THE BROKEN CHAIN IN CROSS-CULTURAL SOFTWARE DEVELOPMENT: COMMUNICATION, MEDIA CHOICE, AND APPROPRIATION

"Research in Progress"

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Abstract

As globalization increases, globally distributed projects have become more common and while organizations achieve a number of advantages in utilizing offshore labor, conducting such projects is not without risk as project failures are common. It has been identified that a majority of project failures are caused by a failure in communication. We investigate the cross-cultural communication process and how factors such as culture and media are impacting it through the lens of Media Synchronicity Theory. We assess particularly the significance of media capabilities in the choice and appropriation of a medium and the role they have to enable (or suppress) particular communication purposes. We integrate our findings into literature on culture and communication and utilize Hall's cultural dimensions to derive and test propositions on how culture affects communication through media choice and appropriation. Following Eisenhardt's approach, we are building theory from case data assuming an inductive approach with the aim of detecting existing relationships between culture, media synchronicity, and communication performance. To achieve that, we develop a communication action chain to help deconstruct a number of communication episodes into separate links and examine the role of expectational differences as source of the communication failure.

Keywords: cross-cultural communication, action chains, media synchronicity theory, requirements elicitation.

1   Introduction

As globalization increases, globally distributed projects have become more common and while organizations achieve a number of advantages in utilizing offshore labor, conducting such projects is not without risk as project failures are common (Christel et al. 1992). Previous studies have identified a number of reasons for project failure in globally distributed software development teams (GSD) (Glaser 2004), such as distance (Zowghi 2002) and labor coordination. However, as teams in global software development projects are usually composed of members from diverse cultural backgrounds, cultural diversity (Casey 2009, Cruzes and Dyba 2011), and communication have proven to be especially problematic (Walsham 2002, Nakakoji 1996, Zowghi 2002, Huang and Trauth 2007, Verner et al. 2012). This is especially prevalent during requirements elicitation as it is one of the most communication-intensive processes during software development (Coughlan and Macredie, 2014).

The results of past research on the effects of culture on cross-cultural software development, however, have been mixed. It has been found that in some cases differences in culture lead to poor performance (Hofstede 1991), while in other cases no difference in performance has been found (e.g. Maznevski 1994, Maznevski 2000). Due to its emphasis on communication and because it is considered the groundwork of much of the cultural research to this date (i.e. Hofstede 1980, Trompenaars and Hamp-

den-Turner 1994), we adopt Hall's cultural classification to examine the cross-cultural communication process in global software development from an anthropological perspective.

Much of the research on communication and media has relied on Media Richness Theory to support its findings (e.g. Leonard et al. 2009). However, several studies have disproved its usefulness (e.g. El-Shinnawy and Markus, 1992; Mennecke et al., 2000; Vickery et al. 2004). While previous research has established that richer media usually increase communication performance (with face-to-face being the richest medium) (Daft and Lengel 1986), in the context of globally distributed projects, frequent face-to-face communication is often neither feasible, nor possible and gives rise to a number of different conflicts (Maruping and Agarwal 2004). Alternative solutions have been identified to facilitate communication in distributed locations such as prototypes, instant messaging, and computer based interviewing (Herbsleb and Mockus, 2003; Kankahalli et al. 2007; Vlaar et al. 2008), but the results of which cultures prefer what type of medium to achieve successful communication have been inconclusive (Richardson and Smith, 2007; Setlock et al., 2004; Massey et al. 2001).

To update some of the premises of MRT, Dennis et al. (2008) developed Media Synchronicity Theory (MST). Previous research on MST in the context of Global Software Development (GSD) lends support to using media with low synchronicity (e.g. e-mail, bulletin board) for conveyance of information (Fernando et al. 2011, Niinimaki, 2011) and using media with high synchronicity (e.g. face-to-face, video conference) for convergence on shared meaning (DeLuca and Valacich, 2005). While basic tenants of the theory could be verified (many of them in retrospect), factors that influence the appropriation of a medium especially in cross-cultural software development as well how the theory relates to the communication process per se (which is bi-directional) have been under investigated. One such factor is culture.

Although past research on the topic of communication within software development project teams has identified, that cultural factors can contribute to problems in the cross-cultural communication process, conclusive results on how specifically culture influences communication, what happens when successful communication does not take place, and why, have not been determined. An updated approach to this important research topic is necessary and Media Synchronicity Theory provides an alternative way to explain media choice and media appropriation among individuals in cross-cultural communication.

Specifically, we are attempting to answer the following research questions:

1) How and why do individuals' cultural differences influence communication performance in cross-cultural software development teams?

2) What role do media choice and media appropriation play in the cross-cultural communication process?

A case study is conducted to test the influence of culture on media choice and appropriation based on the propositions of MST. We investigate the communication processes among members of a cross-cultural, globally dispersed software development team of a large multi-national corporation where individuals in the United States and Asia collaborated on a team project to create a commercial website for the client in Asia. We investigate media choice and the related communication outcome from a multilevel perspective and examine how individuals' national culture affects team communication processes. In our analysis, we will be deconstructing the cross-cultural communication process into sequential steps and uncover those steps that facilitate or inhibit communication. We utilized Hall's concept of "Action Chains" (Hall 1976) which describe a sequence of events necessary to complete a communication process and derived a number of communication episodes. Examining processes this way allows for detecting those links that are problematic and may benefit from further investigation when addressing issues in intercultural communication. These action chains will be examined based on Howell's dyadic communication process for intercultural communication which helps us in addressing individual cognitive issues, such as differences in expectations that ultimately lead to failed communication outcomes.

Motivated by calls for an in-depth understanding of the process of requirements elicitation, validation, and management of requirements between cultures (Zowghi 2002, Damian 2007) and the acknowledgment that so many subsequent activities depend on accurate requirements elicitation (Appan and Browne 2012), this study examines the action chains of media choice and use in communication between cultures towards arriving at mutual understanding of needed requirements to be built into the new system. Theoretically, this is the first study to extend research on MST to the cross-cultural context. In addition, we propose a set of recommendations for project managers to ease communication processes in cross-cultural projects so that frustrations and misunderstanding can be avoided in the future.

2 Literature Review and Theoretical Development

2.1 Media Theories

Media Synchronicity Theory (MST) was conceptualized as an extension and new explication of MRT (Dennis et al., 2008) to account for factors other than media richness and focus more on performance outcomes. The theory illustrates the transmission and processing capabilities of a communication medium (Dennis et al., 2008) and takes into account the communication purpose (conveyance, convergence) as well as appropriation factors to predict communication performance. Media synchronicity is defined as "the extent to which the capabilities of a communication medium enable individuals to achieve synchronicity" (Dennis et al. 2008, p. 581). Conveyance and convergence are the two primary communication purposes that an individual selects during either transmission or processing of information. *Conveyance* is the unidirectional transmission of new information to enable the receiver to create and revise a mental model of the situation (adapted, Dennis et al. 2008). This often represents the delivery of substantial information. The processing of the information is slow and more often retrospective. *Convergence*, then, is the discussion of preprocessed information about each individual's interpretation of a situation, not the raw information itself. The objective is to agree on the meaning of the information, which requires individuals to reach a common understanding and to mutually agree that they have achieved this understanding (or to agree that it is not possible) (Lind and Zmud 1991). During processes where convergence is required, there is a greater need to quickly transmit and process a smaller volume of information to develop a shared understanding. Conveyance and convergence are supported to a varying degree by the transmission and processing capabilities of the media. Media capabilities are "potential structures provided by a medium which influence the manner in which individuals can transmit and process information" (Dennis et al. 2008). Transmission capabilities of a medium incorporate features such as transmission velocity, parallelism and symbol sets, whereas processing capabilities include reprocessability and rehearsability.

Transmission velocity is the speed at which a medium can deliver a message to the intended recipient, parallelism describes the extent to which signals from multiple senders can be transmitted over the medium simultaneously, and symbol sets are the number of ways in which a medium allows information to be encoded and decoded for communications.

Rehearsability is the extent to which the media enables the sender to rehearse or fine tune a message during encoding, before sending it, while reprocessability is the extent to which the medium enables a message to be reexamined or processed again, during decoding, either within the context of the communication event or after the event has passed.

Therefore, it is assumed that communication performance depends on the level of media synchronicity, i.e. the extent to which the capabilities of a communication medium enable individuals to achieve conveyance or convergence purposes (adapted, Dennis et al. 2008).

Previous research on media choice in the context of Global Software Development (GSD) lends support to using media with low synchronicity (e.g. e-mail, bulletin board) for conveyance of information (Fernando et al. 2011, Niinimaki 2010) and using media with high synchronicity (e.g.

face-to-face, video conference) for convergence on shared meaning (DeLuca and Valacich 2005). While basic tenants of the theory could be verified (many of them in retrospect), factors that influence the appropriation of a medium especially in cross-cultural software development have received less attention. One such factor is culture.

2.2   Culture

It has been established, that culture is a variable essential in the investigation of how different groups of individuals interact with information systems (Leidner and Kayworth, 2006). According to Leonard et al. 2009 (p. 850), "Culture influences what people communicate, to whom they communicate, and how they communicate". We investigate the cross-cultural communication process in software development teams from the perspective of national culture as we are particularly interested in how an individual's national culture (not a firm's organizational culture) affects the communication process in cross-cultural software development teams. Prior studies have examined the impact of culture on a number of issues such as risk perception (Keil et al. 2000, Peterson and Kim 2003), the use and implementation of IT (Ein-Dor, Segev and Orgad 1993; Martinsons and Westwood 1997), organizational climate (Tan et al. 2003), decision making (Calhoun et al. 2002), and knowledge sharing (Yoo and Torrey 2002) in cross-cultural software development. The results of past research on the effects of culture on cross-cultural software development, however, have been mixed. It has been found that in some cases differences in culture lead to poor performance (Hofstede 1991), while in other cases no difference in performance has been found (e.g. Maznevski 1994, Maznevski 2000). Cultural aspects, such as hierarchical perceptions, orientation towards the future, relationship building, and time were measured and results indicate that especially rigid organizational hierarchy perceptions and predeterministic thinking negatively influenced performance in cross-cultural teams (Swigger et al. 2004).

Hall's cultural classification considers "culture in its entirety a form of communication" (Hall 1959, p. 51) and conceptualizes it into high- and low-context culture. Cultural affiliation can be determined essentially by the following elements: context, time (monochromic vs. polychromic), and space. The theory classifies individuals' cultures into high- and low-context cultures and each individual belongs to either of the two groups. However, the affiliation is based on a continuum where some cultures may be higher or lower on the two dimensions. Hall's cultural classification focuses on context and meaning. Generally speaking, western cultures lie lower on the context scale than eastern cultures with Chinese and Japanese leading the high context scale, and Scandinavians, Germans, and Americans the low context scale. Hall's analysis of intercultural communication is less focused on what is taking place linguistically and concentrates instead on how communication relates to context. For this reason, issues related to language per se are considered to be less vital in determining the effect of culture on communication (as language in itself is a symbolization of a symbol, Luna et al. 2002). The primary focus and the role of culture on communication lies in the way a message and information receives meaning relative to the way it is contextualized. From these premises, Hall deduced that the essential difference between cultures is their location on a context scale ranging from low to high.

Past research on the potential usefulness of Hall's cultural classification has confirmed that the descriptive characteristics used in Hall's classification hold true in empirical settings (Kim et al. 1998) and have been used extensively in a number of cross-cultural communication studies (e.g. Gudykunst and Nishida 1986, Okabe 1983) as well as studies on website use and development (e.g. Usunier and Roulin 2010; Wuertz 2006). It has been shown that users from low-context cultures prefer more explicit messages, while individuals from high-context cultures relied more on implicit messages. Studies investigating the time dimension (Rose et al. 2003) have confirmed that individuals from low-context cultures (monochromic) were more concerned with download times than individuals from high-context cultures (polychromic), demonstrating the relevance of time perception in the investigation of culture and communication.

2.3   Intercultural Communication

The intercultural communication process and its various elements have received much attention from scholars in disciplines such as psychology, anthropology, and communication. It has been established that communication in global, cross-cultural teams is particularly complex, especially as it is mediated by information technology as enabler for communication where face-to-face meetings are not probable due to distance. Misunderstandings due to the various channels and media available for communication, thus, are more likely, warranting a thorough analysis of how not only choice of a medium but also its appropriation influence communication outcome (Watson-Manheim and Belanger 2002).

According to Barna (1994) among the six reasons for failures in intercultural communication is a false assumption of similarity between the individuals participating in the communication. This false sense of similarity, in turn, induces in individuals a false set of expectations - or a set of expectations in accordance with their own behaviour without being aware of the differences - inevitably leading to miscommunication. Hence, to understand the communication process among individuals in software development teams, we are utilizing Howell's (1979) Interactive Dyadic Model of Communication that divides the inter-personal communication process into separate distinctive episodes while addressing expectational differences as a result of dissimilarities in cultural background.

According to Howell (1979), a communication process is episodic, localized in time and space, and only happens in one unique instance. The process is iterative and cyclical, where each message sent by an individual influences the response from the other individual (Howell 1979). As the sender sends his message to the receiver, he prepares himself for a response from the receiver while the receiver, in turn, receives the message and responds according to his perception of what he assumes the sender intended him to do. If *expectations* in terms of messages sent and received by the individuals are met, the communication proceeds uninterruptedly. If, however, expectations of either the way a message is received, the purpose of the message, or the message content do not match the other person's expectations, the dialogue is interrupted. This happens, when either one or both of the individuals have expectations - i.e. are referring to reference frames that are stored in their cognitive systems from experiences that happened in the past - in order to make sense of such interruptions (Howell 1979).

Successful communication, then, depends not only on media choice, but also the way individuals appropriate such media. The majority of studies on media choice have had a more closed focus on predicting the choice of media alone (Daft et al. 1987, Trevino et al. 1990), without investigating the process of communication itself and how it relates to task and actual communication performance (Dennis and Kinney 1998, Yoo and Alavi 2001). Nevertheless, as media choice is the first step in the communication process and a medium's capabilities, such as amount of information to be presented, speed of information delivery, possibility of immediate feedback etc. determine the continuance of the communication process, it is essential to pay significant attention to the effects that culture has on media choice.

As we have started our process of deconstruction by elucidating the overall interactive structure of the process, we are now attempting to break this cyclical process into a chain of specific steps that take place during each and every single communication episode, applicable independently of whether participants are from the same or different cultures. As according to Howell (1979), "every communication event is an episode, a 'film clip' with an arbitrarily selected initiation and termination" (p. 24), we are conceptualizing communication as episodic and assume that each communication episode consists of a chain of actions and refer back to Hall's (1976) conceptualization of action chains:

"An action chain is a set sequence of events in which usually two or more individuals participate. It is reminiscent of a dance that is used as a means of reaching a common goal that can be reached only after, and not before each link in the chain has been forged. Like frames, action chains can be simple, complex, or derived" (Hall, 1976 p. 124). If a link within the action chain is not executed in a way to meet the communication partner's expectations in terms of media choice and appropriation, an action chain is broken. Action chains are important to be examined in the process of intercultural communication as the propensity to complete an action chain varies depending on culture. Due to their high

involvement, high context individuals tend to be more committed to complete action chains, whereas low context individuals are less inclined to do so, especially in circumstances where things are not going their way (Hall, 1976). Particularly in communication episodes, where individuals from high context cultures communicate with individuals from low context cultures, action chains are more likely to be broken.

For the process of intercultural communication, we propose an action chain that consists of four links: Communication Purpose, Media Choice, Information Presentation, and Media Appropriation. For the communication process to be completed successfully, each link in this action chain must be executed so that the sender's and receiver's expectations are in alignment and ultimately, the media are appropriated by the receiver in the way the sender intended.

2.4 Cultural Dimensions and Media Capabilities

To elucidate the interplay between culture, media, and communication, we have summarized applicable characteristics of the cultural dimensions relevant in our study predominantly based on Hall's Cultural Classification (see Table 1.). Referring to MST's media capability traits, we assume that those factors explain much of the individuals communication behaviour related to media choice as a reflection of each medium's capabilities (see Appendix B.).

	HC	LC
Hierarchy (power distance)	High power distance, many hierarchical levels, expectation of inequality	Flat organization structure, consultative or participative management style, egalitarianism
Group Behavior (Individualism/Collectivism)	Collectivistic – group welfare prioritized, embrace values such as training and skills	Individualistic – individuals are independent of others, embrace values such as personal time, freedom, and challenge
Time (Polychromic/ Monochromic)	Polychromic – Interact with several people at once, involvement of people and completion of transactions is valued	Monochromic - Prefer to do one thing at a time
Communication Style	Indirect – ambiguous, understated, non-confrontational, little information is in coded message (in within culture), most of the information is in context, non-linear, less rational, fast, economical	Direct – transparent, linear, most information vested in explicit code, emphasize rationality and logic, expressing feelings openly, content does not require much additional interpretation

Table 1. Cultural Dimensions for High- and Low-Context Cultures

Based on the characteristics in Table 1. and Appendix B, we have derived a number of broad, preliminary propositions to guide us in our data analysis which are subject to change as we follow along in the analysis process.

We propose that due to a lack of capabilities such as rehearsability and reprocessability, individuals from HC cultures prefer to choose media lower in synchronicity when communicating with individuals from low context cultures. In cultures that are predominantly collectivistic in orientation, individuals prefer to discuss information with their team members as well as superiors first before communicating to individuals from lower context cultures. As more than one individual will have to receive as well as reprocess the message, reprocessability is particularly important. Rehearsability is necessary to craft a message carefully and thoroughly supportive of their desire to have fast and economical conversations. Individuals from lower context cultures, on the other hand, as they are more individualistic are less likely to be in need of media capabilities supporting either reprocessability or rehearsability as their social structures and decision making is more decentralized and does not necessarily require approval of a superior or other team members.

P0: High context cultures tend to rely more on media with lower synchronicity when communicating with low context cultures than low context cultures when communication with HC cultures.

Moreover, even though individuals from HC cultures are inclined to use language featuring numerous symbol sets (such as gestures and other non-verbal cues) when talking among themselves, the distress caused by a lack of understanding lower context cultures' symbol sets (or lack thereof) leads to a preference for media disabling the display of symbol sets to suppress the noise caused by potential confusions. LC individuals, in comparison, as the majority of the message in their communication style is vested in explicit code, written text is sufficient to deliver a message and high symbol sets are not required.

Furthermore, we propose that if an individual attempts to achieve <u>convergence</u> and chooses a medium that has capabilities supportive of that (capabilities: high support for symbol sets, high transmission velocity, high parallelism) such as face-to-face (high) or phone (medium), the action chain may break due to either the information presentation by the sender, the appropriation of the chosen medium by the receiver or both and that if an individual attempts to achieve <u>conveyance</u> and chooses a medium that has capabilities supportive of that (capabilities: high support for reprocessability and rehearsability) such as email (medium/high) or documents (low), the action chain may break for the same reasons.

P1a: Even if media with the right level of synchronicity are chosen, the action chain may be broken due to information presentation and media appropriation.

Both of these breaks are caused by expectation misalignment 1) because of the way the sender presented his/her message to the receiver in terms of the amount of information presented (e.g. long vs. short emails, level of detail), the structuring of that information (e.g. number of receivers addressed in one conversation, number of topics addressed in one conversation), and/or the type of information presented (new or pre-processed information) and 2) because of a mismatch between the way the sender anticipated the receiver to appropriate a medium and the way the receiver actually did (e.g. discussion vs. listening)

Following similar logic, even in cases where media synchronicity propositions are fulfilled, the receiver may not appropriate the medium as intended by the sender which may lead to response (or lack thereof) not aligned with the expectations of the sender. We propose that reasons for such a misappropriation are rooted in cultural differences based on the cultural dimensions we have developed above, such as communication style, group behaviour, or hierarchical predisposition.

P1b: Even if media with the right level of synchronicity are chosen and information content is presented as expected by the receiving culture, the action chain may be broken due to appropriation of the medium.

Lastly, if an individual attempts to achieve <u>convergence</u> and fails to choose a medium that has capabilities supportive of that (capabilities: high support for symbol sets, high transmission velocity, high parallelism) such as face-to-face (high) or phone (medium), the action chain may break due to the information presentation by the sender resulting from the mismatch of communication purpose and media choice and if an individual attempts to achieve <u>conveyance</u> and fails to choose a medium that has capabilities supportive of that (capabilities: high support for reprocessability and rehearsability) such as email (medium/high) or documents (low), the action chain may break for the same reason.

P1c: If information is presented through a medium in a way that it doesn't match the communication purpose, the action chain will break.

For example, similarly to the above, individuals from high context cultures are more inclined to choose media lower in synchronicity for convergence due to their preference to avoid the need to having to interpret unknowns symbol sets of individuals from lower context cultures. On the contrary, LC individuals may be choose high synchronicity media for conveyance because of their open, participatory communication style and hierarchical perspective. Discussion and active participation are generally encouraged so media enabling convergence and bidirectional communication are more likely to be chosen.

3   Methodology

A case study methodology is used to examine the cross-cultural communication process and determine those factors that are influential for successful communication outcome. We are following Eisenhardt's (1989) approach in building theory from case data by analyzing a number of communication scenarios and derive propositions guided by comparisons of our analysis results with the existing literature. We assume an inductive approach with the aim of detecting existing relationships between culture, media synchronicity, and communication performance to answer our research questions without generating specific a priori hypotheses (Baba et al. 2004). As it is our aim to build instead of solely test theory, we will be initiating the analysis at a broad level, parallel to data collection (Eisenhardt 1989) and further examine the data in greater detail once data collection is completed.

We plan to collect data from project members (including business analysts, project technical lead, marketing lead) of the Gennext project at a large multinational company in the U.S. that has focused on their expansion into the Asian region since the mid 1980's. Headquartered in Hong Kong, the company's Asia operations has around 10,000 employees in that region alone. In the last decade, new operating companies were incorporated and new features to manage the customer relationship were implemented, resulting in a disjointed application experience for some users on the website. The ecommerce division at the organization started the Gennext initiative to standardize the global look and feel of the customer website. The project aimed to provide customers a seamless experience with all of the organization's services, regardless of the operating company and increase customer satisfaction through intuitive navigation, and an enhanced and simplified interface. Development focused on the implementation of a component based design architecture and increased speed to market by providing a flexible and user friendly content management interface to business owners.

4   Expected Contributions

We will be contributing to the existing body of literature on media choice and performance by deriving a holistic framework to conceptualize the process of intercultural communication. We are extending Media Synchronicity Theory to encompass individual differences in cultural background by identifying inherent communication styles and preferences stemming from cultural affiliation. Further, we are conducting an in-depth analysis on the communication process by deconstructing communication episodes into action chains consisting of a number of set steps. This communication action chain may be applied to any communication scenario in any context to analyse potential difficulties and prevent misunderstandings due to, for example, trivial/mechanical errors related to media choice. By identifying sources and causes of miscommunication and poor communication performance, managers may take preventative measures to avoid them.

From a managerial point of view, we propose a set of recommendations for project managers to ease communication processes in cross-cultural projects so that frustrations and misunderstanding can be avoided in the future. Utilizing our prescriptive and analytic action chain, managers can identify problem areas that are especially communication intensive and particularly critical to supervise in cross cultural projects. Managers can use our procedural framework to support their decision making process in terms of what or whether group communication technology is used and whether face-to-face meetings should be initiated in the beginning and/or throughout the project or whether they are needed at all.

In our study, we attempt to address various unclear issues on communication and understanding particularly in distributed work (e.g. Vlaar et al. 2008, George et al. 2013, Sarker et al. 2008) by focusing on the effects of culture on communicative acts and illustrate in detail how communication strategies influenced by inherent cultural characteristics as well as media features and capabilities affect communication performance.

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Appendix

A. Definitions of Key Constructs

Media Choice	A sender's chosen medium during the communication process
Communication	"A process in which participants create and share information with one another in order to reach shared understanding" (Dennis et al. 2008)
Synchronous communication	Sender and receiver are communicating at the same time (e.g., face-to-face communication, video conference, telephone conference) (adapted, Dennis et al. 2008)
Asynchronous communication	Sender and receiver do not communicate together at the same time (e.g., fax, voice mail). (adapted, Dennis et al. 2008)
Information Presentation	The way a sender chooses to structure the information for the receiver in terms of amount, type, and format of the information in the final message.
Media Appropriation	The way a receiver adopts and uses a medium. (adapted, DeSanctis and Poole 1994)
Expectation Misalignment	Mismatch between sender's and receiver's expectations related to the media choice or the information presentation.
Communication Purpose	Conveyance: Conveyance is the transmission of new information to

	enable the receiver to create and revise a mental model of the situation. (adapted, Dennis et al. 2008)
	Convergence: Convergence is the discussion of preprocessed information about each individual's interpretation of a situation, not the raw information itself. The objective is to agree on the meaning of the information, which requires individuals to reach a common understanding and to mutually agree that they have achieved this understanding (or to agree that it is not possible) (Lind and Zmud 1991)
Level of Media Synchronicity	Extent to which the capabilities of a communication medium enable individuals to achieve conveyance or convergence purposes. (adapted, Dennis et al. 2008)
Media Capabilities	"Potential structures provided by a medium which influence the manner in which individuals can transmit and process information" (Dennis et al. 2008)

B. Media Capabilities and Cultural Dimensions

Media Capabilities	High Context Culture (HC)	Low Context Culture (LC)	Potential for Conflict (HC ←→ LC)
Transmission Velocity The speed at which a medium can deliver a message to a recipient; possibility of immediate feedback.	Although individuals from HC cultures prefer communication that is economical, fast, efficient, and satisfying (Hall 1976), when talking with individuals from other cultures, communication generally does not follow the same economical, fast and efficient style. Individuals will need time to discuss things and avoid confrontation and prolonged unnecessary discussion.	Unlike HC individuals, LC individuals tend to choose media enabling high transmission velocity. A need to discuss information with superiors is not always needed and their communication style is more direct overall.	Sending fast messages to individuals geared to a slower format tends to result in poor communication performance. Although the content of the message may be understood, it likely will not be received as expected by someone accustomed to a different message speed. The problem arises as often individuals are not aware that such a difference exists (Hall & Hall 1990).
Symbol Sets Number of ways in which a medium allows information to be encoded for communication (gestures, handshakes, nodding).	Symbol sets are generally important for HC individuals. Communication natural involves gestures, body language, silence, proximity and symbolic behavior and are more confident in communicating this way. However, in communication with LC people, difficulties interpreting unknown symbol sets result in a heavier use of email communication. Often, HC individuals will compose longer, more detailed emails and use emoticons	Communication in LC cultures was identified by Hall as just the opposite of HC communication. Individuals from LC cultures communicate, so that the mass of information is directly vested in the explicit code (Hall, 1976). Conversation in LC cultures tends to be less physically animated, with the meaning represented in the content of the written or spoken word.	It is difficult for individuals from different cultural backgrounds to understand the importance of a posture or act. Much of the nonverbal cues that individuals are accustomed to based on their cultural heritage is only partially readable across cultural boundaries. As differences in cultural dimensions increase, the chance of interpreting meaning correctly decreases.

	to make up for the lack of symbol sets.		
Parallelism Extent to which signals from multiple senders/receivers can be transmitted/received over the medium simultaneously.	Due to their collectivist nature and because HC individuals like to address as many things and individuals as possible in one email/conversation, the ability to send a message to multiple recipients at the same time supports their communication. The decision maker is generally the community.	Not needed for low context cultures as they prefer to communicate with one individual at a time. LC cultures are more often considered monochromic in time perception.	Low context cultures tend to be psychologically stressed when dealing with polychronic individuals, leading to frustration as things don't move the way in which they were expected to move. Especially in situations where communication is sent through multiple individuals including those higher in the chain, LC individuals may interpret that potential conflicts are looming when they are not.
Rehearsability Extent to which the media enables the sender to rehearse or fine tune a message during encoding before sending.	Rehearsability is an important feature as individuals from high context cultures tend to require time to rehearse and program a message. Extensive effort and time must be devoted to programming a message and failing to do so results in communication that is incomplete. For this reason, the ability to rehearse and revise a message is essential.	Rehearsability is not a required feature for individuals from low context cultures. Communication is more individualistic and participatory and revising messages on the whim is not considered a problem.	Problems arise as individuals from LC cultures often need to go into much more detail than one is used to in interactions with HC individuals. Individuals from HC cultures generally value more elaborate messages including as much information about the context as possible. Considerable effort and foresight is expected from the HC individual as otherwise, conflict is likely and if HC cultures receive messages that have been encoded without the sufficient detail, they may feel either disrespected and/or frustrated.
Reprocessability Extent to which the medium enables a message to be reexamined or processed again, during decoding.	Similarly to rehearsability, reprocessability is important due to the collective nature of HC individuals where messages may have to be passed on to a number of different individuals. Moreover, as depth and detail are desired when crafting a message, the content of information received by the sender can be processed more thoroughly and individuals can prepare a response or prepare for a conversation properly.	Reprocessability is not essential for LC individuals. Decisions can often be made without the approval of a superior and social structures are decentralized. LC cultures are more individualistic and expected to be independent. Goal attainment is more often a personal achievement than that of a group.	As for HC individuals, decisions often have to be approved by superiors further up in the hierarchy, this need or procedure may be misinterpreted by LC individuals who may see it as an act of revolt or conflict which cannot be solved among the individuals themselves. Both rehearsability and reprocessability are counterproductive for the need of LC culture individuals to express themselves directly and freely especially in situations of conflict.