

Contemporary Issues in Business, Management and Education 2013

Virtual teams: opportunities and challenges for e-leaders

Snellman Carita Lilian^{a*}

^a*Metropolia University of Applied Sciences, Business, Leiritie 1, Vantaa 01600, Finland*

Abstract

In the globalized world with crucial technological changes, leaders are facing unforeseen opportunities as well as challenges while striving to reach their objectives. Such changes have led to organizational restructurings and implied rethinking of leadership functions and practices. Changing organizational structures, from traditional hierarchical towards lower and more flexible ones, have made leaders organize work in new ways. Teams account for one new way of organizing work and reaching organizational goals. Likewise, globalized markets have made leaders search for new solutions to meet the needs of customers. In consequence, organizations strive for competitive advantages through downsizing, subcontracting, joint ventures, strategic alliances, and other collaborative and network-based alternatives which are typically facilitated by virtual teams. Virtual teams are geographically and organizationally dispersed teams that function over time zones. Due to such dispersion, physical contact in virtual teams is reduced or lacking altogether which means that collaboration is enabled by IT-solutions such as computer-based communication. This kind of electronically facilitated team work is known to imply opportunities as well as challenges for today's global e-leaders. Research on virtual teams suggests that organizational success greatly depends on leadership. However, it remains unclear what kind of leaders, and more specifically, which leadership skills, behaviors or practices contribute to effective virtual teams. To add knowledge on the field and fill such research gap, this article aims at exploring e-leadership and answering these questions.

© 2014 The Authors. Published by Elsevier Ltd. Open access under [CC BY-NC-ND license](https://creativecommons.org/licenses/by-nc-nd/4.0/).

Selection and peer-review under responsibility of the Contemporary Issues in Business, Management and Education conference.

Keywords: Global teams; leadership; IT; virtual teams; e-leadership.

1. Introduction

The following paper sheds light on information and communication technology, its effects on organizations and working environment in general, and on team working and leadership in a virtual setting in particular. The purpose of this paper is to add knowledge on ICT mediated virtual working arrangements, and address the challenges leaders

* Corresponding author. Tel.: +358505286696.
E-mail address: lilian.snellman@metropolia.fi

face in managing teamwork in a virtual setting. The paper builds on existing theory and research describing and discussing the findings on virtual teams and e-leadership. Based on the research literature some propositions are made. The propositions are aimed at inspiring future research on virtual teams and, specifically, on e-leadership, and at advancing further knowledge generation in the fields of ICT, and management and organization.

This paper is structured as follows: first, the background, effects and opportunities of the technological development on the economy are addressed; second, the impact of the information and communication technology on organizations, working arrangements, and leadership is described; third, central concepts emerging from the paradigm shift concerning the organization of work and leadership are presented; fourth, challenges faced by e-leaders managing globally dispersed workforces are discussed; fifth, some propositions for effective e-leaders, who may create successful virtual teams by turning leadership challenges in virtual settings into opportunities, are presented; sixth, conclusions are drawn on the basis of the discussion about leadership challenges.

Taken together, the following sections will address questions such as: How information and communication technology has affected organizations, working environment, and leadership? What are the main challenges e-leaders faces when managing virtual teams? How can e-leaders convert the challenges into opportunities in order to achieve successful virtual teams?

2. Background, effects and opportunities of technological development

In the industrial economy organizations were typically structured hierarchically and, consequently, information was filtered through hierarchical structures and formal authority (Jarvempaa & Tanriverdi, 2003), whereas in the new networked economy, power and information are hyperlinked and informal (Pulley, McCarthy, and Taylor, 2000). Inside organizations, there has been a movement from hierarchies towards flat, web-like organizations that enable better knowledge flows among business and allow spanning of organizational boundaries (Jarvempaa & Tanriverdi, 2003). The boundaries have become blurred (Jarvempaa & Tanriverdi 2003), which facilitates relationship-building inside organizations mainly through strong ties, and between different organizations through weak ties (Granowetter, 1973). Organizations no longer operate as stand-alone entities, but create networks of customers, suppliers, and partners (Jarvempaa & Tanriverdi, 2003) enabled by information and communication technologies. At a broader level, economic development, such as the deregulation of many product and service industries, have led to reformulations in organizations (Cascio & Shurygailo, 2003). The growing popularity of inter organizational alliances, and a shift from production to service-related business (Kayworth & Leidner, 2002), have changed the ways to organize and manage work. Such changes have mainly been facilitated by information and communication technologies that improve knowledge management (Jarvempaa & Tanriverdi, 2003) and dissemination of information on the global level, and have created new working methods and organizational structures increasing flexibility (Townsend, DeMarie, & Hendrickson, 1998), enhancing more effective goal-reaching and enabling organizational success in global setting.

In consequence, the exponential explosion in communication technologies has resulted in greater frequency of daily interactions with different actors (Zaccaro & Bader, 2003) who may be dispersed in different units of the same organization, in diversified geographic locations nationally or internationally, and in different time zones throughout the world. As a result, organizational work as well as leadership have become increasingly global (Zaccaro & Bader, 2003) due to spanned organizational boundaries (Jarvempaa & Tanriverdi, 2003), and web-like working environments based on the use of information and communication technology. Companies have set up new arrangements that allow work to be done via cyberspace with increasing levels of virtuality (Brunelle, 2012). As information and knowledge is diffused by modern technology, working and innovation are shifting form structures inside the organization to broader virtual knowledge networks that may reach across time and space boundaries making physical location, buildings, and distribution channels less important (Jarvempaa & Tanriverdi, 2003). Such less hierarchical organizations with blurred boundaries and more flexible working arrangements, have greatly affected leadership posing leaders unique challenges (Gallenkamp, Korsgaard, Assmann, Welpé, & Picot, 2011), which make them obtain new skills, and display specific traits, attitudes and behaviors (Eissa, Webster, & Kim, 2012) while striving for organizational success. Accordingly, the new challenges, arising mainly from the organizational and work-related changes, imply new ways to organize work between globally dispersed experts, stakeholders, organizational units, and different companies. One of new ways to organize work is the virtual team

(Lipnack & Stamps, 1997; Townsend, DeMarie, & Hendrickson, 1998), or e-team team (Cascio & Shurygailo, 2003). Typically, virtual teams function independently of organizational boundaries, geographical locations, and time zones while striving effectively to reach the team-specific goals. The globally dispersed virtual team members are primarily linked through advanced information and communications technology which helps them to provide diversified solutions to current downsized and lean organizations (Townsend, DeMarie, & Hendrickson, 1998). As a whole, in organizational environments, throughout the world there has been an increasing reliance on communication that takes place via electronic means (e.g., email, discussion boards, and satellite conferencing) rather than traditional face-to-face communication (Olson-Buchanan, Rechner, Sanchez, & Schmidtke, 2007). Such development is interpreted as a paradigm shift in organization and leadership (Purvanova & Bono, 2009). Technological changes have made it possible to manage work globally through virtual teams that enable working 24/7 as the members may be dispersed globally throughout different time zones (Trivedi & Desai, 2012). Virtual teams can make use of the best talents because work, knowledge generation, management, and innovation are no longer locally or geographically bound, and moreover, virtual teams allow flexibility as they are based on flat organizational structures without hierarchies and central authority (Jarvempaa & Tanriverdi, 2003). Team members can easily participate in different projects since some members may be experts in several teams and, consequently, hybrid forms of virtual teams, one overlaying the other, are no exceptions (Gassmann & von Zedtwitz, 2003). Consequently, virtual teams can more easily respond to the changing requirements of the environment by making use of the latest knowledge, and adaptable working arrangements, and by taking advantage of increased application of information and communication technologies.

Research indicates that leaders make a critical difference in team performance, and it seems that such findings are also applicable to virtual teams (Cascio & Shurygailo, 2003). Even though the new paradigm of work – anytime, anywhere, in real space or in cyberspace, in which employees operate remotely from each other and from managers (Cascio & Shurygailo, 2003) – appears already to be general knowledge, and even though research on traditional leadership and team management is wide and well documented, research on the influence of information and communication technology on leadership in virtual teams is relatively young (Purvanova & Bono, 2009). In consequence, there seem to be knowledge gaps regarding the challenges that the application of communication and information technologies may imply for leadership. It is also asserted that even though virtual project teams are on the rise in organizations (Purvanova & Bono, 2009) and becoming ubiquitous (Nunamaker, Reinig, & Brigg, 2009), studying an organization that operates in a virtual context will be incomplete without knowledge of how its leaders behave and interact with team members in order to guarantee an organization's success (Eissa, Fox, Webster, & Kim, 2012). Hence, there is growing need to add knowledge about how increased application of information and communication technologies impacts leaders' behavior and performance in globally dispersed integrated organizations. In addition, as the prevalent research on leadership is mainly based on leadership practiced on traditional organizational settings (Kayworth & Leidner, 2002), based on physical contact between organizational actors, the results may not be applicable to leadership practiced in virtual teams. As a whole, then, the emergence of new technological solutions, such as the Internet and the World Wide Web as a powerful and highly transparent communication standard (Gassmann & von Zedtwitz, 2003) facilitating global access to knowledge and its dispersion (Jarvempaa & Tanriverdi, 2003), and new working arrangements, generate need for further research on virtual environment in general, and leadership in such environment in particular. The new technologically mediated working arrangements require new leadership approaches that may explain how leadership is best practiced in virtual environment and what kind of leaders make virtual teams succeed. It is argued that virtual teams are more difficult to manage than traditional face-to-face teams (Nunamaker, Reinig, & Brigg, 2009). Hence, the increasing reliance on communication via electronic means in organizational settings throughout the world (Olson-Buchanan, Rechner, Sanchez, & Schmidtke, 2007), and new pressures on organizations to use global virtual teams (Montoya-Weiss, Massey, and Song, 2001) motivate further research on virtual teams in general, and on leadership in virtual setting in particular. Today, as many organizations are caught somewhere between old organizational structures from the industrial age and new web-like structures created by information technologies and indicating a transition towards virtual organizational environment, traditional assumptions about leadership and organizations must evolve (Pulley & Sessa, 2001).

On the basis of the above discussion, the following sections aim at increasing knowledge on the organization of work in virtual environment and the inherent leadership challenges.

3. Conceptual framework

As noted before, a paradigm shift in organizing work in global setting, facilitated by the implementation of new information and communication technologies, has taken place (Cascio & Shurygailo, 2003; Jarvempaa & Tanriverdi, 2003). Such paradigm shift has given rise to new concepts to better explain the changes in organizations and work arrangements, and to better describe new ways to manage and organize work in a new virtual environment.

In order to adapt to the new environmental requirements, organizations have experienced several reformulations introducing new working and leadership practices. The old hierarchical ways of organizing work have given way to lower, flat (horizontal) and downsized organizations facilitated by information and communication technology (ICT,) and by team-based working arrangements, virtual teams (Townsend, DeMarie, & Hendrickson, 1998). Such teams require a new leadership concept, e-leadership (Avolio & Kahai, 2003), was coined.

3.1. *Information and communication technology, ICT*

The rise and continuous development of information and communication technologies have facilitated the creation of new mechanisms for coordinating work and, subsequently, new collaborative organizational forms, business models and working practices. ICTs are based on collaboration and contribute to competitive advantage, innovation, and economic growth as they enable global access to individual capabilities, best skills, and core competencies (Romero & Molina, 2009). In organizational setting throughout the world, there has been an increasing reliance on information and knowledge diffusion through electronic means rather than through traditional face-to-face communication (Olson-Buchanan, Rechner, Sanchez, & Schmidtke, 2007).

Advances in ICT have provided many advantages for organizations (Raisinghani, Arora, Baylor, Brown, Coleman, & Craig, 2010). Technology-based solutions are seen to improve the expectation of business and generate personal benefits including increased efficiency, productivity, and profitability (Avolio & Kahai, 2003). Researchers have found that collaborative technologies (e.g. the Internet, the World Wide Web, Web Services, global digital networks, integrated development environment, virtual prototyping) combined with groupware, can facilitate knowledge management and information dispersion which enables shared understanding within global project teams (Raisinghani, Arora, Baylor, Brown, Coleman, & Craig, 2010). Nevertheless, it should be noted that in spite of the advantages technology provides, most information technology projects tend to face problems and risks, and great deal of such projects fail to reach all their objectives (Raisinghani, Arora, Baylor, Brown, Coleman, & Craig, 2010). As a whole, ICT seems to have generated great organizational and leadership changes providing, hence, foundations for the creation and development of global virtual teams.

3.2. *Virtual teams*

Changes in working environments have implied a tendency from individual-based work performance towards a team performance, and an increase in global teams where working methods are claimed to differ from the traditional teams because of their reliance on technology for communicating and disseminating information and knowledge (Jarvempaa & Tanriverdi, 2003). Technologies provide virtual work arrangements such as teleworking, teleconferencing, and video-conferencing (Cascio & Shurygailo, 2003) that enable effective communication and information diffusion across time and space. Due to a great or sole reliance on web-based communication and working methods in globally dispersed teams, a specific name, virtual team (Lipnack & Stamps, 1997; Townsend, DeMarie, & Hendrickson, 1998), was coined to characterize their reliance on ITC, in contrast to traditional teams, whose functions are mainly based on face-to-face interaction and communication. The most common reason for forming virtual teams is to overcome geographical or temporal separations while at the same time cutting office-space, travel and time-related costs (Cascio & Shurygailo, 2003). Additionally, virtual teams may be formed to unify functions across an organization, integrate employees as a result of mergers or acquisitions, increase working opportunities in organizations with an undesirable location, facilitate recruiting employees who have the right skills but are unwilling to move (Cascio & Shurygailo, 2003).

Even though research on traditional teams may account for some of the behaviors in virtual teams, there are several essential differences because of the strong technology-reliance in virtual teams, accentuating the need for a specific definition. Virtual team is group of people who work interdependently with a shared purpose across space, time, and organizational boundaries using technology (Lipnack & Stamps, 2000). Virtual teams can also be defined as groups of geographically and/or organizationally dispersed coworkers that are assembled using a combination of telecommunications and information technologies to accomplish an organizational task (Townsend, DeMarie, & Hendrickson, 1998) or, put simply, virtual teams can be seen as temporary, culturally diverse, geographically dispersed teams that that communicate electronically. Research highlights also the notion of virtual organization (Gassmann & von Zedtwitz 2003; Romero & Molina, 2003) and virtual project team (Raisinghani, Arora, Baylor, Brown, Coleman, & Craig, 2010). It is likely that today's global marketplace coupled with the increased costs of travel, tight schedules, and high expectations for project deliverables, will support an explosion of global virtual projects (Raisinghani, Arora, Baylor, Brown, Coleman, & Craig, 2010). It is also claimed that as virtual teamwork differs from face-to-face teamwork, new technology-based work processes are needed in order to make virtual teams succeed (Nunamaker, Reinig, & Brigg, 2009). Accordingly, it has become essential to explore how virtual teams would effectively reach planned goals within specified time limits relying mostly or totally on technologically mediated communication. It is suggested that to be effective in global setting with inherent continuous changes, virtual teams need specific leadership strategies (Jarvempaa. & Tanriverdi, 2003). For these, and several other reasons, it is crucial that research in the field explores the role of e-leadership in virtual environments.

3.3. *E-leadership*

The literature on leadership in virtual communication settings is still young (Purvanova & Bono, 2009), and e-leadership a new phenomenon of leadership (Savolainen, 2013). The extant research suggest that not enough is known about the ways technology impacts leadership (Purvanova & Bono, 2009), and there is lack of evidence on how technological communication context affects leaders behavior and, subsequently, the success of virtual teams. It is important to explore leadership in virtual setting, as leaders in such environment conduct many leadership processes through electronic channels (Zaccaro & Bader, 2003) facing new kinds of challenges.

E-leadership was coined to reflect the new working environment where human interactions are mediated by information and communication technology, and where leaders may lead entire projects form a distance (Avolio, Kahai, & Dodge, 2001). It is argued that the great transition of the global economy, with the inherent changes in organizations, require a significant adaptation on the part of the leadership (Avolio & Kahai, 2003), and a new leadership approach. Typically, hence, e-leadership is seen as a response and solution to global changes generated by the technological development. Likewise, e-leadership can be understood as a result of the technological development and of the great change in global economy. As virtual and flexible work options continue to evolve, more employers are attempting to formalize their virtual work policies and get a better grasp on how to manage virtual workforces (Leonard, 2011). As current business environment and the challenges e-leaders face differ from those in traditional leadership, e-leadership may be seen as a new and expanding context in leaders' work reflecting the new e-era to leadership (Savolainen, 2013). In the new e-era workplaces develop towards virtual contexts, characterized by technologically mediated leader-follower interactions instead of traditional ace-to-face contacts, and in such context work instructions, leadership, feedback, follow-up and training often take place in a digital format (Savolainen, 2013).

It is widely recognized that e-leadership differs from conventional way of perceiving and explaining leadership as well as form leadership practiced in traditional teams where leadership is grounded on face-to-face interactions. E-leader may lead their virtual teams without ever physically meeting their followers (Trivedi & Desai, 2012). Such leaders may lead virtual teams working in the same space but at different times, or in different spaces and time zones where most, if not all, the interactions among team members take place through electronic communication channels (Cascio & Shurygailo, 2003). In consequence, the concept of e-leadership refers to leaders who mainly communicate via information technology, and whose interaction with followers as well as the collection and dissemination of information required to support organizational work, is facilitated by information technology (Avolio & Kahai, 2003). Additionally, e-leadership can be understood as a process of social influence where

changes in attitudes, feelings, thoughts, behavior and organization are brought about with the help of advanced information and communication technology (Savolainen, 2013).

To take a critical stance to the distinctiveness of virtual teams, it is claimed that e-leadership based on the same competences as traditional leadership (Savolainen, 2013), and that the goals of leadership have not changed, whereas it is the medium for implementing the goals that is different (Trivedi & Desai, 2012). Moreover, fundamental leadership objectives related to vision, direction, motivation, inspiration, trust-creation, etc. are seen to remain the same (Trivedi & Desai, 2012).

However, the prevalent notion is that since e-leaders rely on information technology when communicating with team members and when coordinating teamwork, e-leaders meet new challenges and, subsequently, specific leadership skills and behaviors may be required for effective leading of virtual teams (Gallenkamp, Korsgaard, Assmann, Welpe, & Picot, 2011).

As virtual teams communicate via different electronically mediated communication channels, which enable asynchronous and synchronous communication as well as one-to-one and one-to-many communication (Avolio & Kahai, 2001), e-leaders are faced with diversified challenges related to communication, coordination, and knowledge diffusion. Consequently, leaders need to be able to craft communication guidelines in order to effectively transmit their intentions through technology (Eissa, Fox, Webster, & Kim 2012) implying new leadership skills such as strong social networking skills; a global, multicultural mindset, greater sensitivity towards followers' state of mind, and a 24x7 orientation (Trivedi & Desai, 2012). In consequence, e-leaders have to adapt to the requirements of virtual environment and find tools to address new challenges.

4. Leadership challenges

It is claimed that global virtual teams to some extent face similar challenges as traditional teams coupled with challenges generated by the dispersion of team members and by their great or total reliance on information technology as a communication media (Kayworth & Leidner, 2002). The application of communication media is seen to affect e-leaders' ability to convey social presence inherent to face-to-face environments, and information-rich nonverbal cues, such as facial expressions, voice inflections and gestures (Kayworth & Leidner, 2002). Hence, e-leaders face diversified challenges, but being adaptive and effective they might be able to convert these challenges into opportunities. Research has found that the main challenges are typically related to trust creation and maintenance, distance and time-related issues, and problems arising from cultural differences and diversity.

4.1. Trust

Trust has been extensively studied in virtual team environment (Jarvenpaa, Knoll, & Leidner, 1998). Mutual trust plays a key role in successful international alliances (Uber Crosse, 2002), and it is highly important in virtual teams that face uncertainty and have incomplete knowledge of all the group members (Child, 2001). Consequently, trust is seen more critical in virtual environments than in traditional team setting (Cascio & Shurygailo, 2003) being the necessary condition for successful work in virtual teams (Child, 2001). Trust is based on the belief that team members are dependable meeting the team expectations by delivering what they promise, which is seen as highly important in virtual teams as trust will be established by repeatedly setting expectations and delivering results that meet or exceed those expectations (Cascio & Shurygailo, 2003).

E-teams are typically formed for a time-limited mission or task, which may generate problems while trying to build trust within the group and develop cohesion, because such dynamics take time to develop (Zaccaro & Bader, 2003). Empirical analyses show that teams with highest levels of trust began their interactions with social messages, set clear roles for each team member, and showed positive attitudes and eagerness, enthusiasm, and an intense action orientation in all of their messages (Cascio & Shurygailo, 2003). Such results suggest that trust is created by integrating team members by positive dynamics achieved through joint efforts. Effective teams go through stages in developing high levels of cohesion and trust, and the members learn effective ways of interacting and creating jointly standard operating procedures, which facilitate trust building within the team (Zaccaro & Bader, 2003). Hence, trust is related to cohesion and further to motivation, since in virtual work settings motivation derives from the team's degree of cohesion, the amount of trust among team members, and team members' sense of being able to

meet the joint challenges (Zaccaro & Bader, 2003). Trust is fundamentally established via communication (Raisinghani, Arora, Baylor, Brown, Coleman, & Craig, 2010). In addition, trust in virtual teams is a strong motivational factor rising from team members' expectations that each member will fulfill the individual commitments, and that the members will act with good intentions and work hard on behalf of the group and, importantly, it is the responsibility of the e-leader to build trust and by doing so, increase the motivation of the team members (Zaccaro & Bader, 2003). Typically, in a global, outsourced virtual project environment, trust is predominantly facilitated by formal and informal electronic communication technology (e.g. tele-, audio-, data-, and video-conferencing) and related to coherence (Zaccaro & Bader, 2003), communication, and shared understanding, being all critical elements for virtual project success (Raisinghani, Arora, Baylor, Brown, Coleman, & Craig, 2010). Shared understanding facilitates reviewing issues and making choices between alternatives (Raisinghani, Arora, Baylor, Brown, Coleman, & Craig, 2010) and supportive interactions (Zaccaro & Bader, 2003), which finally enable effective decision-making. Trust, knowledge management, and shared understanding are antecedents to effective decision-making, whereas the lack of such dynamics may lead to process losses in globally outsourced virtual project environments (Raisinghani, Arora, Baylor, Brown, Coleman, & Craig, 2010). This kind of risks inherent to virtual teams, can be mitigated via video-conferencing, group decision support tools (e.g. electronic meeting system) and by promoting knowledge management, shared understanding, and team trust (Raisinghani, Arora, Baylor, Brown, Coleman, & Craig, 2010).

As trust is the key factor for virtual teams (Raisinghani, Arora, Baylor, Brown, Coleman, & Craig, 2010), it is essential to explore what leadership-related traits, skills, and behavioral patterns may generate and enhance trust in virtual environment. The above discussion suggests that it is mainly by their behavior or actions that e-leaders motivate team members to create trust. It seems that leaders that diminish uncertainty, enhance coherence, set expectations that commitments will be fulfilled, promote joint efforts, create positive climate and dynamics to meet joint challenges, establish standard procedures, enable creation of shared understanding for effective decision making, enhance knowledge management, increase team motivation, and above all, communicate effectively by applying information and communication technology matching the right tasks with right electronic communication channel. Such behavioral patterns are known to enhance trust as well as also decrease process losses (Raisinghani, Arora, Baylor, Brown, Coleman, & Craig, 2010)

Proposition 1. E-leaders that with their behavior and actions promote trust through setting mutual expectations, through enhancing coherence, and through inspiring and motivating team members, may improve team success and organizational value creation.

4.2. Communication

Even if the empirical literature on leadership in virtual communication setting is still young (Purvanova & Bono, 2009), great interest in exploring the effects of communication on virtual teams and e-leadership is prevalent. Seen from a wider perspective, there is a huge generic literature on how the communication process could be made more efficient and effective (Berry, 2011). Hallmarks of an effective communication include the quantity, frequency, and accuracy of information exchange (Gallenkamp, Korsgaard, Assmann, Welpel, & Picot, 2011). Communication may be understood as the process of transferring information, meaning, and understanding between two or more parties, and communication is claimed to be fundamental to getting any organizing or work done, as it provides the basic building blocks for people to collaborate, make decisions, and act to achieve organizational objectives (Berry, 2011). Communication in virtual teams differ from face-to-face communication, because in virtual teams communication is typically based on computer-mediated asynchronous information and knowledge diffusion which allows multiple themes of conversation to occur simultaneously from multiple contributors. In contrast, synchronous face-to-face communication is based on turn-taking where one team member talks at a time (Berry, 2011).

Research suggests that that face-to-face communication is superior to computer mediated communication for several reasons. First, Face-to-face communication is richer in nonverbal (i.e., visual) and paraverbal (i.e., auditory) cues. Second, face-to-face communication minimizes information loss due to the simultaneous usage of multiple communication channels. Third, face-to-face communication maximizes feelings of social presence and conversational involvement. Fourth, face-to-face communication transmits information about social standing and

social context; and finally, face-to-face communication is less physically and cognitively taxing than other communication media. (Purvanova & Bono, 2009). Additionally, communication in virtual setting may lose social or contextual information, such as member's social status or level of expertise due to the anonymity because communication occurs via electronic channels without physical contact and because there may be great dispersion and long distances between the team members (Kayworth & Leidner, 2002). Moreover, it is claimed that communication across cultures presents e-leaders with special challenges as effective communication across cultures requires sensitivity, trust-building capacity, and ability to create and maintain good relationships (Uber Crosse, 2002).

The above discussion indicates that virtual team members and, specifically, e-leaders face fundamentals challenges because of their reliance on communication and information technology. Coordinating technologically mediated communication within teams may generate problems related to misunderstandings, information diffusion, and knowledge management. As physical contact is lacking in virtual communication setting, e-leaders have to develop new communication skills for creating socializing activities and feeling of togetherness which promote inclusion of all team members. Hence, one of the key leadership challenges is to ensure that in and out-groups, which may be produced by certain employees' proximity to e-leaders, will not be formed (Cascio & Shurygailo, 2003). The main challenge for e-leaders seems to reside in their ability to inspire and motivate team members to mutual, active and continuous communication, which is known to increase cohesion and motivation, enhance trust, and finally lead to successful team performance.

Proposition 2. E-leaders that adapt their behavior and communication to the requirements of virtual team setting by motivating and inspiring globally dispersed team members to active, mutual and continuous communication through socializing activities, which are known to enhance team cohesion and feelings of togetherness, may improve team success and organizational value creation.

4.3. Distance and Time

Distance is typically considered to be one of the key challenges e-leaders face while managing dispersed employees. Distance in working relationships can be physical when produced by geography, time zone or organizational size; operational when related to team size as well as to opportunities for communication and face-to-face meetings or cultural, based on different values, prior familiarity, and status (Chris, 2010). Geographic distance and lack of overlapping work hours may impose coordination burdens on team members (Cummings, 2011) and specifically on e-leaders. Geographic dispersion of virtual team members which reduces the level of social support, prevalent in traditional face-to-face teams, challenges e-leaders to respond quickly to team requests, if they want to increase the feeling of social closeness (Zaccaro & Bader, 2003). As virtual team members communicate without physical closeness, e-leaders have to compensate the physical contact, inherent to collocated teams, by active and diversified use of information and communication technology and by supportive and motivating behavior.

Time-related challenges rise partly from the geographical distances meaning that the team members are typically working in different time zones without overlapping work hours and, consequently, the different time zones hamper simultaneous work (Cummings, 2011). Hence, e-leaders are faced with severe problems when coordinating tasks within virtual teams. While project deadlines and time schedules are seen to represent challenge and adversity for any team, it is claimed that virtual teams are especially susceptible to such stressors due to their reliance on electronic communication which increases the need to address rapidly the steadily rising issues (Zaccaro & Bader, 2003). It is maintained that time is of specific importance for virtual teams because they are typically formed for short projects with strict schedules and fixed delivery dates.

Proposition 3a. E-leaders that address the physical, operational as well as the cultural distance by reacting and responding quickly to the specific distance-related needs of the geographically dispersed team members, by enhancing feelings of closeness, and by actively applying diversified information and communication technologies, may contribute to successful virtual teams.

Proposition 3b. E-leaders who actively mitigate time-related stress, caused by strict schedules and deadlines inherent to virtual projects, who address arising issues quickly, and who effectively coordinate team members' tasks

over different time zones so that the team members' expertise, talent and competence will be fully harnessed, may improve team success and organizational value creation.

4.4. Diversity

Diversity in teams is typically manifested by such factors as national culture, geographic location, different communication practices and values. Diversity affects members' behavior and working practices and may, hence, complicate communication and identification processes and the execution of work (Burnelle, 2012). As the virtual team members may represent great diversity, e-leaders must design explicit activities to promote team building, and respond to diversified competing demands, address ambiguity of remote communication, and establish personal relationships with different team members which, in turn, require implementation of accessible, stable, and user-friendly technology (Nunamaker, Reinig, & Brigg, 2009). E-leaders may address diversity by promoting a sense of belonging; keeping virtual workers engaged (Leonard, 2011); learning how to handle with people from different cultures (Uber Crosse, 2002), promoting specific activities to enhance team-building (Nunamaker, Reinig, & Brigg, 2009), and by adapting their language and messages to team members that represent different communication traditions. Consequently, diversity seems to require specific activities and attentive behavior from e-leaders wanting to prevent conflicting situations within virtual teams. However, as diversity may also provide diversified viewpoints and varied working practices to virtual teams; effective e-leaders might be able to turn diversity-related challenges into opportunities by right leadership actions and behaviors.

Proposition 4. E-leaders who take into account and enact diversity in virtual teams by promoting team-building, responding to the specific needs of the different team members, by learning how to handle people from different cultures, and by applying right user-friendly technology to enhance closeness between the diversified team members, and above all, convert the diversity-related challenges into opportunities, may improve team success and organizational value creation.

5. Conclusion

The development of modern information and communication technology, and the subsequent organizational and leadership paradigm shift, has given rise to "wired" (Avolio & Kahai, 2003) virtual working arrangements with unforeseen opportunities on a macroeconomic, as well as organizational micro-levels. Simultaneously, however, modern information and communication technologies seem to have generated new leadership challenges, and what is more, it seems that the new technologies have not been able to resolve certain traditional organizational, leadership, and work-related problems. As a whole, then, there seems to be relevant challenges related to the application of technology in virtual settings and, consequently, an urgent need for further research in the field to explore the challenges leaders face while managing work in an ICT environment.

On the basis of the discussion about the main challenges e-leaders face some propositions are presented. It is proposed that effective e-leaders may address the challenges and even convert them into opportunities by actively adapting their behavior to new virtual settings, by adopting new skills, and by choosing the right ICT application for the right task. However, it is left for future research to show what the overall role of e-leaders in managing teams in virtual setting is, and what kind of leaders may respond to and convert the challenges into opportunities.

In conclusion, the discussion in this paper indicates that there are important knowledge gaps that wait to be filled by future research. Accordingly, research is expected to show what kind of leadership will effectively address the traditional as well as new challenges, and create successful virtual teams.

The theoretical contribution of this paper is to add knowledge on virtual teams and e-leadership through a discussion of the main challenges of e-leadership in virtual teams, and additionally, to present theoretical propositions for future research on e-leadership. As for the practical contribution, practitioners may increase their knowledge about the effects of information and communication technology on team work and help them to manage leadership challenges in virtual settings.

References

- Avolio, B. J., & Kahai, S., & Dodge G. (2001). E-Leadership: Implications for Theory, Research, and Practice. *Leadership Quarterly*, 11, 615–667. [http://dx.doi.org/10.1016/S1048-9843\(00\)00062-X](http://dx.doi.org/10.1016/S1048-9843(00)00062-X)
- Avolio, B. J., & Kahai, S. (2003). Adding the "E" to E-Leadership: How it May Impact your Leadership. *Organizational Dynamics*, 31, 325–338. [http://dx.doi.org/10.1016/S0090-2616\(02\)00133-X](http://dx.doi.org/10.1016/S0090-2616(02)00133-X)
- Berry, G. R. (2012). Enhancing Effectiveness on Virtual Teams: Understanding Why Traditional Team Skills Are Insufficient. *Journal of Business Communication*, 48, 186–206. <http://dx.doi.org/10.1177/0021943610397270>
- Brunelle, E. (2009). Do Virtual Enterprises Exist? A Proposed Analysis Model. *International Journal of e-Business Management*, 3, 20–34.
- Brunelle, E. (2012). Virtuality in Work Arrangements and Affective Organizational Commitment. *International Journal of Business and Social Science*, 3, 56–62.
- Carte, T. A., Abraham, L. C., & Becker, A. B. (2006). Emergent Leadership in Self-Managed Virtual Teams A Longitudinal Study of Concentrated and Shared Leadership Behaviors. *Group Decision and Negotiation*, 15, 323–343. <http://dx.doi.org/10.1007/s10726-006-9045-7>
- Cascio, W. F., & Shurygailo, S. (2003). E-Leadership and Virtual Teams. *Organizational Dynamics*, 31, 362–367. [http://dx.doi.org/10.1016/S0090-2616\(02\)00130-4](http://dx.doi.org/10.1016/S0090-2616(02)00130-4)
- Chhay, R. V., & Kleiner, B. H. (2013). Effective communication in virtual teams. *Industrial Management*, july/august, 27–30.
- Child, J. (2001). Trust: The fundamental bond in global collaboration. *Organizational Dynamics*, 29, 274–289. [http://dx.doi.org/10.1016/S0090-2616\(01\)00033-X](http://dx.doi.org/10.1016/S0090-2616(01)00033-X)
- Cummings, J. N. (2011). Economic and Business Dimensions Geography Is Alive and Well in Virtual Teams. *Communications of the ACM*, 54, 24–26. <http://dx.doi.org/10.1145/1978542.1978551>
- Eissa, G., Fox, C., Webster, B. D., & Kim J. (2012). A Framework for Leader Effectiveness in Virtual Teams. *Journal of Leadership, Accountability and Ethics*, 9, 11–22.
- Gallenkamp, J. V., Korsgaard, M. A., Assmann, J. J., Welpe, I., & Picot, A. O. (2011). Talk, Trust, Succeed – The Impact of Communication in Virtual Groups on Trust in Leaders and on Performance. SSRN Working Paper Series.
- Gassmann, O., & von Zedtwitz M. (2003). Trends and determinants of managing virtual R&D teams. *R&D Management*, 33, 243–262. <http://dx.doi.org/10.1111/1467-9310.00296>
- Granowetter, M. S. (1973). The strength of weak ties. *American Journal of Sociology*, 78, 1360–1380. <http://dx.doi.org/10.1086/225469>
- Hart, R. K., & McLeod, P. L. (2003). Rethinking Team Building in Geographically Dispersed Teams: One Message at a Time. *Organizational Dynamics*, 31, 325–361. [http://dx.doi.org/10.1016/S0090-2616\(02\)00131-6](http://dx.doi.org/10.1016/S0090-2616(02)00131-6)
- Jarvenpaa, S. L., Knoll, K., & Leidner, D. E. (1998). Is Anybody Out There? Antecedents of Trust in Global Virtual Teams. *Journal of Management Information Systems*, 14, 29–64.
- Jarvenpaa, S. L., & Leidner, D. E. (1999). E. Communication and trust in global virtual teams. *Organization Science*, 10, 179–815. <http://dx.doi.org/10.1287/orsc.10.6.791>
- Jarvenpaa, S. L. & Tanriverdi, H. (2003). Leading virtual Knowledge Networks. *Organizational Dynamics*, 31, 403–412. [http://dx.doi.org/10.1016/S0090-2616\(02\)00127-4](http://dx.doi.org/10.1016/S0090-2616(02)00127-4)
- Kayworth, T. R., & Leidner, D. (2002). Leadership effectiveness in global virtual teams. *Journal of Management Information Systems*, 18, 7–40.
- Konradt, U., & Hoch, J. E. (2007). A Work roles and Leadership Functions of Managers in Virtual teams. *International Journal of e-Collaboration*, 3, 16–35. <http://dx.doi.org/10.4018/jec.2007040102>
- Leonard, B. (2011). Managing Virtual Teams. *HR Magazine*, 56, 39–42.
- Lipnack, J. S., & Stamps, J. (1997) *Virtual Teams – Reaching across Space, Time, and Organizations with Technology*. New York: Wiley.
- Lipnack, J. S., & Stamps, J. (2000). *Virtual teams: People working across boundaries with technology*. New York: Wiley.
- Montoya-Weiss, M. M., Massey, A. P., & Song, M. (2001). Getting it together: Temporal coordination and conflict management in global virtual teams. *Academy of Management Journal*, 6, 1251–1262. <http://dx.doi.org/10.2307/3069399>
- Nunamaker, J. F., Reinig, B. A., & Brigg R. O. (2009). Principles for Effective Virtual Teamwork. *Communications of the acm*, 52, 113–117. <http://dx.doi.org/10.1145/1498765.1498797>
- Olson-Buchanan, J. B., Rechner, P. L., Sanchez, R. J., & Schmidtke, J. M. (2007). Utilizing virtual teams in a management principles course. *Education & Training*, 49, 408–423. <http://dx.doi.org/10.1108/00400910710762968>
- Pulley, M. L., McCarthy, J., & Taylor, S. (2000). E-leadership in the networked economy. *Leadership in Action*, 20, 1–7.
- Pulley, M. L., & Sessa, V. I. (2001). E-leadership: Tackling complex challenges. *Industrial and Commercial Training*, 33, 225–229. <http://dx.doi.org/10.1108/00197850110405379>
- Purvanova, R. K., & Bono, J. E. (2009). Transformational leadership in context: Face-to-face and virtual teams. *The Leadership Quarterly*, 20, 343–357. <http://dx.doi.org/10.1016/j.leaqua.2009.03.004>
- Raisinghani, M., Arora, A., Baylor, E., Brown, P. S., Coleman, C., & Craig, K. (2010). Virtual Project Management of Globally Outsourced IT Projects. *International Journal of Management and Information Systems*, 14, 1–7.
- Rogers, C. (2011). How do I make virtual management work? *Strategic HR Review*, 10, 44–45.
- Romero, D., & Molina, A. (2009). VO breeding environments & virtual organizations integral business process management framework. *Inf Syst Front.*, 11, 569–597. <http://dx.doi.org/10.1007/s10796-009-9195-7>
- Savolainen, T. (2013). Trust Building in e-Leadership – Important Skill for Technology-Mediated Management in the 21st Century. *International Conference on Management, Leadership & Governance: 288-XI*. Kidmore End: Academic Conferences International Limited.

- Shuffler, M. L., Wiese, C. W., Salas, E., Burk, C., & Shawn, E. (2010). Leading One Another Across Time and Space: Exploring Shared Leadership Functions in Virtual Teams. *Revista de Psicología del Trabajo y de las Organizaciones*, 26, 3–17. <http://dx.doi.org/10.5093/tr2010v26n1a1>
- Townsend, A. M., DeMarie, S. M., & Hendrickson, A. R. (1998). Virtual teams: Technology and the workplace of the future. *Academy of Management Executive*, 12, 17–29.
- Trivedi, A., & Desai, J. (2012). A Review of Literature on E-Leadership. Shri Chimanbhai Patel Institutes, Ahmedabad. Working Paper No. CPI/MBA/2012/0004.
- Uber Crosse, C. (2002). Managing Communication within Virtual intercultural Teams. *Business Communication Quarterly*, 65, 22–38. <http://dx.doi.org/10.1177/108056990206500404>
- Zaccaro, S., & Bader, P. (2003). E-Leadership and the Challenges of Leading E-Teams: Minimizing the bad and Maximizing the Good. *Organizational Dynamics*, 31, 377–387. [http://dx.doi.org/10.1016/S0090-2616\(02\)00129-8](http://dx.doi.org/10.1016/S0090-2616(02)00129-8)