MODEL FOR THE PERCEPTION OF THE SPECIFIC E-LEADERSHIP SKILLS AND FEATURES IN LEARNING MANAGEMENT SYSTEMS ENVIRONMENTS

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Abstract

This article proposes a model for understanding the specific skills and characteristics of *e-leadership* in *Learning Management Systems (LMS)*, used for implementation of virtual teams. A framework was done, to identify skills and characteristics of the *e-leaders*, based on the review of literature about the *e-leadership* paradigm and its relationship with the virtual teams. It also presents the empirical model and an explanatory table with the methodology of research and the main approaches in the study. From the characterization of skills and characteristics of *e-leadership*, we built the representation code used for the *Comprehension Skills Model*. In the end we present the conclusions which offer a few guidelines for future work.

Keywords: *e-Leadership*, *e-Teams*, *e-Leader*, Competency Model, Learning Management Systems

1 INTRODUCTION

It is common knowledge that the emerging paradigm of e-leadership arises in a context of economic global changes, which organizations and leaders have been facing during the last decade, characterized by the transformation of the business model. The survival of current organizations is directly connected to the ability to promote change and being able to adapt, evolve and not be stuck in time and space.

This new paradigm forces organizations to defy the conventional business models and leaders to adapt and expand the leadership and virtual communications (Colfax et al., 2009). Organizations and their leaders must be ready to deal with globalization and with the exponential explosion of *Information and Communication Technology* (*ICT*),

(Zaccaro & Bader, 2003), having to learn how to surpass the limitations of space and time, as well as the cultural boundaries (Kerfoot, 2010).

The virtual leaders must acquire new skills that make them able to create and maintain high performance groups, as well as being able to develop a leadership style that takes advantage of the available technologies and minimizes the face-to-face (*f2f*) environments (Colfax et al., 2009). Within this framework, Kerfoot (2010) maintains that leaders must depend on training instead of supervision.

The usage of Learning Managements Systems (*LMS*) able to adapt, readjust and personalize each project and evolve to new stages by adapting to organizational changes, represents the identification and use of a catalyser. In this learning and experience´ s promoter process involving e-leaders and e-teams, in order to maximize the abilities of e-leadership and the e-teams´ performance.

This article presents a proposal for a model to understand the specific abilities and traits of e-leadership in learning management systems environments in the process of social influence facilitated by technologies and of turning the face-to-face (*f2f*) teams into virtual teams (*e-Teams*).

Point two shows: (a) the paradigm of e-leadership; (b) characterising the term "e-leadership"; (c) presents a revision of literature done in the relational space between e-leadership and virtual teams. We approach several aspects associated to virtual teams and the way e-leaders should lead them. This point ends with the framing of the concept of *LMS* platforms as specialized tools in learning virtual training environments.

In the third point, a model of specific skills and characteristics in e-leadership is developed. The process starts with the presentation of the empiric model and the approaches to be used. Based on the representation code the Model for the Perception of the Specific e-Leadership Skills and Features was built.

We conclude with the final considerations that there is a lack of models to be used as reference to the recent paradigm of e-leadership. We suggest the presented Model as well as the *LMS* platform as an appealing solution to the development of learning in

collaborative virtual environments. The last paragraph mentions the evidence of the change in leadership focus, the appearance of collaborative tools, involving the creation of network knowledge and the need for new models capable of maintaining the technical and human support to the organizations that are potential fields for the development of further research.

2 FRAMEWORK

During the latest decade, several authors have been researching on the emergent paradigm of e-leadership. They have tried to define the concept of e-leadership inside the developed research.

However it seems that there is still a need to understand and frame the various definitions and concepts presented in the literature, in such a way that a global idea may be established that outlines what can or cannot be defined as organizational e-leadership.

The emergent paradigm of e-leadership is composed by a body of knowledge organized in three categories: e-leadership, as a form of leadership used by the e-leader in which the *"e*" means the usage of electronic means; e-teams, as work groups that use electronic means to communicate; technology, as a way of communication between the leader and the work group, through electronic means.

In this context technology becomes the common denominator as a means to establish relationships – one-to-one (1:1) and one-to-many (1:M), between leaders and the members of virtual teams, in the pursuit of leadership goals (DasGupta, 2011; Avolio & Kahai, 2003).

Recent surveys have established that e-leadership is a lot more than just the transposition from organizational leadership of face-to-face (*f2f*) environments to a perspective of virtual environments (*e-Teams*), supported by technology. What appeared to be just a change in the action field of the leader, in which it would be enough for him/her to adapt and learn, choose support platforms, train technological skills and help the virtual team to learn how to explore new technological

environments, seems ultimately to enforce complexity and a change in the behaviour of traditional leadership. That must involve the abilities of the e-leader to motivate and ensure the functioning of a collaborative virtual environment, in which the online community will be responsible to participate and share the creation of the knowledge needed to the success of projects and organizational team work.

2.1 E-Leadership

One of the first definitions of the term e-leadership is presented "to incorporate the new emerging context for examining leadership" (Avolio et al., 2000). The term e-leadership is definitely associated to the process of social influence mediated by the Advancing Information Technology (AIT) "to produce a change in attitudes, feelings, thinking, behaviour, and/or performance with individuals, groups, and/or organizations. E-leadership can occur at any hierarchical level in a organization and can involve one-to-one and one-to-many interactions within and across large units and organizations" (Avolio et al., 2000, p. 617).

According to Avolio et al. (2009, p. 439) "leading virtual involves leading people from different departments, organizations, countries, and sometimes even competitor companies". The authors define e-leadership as ways of leadership in which "individuals or groups are geographically dispersed and interactions are mediated by technology", (Avolio et al., 2009, p. 440). Weisband (2008) refers that the e-leader and the virtual teams have a higher probability of occurrence of challenges "when distributed work occurs in different time zones, when local communication and human infrastructures fail, when team members´ hardware and software platforms are different, or when local work demands require the immediate attention of collocated managers and workers, thereby creating pressure to pursue local priorities over the objectives of distant collaborators" (p. 6).

Zaccaro and Bader (2003) certify that the current organizational leaders must know how to deal with two inter-related forces: the global spread of the divisions and units, customers, stakeholders and organization suppliers; and the exponential boom of the ITC, which makes the leader able to deal with geographically dispersed teams. The authors mention that the current business leaders typically lead teams whose

members are not in the same bureau, building, but scattered all around the country or even around the world. They remind us that presently leaders and team members are in touch by telephone, fax, email, groupware tools, chat and video conference. Taking into account these changes, organizational researchers started to use the term e-leadership to refer to leadership through electronic channels. They remind us that, because of the exponential increase in technology and its global reach, in a near future e-leadership will become a routine, not an exception (Zaccaro & Bader, 2003, p. 377).

The definitions of e-leadership in this organizational context, where the style and leadership traits are approached by teams that are located in different geographically places, thus the need of the teams to be mediated by AIT, can be seen in authors such as DasGupta (2011), Jonhson (2010), Hunsaker and Hunsaker (2008), Avolio et al. (2009), Cascio and Shurrygailo (2009), Kahai and Avolio (2008), Hambley et al. (2007), McCuiston et al. (2004), Zaccaro and Bader (2003), Avolio and Kahai (2003), Zigurs (2003), Kissler (2001), Walker (2000), Avolio et al. (2000).

Some authors maintain that the objectives of leadership have not changed; they keep focusing on problems as vision, direction, motivation, inspiration, trust. However, the e-leader started feeling the need of implementing those goals electronically, in an atmosphere where he/she can mediate the virtual teams scattered both geographically and in time (DasGupta, 2011; Jonhson, 2010; Avolio & Kahai, 2003; Avolio et al., 2000).

This new leadership is definitely connected to the global economic changes and to the transformation of the organizational business model – that has been adjusting to the new realities of the global market, and time and space dimensions – only possible with the understanding of the emergence of the ICT that are the technological link in this paradigm of organizational leadership and condition sine qua non for the link, for establishing communication between e-leaders and e-teams. In this framework, the need of the virtual leaders for technical and human support systems able to sustain the team synergy is generally accepted by most authors (DasGupta, 2011; Jonhson, 2010; Avolio et al., 2009; Shriberg, 2009; Malhotra et al., 2007).

It is clear that e-leadership will force the e-leader to acquire particular skills and it is fundamental that he can identify them. It is the only way for the e-leader to realize if he/she is able to lead the virtual teams and/or if he/she needs training. Even because the "lack of the degree of fitness that people with responsibility for the management of change processes possess, represents one limitation to the possibility of designing training activities / development of these persons to enable them with the necessary skills (leadership skills)", (Faria, 2012, p.4). Increasingly the virtual leaders became to depend on training instead of "supervision" (Kerfoot, 2010, p.115; Colfax et al., 2009; Malhotra et al., 2007).

At the same time there is a need to understand the virtual teams through approaches addressed to the structure, ways of communication, multicultural and ethical issues, the building of trust between the leader and the team members, as well as the need to discuss the technological models that can sustain e-leadership and the virtual teams (Lee, 2010; Avolio et al., 2009; Shriberg, 2009; Hambley et al., 2007).

The shortage of models that might act as a reference for the new paradigm of e-leadership and help the e-leaders to maximize both their performance and the teams' they lead, is closely related to the recognition by most authors that current studies are still insufficient and further research is needed for a better understanding of the e-leadership paradigm (DasGupta, 2011; Sutanto et al., 2011; Lee, 2010; Avolio et al., 2009; Carreno, 2009; Hambley et al., 2007; Hanna, 2007; Gurr, 2004).

In recent years, with the development of emerging technologies and the emergence of collaborative learning management systems, some studies have come to light addressed for the role of social structuring of leadership relationships in virtual contexts, as collaborative communities online, that integrate collaborative tools (Dias, 2012; Sutanto et al., 2011; Luther & Bruckman, 2010). In these environments, the search and the maintenance of knowledge networks is achieved by the social and cognitive engagement of the members of the community (Dias, 2012). These studies suggest that the traditional models of leadership should be rethought and that a new form of leadership – team leadership - emerges from the network of motivated people, who can share and participate in the definition of the paths to follow, face the

challenges, and take on commitments. Pulley and Sessa (2001). These models, able to sustain and focused on social collaborative dynamics, are revealed by their characteristics of promoting the creativity and innovation in collaborative innovation networks, build and share knowledge in a network (Dias, 2012) but also with the ability to quickly adapt to the constant change and organizational complexity (Sutanto et al., 2011; Jonhson, 2010; Luther & Bruckman, 2010; Malhotra et al., 2007).

2.2 E-Leadership versus Virtual Team (e-Team)

In this section we show the revision of literature made in favour of the relation between e-leadership and the technological component, as well as the other aspects connected to the virtual teams and the leadership functions and behaviour, the models and environments in e-leadership contexts, to leadership styles and relationships with the virtual teams, to the relationship and need for a reinforcement in the relations amid the members of the virtual teams, and others.

Zaccaro and Bader (2003) agree that the functions of a virtual leader are three: the need of an effective connection of the leader to the virtual team; the definition of a vision, a way, a direction that guarantees that all actions have a defined purpose, according to the general goals of the team; and the leader's function as an operational coordinator.

The three functions of the virtual leader are embedded in a virtual environment where the richness of information available in the face-to-face teams does not exist (Brake, 2006). This means that virtual teams must learn how to work and communicate through a set of virtual tools, with which it is harder to keep and implement the trust in the members of the virtual team. Zaccaro and Bader suggest a model to implement trust in the members of the virtual team in three phases (Samartinho et al., 2012): the first one is the building of trust; the second is trust based on knowledge; the third one is establishing identity trust. This 3rd phase is just a deeper way of trust that develops when the members of the team share the same values, goals and intentions. The latest level of trust cannot be achieved in a short period but, when it is reached, it promotes the unity of the team concerning the perception and future orientation

(Zaccaro & Bader, 2003). Latest research estimates that this kind of trust may not be possible in a short time – 3 to 9 months – (Oertig & Buergi, 2006).

Hambley et al. (2007, pp. 14-19) developed a study to determine the behaviours of leadership in virtual teams and final results showed five main behaviours strictly connected to the characteristics of transactional leadership. The transactional leaders are defined as leaders who inspire their followers, motivating them to the completion of goals, clearly identifying the roles those followers perform in the leadership vision, (Lee, 2010, p. 446).

Lee (2010) refers that in the current business environment the virtual teams are increasing and becoming more and more usual. The author highlights the importance of understanding the appropriate leadership styles for the project of virtual teams and that the transition for the new leadership styles plays an important role in the success of HR (Human Resources) management and virtual projects management. He states that the emergent functions of leadership and management concepts of virtual teams include several leadership models and their usage is fundamental to the evolution of organizational behaviour in virtual environment. The author states that "In a virtual project environment, the effective manager needs to use as many different styles as needed to bring the project to a successful completion" (Lee, 2010, pp. 445-446).

Kerfoot (2010) tells us that virtual leadership, besides being different from the physical leadership, is characterized by the management of distributed work teams, in which the members of the team communicate and coordinate their work mainly by electronic means. The virtual leaders must lead the relational boundaries as well as focus on the environment interface. In the author's research focused on the Health sector it is proved that traditional leadership is being replaced by virtual leadership, as technologies allow for new models of communication in the Health sector. He reinforces that it is a demand for the virtual leaders to know how to surpass both the dimensions of time and space and the cultural boundaries. Thus, the virtual leaders need to obtain new skills to create and maintain high performance virtual teams. In this context, the e-leader will depend on training instead of supervision (p. 115).

McCuiston et al. (2004) identifies five components needed to an effective leadership of virtual groups when in multicultural environments: knowledge and sensibility on the part of the e-leader; ability to identify and make available resources that may strengthen and improve the quality of life of the team members; ability to openly communicate with the members of the virtual team about cultural differences; ability to develop and implement strategies that allow the leader in particular and the team in general to act as change agents in order to maximize the benefits of a multicultural workforce; ability to manage their private/ familiar lives with the demands of managing a virtual team.

Colfax et al. (2009) maintain that the virtual teams are a need in global and regional businesses thus a new style of management is needed to addresses the virtual approaches and management. They agree that current leadership styles do not go well with the new global businesses and state that present leaders have to change their own approaches to keep up with the global changes and promote green and efficient practices (p. 134).

Shriberg (2009) refers that, in the beginning, virtual leadership was associated to international groups but today it is crucial in almost all business models that aim at evolving and growing apart from their dimension. He also mentions that nowadays, companies do not need to have offices in other towns or countries to leverage the management and virtual teams. Thus he believes that virtual leaders need to build technical support systems to sustain the synergies of the virtual team and that the making of support and teamwork promotion tools is also needed. So that collaboration among its members may exist. In the author's opinion, to lead a team whose members are located in different countries, with different time zones and speaking different languages is a very complex task.

Purvanova and Bono (2009) analysed the transformational leadership in a context of virtual and traditional *f2f* (face-to-face) teams. The analysis of 39 leaders showed identical average levels in transformational leadership in both teams. However, the most effective leaders were those who increased their leadership styles concerning the transformational component in virtual teams. It was also shown that, in

transformational leadership environments, the virtual teams had a better performance comparing to f2f teams. The results concerning the levels of satisfaction with the project felt by the teams showed that the virtual teams were more satisfied at work and appreciated the transformational leader better. Therefore, the authors concluded that transformational leadership is more strongly felt in virtual teams, who only communicate by means of computers and that the leaders improved their leadership transformational styles throughout the project achieving higher levels of team performance.

Sutanto et al. (2011) refer in their research *"Emergent Leadership in Virtual Collaborating Settings"* that in the studies of Avolio et al. (2009), Cascio and Shurygailo (2009), Hertel et al. (2005), Kahai and Avolio (2008), where as they did a completely new empirical study in which they directly examined the role of social structuring of leadership relations in virtual contexts, in the particular case of social tools mediated by collaborative configurations (Sutanto et al., 2011, pp. 14-15), there was a research approach the style and leadership traits. The authors refer that the study provides the managers with some practical implications on effective leaders' practices in exploring the collaborative social tools, quoting (Malhotra et al., 2007). The first implication is that the mapping of social networks and perceptions of leadership in collaborative virtual environments may be useful as a diagnosis tool to be used in MNCs (multinational corporations), a challenge linked to planning, implementation and performing specific tasks that demand the participation and know-how of workers physically separated; the second implication concerns the management of dynamic teams in complex environments. Most organizational work is structured around projects with workgroups in permanent mutation; the groups either integrate or disintegrate elements to better face the specific requirements and the contingencies of each project, (Sutanto et al., 2011, pp. 14-15). Thus this research contributes in the author´s opinions to the understanding of how an emergent leader in social software systems should behave and promote an effective virtual collaboration in the team.

Studies associated to online communities and their leadership have also been carried out by Luther and Bruckman (2010). These authors studied how creativity was managed in collaborative innovation networks, in the concept of virtual teams. The

study was done outside the organizational context and amateur collaborative networks were used in a non-commercial context; the intention was to find an interpretative perspective that would help understand the phenomenon. In this study an online community of *Flash* programmers collaborated by building animations and games on the Internet. The research was focused on collaborative social dynamics, mainly on the role of leadership / e-leadership (Luther & Bruckman, 2010).

Dias (2012) writes on team leadership (shared leadership), on the importance of strengthening the relationship one-to-one (1:1) and one-to-many (1:M) when the territorial marker is lost (when you leave a physical space and enter and act in cyberspace) and also about the way knowledge can be built by approaching the fields of evaluation, knowledge and leadership in online communities (video-conference "learning evaluation in online communities", presented before a class of master degree students in e-learning teaching regime). It looks clear, and equally adapted to the characteristics necessary to new models of leadership mediated by ICT, the fact that, when working in online communities, it must be understood that this process implied concepts of networking, participation and sharing. It is the union of these concepts that permits the development of a sense of sharing or interaction that reveals the knowledge of a team thus generating an identity bond of a sequence of events that make the team's identity. Dias (2012) points out that the sense of sharing builds a community and typifies what he labels as *"social and cognitive emersion of the members of that community"* expressing the ability of the community members to search for information and feed their own knowledge networks. The author reminds us that "Learning is crucial in a social process", (as cited by Brown & Dugrid, 2010) and it is social as it involves the team members in the making of learning (Dias, 2012, 6´35´´). He also notes that "Team leadership (…) is not built by the teacher or the tutor only, or somebody else. No! Leadership is built by the mediator but every so often we should perceive that the mediator is the one who better makes use of speech and manages the creation, that is, defines the process in that moment." (Dias, 2012, 43´25´´).

2.3 The Learning Management System Platforms as Specialized Tools for Training and Virtual Learning Environments in the Relation e-Leadership versus Virtual Team

The implementation of the LMS platform to gauge the proposed model of skills and characteristics of e-leadership is "*per se*" justified and validated by the need to ensure the framework of aspects related to e-leadership and virtual teams. A reliable structure is expected to be ensured where projects common to virtual team members can be shared and developed in virtual spaces (it must be noted that, in our view, a virtual team is the one that interacts, shares and creates knowledge, develops team relationships in collaborative virtual environments, being or not "physically delocalized"). Simultaneously a virtual team must ensure spaces and models of training in a Lifelong Learning context that prepare the members of virtual teams to explore and potentiate the *LMS* Platform for projects they will be (or already are) involved in.

We have chosen a platform that would permit the adjustment of its configurations and /or revision of activities, resources or additional applications that might better suit the characteristics of each organization and its business model. Obtaining a platform of reduced costs was a critical factor and a limitation too, as it meant the choice of a Learning Management Systems platform "*Open source and freeware".*

Given the circumstances proposed at the beginning of the process to not condition its development by lack of funding and being aware that there had been strong constraints to maintain a technical support team that could guarantee its reliability and operability, we chose a Learning Management Systems platform that would comply with the previously defined specifications.

These platforms are "within the category Virtual Learning Environments, there is a specific category of applications called Learning Management Systems. This environment category has a set of features designed to store, distribute and manage learning content, in a progressive and interactive, and can also record and report activities of the learner as well as its performance. The educational strategy aims implicit support for two or more subjects build their knowledge through discussion, reflection and decision making, and where computing resources act as mediators in the process of teaching and learning." (in Wikipedia, http://pt.wikipedia.org/).

We adopted the MOODLE platform (www.moodle.org), because it corresponds to the characteristics considered *facilitators* and appropriate to the model to be tested and

measured. MOODLE is an acronym for *Modular Object-oriented Dynamics Learning Environment* and it is a software freeware and open source, with the features of a customizable collaborative Learning Management System.

It is worth noting that, considering the easy adjustment of LMS to projects developed in collaborative virtual environments – together with the availability of the technical support team and server – the examples presented in this article were developed in a customized case of platform LMS named *e-raízes.redes* (www.eraizes.ipsantarem.pt), which is the Santarem Polytechnic Institute e-learning platform.

It is also worth mentioning that, according to *Wikipedia – the free encyclopaedia*, the main advantages and benefits resulting from the study of the functionalities of a LMS are: the decrease in training costs; the availability any time and any place; the increase in the skills of employees; the decrease in staff costs; the possibility to manage the learning tools together with the human resources´ goals to be achieved.

3 THE MODEL FOR THE PERCEPTION OF E-LEADERSHIP SKILLS AND CHARACTERISTICS

The Model for the Perception of e-Leadership Skills and Characteristics (figure 2) was built based on an empiric study that supports the options resulting from the interpretation of documental research using heuristic methods, in a subjective/argumentative approach and verified through testing. In the first phase of the study the table containing the representative model forces and its description was obtained (table 1 and annex 1).

The verification of the model was reached from the interpretation and understanding of each type of skills and characteristics in e-leadership, identified in the first phase of the study and from which the construction of the model itself was achieved (figure 2). The model was verified by experimenting with two master classes of the Santarem school of Management and Technology.

The empirical model of this study is shown in the following section with the table explaining the methodology used and approaches used. The procedure of development of the proposed model is shown in 3.2 and 3.3.

3.1 Methodology

The methodology of investigation used, in our view, is possible to be framed in studies like these. However, this methodology can be the target of debate, as it is in permanent evolution within the scientific community (Gable, 1994; Stolen, 1993).

However, and taking into consideration the goals of the project and the environment in which it was been developed, various simultaneous and articulate approaches were used. The chosen methods are classified as scientific approaches considering their nature, as one of them is of interpretative nature (subjective/ argumentative) (Myers, 1997; Galliers, 1992).

This way a documental research was done, based on bibliographic revision, later on "*aligned*" in a perspective of experimental research, for the consolidation of the proposed model. The approach subjective/ argumentative was also used, based on the opinion and supposition of the observer/researcher (Vogel & Wetherbe, 1984), by means of the observations done. It is our intention to produce new ideas and perspectives that can be used in the development of theories that may be validated by other methods.

Thus, the study followed three main approaches (figure 1). The documental research and the subjective /argumentative were used to do the tasks of theoretical and bibliographic revisions, as well as in the definition of the items of the model skills and characteristics. As for conceptual framing, analysis and design of the model, a subjective/argumentative approach was used that was framed in the exploratory nature of the study, besides having tested the model by experimentation.

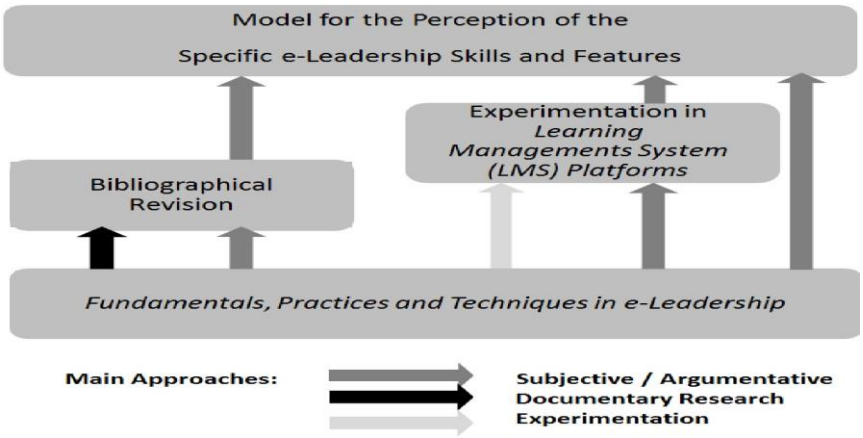

Figure 1 - Figure explaining the methodology of research taking into account the operational goals of the project and the environment into which it is to be developed.

3.2 Description of the Skills and Characteristics Identified versus the Representation Code in the Model

The skills and characteristics in e-leadership were sought, firstly, from the bibliographic revision that permitted the identification of important aspects of the leadership process in work teams in collaborative virtual environments. A set of abilities and characteristics were identified associated to e-leadership, e-leader and e-teams. Each identification was given a code. We can verify the identification of 23 (twenty-three) items numbered from Id1 to Id23 (annex 1).

To represent the model it was advisable to transpose the skills and characteristics identified to a set of representative and interpretable forces. So, we opted to build what can be called "Representation codes in the model" of these skills and characteristics. This record made the construction of a table of representation codes possible (table 1) with their identification, description and an observation column.

The conditions to complete the representation of the model based on the triangular approach of the e-leader aptitudes to lead virtual teams in collaborative environments supported by LMS platforms was thus created.

Table 1 - Code for the representation of skills and characteristics of e-leaders/ e-teams in the Model for the skills and characteristics in e-leadership.

Cod. Mod. Rep.	Description of the representation code in the model (Cod. Mod. Rep.)	Observations
[FOR1]	Environment Control	Global dispersal of divisions and units, customers, stakeholders, organization suppliers.

[FOR2]	Evolution/Change	Exponential explosion of ICT.
[COM3]	Communication/Reliable infrastructures	Crashes in local communication and structures usage of different hardware and software by the team members.
[CTR4]	Team control/Local managers	Local jobs demand immediate attention by managers and local workers.
[REL5]	Relationships 1:M, M:M/Trust	Relationships 1:1 and 1:M between *e-leader* and e-team members*;* build trust between *e-leader* and e-team members.
[REL6]	Relationships 1:M/Trust among e-team members	Relationships 1:M between e-team members*;* build trust among e-team members
[COM7]	Communication/Services 24x7/Green Era	Ability to communicate in real time; ability to improve customer supply; possibility of cost decrease 24x7 (green era).
[FOR8]	Multifunctional teams creation	Opportunity to improve the organizational performance by creating multifunctional teams.
[GES9]	Shared knowledge management	Ability to better manage shared knowledge.
[MOT10]	Digital enthusiasm/Motivation	Effective communicating by electronic means by transmitting digital enthusiasm; building trust with someone you may not know physically; creation of reliable alternatives of electronic means and tools; inspiring and promoting remote motivation; Managing virtual teams; accompanying and monitoring the team social component by making their presence felt in virtual environment; technical ability not to influence the performance of 24x7 balance.
[CPT11]	Skills and leadership	Writing skills; social skills; global and multicultural mentality; higher awareness concerning team motivation; ability to lead the model based on 24x7; *Follow-The-Sun* approach.
[CPT12]	Digital abilities	Environment interface; go beyond time and space dimensions; get new abilities to build and maintain high performance virtual teams; innovation.
[SI/TI13]	Technological infrastructure and architecture	Adapt to change; depend on training and organizational vision; architectures should rule the technological infrastructures; management solutions, appropriate to the business model.
[CPT14]	Further abilities (Global leader)	Further abilities linked to the complexity that e-leaders should get; based on the concept that not all leadership roles are connected with complexity; these abilities go beyond the basic functions virtual leaders are demanded to possess (Zigurs 2003) in the change of leadership roles whenever virtual environments are used that imply a change in group dynamics.
[GES15]	Management of dynamic groups in complex environments	When building the e-teams, the e-leader must guarantee the development of articulate and functional works units in which team member should acquire self- management abilities; this is done through the development of a team guideline including motivational factors; the e-leader must be able to listen to what cannot be seen, namely team awareness, its mission, its strong and weak points and group dynamics. Thus the dynamics through the development of team awareness..
[EST16]	Leadership style	In a virtual project environment the *e-leader* may have to apply as many different styles as those needed to a successful outcome.
[CUL17]	Multicultural environments	Achieved the necessary synchronization to build up virtual teams geographically, culturally and technically diverse demands the leader's ability to prioritize and acquire new skills.
[SAT18]	Human technical support/Tools building	Human technical systems to support the virtual team's synergies; support tools building and promotion of team work so that collaboration among the *e-teams* members may exist.
[TRN19]	Training (e-leader, e-team/ technical support teams)	Lifelong learning; virtual teams insertion; development, management and study of the tools; achieve the necessary synchronization to build up virtual teams geographically, culturally and technically diverse demands the leader's ability to prioritize and acquire new skills, many of these through training. .

Our next step is then to present the Model of perception of skills and characteristics of e-leadership.

3.3 The Model for Specific Abilities and Characteristics in e-Leadership

The model for specific abilities and characteristics in e-leadership is grounded in the paradigm of e-leadership and its triangular representation expresses the relation amid

the e-leader(s), virtual team(s) and ICT. The central part of the model shows the collaborative virtual environment applied to the usage of tools such as LMS platforms.

The model aims at helping to understand and interpret the surrounding environment and the method and relations to promote a higher performance of the workgroups in collaborative virtual environments. It also aims at being a guideline for the performance of a successful leadership in these virtual environments.

The description of its three construction phases is as follows. The first phase is composed by documental research that allowed the identification in the bibliography of the characteristics and skills, the functions and abilities, the models and leadership styles, the environments and the technologies, the cultures and the personal and social relations linked to e-leaders and virtual teams. From this documental research, a set of items identified and described was obtained.

In the second phase we used the subjective/argumentative approach, that allowed the checking of the items obtained in the previous phase, in order to get a "*Representation of the skills and characteristics of e-leaders/e-teams"* to be shown in the "Model for skills and characteristics in e-leadership". This representation was described in the point 3.2 and resulted in table 1.

The third phase of the study, developed to adjust and strengthen the model, was based on a mix of approaches (testing, subjective/argumentative) in which the experiments helped to consolidate, understand and align some aspects related to the *Codes for the representation of the abilities* and how, in practice, they can influence positively or negatively the virtual teams.

At the end of this third phase, we obtained an always evolving version of the model proposal (figure 2).

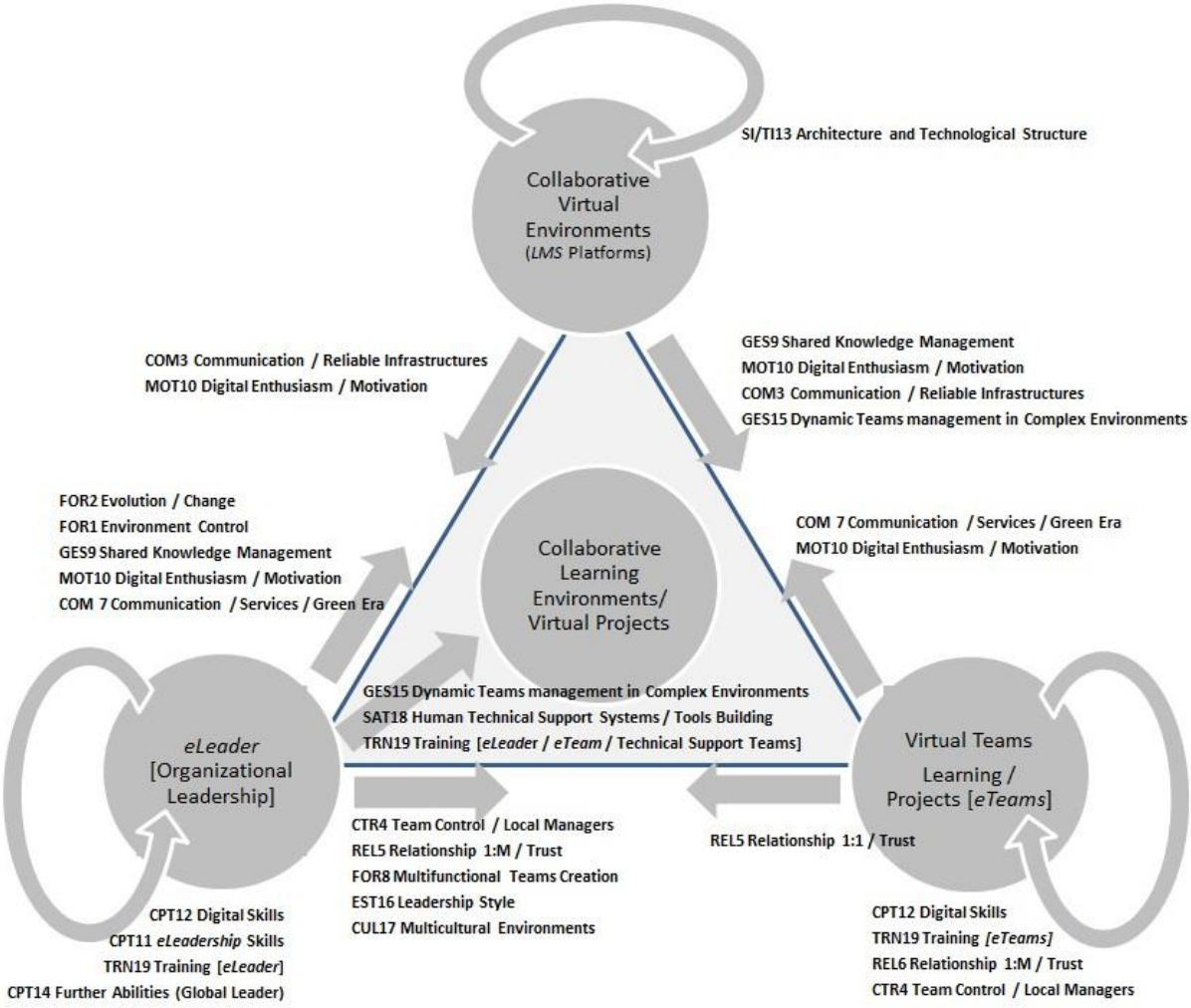

Figure 2. Model for Specific Skills and Characteristics in e-Leadership.

3.4 Interpretation of the Model Results

The reading and usage of the *model for specific abilities and characteristics in e-leadership* must consider its suitability to the model of organizational business (SI/TI13) (figure 2 and table 1).

This means that each organization has specific particularities and that the creation of collaborative learning environments / virtual projects (the core feature of the proposed model) must always be assessed considering:

- The availability of means and resources the organization possesses to train the virtual teams. (GES15, TRN19, CPT12, FOR8; figure 2 and table 1, lines 4,8,12, 15 and 19);

- The quality and reliability of communications and technical components (SAT18,COM3; figure 2 and table 1, lines 3, 18);

- The human resources available, mainly technical teams, to ensure the operability of online environments and the development of suitable tools (FOR1, FOR2,COM7; figure 2 and table 1, lines 1, 2 and 7);

- The commitment of the top managers to report the feasibility of the project to make the building of virtual teams possible (for projects or for training /lifelong learning) and the establishment of relationships that may encourage the management and sharing of knowledge (REL5,REL6, GES9, MOT10; figure 2 and table 1, lines 5, 6, 9 and 10).

It is the job of the e-leader to assess those means and ensure their training in order to acquire the skills needed to those leadership environments, that may even be a shared leadership (CPT11, CPT14, CTR4;GES15, EST16, CUL17; figure 2 and table 1, lines 4, 11, 14, 15, 16 and 17).

Section 3.5 presents some aspects, considered relevant, related to the study of collaborative virtual environments, identified in the study during its 3rd phase.

3.5. The Experiments to test the Model

The testing process was developed in two phases, in two curricular units of the 2nd cycle courses at Santarem Polytechnic Institute – ESGTS through the *e-raízes.redes* platform.

The first phase was carried out during the academic year of 2011/2012, 2nd year, 1st term, in the CU e-learning Exploratory Techniques, Master degree in Information Systems for Management (1st ed.).The master's class had 7 students – 5 males and 2 females. They were all working students and they attended classes in the evening (Fridays from 6.30 p.m. onwards and Saturdays).

The second phase happened during the academic year 2012/2013, 2nd year, 1st term, in the CU Information Systems for Public Management, Master degree in Public Management (2nd edition). The master's class had 16 students – 8 males and 8

females. They were all working students and they attended classes in the evening - Wednesdays and Fridays from 6.30 p.m. onwards and Saturdays.

It is also worth mentioning the fact that we involved students and teachers in *e-learning* context or *blended-learning*, which actually does not change the aspects observed when applied in organizational situations. This is also the conviction of a number of authors who state that the e-leadership situations in collaborative virtual environments happen both in organizational context and in educational environments, and others.

The proposed model is, as any organizational system, in permanent development considering the evolution of technologies in order to face the new demands of the market caused by the promotion of change. It is this change that helps us to recognize that collaborative virtual environments are a consequence of globalization.

4 FINAL CONSIDERATIONS

The emerging paradigm of e-leadership has been growing hand in hand with the ongoing and complex organisational changes in a globalized context. It emerges from a recursive relationship with the technology, which *per se* proves to be ingrained in an evolutionary, interactive and permanent development cycle.

The e-leader guarantees the purposes of the traditional leadership still focusing on vision, direction, motivation, inspiration and trust issues, but he will have to implement these electronically in a virtual environment. For that, the e-leader will need a system able to support the virtual environment as well as enhance the team's synergies. In this structure, the e-leader needs to identify specific skills so that he may acquire them through training. At the same time, the e-leader must be ready to understand the virtual teams, by means of approaches addressed to the structure, learn how to communicate, deal with multicultural end ethical issues, raise trust with the team members, and be able to choose the technological model(s) that best supports e-leadership and the virtual teams. Yet, there is a shortage of models that could be the reference for the new e-leadership paradigm and that would help the e-

leaders to maximize their performance, as well as the performance of the teams they lead.

Currently, the usage of Learning Management Systems (LMS) can be a very appealing solution to the development of learning/training in collaborative virtual environments or to the development of projects with virtual teams.

In recent years, with the evolution and development of emerging technology and more advanced collaborative learning systems, a new team of researchers has appeared who see e-leadership in a perspective of sharing, based on the role of social structuring of leadership relations in virtual communities collaborative contexts. This new thinking suggests that the traditional leadership models must be reconsidered and that the future models must be focused on the collaborative social dynamics that better promote creativity and innovation in collaborative innovation networks, build and share network knowledge.

The *Model for the perception of the specific e-leadership skills and features in Learning Management Systems environments* proposed may act as a guidance and alignment tool between the desirable conditions for the development of collaborative virtual environments and the conditions we may get through the limited resources of organizations (both human and technical). Actually, the e-leader must consider the available resources and identify, from the Model, which skills, what type of training, what the commitment level is and what the technological limitations are. From all of these, he can build a project plan that may certify a healthy evolution of the virtual environment and his work teams. Though the model may be a tool to support the planning and management of the collaborative virtual environment and may help the e-leader to identify and know his teams' needs in acquiring skills, the Model *per se* is not a solution for the limitations and lack of conditions in an organization. This means the choice of acceptable solutions and adequate to the trade-off concept, always present, turning the contingency into more than just a limitation…an opportunity to innovate, to obtain skills to be ready for the future and for the creation of knowledge in collaborative learning models online.

Finally, it is important to refer that in the current globalization context, where the organizations face the reality of the change of business model and the exponential growth of technologies, there is a positive environment to the evolution of the paradigm of e-leadership. The change of the traditional leadership focus on collaborative environments in online communities, the appearance of collaborative tools to enhance the creation of network knowledge, the need to build models able to provide technical and human support to the organizations, are some of areas to evolve and intervene in the future, linked to e-leadership. The leader, the *e-leader,* will play a crucial role by pursuing new ways and ensuring the success of the organization in an ever-changing world.

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Annex 1

Table 1.1. Skills and characteristics of e-leaders / virtual teams and their identification in the representation code in the Model for skills and characteristics of e-leadership with Reference to authors

Id ability or characteristic e-leader / e-teams	Description	Further observations	Id skills or characteristic versus representation code In the model	Authors
Id1 inter-related forces: global dispersal and exponential explosion of technologies	. Global dispersal of the divisions and units, customers, stakeholders, organization suppliers	The two inter-related forces the organisational leaders currently have to deal with	**Characteristic forces (FOR1 and FOR 2)**	Zaccaro and Bader (2003)
Id2 Occurrence of challenges: e-leader and virtual teams	-Work distribution happens in different time zones -Failures in local communication and infrastructures -Usage of different platforms of hard and software by team members -local work demands immediate attention by managers and local workers	. Checking these issues promotes a higher probability of occurrence of challenges	**Getting abilities (COM 3, CTR 5, CPT 12, SI/TI 13)**	Weistand (2008)
1d3 develop relationships: e-leader and virtual teams	Relationships 1.1 and 1:M between e-leader and e-team members Build trust between e-leader and e-team members	The success of the e-leader depends on his ability to build relationships and trust with his e-team	**e-leader skills (REL 5 and REL 6)**	Avolio and Kahai (2003)
1d4 Opportunities of e-leadership	- real time ability to communicate: -ability to use talents that are physically in another place -opportunity to improve the organizational performance with the creation of multitask teams -ability to provide better services to customer 24x7 -Possibility of costs reduction (green era) -ability to better manage knowledge (shared)	e-leadership as the expression of implementation of the leadership goals by electronic means mediated by teams scattered in time and space	**e-leadership opportunities (COM 7, FOR 8, GES 9)**	DasGupta (2011)
Id5 New challenges for the e-leader	Effectively communicate by electronic means transmitting digital enthusiasm Build trust with someone who you may not physically know Create physical alternatives of electronic means (choice of means and tools) Inspire and promote distance motivation Manage and lead virtual teams Follow and monitor the social component of the group by making its presence felt in the virtual environment Technical skill to not affect the performance and the balance 24x7	E-leadership means new challenges for the e-leader	*e-leader* challenges **[MOT 10]**	DasGupta (2011)
Id6 get new skills: e-leaders	Writing skills; social relationships skills Global and multicultural mentality; higher sensibility concerning group or team motivation Model orientation skills based on 24x7 – approach suggested *Follow-the-sun*	To succeed E-leaders must get new skills, and abilities, very important and needed in virtual environments	**E-leader skills (CPT 11)**	DasGupta (2011)
Id7 the three functions of the e-leader	The leader needs to effectively connect to the virtual team: the leader must watch and interpret the e-team and the environment events – global environment Define a vision, a way: he must ensure that all actions have a specific purpose in connection with the general goals of the e-team The leader must know how to perform his job as an operations coordinator: the leader must be a facilitator and creator of motivation and ensure the abilities of the team members towards the effort of completion of the tasks, thus diminishing the losses of the process	These three functions of the e-leader are inside a virtual environment where the richness of information available in the face-to-face teams does not exist (Brake 2006); this means that the e-teams must learn how to work and communicate through a set of virtual tools where it is a lot harder and complex to implement and maintain the trust in the e-team members	**Functions of the e-leader (FOR1, FOR2, GES9; CTP11)**	Zaccaro and Bader (2003)
Id8 Three phases model to build trust in the e-team members	Phase 1 – Building trust when organizing the e-team; the e-team members will recognize that working together is beneficial to reach the organizational goals Phase 2 – trust based on knowledge Phase 3 – Establishing identity trust (This phase, this level, is not attainable in the short term. It is estimated that periods from 3 to 9 months[Oertig and Buergi 2006]) are needed	-The recognition by the group members creates synergies that facilitate and allow the e-team members to get to know each other and strengthen the bonds among themselves -Trust based on knowledge gets deeper as the team members get to know each other better and are able to preview actions or behaviours amid them Identity trust is the strongest trust that develops when the team members start sharing the same values, goals and intentions.	Model **[MOD 3F]**	Zaccaro and Bader (2003)
Id9 the five main behaviours of e-leaders in virtual environments of transactional leadership	Ability to transmit, clearly and objectively, the function to be performed by the team member Ability to work together with the team Ability to build relationships inside the team – e-leader relationship abilities; Ability to lead successful meetings with his team Ability to manage the project	Behaviour strictly related with transactional leadership characteristics Where you can identify the transactional leader as the one who inspires his followers to work, motivating them to achieve the goals, clearly identifying the roles they perform and framing their goals with his vision (Lee 2010)	*e.leaders´* skills **[FOR 1, COM 3, REL 5, REL 6, COM 7, FOR 8, GES 9, CTP 11]**	Hamblet *et al.(* 2007)
Id10 Functions of the *e-leader*	Manage relational boundaries Focus on the interface with the environment Go beyond the time and space dimensions Go past cultural boundaries Get new abilities to create and maintain high performance virtual teams	Given this framework, the e.-leader must depend on training instead of supervision	Functions of the *e-leader* **[FOR 1, FOR 2, COM 3, REL 5, REL 6, COM 7, FOR 8, GES 9, MOT 10, CTP 11, CTP 12, SI/TI 13]**	Kerfoot (2010)

Table 1.2. Skills and abilities of e-leaders / virtual teams and their identification in the representation code in the Model for skills and characteristics of e-leadership with reference to authors (continuation of Table 1.1)

Id skill or characteristics e-leader / e-teams	Description	Further observations	Id skill or characteristic versus Representation Code in the Model	Authors
Id1 Skills that must characterize the efficient leaders in virtual leadership environments	Ability to communicate in an effective way, which is the leaders' crucial ability namely of those who use communication through technology (Linknow 2008) Communication frequency, including a quick answer to questions and problems put by the e-team members, as well as the quick disclosure of information , ensuring this is received and understood (Avolio and Kahai 2003) Promote the vision and general goals of the team in a clear way and establish individual goals and objectives ensuring their understanding - e-leader's ability to hear what cannot be seen, namely the team's consciousness, its global mission, its strong and weak points, group dynamics [Hunsaker and Hunsaker 2008]; -The need to raise team's awareness, crucial to the group's synergy[Hunsaker e Hunsaker 2008], so the e-leaders must be able to carefully assess the group dynamics and do the necessary adjustments, based on observation and regular assessment of the group's dynamics -E-leader's ability to use the available technology, is also a condition for an effective communication (Zigurs 2003) and it is implicit *"educate and train"* the virtual team on the appropriate usage of those tools. The e-leader must decide what tools best suit the development and communication of the virtual team in order to enhance its performance .E-leader's personal traits and his ability to build trust in the virtual team, An open mind is thus necessary, as well as flexibility, interest, sensibility to deal with multiculturalism, ability to deal with complexity, an optimistic attitude, honesty and energy[Kramer 2005]. The e-leader must also be able to learn how to deal with logistic complexity, with inter-organizational coordination, with the coordination inside the organization in multicultural environments and/or located in different countries	Skills and Basic functions demanded to the virtual leaders [Zigurs 2003) in the change of leadership roles when you use technological environments that comprise change in the group dynamics.	*e-leaders* skills **Basic functions of the e-leaders[CPT 14]**	Johnson (2010)
Id12 Further skills a global e-leader must also get connected to the complexity of global environments	-Global leaders must have an open and flexible mind to listen to new ideas, work different configurations with different people, etc. -E-leaders must show an interest and sensibility towards new cultures, as the healthy curiosity about people and their cultures and lives creates empathy and fosters good relationships Global e-leaders must be able to deal with complexity, for they must be prepared to take decisions involving multiple variables and ambiguity, in ever changing environments and constant evolution -The global leaders must be resilient, ingenious, optimistic and energetic, since creativity , a positive attitude, physical and emotional energy are needed, to promote success and avoid discouragement in difficult situations; Global leaders must keep honesty and integrity, as these are the conditions for trust -Global leaders must have a stable personal life, with familiar support and understanding of the global commitment to the mission they are performing Global leaders must bring an added value, namely technical or business abilities , to give credibility to their jobs before the team members, such as learning agility, characterized by enthusiasm and the ability to learn (Kramer 2005)	Additional abilities linked to the complexity that e-leaders must get, based on the concept that not all virtual leadership roles are connected to complexity. These abilities go beyond the basic functions demanded to the leaders [Zigurs 2003) in the transformation or change when technological environments that comprise change in the group dynamics are used.	*e-leaders* skills Additional functions for global e-leaders **[CPT 14]**	Johnson (2010)
Id13 e-leader's ability to create and ensure coherent and integrated virtual teams	The e-leader must promote a common group goal that develops positive affection and moulds the perceptions of the team members Once this environment is settled , the e-leader has two main leadership functions: the management of the e-team's performance and the development of the teams	When creating e-teams, the e-leader must ensure the development of suitable work units in which each member must get self-management abilities. This is achieved by the creation, by the e-leader, of a team guidance including motivation factors.	Motivation factors for the creation of e-teams *e-leader* functions **[REL 5, REL 6, GES 9, MOT 10, GES 15]**	Hunsaker e Hunsaker (2008)
Id14 e-leader's ability to develop team's awareness to enhance the team's synergy	Types of awareness to maximize group dynamic: Awareness of the virtual team members of the Project; Awareness of availability: the e-team members must be available 24X7; Awareness of the Project: each e-team member must understand the sequence of the Project and his individual tasks, as well as the way these adjust to the global Project; knowledge: each member of the e-team must know the other team members and their social environments;	. The e-leader must be able to hear what cannot be seen, namely the team's consciousness, its mission, its strong and weak points, the group dynamics. Thus, the e-leader must maximize the team through the development of the team's consciousness.	e-leaders abilities- team awareness **[REL 5, REL 6, GES 9, MOT 10, GES 15]**	Hunsaker e Hunsaker (2008)
Id15 Characteristics of management style for e-leaders	More green and effective practice through: Take advantage of the available technologies; minimize the forced f2f environments Adopt and expand the virtual leadership; - regular training of e-leaders and e-teams Total trust, delegation acceptance and inclusive communication constant among the e-team members	The need for global business, even at a regional level, demands a new management style addressed to virtual approaches and management. The leaders must change the approaches in time to meet the needs and demands of changes.	Characteristics e-leaders (suitability to the management style) **[FOR 2, EST 16]**	Colfax *et al.* (2009)

Table 1.3. Skills and abilities of e-leaders / virtual teams and their identification in the representation code in the Model for skills and characteristics of e-leadership with reference to authors (continuation of Table 1.2)

Id skill or characteristic e-leader/ e-teams	Description	Further observations	Id skill or characteristic versus Representation Code in the Model	Authors
Id16 Management styles addressed to Leadership Control Models in a virtual project environment	Transformational leadership: to situational and contingency leadership styles	In a virtual project environment the e-leader may have to use as many different styles as necessary to successfully accomplish the project	Leadership management styles in virtual teams **[EST 16]**	Lee (2010)
Id17 Issues connected to leadership during the last decade	Do leaders have an innate ability or the ability to lead is got through molding his leaderships skills and learning abilities? How can followers influence the leader's success? How can some charismatic leaders build or destroy societies? In what way can the impact of technology usage on leadership influence the individual and team performance?	In the leadership field, during the last decade, huge progress has been made in the discovery of some of the great mysteries connected to leadership, to answer all the questions asked.	Issues related to leadership **[EST 16]**	Avolio *et al.* (2009)
Id18 Virtual leadership – advantages of transformational leadership in virtual environments	the most efficient leaders are those who increased their transformational leadership style in virtual teams; In virtual transformational leaderships environments the teams' satisfaction at work and the appreciation towards the leader was higher than that of f2f teams Transformational leadership is more intensely felt in virtual teams that only use communication by means of computers The leaders who improved the transformational style through the project reached higher performance levels in their teams	Aspects related to transformational leadership in virtual and f2f teams context have been analyzed	Management styles in virtual teams **[EST 16]**	Purvanova and Bono (2009)
Id19 The five components needed to the effective leadership of virtual teams in multicultural environments	Knowledge and sensibility to deal with the diversified teams´ workforce Openly communicate with the e.-team members about cultural differences Identify and make available the resources to strengthen and improve the e-team's quality of life Create and implement strategies that allow the leader in particular and the team in general to act as agents of change to maximize the benefits of a multicultural workforce Ability to manage and adapt the personal and familiar life to the demands of a virtual 24x7 team	These components are characterized to effective leaderships in multicultural virtual environments	*e-leader* skills **[REL 6, EST 16, CUL 17]**	McCuiston (2004)
Id20 the need for tools to technical and human support	Technical and human support systems to sustain the virtual team synergies Develop tools that support and promote the team's work so that collaboration among the e-teams' members may exist	In current virtual environments, where the teams don't need a physical office in other locations, the e-leaders need to build systems to support the e-teams synergies	Support tools to the virtual model **[REL 6, SAT 18]**	Shriberg (2009)
Id21 Practical implications for effective practices in exploring the collaborative social tools	The first implication to which the mapping of social networks and leadership perceptions in collaborative virtual environments may be useful as a diagnosis tool to deal with challenges linked to planning, implementation and performance of specific tasks demanding the participation and experience of physically scattered employees The second implication for the practice is concerned with the management of dynamic teams and complex environments. A great deal of organizational work is structured around projects with work teams in permanent change; the groups integrate and disaggregate elements to better face the specific demands and the contingency of each project	Leadership style, leadership traits, in the role of social structuring leadership relationships in virtual contexts, in the case of social tools mediated by collaborative configurations [Malhotra et al. 2007)	Practical implications to e-leaders – exploring collaborative social tools **[FOR 2, GES 15, EST 16, SAT 18]**	Sutanto *et al.* (2011)
Id22 Leadership practices in virtual teams by using collaborative technologies	Build and maintain trust through the usage of communication tools Ensure that the distributed diversity (collaborative) is understood and appreciated by the team members Manage the virtual life cycle of the project's meeting Follow and monitor the team's process by means of technology Increase the visibility and assumptions of the virtual members in the team and outside the organization Allow for the members to share knowledge together	Virtual teams leadership by means of collaborative technologies in which the teams are geographically scattered, are multi-task and perform tasks highly inter- dependent, has unique challenges to leadership. The six leadership practices identified may be the basis or the foundations to train future virtual teams' leaders.	e-leadership practices – usage of collaborative technologies **[FOR 2, GES 15, EST 16, SAT 18]**	Malhotra *et al.* (2007)
Id23 Leadership skills the e-leader needs to synchronize and manage the virtual teams	The first priority is building work relationships, in which the members of each team may freely share knowledge, influence collective skills, anticipate each other's actions and believe that all the team members are contributing and objectively participating in the project and to the success of the team; The second priority is associated to the leaders' ability and virtual teams to overcome coordination barriers linked to distance and time, as well as cultural and linguistic boundaries In third place take on the individual commitment of each team member to ensure the development of the project (this concept is often associated to the knowledge each member possesses of the local details and demands, they themselves can facilitate and integrate in the project) Finally, the virtual teams leaders must also help the members to overcome possible feelings of isolation by building the team's cohesion, establishing collaboration rules and sharing knowledge, involving the members in the team's mission	Achieve the necessary synchronization to lead diversified virtual teams at a geographical, cultural and technical level, demands an effort , the definition of priorities and the acquisition of skills by the e-leader.	e-leader skills - usage of collaborative technologies **[FOR 2, CPT 11, CPT 12, CPT 14, GES 15, CUL 17, SAT 18, TRN 19]**	Malhotra *et al.* (2007)