem solving and knowledge sharing, but also for people to share personal interests and information. Like email, however, blogs can lead to miscommunication due to the lack of nonverbal cues and communication.

Collaborative writing/online file sharing (based on Web 2.0) allows multiple people at different locations to work on the same document simultaneously [50][3][85][69]. This is an efficient and convenient way for several people to write or update a document. Like blogs, online collaborative writing facilitates multi-way communication. It can increase cooperation and stimulate people to meet deadlines.

Wikis (based on Web2.0) can be used by team managers to create a place where team members can store documents, share information, and collaborate with one another [47][85][83]. Unlike web pages that only allow the webmaster to post documents or information, wikis allow anyone in the team to do so, and enable multi-way communication. They are useful for increasing information/document sharing and collaboration. In many ways, wikis resemble blogs. However, unlike blogs, which also serve as places for sharing personal interests and opinions, wikis are more task-oriented.

Forums (existed prior to Web2.0 but improved with it) allow team members to hold conversations in the form of posted messages [67]. Unlike chat rooms, forums archive messages for as long as needed. All team members can see one another's posts for complete information transparency. This channel can be used to develop long distance brainstorming, to leave messages within the team, and to share and develop ideas.

Social networking (based on Web 2.0) is similar to websites and other applications that enable users to communicate with each other by posting information, comments, messages, images, video and more [83]. This channel is useful for creating communities of experts or of people with similar interests, but it is a fundamental tool for improving social bonds between the members of a group by allowing them to share their interests and personal information, thereby developing social interactions and

personal relationships.

Voice mail has the advantage of conveying the sender's tone, which adds the dimension of vocal cues [50], thereby reducing the risk of misinterpretation, as compared with email. This channel is recommended for sending short messages over different time zones.

Video streaming helps team managers or members express themselves through video [3]. This channel is excellent for team training, since team members can see their colleagues or manager explain a topic, rather than merely viewing a presentation. The disadvantage of this channel is that teammates cannot ask questions. The main advantage is that anyone can view the video at any time, irrespective of time zones.

2) *Synchronous*

Chat/instant messaging allows two or more team members to communicate simultaneously [50][3][75][36][67]. This channel facilitates the sharing of information on low-complexity issues, and is therefore useful for simple decision making. Like other text channels, its chief disadvantage is the lack of visual and audio cues.

Electronic meeting systems help to improve creative problem solving and decision-making [50][75]. This medium helps increase participation and meeting quality, and represents a more official meeting format than chat/messaging, but still suffers from the same drawbacks as the text channels.

Phone/VoIP is also a common means of communication. Phone calls are easy to use; thanks to advances in mobile phone technology, everyone has a phone nowadays [50][75]. Cost, which was once prohibitive, has dropped even for international phone calls. The major drawback, however, is the lack of visual cues. Team members who are not fluent in English, for example, would find communication in this medium challenging. However, it is ideal when urgent issues arise, when a face-to-face discussion with a fellow team member is not possible, and for conversations intended to motivate and support.

Conference calls are an easy method for communicating with multiple team members simultaneously [3]. However, different time zones must be taken into consideration—and these can pose a serious challenge. Also, as with phone/VoIP, team members who are not fluent in the language used in the call would find it hard to participate. This medium is useful for tasks such as coordination when urgent issues arise, and for decision making. On a social level it can help foster team motivation by developing social relationships. This is a convenient means for regular team meetings, but someone must be responsible for summarizing the call/meeting.

Video conferencing is considered the closest communication channel to actual face-to-face meetings [50][3][75]. It is the preferred method for forging strong relationships, for open discussion, decision making and problem solving. It is also a useful means for getting to know new members. This is the best alternative to actual face-to-face meetings. Although there is no lack of audio

¹ This refers to a method of communication that improves upon two-way communication in e-participation (ICT-supported participation in processes involved in government and governance), e.g. internet conferencing, online mediation and comments, discussion forums and so on.

and video cues, members who are not fluent in English may be reluctant to participate. A summary of all ICT channels including some relevant advantages and disadvantages, and their best use have been grouped in table 1.

| | | Technology | Some of relevant Advantages | Some of relevant Disadvantages | Useful for |
|--------------|-------|---|---|---|--|
| Asynchronous | Text | Email | accessibility, easy to use, easy and quick attachment sending, Can send to specific persons (one or many) | Miscommunications, Information overload, mistakenly information sends | Information exchange, Document sharing, quick updates, short request |
| | | Web Pages | accessibility, easy to use, Cheap | One way communication, Relationship and Discussion lack, limited person can post | One way knowledge, Document and information Sharing, Updates |
| | | Web Blogs | Multi-Way Communication, anyone can post and react | Miscommunications, Irrelevant information and Information overload, Employee can spend too much time on posting | Problem solving and knowledge sharing, personal interest and opinion sharing |
| | | Collaborative writing and Online Shared files | Multi-Way Communication, increase cooperation and stimulate to reach deadline | Miscommunications, Task oriented only | Sharing, Developing and updating Document |
| | | Wikis | Multi-Way Communication, anyone can post, stimulate collaboration | Miscommunications, Employee can spend too much time on posting | Document storing and sharing, Information sharing, Social interaction |
| | | Forum | Multi-Way Communication, Cheap | Miscommunications, Employee can spend too much time on posting | Problem solving and knowledge sharing, |
| | | Social Networking | Multi-Way Communication, anyone can post and react | Miscommunications, Employee can spend too much time on posting | Personal interest and opinion sharing, Social interaction |
| | Audio | Voice mail | Cheap, easy to use | On way communication, Relationship and Discussion lack, | Quick updates, Short request |
| | Video | Video Streaming | Cheap, easy to use | On way communication, Relationship and Discussion lack, | Knowledge sharing |
| Synchronous | Text | Chat/messaging | Can be One on One or Multi-Way Communication, | You need to be able to type and read fast. Lack of Audio and Visual cue | Short factual messages, Simple Decision Making, Social interaction |
| | | Electronic meeting systems | Multi-Way Communication, Increase creativity, participation, quality | Lack of Audio and Visual cue | problem solving and decision-making |
| | Audio | Phone/VOIP | One to One Communication Audio cue | Cost of VOIP tech., Can be a problem for people who are not no-fluent in English (for example) | Decision Making, Motivation and Commitment, Social interaction |
| | | Conference-Call | Multi-Way Communication, Audio cue | Cost of VOIP tech. Unequal Participation (for not fluent foreign language people for example) | Decision Making, Motivation and Commitment, Social interaction |
| | Video | Video Conference | Multi-Way Communication, Audio and Visual cue, The closest to Face to Face meeting | Cost, Unequal Participation (for not fluent foreign language people for example) | Decision Making, Motivation and Commitment, Social interaction |

Table 1 - Summary table of ICT Channels

B. Main factors for cognitive and swift trust

As stated before, swift trust is based mainly on cognition.

Therefore, we need to develop traits based on cognitive foundations within the team. We will focus on five principal

traits to develop swift trust: competence, information sharing, integrity, commitment and reciprocity. These traits are more task/project-oriented than relationship-oriented.

Competence - Team members need to believe that the team leader and the other members of the team have the knowledge, skills and ability to achieve their task successfully, so that they may rely on them to handle their parts of the job. *Information Sharing* - In a team environment, team players are dependent upon one another. Trustors need to know that the other team members will share all information that is important and relevant to the success of the project with them. Trustors need to know that the other members will help them acquire the knowledge they need to successfully complete their task.

Integrity - Trustees must be dependable and reliable. Their fellow team members need to know that the trustee maintains a high moral level, and behaves according to this level. There is nothing more important for trust building than honesty.

Commitment—Trustors need to know that the trustees will

follow through and keep their promises. Trustees must be committed to the task and their deadline.

Reciprocity— In order for others to trust us, we must trust them as well. Trustors will be able to trust someone if they feel trusted by that person. If we want people to cooperate with us, we must be cooperative with them as well.

Through our content analysis, we found 29 factors that are cognitive-trust oriented. These factors are essential for developing trust in virtual teams. Our findings show that it is vital for team leaders to communicate as often as possible and to encourage their teams to do so as well. Another crucial element, we found, is mastering ICT by knowing which channel to use, and how and when to use it. This will have a significant impact on trust building. The next factors we outlined are task-oriented and are the most central to developing trust within a virtual team. These include communicating tasks, work progress, responsibilities and competencies. Following those were factors about team leader character and team atmosphere (Table 2).

| | Factor | Quantity | Source |
|----|---|----------|---|
| 1 | High Communication Frequency | 14 | (1)(7)(9)(10)(12)(14)(15)(16)(19)(22)(23)(24)(25)(26) |
| 2 | Use the right Channel of communication | 13 | (6)(7)(8)(9)(10)(12)(14)(15)(19)(22)(23)(24)(25) |
| 3 | Work progress communication | 11 | (1)(5)(9)(10)(13)(14)(15)(20)(22)(23)(24) |
| 4 | Communicate Team member competencies and skills | 10 | (3)(4)(5)(8)(16)(17)(20)(22)(24)(25) |
| 5 | Communication of goals and tasks | 10 | (2)(3)(4)(8)(10)(13)(15)(22)(23)(24)(25) |
| 6 | Communication of roles and Responsibility | 9 | (1)(3)(4)(8)(14)(15)(20)(22)(26) |
| 7 | Establish commitments, Keep promise and perform as expected | 8 | (2)(4)(5)(15)(19)(22)(24)(26) |
| 8 | Encourage Sharing knowledge and experience | 7 | (7)(8)(9)(16)(18)(20)(22) |
| 9 | Response time, be responsive | 7 | (1)(4)(6)(13)(16)(22)(26) |
| 10 | Transparency | 6 | (2)(10)(13)(21)(22)(26) |
| 11 | Encourage Participation | 6 | (2)(5)(7)(8)(16)(22) |
| 12 | Communication tone and way to express | 5 | (1)(6)(7)(14)(22) |
| 13 | Empower to make decisions | 5 | (9)(16)(17)(25)(26) |
| 14 | Be touchable, be approachable | 5 | (1)(2)(6)(16)(22) |
| 15 | Communicate what outputs or outcome you expect | 5 | (1)(9)(10)(20)(22) |
| 16 | Take time to listen, Pay attention | 4 | (2)(5)(8)(22) |
| 17 | Make everyone a star | 4 | (7)(8)(9)(22) |
| 18 | Work procedure and process | 4 | (4)(9)(14)(20) |
| 19 | How to use ICT | 4 | (4)(10)(14)(23) |
| 20 | Recognize Effort and Positive results | 4 | (2)(8)(9)(22) |
| 21 | Let them show they can be trusted and reliable | 4 | (4)(8)(15)(22) |
| 22 | Manage conflict | 4 | (16)(17)(20)(24) |
| 23 | Willing to trust others | 3 | (8)(13)(22) |
| 24 | Willing to promote, protect and defend the team | 3 | (15)(22)(24) |
| 25 | Handle sensitive issue with discretion | 3 | (6)(22)(24) |

| | | | |
|----|------------------------------|---|--------------|
| 26 | Take responsibility | 3 | (2)(22)(26) |
| 27 | Be authentic and consistent | 3 | (19)(22)(24) |
| 28 | Be on time (Virtual Meeting) | 2 | (4)(22) |
| 29 | Talk about trust | 2 | (7)(8) |

Table 2 – Factors based on cognitive-trust

We will highlight the main factors found in our analysis of the professional literature on this subject. These factors will help team leaders develop and improve the five traits. The recurring element that stands out most from a survey of the literature is communication. The following questions and recommendations aim to guide team leaders on how to develop these factors in general. At a later stage, we will recommend how to do so using ICT.

First, the team leader must create a plan and procedure for communication:

- How will the team communicate (email, phone calls, video conferencing, instant messaging, etc.)? The method of communication depends on the purpose and the message we want to communicate. Before defining the means of communication, one must examine whether it is the most effective means in this situation.

- How often will the team communicate? Will there be a weekly team status meeting, or a daily task status report? The more the team communicates the better. Because face-to-face encounters are rare or entirely non-existent, the frequency of communication is crucial. Team managers should communicate as often as possible and encourage their teams to do so as well.

- When does the team communicate? Since it is a virtual team, team members can be all over the world and in different time zones, so managers must set a time that is most convenient for everyone.

- What is the acceptable turnaround for replying to a query, or at least for devoting some attention to it?

- What important information must be communicated?

- What are the roles and responsibilities of the team members? Managers should remember to add a few words—about the professional and academic background, and professional experience—of both themselves and each of the other team members. Inform all team members of any changes.

- Goals and expected outcomes: what is the deadline for each of the outcomes? What are the quality metrics?

- What are the milestones and tasks, not only for the relevant team member, but for all team members? All team members need to know not only what is expected of each of them, but also what is expected of all of them. Any changes must be explained to the team, and they must be informed of any updates. Why has the deadline been moved? Why is current progress not satisfactory? Why have changes been made to the project?

Transparency is fundamental, so managers must be open and communicate status, problems, changes—anything that

seems relevant for the team or the project. Team leaders who do so will notice their team members doing so as well. Team leaders must be reachable and accessible. They must let their team know their preferred method of communication, and at what times they are available. They must ensure that other team members do so as well. Team leaders must be conscious of their tone, not only during voice communications, but also in text-based media. The tone of their communications may set the tone for the whole team. Sarcasm and teasing must be avoided, since they are easily misinterpreted in text-based communications. Team leaders must be on time for calls and video conferences, and listen attentively during these conversations. They should not multitask during the call, but rather concentrate on what the other side has to say. The team leader is responsible for creating a healthy work environment. Team members take their cues from their leader's behavior and act accordingly. Since team leaders' actions are scrutinized by the team members, they must be sure to:

- Always treat the other side with respect, even when the other side does not reciprocate.

- Trust the team; show them that they are confident of their team's abilities. They must be given the opportunity to show that they can be trusted, and in turn, they will mirror this trust.

- Take responsibility for the whole team.

- Keep promises no matter what. If something truly unexpected happens and a team leader is unable to keep a promise, the circumstances must be explained, and always truthfully.

- Treat all team members in a consistent manner, without showing preferential treatment to some team members—especially at the expense of others.

- Show them that the team's success is essential to their leader, and always protect the team's interests. Team leaders must promote their teams—not themselves.

- Treat each team member not just as part of the team, but also as an individual.

- Give feedback, even when it is negative.

- Encourage members to participate, to share new ideas and solutions to problems. Create an environment where team members feel comfortable enough to share information and knowledge.

- Empower team members to make decisions and act on them.

- Give help and advice when needed.

- Deal with conflict with a team member in private.

- Learn team members' cultural backgrounds in order to

communicate effectively.

As we argue, in a virtual environment, communication is based on information and communication tools. Team leaders must therefore ensure their team members know how to use ICT in the most effective way.

C. Main factors for affective and deeper trust

Swift trust based solely on cognitive trust is fragile. For a long-term team, it is necessary to develop affective trust as well. We will focus on the five traits of affective-based trust that are relevant in a team context: compatibility, benevolence, predictability, inclusion and accessibility. These traits are mostly relationship-based.

Compatibility – one way to create social bonds is to find common interests, to share the same values and goals. Two people with the same background will usually have an easier time building a relationship.

Benevolence – The trustor needs to believe that the trustees feel interpersonal care and concern, and that they have the willingness to do good for reasons that transcend an egocentric profit motive.

Predictability – Based on the observation that the behavior of team members is consistent over time and in different contexts, the trustor is able to predict the trustee's next move.

Inclusion – Trustors are an integral part of the group.

Other group members will actively include them in their social and work activities.

Accessibility – Other team members are willing to be open about their feelings with the trustors. They are willing to share their emotions and sensitivities with them. The trustors can relate to them on a personal level.

As expected, we found that the factors that are based on affective trust are mostly related to the social aspects. We attribute the smaller number of such factors (we found seven) than the cognitive trust-based factors to the relatively new references to long-term distributed teams in the literature, as discussed above. The most dominant factor, we have found, is that the team leader must improve the team's social interactions to the greatest possible extent. For this reason, the content analysis recommends that team leaders try to organize face-to-face meetings, despite the challenges posed by geographic distances. In order to overcome the lack of social relationships due to differences in geography, culture and time zone, the use of ICT to simulate such social encounters through social networking or virtual meetings is crucial. One-on-one time and shared interests with each of the team members is also an important factor in developing affective trust (Table 3).

| | Factor | Quantity | Source |
|---|---|----------|---|
| 1 | Improve Social interaction | 14 | (1)(2)(4)(7)(9)(11)(12)(14)(15)(16)(19)(20)(22)(23)(26) |
| 2 | Face-to-Face When possible | 12 | (1)(9)(12)(15)(16)(17)(18)(19)(20)(22)(23)(26) |
| 3 | Use of Social Network like Facebook or Team Social Network | 10 | (1)(2)(4)(7)(8)(9)(16)(22)(25)(26) |
| 4 | Organize virtual social meeting, Create Virtual Face Time | 9 | (2)(7)(8)(12)(16)(19)(20)(22)(26) |
| 5 | Share personal interest and information | 9 | (4)(5)(6)(7)(8)(16)(19)(20)(25)(26) |
| 6 | Take time to get know as individual, Show interest in their personal life | 8 | (5)(6)(8)(20)(22)(24)(25) |
| 7 | Ice breaker exercises and games | 7 | (4)(7)(8)(11)(20)(22)(24) |

Table 3 – Factors based on affective trust

In this chapter on affective and deeper trust, we will outline some of the main factors that a team leader can use to improve trust within long-term teams. Based on our findings, the following recommendations aim to help the team leader develop affective trust. Team leaders must create and seek any opportunity for social interaction by using any and all of the means of communication and sharing at their disposal. The first step is to consider the possible social uses of each ICT channel, such as showing an interest in team members' personal lives or sharing elements of one's personal life. ICTs can be used to facilitate icebreaker activities and virtual games that will help team members develop interpersonal relationships beyond their daily working relationships. They will get to know one other in a more pleasant and relaxed way. In order to develop swift trust, team leaders must learn about team members' cultural backgrounds. They should be allowed to share their local customs and habits with their fellow team members. Team leaders should be creative and

find a way for team members to have "face time" virtually. Even when the team cannot be brought together in one room, virtual social meetings can be organized to help make them feel as though they are together. During these meetings, the topic of work should be avoided. Rather, pleasant topics should be discussed over video or phone conferencing, and refreshments should be provided to all participants. Some organizations even develop social networks for their teams using Facebook and the like. This helps team members share personal information and pictures, and connect over shared interests and ideas. People will get know each other on a social level, rather than a strictly professional level. Team leaders can use ICTs to be supportive and show that they care—not only for the team as a whole, but also for each member as an individual. They must give recognition when it is deserved. Lastly, nothing can compete with actual face-to-face meetings. Such meetings should be organized whenever possible. If face-to-face meetings for the entire

global team cannot be arranged, an attempt should at least be made to gather them in small groups, and then to connect the groups by video conference.

V. HOW TO INCREASE VIRTUAL TEAM TRUST THROUGH ICT

After establishing a list of the common ICT channels and identifying the principal factors of team trust building in a virtual environment, we can provide some examples of how to use ICT channels to develop trust building factors.

A. Cognitive Factors

The first two factors we found for cognitive trust are "high communication frequency" and "appropriate use of the communication channels". These two factors are in agreement with the purpose of this article, which is to identify the right ICT channels for trust building. The next factor is "communicating about the progress of the work". For daily updates, channels such as email, web pages or wikis are recommended. These asynchronous and text-based channels are appropriate for updates and information sharing. For weekly/biweekly updates, the recommendation is to hold team meetings using conference calls or video conferencing. The fourth cognitive factor is "communicating team member competencies and skills". Asynchronous and text-based channels such as web pages or wikis, which are appropriate for information sharing, are also recommended for this purpose. The next factor is "communicating goals and tasks". Such communications should initially be sent using email,

then posted on a web page or wiki. Online file sharing can also be a solution if some team members must be able to update tasks. The sixth factor, "communicating roles and responsibilities", is quite similar to the previous factor. Therefore the same channels can be used. The next factor, "keeping promises and performing as expected", can be attained by informing the team of any progress and status updates, in the same manner as the third factor ("communicating about the progress of the work"). Blogs, wikis and forums are all suitable for the eighth factor—"encouraging the exchange of knowledge and experience". Team members can share their knowledge and learn from others through these channels. Synchronous channels such as instant messaging or phone/VoIP are preferable for the "responsiveness" factor. When these are not possible, asynchronous channels such as email or voice mail can also be used. "Transparency"—the next factor—is best achieved by communicating any updates over a blog. Web pages and wikis are also suitable. For periodic updates, team meetings should be held over conference calls or video conferencing. Finally, the last cognitive factor to be addressed in this article is "encouraging participation". Any multi-way communication channel is suitable for this factor. However, the team leader should pay attention to team members who may have foreign language issues when using audio channels such as conference calls or video conferences. In table 4, we have grouped all the Cognitive Factors including the preferred channels to develop them.

| Factors | Best Channels | Other Channels |
|---|---|--|
| Work progress communication | For updates: Email Then post in: Web page, Wiki | During team meeting: Conference call and Video Conference |
| Communicate Team member competencies and skills | Web page, Wiki | |
| Communication of goals and tasks | For updates: Email Then post in: Web page, Wiki | If needed to be update by other team members: Online Shared files |
| Communication of roles and Responsibility | For updates: Email Then post in: Web page, Wiki | If needed to be update by other team members: Online Shared files |
| Establish commitments, Keep promise and perform as expected | Email, Web page, Wiki | |
| Encourage Sharing knowledge and experience | Web Blogs, Wikis, Forums | |
| Response time, be responsive | Chat/Instant Messaging , Phone/VoIP | Second choice: Email, Voice Message |
| Transparency | Web Blog | Second choice: Web page, Wiki During team meeting: Conference call and Video Conference |
| Encourage Participation | All Multi-Way Communication Channels | |

Table 4 – Preferred ICT channels for cognitive factors

B. Affective factors

Like the first two cognitive factors mentioned above, the first affective factor is consistent with the purpose of this article. "Improving social interactions" involves identifying the most appropriate ICT channel for each kind of social interaction. The second factor, as discussed previously, is "communicating face-to-face when possible". No ICT channel can hope to achieve social interaction objective as effectively as face-to-face interaction. The ICT channel closest to an actual face-to-face meeting is video conferencing, where each participant can both see and hear the other team members. Obviously the best channel for the third factor—"using social networks"—is any one of the social networking tools available on the market. Although use of this channel in business settings is still in its infancy, it is nevertheless a growing trend, and is encouraged by recent studies [85][83]. This channel is still complicated to promote, due to costs and the integration and deployment time. The recommendation, therefore, is to at least use a channel such as a blog that allows personal interests and opinions to be shared. The next factor—"organizing virtual social meetings to create virtual face time"—can be achieved through group chatting. This is also an easy method for

generating group discussions on a social level. It is advantageous for people with foreign language issues, but puts those people who have trouble with writing at a disadvantage. Conference calls, especially video conferences, are excellent for this goal but are hard to organize. Team members who struggle to speak in the language of the meeting will prefer text-based channels such as instant messaging. Blogs and social networks are ideal for the fifth factor: "sharing personal interests and information". Alternatively, virtual social meetings could be arranged using group chats, conference calls or video conferencing. Showing individual interest in team members can be done using one-to-one communication such as phone/VoIP or chat/instant messaging, which allows the team leader to have a private moment with one of the team members. The last affective factor to be listed in this article is "social activities or games". Several software products available on the market can be used for this factor, but the creative team leader will find a way to use one of the common channels previously discussed to achieve this objective as well. In table 5, we have grouped all the Affective Factors including the preferred channels to develop them.

| Factor | Best Channel | Other Channel |
|---|--|---|
| Face-to-Face When possible | The Closet is: Video Conference | |
| Use of Social Network like Facebook or Team Social Network | Social Network | Second choice: Blog web |
| Organize virtual social meeting, Create Virtual Face Time | Group Chat, Conference call, Video conference | |
| Share personal interest and information | Social Network, Blog web | During virtual social meetings: Group chat, Conference call or Video conference. |
| Take time to get know as individual, Show interest in their personal life | One to One Chat/Instant messaging, Phone/VoIP | |
| Ice breaker exercises and games | Be creative by using any ICT Channel | |

Table 5 - Preferred ICT channels for affective factors

VI. CONCLUSIONS

Virtual teams or distributed teams are becoming increasingly more common in companies. This kind of team allows companies to build teams whose members live all over the world. Meaning, they can choose the most appropriate people for each team, provide services 24 hours a day, or work 24 hours a day to expedite the completion of a project. Unlike face-to-face teams, however, social interaction is almost nonexistent. Without a lot of social interaction, high levels of trust between the members of the team cannot develop. Since trust has been identified as a predominant factor for team collaboration, developing trust has become one of the biggest challenges in a virtual environment. In an

environment devoid of face-to-face interaction, ICTs represent almost the sole method for communication with people from across the globe. Team leaders must learn how to use ICT channels efficiently in order to build and develop trust within their team. This article proposes several ways to build and develop trust using different types of ICT channels. The theory of cognitive and affective trust is used to define two kinds of virtual teams (short- and long-term), organize the common ICT channels into categories and identify the main factors for team building in a virtual environment. Cognitive trust, which is based on rational reasons for trusting another person, has been the subject of research for developing trust among short-term virtual teams. The principal theory based on cognitive trust is known as the

"swift trust" theory. This theory, however, cannot properly address trust development in long-term virtual teams. These teams, whose development is even more recent than that of short-term virtual teams, require more than swift trust alone—as would any long-term relationship. Swift trust alone is fragile and cannot be sustained over time. When working with long-term teams, therefore, "emotional bonds" must be developed in order to build trust. These emotional bonds must be based not only on cognitive trust, but also on affective trust. Both kinds of trust must be fostered in a long-term team if it is to maintain trust levels over time. ICTs can facilitate both task-based and social-based communication. Of the large range of ICT channels, some are more suitable for task-based and some for social communication. Over the past few years, the developments of Web 2.0 technologies have added new communication capabilities. By understanding the different ICT channels, team leaders will be able to use them efficiently. They will be able to use the right channel at the right moment, depending on the message they seek to convey, and whether this message is task-oriented or relationship-oriented. Furthermore, team leaders will be able to train their team to do so as well, thus allowing the team to develop trusting relationships with greater ease.

VII. SUMMARY

This study intends to help the team leader decide which ICT channel to use in order to collaborate more effectively within the team, depending on whether the message is more cognitive trust-oriented or affective trust-oriented. After having identified the cognitive and affective factors for trust building in a virtual team environment, some examples of ICT channels and their appropriate uses were provided, based on the objective. Cognitive factors are more task-oriented and are based on rational criteria rather than on emotional criteria. Email is the basic channel for cognitive factors, but a Web 2.0 technology, such as a blog or wiki, is imperative for sharing information and knowledge. Because of the lack of face-to-face team meetings, these channels (e.g. email, blogs, wikis) can lead to miscommunication, and even the task itself could be misunderstood. Therefore, the team leader must organize virtual team meetings using conference calls or video conferencing. This kind of channel, which is both synchronous and audio/video based, can decrease the risk of miscommunication. Affective factors are about social interaction. Therefore, team communications that can approximate the atmosphere of face-to-face interactions are most efficient. Of the ICT channels that exist today, video conferencing most closely approximates face-to-face interaction. The new Web 2.0 tools that have emerged in the past year are highly suited to creating virtual social interaction. These tools will be the subject of new research into trust building and developing collaboration in organizational environments.

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