Virtual Teams: Human Resources' technology preferences for better communication, increased trust and performance.

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Abstract

Virtual Teams (VTs) are increasingly being adopted by companies. Being geographically and time dispersed, human resources of VTs are totally dependent upon the use of information and communication technologies (ICT) to support their communicational success. Although much research has already been done on several aspects of Virtual Teams, very little has focused on the relation between the virtual team communication performance and the selection of tools available to the team members. Additionally, most of the theories related to tool selection concentrate in the combined characteristics of task and technology, disregarding human factors based in personal characteristics, comfort and preferences.

To detect which technology workers of Virtual Teams prefer for accomplishing each one of their communicational needs and to analyze the impact of personal characteristics based technology choice, on cohesion, leadership, knowledge share and trust, leading to virtual team performance, an electronic questionnaire has been sent to members of virtual teams in several companies from different sectors of activity, and 79 valid answers were received.

The analysis looked at the data from different perspectives: Is there, globally, a preferred technology? Do personal characteristics of workers - Gender, Age Group, Education Level and IT use Proficiency – influence the choice? And, does the choice of the preferred technological tool that best suits each of the four HRM themes – Trust buildup, Management, Knowledge Share and Cohesion – follow the global preference?

The results have shown that e-Mail is the preferred technology choice and that this choice is not influenced by gender. The other three sets of personal characteristics influence the choice. For building Trust and Cohesion, the preferred technology is videoconference, contradicting the global tendency whereas for Knowledge Share and for Management activities e-Mail is again the preferred technology, in line with the main choice.

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Resumo

A adoção de Equipas Virtuais pelas empresas tem vindo a aumentar. Encontrando-se dispersos, geograficamente e no tempo, os recursos humanos das equipas virtuais dependem totalmente da utilização de tecnologias de informação e comunicação (TIC) para suportar as suas necessidades comunicacionais. Embora exista muita investigação efetuada sobre inúmeros aspetos das equipas virtuais, muito pouca se focou na relação entre o desempenho comunicacional destas e a seleção das ferramentas disponíveis para os membros. Além disso, a maior parte das teorias relacionadas com a selecção de ferramentas concentra-se na combinação de características tarefa/tecnologia, descurando factores humanos baseados nas características pessoais, no conforto e nas preferências.

Com o fim de detetar qual a tecnologia preferida pelos trabalhadores das equipas virtuais para a satisfação das suas necessidades comunicacionais e ainda para analisar o impacto da escolha tecnológica - baseada em características pessoais - na confiança, coesão, liderança e partilha de conhecimento foi enviado um questionário eletrónico a membros de equipas virtuais de empresas operando em diferentes sectores, tendo sido recebidas 79 respostas válidas.

A análise dos dados centrou-se em diferentes perspetivas: Existe uma tecnologia preferida? As caraterísticas pessoais dos trabalhadores – género, faixa etária, escolaridade e capacidade de utilização de tecnologia – influenciam a escolha? A escolha da tecnologia que melhor se adapta a cada um dos 4 temas de GRH - confiança, coesão, liderança e partilha de conhecimento – segue a preferência global?

Os resultados mostraram ser o e-Mail a tecnologia preferida e que esta escolha não é afetada pelo género. Os outros três tipos de caraterísticas pessoais mostraram ter influência na seleção da tecnologia. Para o estabelecimento de confiança e coesão, a tecnologia preferida foi a vídeo-conferência enquanto para a partilha de conhecimento o e-Mail voltou a ser a escolha principal.

Palavras chave: equipas virtuais, tecnologia de comunicação, seleção de canais, recursos humanos, coesão, confiança, performance

1 Introduction

Virtual Teams (VTs) are increasingly being adopted by companies, as a form of organizing work, driven by the increase in globalization, international trade, and fast communications networks.

This increasing shift towards globalization of businesses and international trade has created the need to have team based structures spread across several different locations, but still working together as if they were in a single location. Working together in different locations means that teams need Information and Communication Technologies to interact.

Work groups and team-based structures are not a new concept as a form the companies use to organize work. Traditionally these groups were functional departments. Later they have evolved towards a cross-functional style of work, in flatter organizational structures. Organizations are replacing the traditional hierarchies and functional areas by team-based structures where its members become fully responsible by the outcomes of their work, be it a product, a service or a building part of those.

The recent evolution of both computer systems and telecommunications networks has brought to light several distinct technologies that are used to link the geographically disperse members of Virtual Teams. This form of link between team members is usually referred to as Computer Mediated Communication (CMC).

The organization of work in virtual teams, contrary to face-to-face teams, is totally dependent upon the use of information and communication technologies (ICT), such as e-mail, telephony, instant messaging, and, in more sophisticated forms, videoconferencing, shared workspaces, and group decision support systems. More recently we have also seen the introduction of Web 2.0 tools like Wikis, Blogs, Social Networking or even Virtual Workspaces to support some of the communicational needs of VTs.

VTs have different communicational needs – examples are holding a meeting, transmitting orders, sharing knowledge, presenting results, etc. To perform different tasks different types of technical functionalities are needed.

The aim of the present research is to detect which technology workers of Virtual Teams prefer for accomplishing each one of their communicational needs and to analyse the impact of personal characteristics based technology choice, on cohesion, leadership, knowledge share and trust, leading to virtual team performance.

The research is based in the application of a questionnaire to people working in virtual team's environments.

This study should contribute to improve information about the most appropriate technology for each individual communicational need, at both organizational and personal levels, and to a better management of teams' human resources.

The remainder of the paper is organized as follows: A theoretical background analysis serves the double purpose of defining and characterizing the concepts associated with the theme, and also to provide a literary revision of some of the most important research in the field of VTs, emphasising the main theories behind technological tools selection. The section finishes with the investigation hypothesis. Next we describe the methodology employed for the study, which is followed by the analysis of collected survey data and discussion of findings.

2   Theoretical background

Throughout the twentieth century we have witnessed profound transformations in organizational structures and in the way how work is organized in a continuous search for more efficient and effective solutions to increase productivity.

From the classical theories (Scientific Labour Organization, Fordism and Taylorism) which place an emphasis on the way individual tasks are organized without concern for the human factor, to the most recent motivational approaches which take worker motivation as a key determinant of productivity, the transformation has been a constant.

The growing complexity of the challenges faced by organizations, from the environment in general and the market (increased competitiveness, increased requirements from consumers, etc.) in particular, led them continuously grow the adoption of teams as a form of organizing work.

The constitution of teams as a form of work organization is not new:"Although examples of the move toward team-based organizational structures can be found dating back to the 1970s, the nature of modern teamwork has changed significantly" (Kimble, 2011)

The concept of team is, many times, confused with another one: the group. Some researchers state that both are the same although others consider them to be completely distinct. For this reason it is important to clarify here both concepts, clearly identifying their differences.

We can define group as a set of, at least two, individuals that interact between them. This interaction can be social or take another form (e.g. work) and is aimed at the achievement of some goals.

Authors (Guzzo & Dickson, 1996) define group as "made up of individuals who see themselves and who are seen by others as a social entity, who are interdependent because of the tasks they perform as members of a group, who are embedded in one or more larger social systems (e.g. community, organization), and who perform tasks that affect others (such as customers or coworkers)". These authors state that they "use the terms group and team interchangeably recognizing that there may be degrees of difference, rather than fundamental divergences, in the meanings implied by these terms". The same position is also supported by (Cushway & Lodge, 1999) stating that a

group and a team are the same type of work structure. A workgroup, or team, is a set of people with a common purpose that interact with each other, are psychologically interdependent and view themselves as a group.

Supporting the distinction between group and team, (Katzenbach & Smith, 1993) consider that a team is a group that has developed a sense of shared commitment and strive for synergy among members. They propose, as a definition of team, a small group of people with complementary skills who are committed to a common purpose, performance goals and approach for which they are mutually accountable (Katzenbach & Smith, 1993).

Teams are organizational units that share a common goal and whose members have a feeling of mutual responsibility for the results that the team produces. They also allow members to share information that would previously have never crossed the walls of the traditional functional silos based on departments (Kimble, 2011).

Teams are a form of work organization which meets diverse needs of workers, such as belonging and esteem, of companies and also promote employees' commitment to the company. In a team, individual skills are complemented by the skills of other team members. For this reason, teams are more effective in tackling with complex problems or in developing projects.

External pressures, globalization and competitiveness, have forced companies to find new ways to organize their work processes worldwide. The need to be present in various different locations around the globe, to gain access to expert workers at lower costs together with the possibilities raised by the new technological tools have paved the way to a new form of team – The Virtual Team (VT).

The word "Virtual" has many definitions. However, it is common today to associate the concept of virtual to computers and/or on-line environments. This concept applied to teams, means that the members are united by some form of computer and telecommunications technologies. VTs are "teams whose members use technology to

varying degrees in working across locational, temporal and relational boundaries to accomplish an interdependent task" (Martins, Gilson, & Maynard, 2004, p. 808).

The technology allowed companies to get the most talented workers from all over the world. Virtual teams (VTs) are becoming popular as they allow companies to bring in the best talent without regard to geographic constraints (Vlaar, Fenema, & Tiwari, 2008), (Shachaf, 2008). VTs bring flexibility to organizations, but they need appropriate management to maximize their output. GVT leadership faces some challenging tasks. He/she must create integration across time and distance at the same time being able to develop a sense of unification among different business processes, management styles, personal cultures and languages and operational support systems, thus promoting communication, cohesion, shared meaning and trust relationships among team's human resources.

Virtual teams have other distinctive characteristics besides the use of technology to communicate - number of employees, temporary or permanent team, geographic dispersion, time difference, diversity of knowledge - which are very important for the performance of their tasks, as stated by (Ale Ebrahim, Ahmed, & Taha, 2009, p. 1578) who define Virtual Teams as "small temporary groups of geographically, organizationally and/or time dispersed knowledge workers who coordinate their work predominantly with electronic information and communication technologies in order to accomplish one or more organization tasks"; "Virtual teams are comprised of geographically and time dispersed individuals, with strength of diversity in terms of skills, experience, knowledge and expertise, all round the globe, who collaborate through ICTs to accomplish a task (Bastida, Gupta, & Wingreen, 2013); or "A virtual team is a group of dispersed workers with distinct skills who focus on a specific goal on a temporary or ongoing basis" (Gaspar, 2001, p. 45).

Teams, in general, and VTs in particular, need to communicate to exist: "Communication is the foremost enabler of a virtual team and in its absence a VT would have ceased to exist" (Gupta, 2013, p. 64). Communication is very important in the context of virtual teamwork,

bearing a substantial impact in team's outcomes (Sarker, Ahuja, Sarker, & Kirkeby, 2011) (Webster & Wong, 2008). The usage of information and communication tools to support communicational needs of teams is not limited to VTs. Traditional face-to-face teams also use them, the main difference being that, for VTs, all communication is done through electronic communication platforms.

In an organization working globally, communication between employees, between employees and employers or between employees of various companies is only possible through efficient communication tools. And in the past two decades we have seen a tremendous development in the capabilities of Information and Communication Systems (ICT). This increase in systems power has been accompanied by a significant decrease in costs of Hardware, Software and specially Communications Bandwidth where the available capacity continues to grow (mainly since the development of Fiber Optics) with the corresponding prices continually decreasing.

This technological development, together with the evolution in world trade and the increasing dispersion of skilled workers around the world has lead to global work to become a growing reality. The number of people working in different places and/or time zones, brought together through the use of information and communication technologies, has been growing in an astonishing way. In 1999 there were, all over the world, 9.5 million virtual workers. In 2005 they were 11.3 million and actually this figure should be between 20 and 30 million (Lambotte, 2013).

Communication in VTs is a complex system that consists in the interaction among virtual team workers using verbal and non-verbal language, written or spoken trough electronic communication channels. The communication is very important to manage various situations, so it must be efficient and effective: efficient when a message is transmitted correctly, credibly, appropriately, when it is relevant to the underlying activity and understood; and effective when the message is capable of conveying its issuer's intentions, leading recipients to follow them by acting upon, and modifying, their behaviors, perceptions and feelings.

Virtual communication also impacts leadership in GVT context, commonly referred to as e-Leadership. First of all, the e-leader must ensure that workers are able to overcome all barriers associated with working in virtual teams, like those that affect understanding between people from different cultures, cohesion and trust. Buildup of trust is gaining importance in organizations, and it is recognized as a key task of leaders (Yukl, 2010). The e-leader must also create the opportunity for workers to develop a common organizational sense that, together with the willingness to share knowledge, strengthens cohesion, mitigates isolation feelings and leads to increased motivation and commitment (Savolainen, 2014).

From leadership to e-leadership, the goals remain unchanged. But the medium used for their implementation is a new one. E-leadership brings a new paradigm into the leadership agenda, requiring the achievement of leadership objectives using computer mediated communication tools to communicate with human resources, dispersed across space and time boundaries, most (or all) of which he/she may never physically meet. According to (DasGupta, 2011), besides the usual set of skills any leader must possess, new skills are required for this "new-leader": stronger written communication skills; strong social networking skills; a global, multi-cultural mindset; greater sensitivity towards followers' state of mind; and a 24x7 orientation.

Virtual Communication has impacts at both organizational and individual levels. From the organizational point of view these impacts manifest themselves as a greater difficulty in employees' identification with their company (culture, values, and norms) and in building, at distance, a shared meaning, together with increased difficulty in member's activities supervision and prevention of unproductive work In some cases, the implementation of new technologies, that team members are not prepared to use efficiently, can also have negative impact on the team. At individual level, CMC offers reduced possibilities for informal communication, to establish friendship, and low level of interpersonal contact. It also enhances workers isolation, leading to increased levels of stress, burnout and depression.

Information Systems (IS) in organizations have, since a long time, been precious information processing tools, used to pursue efficiency and effectiveness objectives. In the present network economy, with the organizations becoming more and more "connected", the utilization of technologies to facilitate communication in the workplace has become paramount, with various computer-mediated communication (CMC) technologies being proposed and designed to enhance performance in the workplace through improvements in communication (Quan-Haase, Cothrel, & Wellman, 2005).

Communication in virtual teams is subject to several constraints (first of all, the fact that people involved rarely or never meet) thus implicating that technology selection is not a mere function of the communicational activities requirements and the characteristics of the tools. Other factors must be taken into consideration so, before we focus on the issue of technology selection, the central subject of this research, some attention must be paid to those other factors.

One of the barriers imposed by the majority of CMC tools is their inability to transmit the non-verbal cues which are typically present in FTF communication. Cues like facial expressions, tone of voice and body language convey sometimes much more information than the actual verbal message. Nevertheless, a number of tools can pass some of this non-verbal information. Tools capable of transmitting audio and video can pass these cues to the receiver (ex: audio/video conferencing), whereas those that are limited to written communication can't (ex: e-Mail, IM, blogs, wikis).

The communication interaction between the elements of virtual teams, as identified by some studies (Sivunen & Valo, 2006), is done in two main modes: synchronous communication, also referred to as "hot" or "on-line", requiring the active participation of the team members involved simultaneously (ex: instant messaging (IM) and audio/video conference); or asynchronous communication, also termed as "cold" or "off-line", which can be performed individually in time, that is, not requiring the active and simultaneous presence of the other members (ex: e-Mail, wikis, blogs). "During the life of

a team, the interaction between its members moves repeatedly between these modes of communication" (Kimble, 2011, p. 11).

Combination of channels is one way in which ICT can help VTs overcome cultural diversity issues (Shachaf, 2008). A shift to asynchronous communication channels can, according to some researchers, help overcome linguistic diversity by facilitating understanding of messages written in a non-native language since the receiver has more time to interpret it correctly before producing an answer (Duarte & Snyder, 2001).

Combined use of synchronous and asynchronous communication modes can minimize some CMC problems. Even asynchronous communication, because it constrains the ability of VT members to interact effectively in real time, is many times said to be poorer than synchronous communication and responsible for some problems, such as reading/response delay, possible message misinterpretation by lack of non-verbal cues culture diversity issues and reduced interpersonal relationship building, also presents some advantages. For example, in brainstorming environments, individuals with lower self confidence, feel more comfortable participating and exposing their ideas CMC, because of its relative anonymity, can reduce discrimination based on attributes that people are born with (e.g., gender, race and physical attractiveness) (D'Souza & Colarelli, 2010).

Technology should be able to overcome geographical, time, organizational and cultural dispersion and maintain strong organizational identification of VT members, but this is still a point of debate (Cummings, 2011).

Confidence level among members derives from higher levels of trust, and may bring closer together the physically distant workers, promoting the increase in their psychological connectedness (Cummings, 2011), helping increased interpersonal reliance and establishment of durable social ties (Mukherjee, 2012). Studies of (Henttonen & Blomqvist, 2005); (Kirkman, Rosen, Gibson, & Tesluk, 2002) have shown that a sense of shared understanding, repetition of commu-

nication and information and knowledge sharing through electronic means increase the degree of confidence of virtual teams' members (Horwitz, Bravington, & Silvis, 2006).

Trust is a critical issue in GVTs because of member diversity – they bring into the team different cultures, values, languages and ideologies - and lack of past shared-history (Sarker, Ahuja, Sarker, & Kirkeby, 2011). Trust is seen as the "glue" that helps in creating virtual team relationships (O'Hara-Devereaux & Johansen, 1994) apud (Sarker, Ahuja, Sarker, & Kirkeby, 2011). It has been viewed as an "efficacious means" for ensuring a successful collaboration (Carson, Madhok, Varman, & John, 2003, p. 45).

To implement the sense of trust, defined as "a state involving confident positive expectations about another's motives with respect to one's self in situations entailing risk" (Boon & Holmes, 1991, p. 194), it is important that the elements of virtual teams know each other personally and establish, initially, personal relationships. Ideally "virtual teams should be able to operate in multiple modes: sometimes face to face, sometimes via electronic communication, sometimes interacting with each other directly, and sometimes working as Individuals" (Kimble, 2011, p. 7). Nevertheless, in most cases, this is not possible, and team members never have the possibility to meet face to face.

Technology does not solve, in full, the problems resulting from little or no existence of physical proximity, frequent interaction and lack of access to various sources of presence, such as non-verbal communication (by comparison to face-to-face teams). Some CMC tools, because of slow feedback, lack of emotion transmission and of audio/visual contact, inhibit the creation of what is frequently termed as "Social Presence". A classical definition of social presence, "the degree of awareness of other people in an interaction and the subsequent recognition of interpersonal relationships" has been proposed by (Short, Williams, & Christie, 1976). Nowadays, social presence, or co-presence at is also termed, is considered as the perceived sensation someone has of interacting with another individual (Kimble, 2011).

The aim of Social networking tools design is to facilitate interlocutors' communication so as to strengthen their social relationships, thus building the desired trust among team members (Ou, Sia, & Hui, 2013), contributing the objective of creating the social presence for VT members. Adoption of this type of tools in organizations is increasing.

The fact that VTs are geographically separated does not mean that they cannot have room for informal social gatherings – a kind of virtual coffee breaks. Since physical separation is impeditive of team members bumping into each other, the team can decide how and when to conduct these informal gatherings. Web 2.0 tools like Facebook or other similar social networking sites can give team members the opportunity to socialize and get to know each other, exchanging personal information besides professional interaction (O'Keefe & Chen, 2011). This allows human contact and can reduce the feeling of isolation, increase cohesiveness and trust, leading to enhanced motivation and performance.

Trust among members of the virtual team, the emergence of belonging feelings, and the commitment with the team peer's is an important factor to its performance, so its members will have to choose the appropriate technological tools in order to establish trust as exists in face-to-face teams (Haines, 2014).

A major challenge from a theoretical perspective is in incorporating the interaction, over time, between team characteristics, individual characteristics and the nature of the task(s) in determining the effectiveness of any communications technology. Workers need the capacity to adapt "to different work styles and cultures, leverage harmonious team processes, and utilize appropriate technologies to create efficiencies in the global workplace" (Pinjani & Palvia, 2013, p. 151). The purpose is to find the relation between the characteristics of a virtual team, the tasks it needs to accomplish, the human resources that compose it and the key functionalities provided by communications technologies.

Traditionally, academic research on the subject of technology adoption, focused on studying the "influencing factors for individual or organizational choices with respect to media or technology adoption and use" (Ou, Sia, & Hui, 2013, p. 173). Examples of that are Media Richness Theory that proposes that, when task needs are matched to a medium's ability to convey information, its performance will be improved (Daft & Lengel, 1986) and Task Technology Fit (TTF) that takes into consideration the way a task affects technology or, more specifically, that part of the adoption criteria for a new technology depends on how well it fits the requirements of that particular task (Goodhue & Thompson, 1995). Later Pnina Shachaf and Noriko Hara (Shachaf & Hara, 2007)developed the behavioral complexity theory (BCT) that defends that the choice of technology tools by workers depends on a set of factors: the repertoire of communication channels, individual skills and the ability to act in different situations taking into account various constraints. BCT demonstrates, when compared to the other media choice theories, a shift towards an increased weight given to the team's human resources .The behavioral complexity theory "assumes ambiguity and complexity of the media selection process in a nonlinear, organic, and holistic way" (Shachaf & Hara, 2007, p. 63).

Recent research streams emphasize the media and technology performance, namely, the outcomes of utilizing media or technology, as is the case of Media Synchronicity Theory (MST), which analyzes technology's ability to promote the "capability of the media to support synchronicity, termed as a shared pattern of coordinated behavior among individuals working together (Dennis, Fuller, & Valacich, 2008). By providing an ideal combination of media capabilities MST, seen as a theory of communication performance, will lead to better communication and subsequently task performance. (Ou, Sia, & Hui, 2013)

This shift in focus can be understood in the light of the existing constraints in technology adoption. In the past, variables like infrastructure and implementation costs, technology capacity and user ability and capability to use it had a much heavier weight than today, forcing the adoption criteria to be centered on these. Today, technology development, reduced costs and a new generation of tech aware

users remove some of the old constraints and allows the choice to be outcomes and results oriented.

Technology adoption by the latest generations, from Baby Boomers to Generation Y'ers, has been going through a great deal of change. Older generations (boomers and gen X), who did not grow up dependent of technology view it as artifacts of organizational culture (Simmons, 2010) apud (Kaifi, Nafei, Khanfar, & Kaifi, 2012). They tend to view the Internet as no more than a piece of technology they connect to, in order to execute some specific task, like sending an e-mail, find some piece of information or even to buy a product. Generation Y'ers, or Millennials as they are also referred to, are digital natives (Hansen, Hope, & Moehler, 2012). They grew up with technology and their ability to use digital technologies, media and communication systems is far higher than that of the previous generations (Kaifi, Nafei, Khanfar, & Kaifi, 2012). For this generation, Internet is viewed as a resource for doing everything – from simple information gathering to expressing themselves in their social network profiles or blogs, through innumerous other online activities, such as shopping, booking tables or airline tickets, access multimedia contents (audio/video) and staying connected to others.

Contrary to older generations, that based the establishment of interpersonal relationships in physical presence, the new generation relies more on digital presence to that purpose, their trust level with online network being much higher. They don't see life and work as separate activities, since they are permanently connected to both their personal and professional networks.

Research from (Childa, Gingrich, & Piller, 2009) revealed that 96% of Gen Y'ers had active profiles in some form of social network. Data from a survey by Ipsos MORI, show that 71% of generation Y'ers use the Internet mainly to visit social networking sites, forums or blogs (for Baby Boomers this figure is only 30% and for Generation X'ers it does not exceed 55%) (Carr, Dangerfield, Harris, Matkov, & Pettit, 2014). They have a strong will to share information about happenings in their everyday life with "virtual" friends and family. At the same time they also use social media to actively follow the lives of both

their personal and professional networks (O'Keefe & Chen, 2011). We have used, for simplicity, the commonly accepted designations of Baby Boomers, Gen X and Gen Y, as proxies of age groups, since they reflect age groups that share common characteristics.

Organizations can take advantage from the fact that, for these workers, being a member of a GVT is a mere continuation of the way they have always communicated in their personal lives. Being used to live in the digital world gives them the experience and qualifications to overcome some of the known issues of GVTs. Communication, trust, interpersonal relations, cultural differences, leadership and technology play a key role on the success of VTs (Etim & Huynh, 2015).

Trust among GVT members is the most important of those issues. Building trust implies communicating and building relationships. In a virtual environment, where people seldom or never meet face-to-face, where communication is computer mediated, lacking most of the richness stemming from non-verbal cues and the informal interactions of people bumping into each other around the office, the creation of the bonds necessary to build trust becomes more difficult. But Gen Y'ers, who are used to trust their peers with whom they build personal relationships in the digital world, easily bring this form of relationship building to the work environment, relating and socializing with their co-workers, through digital channels, as if they were in the same place. For them, digital presence is almost the same as physical presence.

So, Gen Y, due to its individual's characteristics, is expected to choose social media, or web 2.0, tools to efficiently and effectively support most of their communicational activities, namely those related with interpersonal communication, relationship and trust buildup. But, on the one hand, although millennials constitute, today, an important and continually growing group within the workforce, they are only around half of it. On the other hand, not all communicational activities are directly related to the buildup of interpersonal relationships among members of GVTs.

When GVT members are given the freedom to choose, for each particular communicational activity they need to engage into, the technological tool they feel more comfortable with (because they see it as the one that best performs, or because they feel better prepared to use it, or even because they are influenced by respected ones) their level of satisfaction and motivation will result increased. They will use that technology without resistance and avoidance and will repeatedly use it to connect with their co-workers. This repeated use will lead to increased levels of trust. So, we can assume that this choice of technology positively relates to team performance, knowing that the higher the level of trust among team members, the more effective the team will be in achieving its objectives.

Assuming that for each communicational activity there is a technological tool that best suits its accomplishment (task-technology fit), our concern goes in the way of understanding, also, in which way the human factor – understood here as the individual characteristics of each person like age, gender, IS skills and education – is reflected in the individual choice of technology. These communicational activities can then be grouped into four, human resource management related, themes – Trust, Management, Knowledge-share and Cohesion - giving us a perspective of which tools best concur to each of these.

The study is based in the following investigation hypothesis:

- **H1**: There is one preferred technological tool for satisfying the communicational needs of Virtual Team's workers.

- **H2**: The choice of the preferred technological tool depends on the personal characteristics – Gender, Age Group, Education Level and IT use Proficiency – of the workers.

- **H3**: The choice of the preferred technological tool that best suits each of the four HRM themes – Trust buildup, Management, Knowledge Share and Cohesion – follows the global preference and depends equally on the personal characteristics – Gender, Age Group, Education Level and IT use Proficiency – of the workers.

3   Research Methodology

A deductive exploratory study has been conducted, in February/March 2015, by randomly applying a closed questionnaire to members of virtual teams. Google Forms was the tool used to design the questionnaire and to submit it to the respondents. We received 79 valid answers from individuals in 10 countries, of both genders, with ages below 60. The answers to the questionnaires were anonymous.

The survey was composed of 11 initial questions (characterization of respondents) and 30 closed questions in its main body.

The sample is comprised of 45 men (57%) and 34 women (43%). Their distribution in age groups is as follows: Generation Y – 43 (54.4%); Generation X – 32 (40.5%); Baby Boomers – 3 (3.8%); No Answer – 1 (1.3%). We use the commonly accepted definition of generations as a proxy of age groups, with the following definition: Generation Y: 1980-2004; Generation X: 1965-1980; Baby Boomers: 1946-1964. 59.5% of respondents have training in IT, whereas 36.7% have not. 34.2% respondents consider themselves as advanced technology users while 39% say that they are intermediate users and the remaining 13.9% see themselves as basic users. The geographical distribution of respondents is as follows: Portugal – 62%; Angola – 10.1%; Brazil – 8.9%; USA – 7.6%; the remaining are distributed by Australia, India, Luxembourg, Switzerland and United Kingdom.

4   Findings/Data Analysis

Survey data show that, at a global level, the most selected technology is e-mail, with 27.72%. Completing the list of the top chosen technologies are videoconference (16.03%), file share (9.16%), telephone (7.09%) and Groupware collaborative tools (5.44%).

Against what was expected, environments that promote social relations like IM/Chat (4.05%), virtual meeting rooms (3.12%) and shared screens (2.49%) did not get high choice rates. The same happened

with web 2.0 tools like social networks (1.86%), Wikis (0.72%), Blogs (0.42%) or even Virtual Universes (0.21%).

However, the survey has also made clear that decisions about the choice of the global best fit technology diverge among men and women. Although both choose e-mail as the preferred technology and video conference as the second best, for men the difference between both technologies is dimmer (e-mail 23.93%, videoconference: 16.74%) while for women it is higher (e-mail 15.10%, videoconference: 32.75%).

Men preference for Chat (5.04%) is almost double that of women (2.75%). Also when it comes to Social Networks use, men (2.37%) show more familiarity than women (1.18%), although the choice of Groupware collaborative tools by women (7.55%) is bigger than by men (3.85%).

Data also showed some variation in technology choice among different age groups. Generations Y and X chose e-mail as the best technology (27.05% and 30.00% respectively), giving second choice to video conference (14.11% and 19.27% respectively) while Baby Boomers generation presents different choices – Electronic meeting rooms is the preferred technology (14.44%) and in second choice we have e-mail and telephone both with the same choice rate (11.11%).

Past studies have demonstrated that the younger generations (Gen Y) are likely to evidence preference for Web 2.0 and Social Networking tools, given the fact that they are accustomed to use them in their private lives. Survey data has not verified this fact, showing a preference for e-mail among this generation. A possible explanation lies in the fact that the majority of respondents are from Portugal (followed by African portuguese speaking countries) together with the fact that, in Portugal, although the first projects promoting tech use date back to mid 1980's, only in 2007 it has received a considerable boom, with the implementation of "Plano Tecnológico 2007-2011".

Considering the split by education level (Basic/Secondary and Graduate/Master/Doctor) data evidences that university graduates

follow the global tendency of technology choice, whilst the other group shows a different choice – E-mail is the preferred technology (36.47%), followed by Telephone (13.73%), Groupware collaborative tools (8.04%) and File Share (7.45%). The type of IT user (Basic/Intermediate/Advanced as seen by the respondent) also influences choice since advanced users show a slightly higher preference for videoconference (20.62%) over E-Mail (16.30%).

To get a better view of the impact of technology choice in human resources management (HRM), responses have been grouped in four HRM thematic areas - Trust, Management, Knowledge-share and Cohesion.

The technology chosen as the one that best contributes to a high level of Trust is video conference (21.62%), closely followed by e-mail (19.94%). This result goes, in part towards expectations, since video conference allows the use of non-verbal cues. Nevertheless, one would expect a smaller weight given to e-mail. The behavior is different when comparing responses from men and women – while men prefer videoconference to e-mail (22.96% and 16.48% respectively), women's results are inverted, with e-mail as the preferred technology for building trust (24.51%) and video conference the second choice (19.85%). Women prefer, for some communicational tasks, to use non-visual technologies, thus avoiding gender discrimination and "first impression error".

To perform the communication activities that directly concur to Trust buildup, Generation Y has chosen almost equally e-mail and videoconference (19.57% and 19.38% respectively) whereas for Generation X individuals data evidences that videoconference has a slight advance over e-mail (25.00% against 21.09%). Telephone is the third most chosen media accounting to a little less than 12% for both generations Y and X.

For management related communicational activities, e-mail is the preferred technology (34.77%), followed by videoconference (12.32%) and File share (11.22%). These three technologies account for almost 60% of preferences. Both men and women chose e-mail

as the preferred technology, although women have given it a bigger weight than men (40.20% against 30.67%). For women, file share gets a slight advantage over videoconference. E-mail is the favorite technology for both generations Y and X (34.88% and 36.25%). As for the second and third choices, Gen Y chose File Share (11.16%) and videoconference (10.39%) while Gen X shows an inversion between those two technologies – video conference: 15.73%; File share: 11.67%.

Globally, the first choice technology for Knowledge-share is e-Mail (24.61%) followed by videoconference (15.33%) and File Share (10.27%). The same tendency is evidenced when breaking responses by gender or by generation.

For promoting Cohesion, the ranking of the three preferred technologies is as follows: Videoconference (22.47%), E-Mail (19.51%) and Telephone (11.81%). Considering gender split, women value more e-Mail (25.00%), making it number one choice over video conference (20.59%). For men, the results follow the global tendency. The split between Generations Y and X also follow the global tendency. However, data shows that, for Gen Y, Groupware collaborative tools come in fourth place with a choice rate (10.66%), very close to the third.

More than half of the respondents (54%) being Gen Yer's, youngsters "born digital", living and sharing their life over Internet Social Tools, it was expected a greater preference towards Social and Web 2.0 technologies. However this study has showed that these technologies received very dim choice rates, the main preferences going towards e-Mail and Videoconference, the two main choices.

Regarding the impact of technology choice in HRM concepts like management of people, knowledge share and building of trust and cohesion, answers are still needed for questions such as: how can a leader obtain levels of performance and productivity from workers with whom he/she has no possibility of meeting face to face? And: if/how can technologies help mimic the advantages of physical presence? Can newcomers to the labour market, namely the younger Gen Yer's who are entering now and Generation Z that will begin to enter in the quite near future, due to their close link to technology, con-

tribute to solving the still existing problems? More focused studies are needed to understand the impact of existing web 2.0 and social networking tools, and future web 3.0, in worker's interpersonal relations, increased levels of trust and cohesion, more and better share of knowledge and, ultimately in the increase of performance and productivity of Virtual Teams.

This study has suffered some limitations, the main being the reduced sample dimension and geographical dispersion that does not allow extrapolation of results for a characterization of the universe of virtual team's workers. Further study must be based in bigger and more dispersed samples, for a better representation of the universe, thus permitting a better characterization of the factors that lead workers to prefer some type of communication technology in detriment of others.

Further investigation, namely qualitative rather than quantitative, might shed some light over these findings. Nevertheless, possible explanations, that may constitute investigation ideas for a next study, can be raised. E-Mail might have been the main selected technology because of some factors that are inherent to it. First, because it is a technology that has been available since the beginning of Internet, which is very simple to use yet effective in most situations so everyone is comfortable using it. E-Mail doesn't require heavy infrastructural conditions, can be accessible everywhere and by every platform and also guarantees a good level of message security and, very important, no repudiation, thus leading to increased trust. Videoconference, today being a simple and rather cheap technology thanks to the use of tools like Skype, is the best form to mimic face-to-face meetings in virtual environments. When workers don't have the possibility of meeting "physically", this is a form of getting together, of seeing each other, leading to increased levels of cohesion and trust.

Investigation centered in themes related with Human Resources, Technology, and Virtual Teams – which links the previous two – is far from static, rather presenting a very dynamic field of study. The evolution is in fact very rapid due to both people and technological

factors. New generations are coming to the labor market, bringing with them new sets of personal characteristics, especially when it comes to the way they establish personal relationships and how they use, and rely on, technology for managing their lives – personal and professional. Also technology itself has been, and expectedly will continue to be, in constant evolution. New tools are being developed and, at the same time, increased computing and communication power is available every day. The Internet of Things (IoT or Web 3.0 as it is also known) is constantly evolving bringing new opportunities, and also new challenges, that will significantly impact human way of life and work. Discovering and understanding the impact all this will have in the way "Social Presence" will be constructed in the future, and how it will affect work relations and performance in Virtual environments is the track that will continue to be followed.

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