Influence of cultural factors in the communication in global virtual projects
Case study of a Technology company

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ABSTRACT

Management of virtual teams in global projects demands close attention to the communication process which becomes critical as the traditional communication resources become limited and need to be replaced by methods based on technology (teleconference, e-mail, chat, etc.). Moreover, it is frequent that global projects' teams encompass members from different cultures. This research studies how the communication process is affected by cultural differences through a survey about the perception of virtual communication tools which is answered by a group of Americans and Brazilians. The results show significant differences between the perceptions of the groups, according to their national culture characteristics.

Keywords: Virtual Teams, Global Projects; Communication; Cultural Differences.

Résumé

La gestion d'équipes virtuelles dans des projets globaux demande une attention à la communication entre les membres de l'équipe car devient complexe dans la mesure où les moyens traditionnels de communication (des rendez-vous face-à-face, de la communication non verbale, la suivit du projet sur place) sont réduits et remplacés par d'autres moyens de communication basés sur la technologie d'information (vidéoconférence, e-mail, chats). Un autre facteur qui augmente la complexité de communication est lié au fait que dans des projets globaux, l'équipe est intégrée par des membres originaires de différents pays et différentes cultures. Cet article explore le processus de communication en temps que variable déterminante du succès d'un projet virtuel global. Une enquête portant sur la perception des outils de communication virtuelle a été répondue par des équipes participant dans des projets virtuels de nationalité nord américaine et brésilienne. Les différences identifiées dans les équipes sont discutées à partir des différences constatées dans les cultures de chaque pays. On peut conclure l'existante de différences significatives dans la perception de chaque groupe vis à vis les outils de communication employés. Cette perception est cohérente avec les trais culturels de chaque groupe.

INTRODUCTION

Nowadays, many projects around the world are developed through activities by people who do not keep face to face contact. This expansion of borders aims at the exploration of the competitive advantages offered by each involved country, both for costs reduction regarding human resources in countries at a different development level (DAGA and KAKA, 2006) and for the offered specializations.

This research analyzes how the cultural traces intervene with the communication in global virtual projects, specifically the influence of the cultural dimensions like "individualism/ collectivism", "power distance", "uncertainty avoidance" and "cultural context in communication" (HOFSTEDE, 2005; HALL, 1976), in the perception of functionalities of the electronic communication channels such as email, chat and teleconference (audio and video).

The core question of the study is: "**How cultural differences influence the perception of communication tools in global virtual teams**".
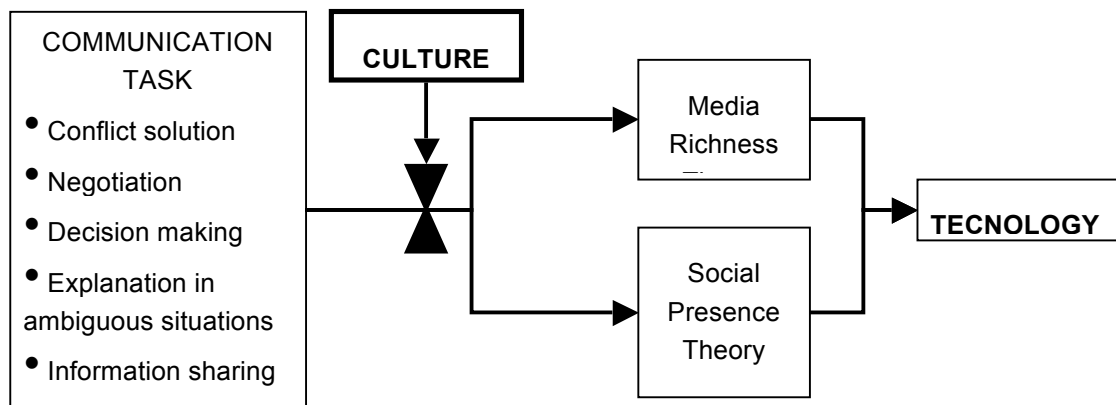

Figure 1 – Schematics of how culture influences the fit between the communication technology and the communication task.

The drawing illustrates how the fit between communication technologies and different communication tasks can be weighed by the culture.

The subject Culture, illustrated in the figure, comprehends several meanings - national, corporative, professional culture, etc. This study, however, is focused on the national culture as a research variable.

Virtual teams

According to POWEL et al (2004), virtual teams are groups that may be dispersed geographically, organizationally or in time, and meet through information sharing and telecommunication technologies to carry out one or more organizational tasks. Regarding their purpose, teams studied in this research fit in the functional type proposed by DUARTE and SNYDER (2007): "Project or product development, carried out through projects with definite duration".

Global projects and cultural aspects

For CLELAND and IRELAND (2000), global or international projects are those that cross one or more international borders, can be lead by an organization or a partnership and go beyond national borders. Cultural differences, time zone differences, different languages and currency make part of these projects.

These differences among project members increase the misunderstanding possibilities, and the communication barrier caused by language may cancel one of the advantages of distributed virtual teams which is to benefit from different perspectives of the team members towards a given subject (COMBS, 2007). According to SCHILL et al (1994), the main challenge for the management of global technology projects is usually not the technology management, but the management of people and of inter-organizational dynamics. These authors attest that the critical management task is to manage the attitudes, perceptions, and commitment of people. These tasks depend on the communication between the project manager and the team. For RAO (2004), managers must be able to adapt their managerial style to incorporate cultural differences.

KRISHNA et al (2004) studied cases of American, Japanese and eastern European companies interacting with software development Indian companies, and observed that different societies present different communication approaches. Indian companies, for example, pointed out that, when dealing with American customers, they need to develop written agreements and explicit documentation, strengthened by informal contacts through telephone and email, while, when dealing with Japanese, agreements are more tacit, preferentially verbal, with less frequent and more formal use of email. Another cultural aspect that emerged from this study was the attitude related to authority - in a project with an English customer using Indian programmers, in face-to-face meetings, the Indians avoided doing criticism. They preferred to express their opinion by email later. This frustrated the English project managers used to the intense interaction in meetings aiming at the development of ideas.

In some cultures, like the Japanese, it is not polite to step into a conversation during a meeting without being explicitly invited to participate, to avoid abruptly interrupting the team conversation. On the other hand, if team members are not invited to express their opinion, they are on their right to disagree with what was argued (ANAWATI; CRAIG, 2006). Also according to ANAWATI and CRAIG (2006), not all cultures feel comfortable with open discussions, and in such cases, combining conference meetings with one to one phone talks can assure that people of different cultures are included in the conversations.

A case study with a Chinese team (HUANG; TRAUTH, 2007) showed that, for Chinese people, written English is easier to understand than spoken English, what explains the fact that email (asynchronous, allowing certain time for reflection on what it is being written) is preferred instead of other communication technologies such as teleconference (synchronous, allowing not much time for careful examination and dependent on speaking skills and listening comprehension). The language barrier is sharper in situations of confrontation than in routine work, mainly in regard to speaking and listening comprehension.

According to EVARISTO and SCUDDER (2000), in geographically dispersed projects, called in this research Global Virtual Projects in face of the virtual communication, the coordination and communication among the team members are primordial, however much of the experience cumulated in the area of project management is not as useful - virtual projects

involve new challenges when compared to the usual project management practices (SOLOMON, 1995 apud EVARISTO, 2000).

Computer mediated communication (CMC)

Communication in virtual teams depends on technological support, being this preponderant in geographically or time dispersed teams. The communication process based on technology receives the name of CMC - Computer Mediated Communication, defined by WARKENTIN et al (1997) as socio-technical systems that support and increase the communication activities of team members in cooperative works. They are divided basically in two groups, synchronous and asynchronous as shown below:

Table 1 - Classification of the communication technologies in synchronous x asynchronous

Time characteristics of the CMC	Category	Examples
Synchronous	**Chat** (instant messaging)	Microsoft Messenger, ICQ
	Teleconference (audio and video)	Netmeeting, CU-SeeMe
	Data conference	whiteboards, application sharing
	IP phone	VoIP
	Electronic meeting systems	GroupSystems, MeetingWorks, TeamFocus, VisionQuest, Facilitate.com
Asynchronous	**e-mail**	Outlook, Hotmail
	Discussion forum	Lotus Notes
	Web pages	
	Groupware	intranet, newsgroups, document sharing

Source: adapted from BAJWA *et al* (2005)

Table 1 shows different types of CMC tools, used according to the communication needs. The choice and the form of use of these tools are influenced by cultural characteristics of the teams (ROBEY et al, 2000). The present research focuses in the email, chat and teleconference (audio and video).

The choice of the communication support technology has to take into account the task to be carried through, such as generation of ideas, solution of routine problems, solution of ambiguous/ complex problems, negotiation of interpersonal or technical conflicts, information sharing, etc. POWEL et al. (2004) argue that this choice also depends on individual preferences, individual experiences with the technology, easiness of use and the urgency of the task (HOLLINGSHEAD et al., 1993). MASSEY et al (2001) emphasize the national culture, not the individual preferences, as an influence factor in the perception or choice of the CMC tool (Figure 2).
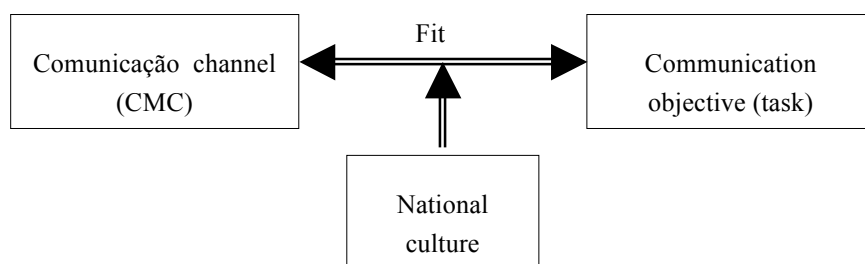
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Figure 2 – Illustration of the national culture interfering with the fit between the CMC tool and the communication task.

Source: Adapted from MASSEY et al (2001)

Culture

Among the diverse definitions of culture found in literature, that from Kroeber and KLUCKHOHN (1952) identifies it as patterns of ideas and values that mold the behavior of the individual. The learned patterns of perceptions, beliefs, values and actions are formed during childhood and strengthened throughout life (VIEGA et al, 2001 apud ILLIA; LAWSON, 2001). The cultural diversity, frequent in virtual teams, at the deeper levels, involves values, characteristics and attitudes of the team members and its effect tends to grow with time, while the effect of the diversity at the superficial level (demographic) tend to diminish (HARRISON et al, 1998 apud POWEL, 2004). People tend to like other people whose attitudes and values seem congruent with their own ones, disliking those with whom they disagree (GRIFFITT, 1974 apud POWEL 2004).

Categories of culture

Culture is presented in categories, according to DUBÉ and PARE (2001): national culture which involves values, tradition, common habits of work and behaviors common to a country; organizational culture which refers to the rules and habits cultivated by the organizations, and functional culture, where each type of professional keeps special points of view.

GUINDI and KARNEL (2003) examined the relationship between corporative culture and conflicts in multi-cultural teams and concluded that the dissemination of the corporate culture helps to mitigate these conflicts and to improve the efficiency of the team, being able to supersede the national culture.

Dimensions of the national culture

Diverse models have been conceived to allow the comparison between different national cultures. These models retrace anthropological studies which encompasses the premise that some problems are universal, such as the relation with the authority, the concept of the self - the relation between the individual and the society, and the individual concept of masculinity and femininity - and the way to deal with conflicts, including the aggressiveness and the expression of feelings (HOFSTEDE, 2005).

According to ILLIA and LAWSON (2007), four cultural dimensions are the most important for the study of virtual teams: power distance, individualism/collectivism and uncertainty avoidance from the HOFSTEDE's model (2005, p.23), and the cultural context in communication introduced by HALL (1976).

The HOFSTEDE's model (2005), verified through a survey answered by more than 50,000 IBM employees in subsidiaries in more than fifty countries in the decade of 1980 and later tested with other groups, detaches four independent dimensions that can be measured and allow comparison between cultures. Later, a fifth dimension was added to the model. In this model, each country is characterized by a score in each one of the five dimensions.

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The present research makes use of the four dimensions described below, the three first ones from HOFSTEDE's model and the fourth one from HALL's model mentioned above:

i. Power distance (varying from small to large): it characterizes the way certain cultures deal with the inequality among people (physical or intellectual capacity, wealth, power, and status). It represents in HOFSTEDE's model, the extension to which the less powerful members of institutions and organizations in a country expect and accept that the power is differently distributed. (HOFSTEDE, 2005, p.46). Typically, cultures with large power distance have preference for communication technologies with asynchronous participation, such as email (DUARTE and SNYDER, 2007).
In HOFSTEDE study (2005, p.43), the scores of the countries considered in this research are:
• Brazil: 69 points in the scale of 0 to 100, having therefore a culture of moderately large power distance.
• USA: 40 points in the scale of 0 to 100, having a culture of moderately small power distance.

ii. Individualism x collectivism (individualistic cultures versus collectivist cultures): it refers to the members' preference to act as individuals *versus* as group members. In individualistic societies, it is expected that each individual takes care of himself and of his immediate relatives. Its members feel more comfortable with loose ties among them and with the division of work (HOFSTEDE, 2005, p.76, p.101). In collectivist societies, in contrast, since birth, people are integrated in strong groups, and protect each other throughout all life in exchange of unquestionable loyalty (HOFSTEDE, 2005, p.76). Members in collectivist societies prefer to carry out activities in groups. Collectivist cultures prefer face-to-face interactions (DUARTE; SNYDER, 2007). In HOFSTEDE study (2005, p.43), score of the countries considered in this research are:
• Brazil: 38 points in the scale of 0 to 100, having a moderately collectivist culture.
• USA.: 91 points in the scale of 0 to 100, having a highly individualistic culture.

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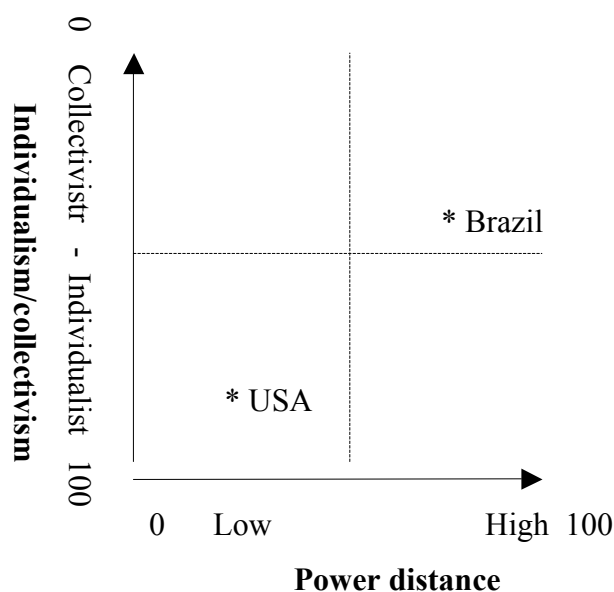
Chart 1 – approximate localization of Brazil and USA in the coordinates of the two cultural dimensions seen above: "individualism/collectivism" and "power distance".

iii. Uncertainty avoidance (varying from weak to strong avoidance): it refers to the extension to which members of a culture feel threatened by ambiguous or unknown situations (HOFSTEDE, 2005, p.167). This feeling is, among others things, expressed through nervous stress and the need for foreseeability: necessity of written and not written rules. What it is different is dangerous. Members of cultures of strong uncertainty avoidance, such as the Japanese, prefer structured situations, with clear rules and less ambiguity seek for preventing conflicts and reach consensus. In contrast, weak uncertainty avoidance cultures, such as the American and the British, demand less rules and structure and are more comfortable with the ambiguity. When uncertainty avoidance is strong, communication media that present permanence of information such as email is preferred because longer lasting register of discussions and decisions is provided. , The opposite occurs with to audio or video conference, unless they are recorded and transcript (DUARTE; SNYDER, 2007). Score of the countries considered in the case study:
• Brazil: 76 points in the scale of 0 to 100 - a culture with moderately strong uncertainty avoidance.
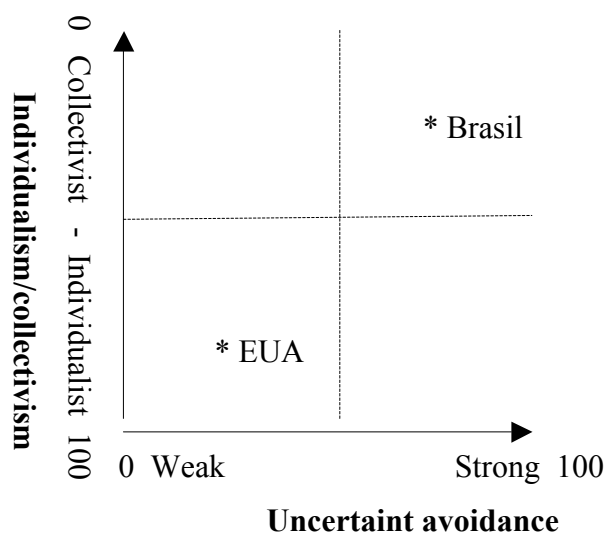• USA.: 46 points in the scale of 0 to 100, 62ª. - a culture of weak uncertainty avoidance.

Chart 2 - approximate localization of Brazil and USA. in the coordinates of two of the analyzed cultural dimensions: "Individualism/collectivism" and "uncertainty avoidance".

iv. Cultural context in communication (varying from low to high): the amount of complementary information needed for decision making, additional to information related to the fact itself. The meaning is the result of combining the facts and the context (NEULIEP, 2005). In a high-context communication, most of information is in the physical environment or in individual's mind. It is poorly codified and only part of information is explicitly transmitted. In the low-context communication, in contrast, most of the information is contained in the explicit code, in words –information is richly expressed trough the explicit code (words said - BARCZAC et al, 2006). Additionally, in high-context cultures,

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communities are created through open and frequent communications, while the low-context ones use more economical communication patterns focused in the task. High-context cultures give greater importance to the relationships and communication nuances and prefer technologies rich in information and with sensation of social presence, while the low-context ones prefer asynchronous communications (DUARTE; SNYDER, 2007).

According to DUARTE and SNYDER (2007), this dimension may be one of the most important cultural variables in global virtual teams.

Brazil presents high "cultural context in communication", whereas USA present "low context in communication" (WARDROBE, 2005).

Communication

Culture influences communication and perception/choice of the communication tools, according to their capacity to comply with the style and objective of the communication.

Communication in virtual teams occurs most frequently or totally through CMC. The Media Richness Theory describes the following capacities of the communication media and thus can help to understand how the virtual teams make use of the media (DAFT LENGEL, 1987):

Richness: capacity to convey verbal and non verbal stimulus and to facilitate the shared understanding in a fast way;

Interactivity: the measure of how fast the feedback can occur;

Social presence: the degree of proximity perceived by the participants.

The Social Presence Theory on its turn defines that tasks are different on their demand for social presence. The media fit to a certain communication task is determined by how its social present degree matches the task´s requirements (SHORTS et al, 1976). The Media Richness Theory (DAFT & LENGEL, 1984, 1986; TREVINO et al., 1987) is an alternative to the Social Presence one (RICE, 1992 apud KING; XIA, 1997) and considers that the choice of the media depends on the adequacy of its richness to the characteristics of the task.

For the study of global virtual teams, other characteristics are also relevant according to DENNIS and VALACICHI (1999):

Variety of symbols: the number of forms in which the information can be conveyed;

Rehearsability: the extension to which the message can be "fine tuned" before being sent;

Reprocessability: the extent to which one can reexamine a message received.

Communication and technology

Table 2 presents the categorization of some communication technologies regarding capabilities and characteristics seen above.

Table 2: Characteristics of some communication technologies

Capabilities Technologies	Synch/ Asynch	Richness	Feedback	Social Presence	Symbol Variety	Rehear- sability	Reproces- sability
Videoconference	Sync	High	Medium-	High	Low-	Low	Low

ALMEIDA, F. C. ; DURANTI, C. M. . Influence of cultural factors in the communication in global virtual projects Case study of a Technology company. In: XVIIIème Conférence de l AIMS, 2009, Grenoble. Actes de la conférence AIMS 2009 (Grenoble). Grenoble, 2009.

			High		High		
Telephone	Sync	Medium	Medium	Medium	Low	Low	Low
Chat	Sync.	Low	Medium	Low	Low-Medium	Low-Medium	Low-Medium
Email	Async.	Low	Low-Medium	Low	Low-High	High	High
Groupware	Async.	Low	Low	Low	Low-High	High	High

Source: adapted from Dennis, VALACICHI (1999); MASSEY et al (2001)

The media capacities must be aligned to the communication processes (DENNIS; VALACICHI, 1999). For example, the asynchronous technology may be used to diffuse information. Members don't need to focus simultaneously to this kind of information as they may need some time to react to it. Rehearseability and reprocessability became important characteristics. On the other hand, when the convergence for decision making is desired, the development of shared meaning and agreement are needed. In this case the synchronous technology is more appropriate than the asynchronous one.

The fit between communication technology and task, however, has to take into account the cultural differences among the team members as different cultures may show different communication styles (DAFT et al, 1987).

Communication styles

Culture has deep influence in the communication styles (LUSTIG; KOESTER, 2003 aupd apud HUANG; TRAUTH, 2007, p.39). Some cultural groups prefer a direct communication style whereas others prefer an indirect one where the verbal message is subtle and implicit, only slightly touching the intention of sender (MARTIN; NAKAYAMA, 2005 apud HUANG; TRAUTH, 2007, p.39).

Studies of HUANG and TRAUTH (2007) with Chinese and Americans showed the reluctance of the former in speaking without hesitation (speak-up). This is partly explained by the Chinese educational model where teachers teach and pupils just listen, whereas in the American system, pupils are encouraged to speak and to self-express well. The introverted personality characteristic of the Chinese culture (HUANG and TRAUTH, 2007) in its turn influences the behavior where the opinions are kept internal and conflict is prevented through the suppression of the feeling perspectives. This behavior is still corroborated by the Confucianism which advocates the balance in words and attitudes (MARTINSONS; WESTWOOD, 1997 apud HUANG; TRAUTH, 2007). These characteristics form the indirect communication style and valuation of the context, in contrast with the more open and direct communication characteristic of occidental cultures, such as the American (ZAKARIA et al, 2004).

When people communicate, they make forecasts about the effect of the communication, based on the expectative of how the receiver will answer (MILLER; STEINBERG, 1975 apud MASSEY et al, 2001). For these forecasts, people rely on their experience in past events and expectations for the future. Culture, being a structure shared among a group of people, influences these forecasts. The communication styles, then, reflect the values and patterns of

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the culture. A given communication technology can facilitate or harden the ability of an individual using the style of communication inherent to their culture (MASSEY et al, 2001). GUDYKUNST and TING-TOOMEY (1998) identify four styles of verbal communication:

Direct x indirect: the extension to which the sender of the message discloses its true intentions through verbal or textual communication.

Elaborated x succinct: refers to the amount of the message that has value. It can have three variations: elaborated (use of rich and expressive language), exacting (no more nor less than the necessary) and succinct (use of understatements, pauses and silence in the interaction)

Contextual x personal: the personal style refers to the use of artifacts that strengthen the sense of personal identity ("I") - use of the language centered in the individual, whereas the contextual style relates to the use of signals that emphasize the sense of identity of the role - use of language centered in the role.

Affective x instrumental: the instrumental style is focused and objective driven, whereas the affective style is focused in the receiver and is process or negotiation driven.

Relation between communication styles and culture

The table below shows the relation between some communication styles and some of the cultural dimensions (the dimension "Power Distance" is not referenced here).

Table 3: Summary of communication styles and associated cultural dimensions

Style	Cultural Dimensions High (H), Moderate (M), Low (L)
Direct	Individualistic, L-context
Indirect	Collectivist, H-context
Elaborate	M-uncertainty avoidance, H-context
Exacting	L- uncertainty avoidance, L-context
Succinct	H- uncertainty avoidance, H-context
Personal	Individualistic, L-context
Contextual	Collectivist, H-context
Instrumental	Individualistic, L-context
Affective	Collectivist, H-context

Source: adapted from MASSEY et al (2001)

RESEARCH METHOD

A survey on the perception about the virtual communication tools was applied in an American company which develops global virtual projects in the IT infrastructure field, with experienced professionals in this type of project. USA and Brazil divisions were researched. Given that the respondents work for the same company, in the company´s divisions of their respective countries, the influence of the corporate culture in the research is minimized as the respondents are subject to the same corporate culture, whereas subject to different national cultures.

ALMEIDA, F. C. ; DURANTI, C. M. . Influence of cultural factors in the communication in global virtual projects Case study of a Technology company. In: XVIIIème Conférence de l AIMS, 2009, Grenoble. Actes de la conférence AIMS 2009 (Grenoble). Grenoble, 2009.

The survey was sent to project managers and technicians accustomed to projects with members working remotely - each member in its origin country - being virtual communication the only form of contact usually available. It is an exploratory analysis, aimed at confronting characteristics found in the case with some of the concepts seen in literature.

The Brazilians from the researched group are fluent in English and do their work in the company using this language, despite the fact that it is not their mother language.

The researched groups - 34 Americans and 34 Brazilians – were then analyzed according to their classifications found in literature about the cultural dimensions Individualism/ Collectivism, Uncertainty Avoidance, Power Distance and Cultural Context in Communication. Brazil and USA are countries with different cultural profiles according to HOFSTEDE (2005) and HALL (1989), reflected in these cultural dimensions.

The survey´s questions approach the adequacy of the technology for the team´s tasks, focused in the communication processes: information conveyance and convergence. The technological tools analyzed comprehend Email, Chat and Teleconference (audio and video). The survey was adapted from surveys used in previous studies from the literature, where they had been applied to other groups of countries to detect the need for media richness in virtual communication (ILLIA et all, 2007) - and the perception of fit between different virtual communication tools and different tasks in projects – (MASSEY et al., 2001). These two approaches, found separately in literature, are combined here, as they look complementary, considering that the researched tools present different degrees of media richness (DENNIS, 1999).

The respondents were requested to indicate to which degree they agreed to 23 affirmations on the need for media richness aspects for the communication in hypothetical work situations and to which degree they agreed to affirmations on the adequacy of virtual communication tools to solve hypothetical needs. The answers were given in a Likert scale from 1 (strongly disagree) to 7 (strongly agree).

The questionnaires were sent in electronic document by email and returned answered in the same way during the second quarter of 2008.

Each question answered by the group of Brazilians is compared with the same question answered by the group of Americans, having the independence hypothesis been tested through Qui-square statistics:

Null hypothesis, H0: there is no association between the groups, the variables are independent. The difference between the answers from the two groups is significant

Alternative hypothesis, Ha: there is association between the groups, the variables are dependent. The difference between the answers of the two groups is not significant.

For each question, the answers from the two groups are given in the form of frequencies for the options 1 to 7 on the scale and the values of Qui-square and the probability p are calculated. In case the probability p is less than 5%, H0 is accepted (or not rejected, as the difference is statistically significant) with 5% of significance (the maximum probability of error), otherwise H0 is rejected and Ha is accepted (statistically not significant difference).

ALMEIDA, F. C. ; DURANTI, C. M. . Influence of cultural factors in the communication in global virtual projects Case study of a Technology company. In: XVIIIème Conférence de l AIMS, 2009, Grenoble. Actes de la conférence AIMS 2009 (Grenoble). Grenoble, 2009.

After the analysis of each question´s Qui-square test, a joint vision of the results is checked through Correspondence Analysis, which shows the variables disposed in rows and columns in a chart.

Given the premise that the main cultural dimensions that influence the use of communication media by the individuals are uncertainty avoidance, power distance, individualism/ collectivism and cultural context in communication (ILLIA; LAWSON, 2007, MASSEY et al, 2001), and that the studied groups fit in the classification below for Brazilian culture and American culture, it is possible to check if the group of Brazilians presents higher necessity of media richness compared with the group of Americans, as expected according to what was seen in literature.

Brazilian culture (HOFSTEDE, 2005; HALL, 1989): intermediate uncertainty avoidance, intermediate power distance, intermediate collectivism and intermediate context in communication.

American culture (HOFSTEDE, 2005; HALL, 1989): low uncertainty aversion, low power distance, low collectivism and low context in communication.

ALMEIDA, F. C. ; DURANTI, C. M. . Influence of cultural factors in the communication in global virtual projects Case study of a Technology company. In: XVIIIème Conférence de l AIMS, 2009, Grenoble. Actes de la conférence AIMS 2009 (Grenoble). Grenoble, 2009.

RESULTS

Necessity of media richness as a function of the culture

The first set of seven questions, adapted from ILLIA; LAWSON-BODY (2007), directly measures the importance attributed by the respondents to the characteristics of media richness in a hypothetical situation where he/she needs to get clarification on an ambiguous direction from a colleague. The answers vary from 1 (strongly disagree) to 7 (strongly agree with the statement).

Table 4 – Frequency of answers between 5 and 7 from the groups of Americans and Brazilians for questions on the necessity of media richness

Q	Question about the need for media richness Situation: If you need to get clarification of an ambiguous directive from your colleague	Freq. agreement BRA	Freq. agreement USA	P (Chi-test)
1	It's important that the communication medium can convey cues like voice inflection and mood	29	17	**0,00**
2	It is important that the communication medium can convey cues like gesture and body language	16	8	**0,00**
3	Is it important that the communication medium provides a mean to be aware of the communication context in which my communication partner is (daytime, weather, etc.)	13	14	0,11
4	It is important that the communication medium allows me to get instant feedback from my communication partner	30	26	**0,00**
5	It is important that the communication medium allows having communications where my words and my language are tailored to the person I am dealing with	24	24	0,52
6	It is important that the communication medium allows using a variety of languages including sign language	12	11	0,74
7	It is important that the communication medium allows using a variety of languages including symbols and graphics	22	17	0,17

ALMEIDA, F. C. ; DURANTI, C. M. . Influence of cultural factors in the communication in global virtual projects Case study of a Technology company. In: XVIIIème Conférence de l AIMS, 2009, Grenoble. Actes de la conférence AIMS 2009 (Grenoble). Grenoble, 2009.
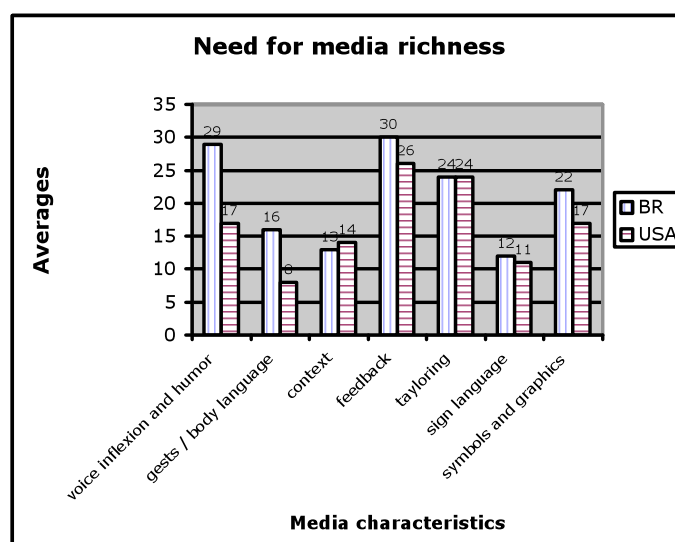
Chart 3 - Frequency of answers between 5 and 7 from the groups of Americans and Brazilians for questions on the necessity of media richness.

The frequency of answers between 5 and 7 (agreement with the statement) gotten from the group of Brazilians for the questions on the importance of the elements that characterize the media richness were in general higher than those gotten from the group of Americans, indicating the trend that media richness is more valued by the Brazilians, what is coherent with the expected results considering the cultural dimensions from the literature where the Brazilian culture presents higher uncertainty avoidance and higher cultural context in communication (ILLIA; LAWSON, 2007) compared with the American culture. Statistically, 3 out of the 7 questions on media richness presented significant differences between the groups of Brazilians and Americans, these three being those that approach the media capacity to transmit multiple tips such as voice inflection, mood, gestures and corporal language, and instantaneous feedback. This suggests that the Brazilians would prefer communication media that convey multiple pieces of information about the context of the communication, such as audio and videoconference, for example. In the same way, communication tools which allow instantaneous feedback (online) would be preferred.

Perception of the tool's adequacy as a function of culture

The second set of questions (8 to 23), adapted from MASSEY et al (2001), measures the perception of the respondents about the adequacy of the virtual communication tools - email, chat, teleconference and videoconference - for the hypothetical necessities of convergence (necessity of decision making and necessity of reaching an agreement) and conveyance of information (necessity to share opinion and necessity of self-explaining). In some cases the question/affirmation is made in negative form.

<u>Situation of convergence</u>

Perception of the adequacy of the tool for decision making

Table 5 - Frequency of answers between 5 and 7 from the groups of Americans and Brazilians for questions about the communication media fit to support decision making.

Q	I find this tools useful in facilitating decision making	Freq.agreement BRA	Freq.agreement USA	P Chi test
8	Email	21	24	0,33
12	Chat	18	27	**0,00**
16	Teleconference	32	32	0,88
20	Videoconference	27	19	**0,00**

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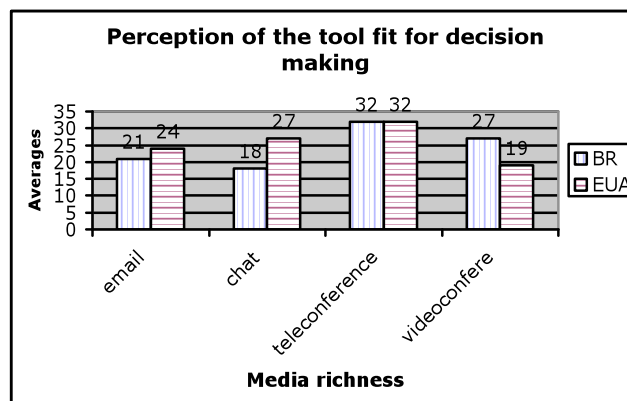
Chart 4 - Frequency of answers between 5 and 7 from the American and Brazilian groups for questions about the fit of the communication tools to support decision making.

Significant difference in the preference of the group of Americans for the chat (synchronous tool) was evidenced, whereas the same was not observed in relation to email. This could be explained by the fact that individualistic, low-context and low uncertainty avoidance cultures tend to prefer to make decisions through a more direct and linear communication process where debate and confrontation are valued (GUDYKUNST, 1988 apud MASSEY et al, 2001). This can become difficult through a simple and asynchronous tool, such as email. Collectivist, high-context and higher uncertainty avoidance cultures tend to prefer to make decisions through more indirect and subtle communication that appraises the hierarchic relations and a calculated degree of imprecision to avoid conflict. The difference observed in relation to the videoconference, better perceived by the group of Brazilians, could be attributed to its higher richness, meeting what was seen in literature, in function of the considered cultural dimensions, given that the Brazilian culture is collectivist, presents higher uncertainty avoidance and higher context in the communication when compared with the American culture.

Perception of the tool's adequacy to reach an agreement (NEGATIVE affirmation)

Table 6 - Frequency of answers between 5 and 7 from the groups of Americans and Brazilians for questions about the fit of the communication tools to support the reach of an agreement.

Q	When my team disagrees, communicating through this tools makes it difficult to come to agreement	Freq.agreement BRA	Freq.agreement USA	P Chi test
9	Email	28	22	**0,00**
13	Chat	20	17	0,79
17	Teleconference	3	4	0,42
21	Videoconference	2	3	0,34

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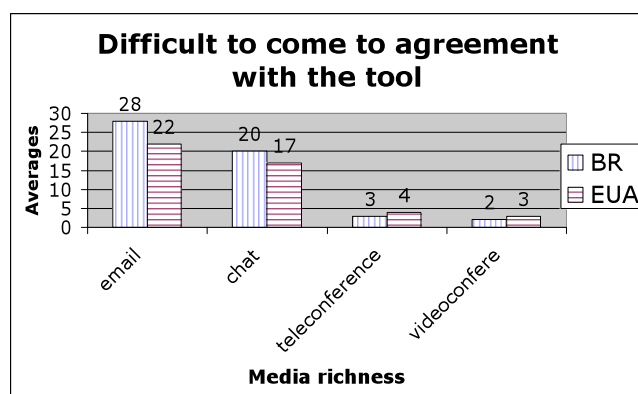
Chart 5 - Frequency of answers between 5 and 7 from the groups of Americans and Brazilians for questions about the fit of the communication tools to support the reach of an agreement.

As in the previous case, some preference of the group of Americans for the lower richness tools is noticed (email and chat), in detriment of the higher richness ones (teleconference and videoconference), this time for the seeking of an agreement, the affirmation having been done in negative form. Looking from the left to the right side of the chart, between the email at left (lower richness media) and the videoconference at right (higher media richness), a decrease in the frequency of agreements can be seen for both the Brazilians group and the Americans group as well. Considering that the affirmation was stated in negative form ("the tool makes it difficult to reach an agreement"), the result meets what is expected according to the media richness theory (DAFT et al, 1987) in view of the complex situation of an agreement seek, which demands higher media richness. In the case of email, the differences in the answers from the Brazilian and American groups were statistically significant in the Qui-Square test, showing this asynchronous tool to be more valued by the group of Americans. Significant difference was not found with regard to chat, to teleconference and videoconference, despite the differences in the frequencies, observed mainly for the videoconference.

Situations of information conveyance

Question on perception of the tool fit to share opinion (NEGATIVE affirmation).

Table 7 - Frequency of answers between 5 and 7 of the groups of Americans and Brazilians for questions on the adequacy of the communication tools for the sharing of opinion.

Q	Communicating through this tools gets in the way of me sharing my opinions	Freq.agreement BRA	Freq.agreement USA	P Chi-test
10	Email	5	9	0,07
14	Chat	11	6	**0,00**
18	Teleconference	3	7	**0,00**
22	Videoconference	5	9	**0,01**

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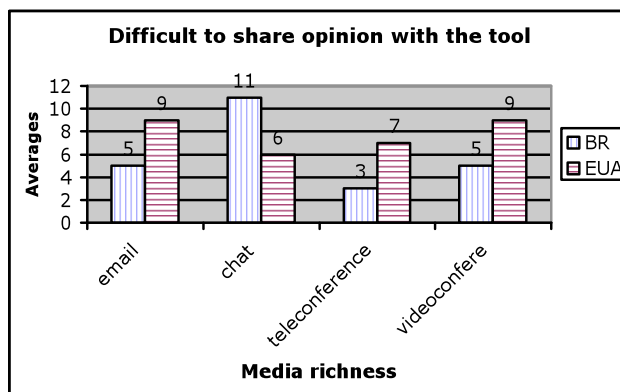
Chart 6 - Frequency of answers between 5 and 7 from the groups of Americans and Brazilians for questions about the fit of the communication tools for opinion sharing.

In this case also, a better perception of the teleconference and videoconference tools – higher richness – was observed in the group of Brazilians. The difference was statistically significant for both tools. Some difference was found in relation to email, however not statistically significant. Considering only the frequency of agreements, the email was most accepted by the group of Brazilians for opinions sharing (less difficulty in sharing opinions through the email). The asynchronous characteristic of the tool can be responsible for this result by allowing more time for the composition of the message (rehearseability), considering that the communication is not made in the mother-language of the Brazilian group. The significant preference of the group of Americans in relation to chat in comparison with the group of Brazilians could be attributed to the fact that members of individualistic and low-context cultures tend to express and accept the communication by its face value (MASSEY et al, 2001). The simple communication environment of the chat allows the personal and instrumental communication styles, which are inherent to the individualistic and low-context cultures, accustomed to express opinions centered in the communicator (MASSEY et al, 2001).

Question on perception of fit of the tools for self-explanation

Table 8 - Frequency of answers between 5 and 7 of the groups of Americans and Brazilians for questions about the fit of the communication tools for teams discussions.

Q	I can easily explain myself through this tool in team discussions	Freq.agreement BRA	Freq.agreement USA	P Chi test
11	Email	29	25	**0,00**
15	Chat	22	21	0,73
19	Teleconference	34	32	0,03
23	Videoconference	30	23	**0,00**

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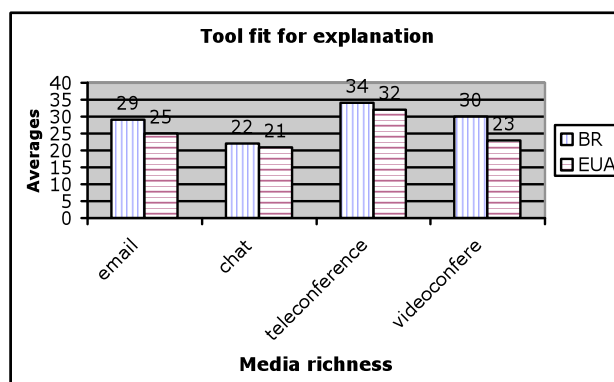
Chart 7 - Frequency of answers between 5 and 7 from the groups of Americans and Brazilians for questions on the fit of the communication tool for team discussions.

The difference found was statistically significant in the cases of email, teleconference and videoconference, having the group of Brazilians showed perception of higher utility in these tools than the group of Americans. In relation to the teleconference and the videoconference the result found meets what is expected in function of these tools to present higher richness which is more appraised by collectivist and high-context cultures. According to MASSEY et al (2001), high-context cultures make use of contextual and affective communication styles and its members need to know if they have been understood by the others. Regarding the email, as in the previous case, the asynchronous characteristic of the tool can allow more time for the composition (rehearseability), an interesting characteristic for the group of Brazilians for not to communicate in its mother language. Regarding chat, a significant difference was not observed.

Joint view of the results about the tools perception.

The variables chosen for the Correspondence Analysis are GROUP (group of respondents: Brazilian and American) and TOOL.

The groups were subdivided in:

a. "Brazilian in favor of the tool" / "American in favor of the tool";

b. "Brazilian against the tool" / "American against the tool"

Where, "against the tool", indicates the attribution of degree 1 the 4 to the fit of the tool for the set of activities presented in the questionnaire. On the other hand, "in favor of" indicates the attribution of degree 5 the 7 to this fit.

These groups should be analyzed separately "Brazilians in favor of the tool" *versus* "Americans in favor of the tool" in one analysis and, "Brazilians against the tool" *versus* "Americans against the tool" is another analysis. The tools are email, chat, teleconference (only audio) and videoconference. The complement of the frequencies of the answers from 1 to 7 have been taken for the questions with negative statements and consolidated for each tool.
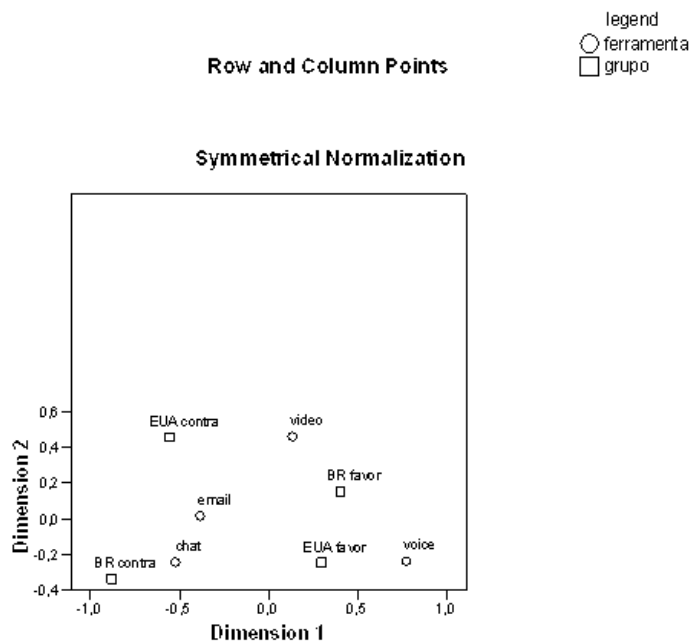
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Chart 8 - Correspondence Analyzes of the dimensions GROUPS and TOOLS.

Interpretation of the chart:

Points (line and column) that are next to each other are more related than the distant ones. The first dimension separates those in favor of the tool ("BR in favor" and "USA in favor"), more to the right in the graph, from those against to the tool ("BR against" and "USA against"), more to the left.

Respondents in favor of the tool - it is observed that the "BR in favor" is nearer to videoconference and teleconference than to email and chat, which illustrates its preference for higher richness tools. Moreover, "BR in favor" is considerably nearer to video than the group "USA in favor", illustrating the preference of the group of Brazilians for this tool, compared with the group of Americans. This meets the result of the research from BEISE et al (2004) carried through an American company, where the videoconference was pointed by IT project managers as the less essential tool, under the allegation that the audio-conference would be capable to reach the same results, in spite of the latter one not to allow the perception of signals from facial expression by the listeners. The same was not detected regarding teleconference with audio only, from which Brazilian and American are practically equidistant.

Respondents against the tools - the analysis of the points in the graph illustrates the opposite of the distances found for the groups in favor of the tools, with "Brazil against" sufficiently more distant from videoconference than "USA against".

CONCLUSIONS

The results of the research show considerable difference between the answers from the Brazilian and American groups regarding the interest for characteristics of media richness. The media richness theory does not deal with the cultural difference as a moderating factor. Other studies, however, show the effect of the cultural differences, measured through the

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cultural dimensions. The results of this study point in the direction that the media richness tends to be more important for the group of Brazilians than for the group of Americans.

Other factors beyond the national culture can have influenced the results gotten in the research. Among them, there is the corporative culture, the fact that the respondents work under standardized processes of the same company to which they must adjust, and the fact that they have had joint experiences that can have led to a process of homogenization of the tools use practice. These factors, however, would act in the direction to mitigate the differences, not having been enough, however, to eliminate them, according to the results found.

TOPICS FOR FUTURE RESEARCH

Future research on this field could include the quantification of the individual classification of the researched groups in the cultural dimensions, allowing a quantitative analysis of the existing correlation between the perception about the communication tools and the scores in the cultural dimensions. The communication styles also would deserve quantification, together with the cultural dimensions to which they are related in this work in a qualitative way only. Studies on the power of mitigation of corporative culture in relation to the differences of national culture to approach communication problems would have applicable character.

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