Cultural Differences in Temporal Perceptions and its Application to Running Efficient Global Software Teams

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Abstract

Global software development has been found to be a difficult undertaking, in particular, when members of a single team are not co-located. Studies have looked at the impact of different cultural backgrounds, communication structures and temporal distance on the team’s effectiveness. This research proposes to examine the impact of culturally based perceptions of time. A gap analysis is proposed to carry out this examination. The gap that will be measured is the gap between time-based attitudes and behavior in team unit A and team unit B where units A and B are part of the same team but are not co-located. These time-based attitudes and behavior will be compared to measures of team satisfaction and team effectiveness. A model of the impact of the temporal cultural differences and their effect on team performance is presented and the proposed research for testing this model is described.

1. Introduction

Global software development is a common business practice today. Companies develop software in multiple areas of the world to be competitive in the global economy by taking advantage of lowered employee costs and by being closer to markets they wish to expand. Unfortunately, there continue to be reports of problems with the globalization of software development. Herbsleb [1] suggests that global software development requires close cooperation of people with different cultural backgrounds, something that is difficult to obtain. He indicates that conflicts arise because cultures differ on such critical things as the need for structure, observance of hierarchy, time perceptions and communication practices. Globally dispersed, virtual teams are additionally affected by time zone differences, often referred to as “temporal distances.” Carmel and Agarwal [2] notes that work within a time-zone band facilitates synchronous communication but work across time-zone bands causes communication problems. Other researchers have reported evidence of software project problems arising when cultures differ on such things as the need for structure, observance of hierarchy, time perceptions and communication practices [3-6]. Most of these reports are anecdotal and come from broad-based observations of software teams in action. Given the rise in global software teams and the importance that they perform as well as they can, there is a need for a more in-depth examination of the factors that determine team success.

The research described in this paper focuses on one cultural difference, temporal perceptions, and the effect this difference might have on the performance and satisfaction of software teams that are distributed across temporal distances. As such, this work needs to separate out the effects of cultural time perception from the effects of other variables such as time zone differences and general cultural differences.

One method for uncovering differences in cultural perceptions is “gap” analysis [7]. A gap analysis will assess the differences between how team members in one culture perceive and evaluate their time attitudes and behavior and how team members in a second culture perceive and evaluate these same time attitudes and behavior. If the gaps are large, then it is expected that team communication will be less, satisfaction will be lower and work will be less effective.

Gaps between dispersed teams will be measured through the distribution of a questionnaire to approximately 100 employees working on software
testing tasks in a Fortune 500 company. The software
test teams are distributed across the globe with units of
20 or more testers in the U.S., the United Kingdom,
India, Taiwan, China and Singapore. The tasks are so
constituted that 60-70 percent of the teams work on a
task in a co-located team while the distribution
expertise forces other tasks to be assigned across
globally separated teams that differ in 6 to 9 hour time
zone differences. This setup creates the potential for
comparing team performance and time-based cultural
differences. It does not control for the effects of
temporal distances, but does allow us to examine them
since teams will differ along a temporal distance
dimension.

This paper is organized as follows: The next section
presents studies of global virtual teams that document
the difficulties encountered, in particular, in
coordination and communication. This is presented to
illustrate the scope and nature of the problem. It is
followed by a description of time differences that have
been catalogued, both cross-cultural and for specific
cultures. The section suffers from a predominance of
information on western-based time cultures, which
have been more widely studied. This work is used as a
basis for developing measures of cultural time
differences. The proposed research methodology is
then described along with coverage of prior work on
gap analysis. Sample questions from the survey that
has been developed for this study are given in this
section. A final section summarizes the expected
contribution of this work.

2. Issues in Global Teams

Global teams have been found to have significant
drawbacks despite their cost savings. Poltrock and
Grudin [8] performed case studies on two virtual teams
and found that distance created significant barriers to
communication. In the context of global development,
the structure imposed on formal communication by
organizations may mean that all communication from
site to site is routed through managers, and the normal
informal communication that occurs on a same site
project may decrease.[9] Jarvenpaa [10] looked at
communication and trust in virtual teams and, using the
work of O’Hara-Devereaux and Johansen [11],
suggests that “such dysfunctions as low individual
commitment, role overload, role ambiguity,
ascenteeism, and social loafing may be exaggerated in
a virtual context.” Reliance on technology also limits
or filters out non-verbal feedback, such as head nods,
facial expressions, voice tone and so-forth.

Geographical dispersion further introduces differences
due to local holidays, customary practices, local
history, (including individual, team, and organization). Cramton et al. [2] found that dispersed teams were not
skilled in the communication of these differences and
in fact frequently failed to share information about
these differences which Cramton suggests could
damage coordination and interpersonal relationships.
Cramton concludes that:

- Geographically dispersed teams have less effective
  work processes than collocated teams.
- There is a significant negative relationship between
  dispersion and perceived performance.

Many authors have said that distributed work was not
as effective as face-to-face because of a variety of
problems that affect communication and coordination.
Such problems as ambiguation [12], proximity [13], the
value of face-to-face communication [14], time as
distance [15], conflicts [15, 16], attribution [17], and
even the realization of who is recognized as being a
member of the team [18].

Cultural differences has been an aspect that many
have looked at. Hall initially addressed this in his 1959
book where using his training as an anthropologist he
illustrated that while culture is thought of as the sum of
its learned behavior patterns, attitudes and material
things it is also especially about communication. How
one communicates and interprets the communication of
others. [19] In this, cultural acts as a filter directly but
unconsciously influencing our communication with
others. Hall also states that culture affects or molds the
structure of experience through common unstated
events and communication and that this molding is the
basis for judging all other events.[20] Hall also
expressed the concept of High and Low context
communication which Hofstede equated to his concept
of collectivism and individualism. High-context
communication would represent collectivism which
implies that little needs to be said because most of the
information is contained in the context. Low-context
would correspond to Individualism, in that there is a
need for most if not all information to be made explicit.

[21] Hall and Hofstede are only two of many who
worked showing that culture made a difference and that
one could not assume that one’s meaning was clear.
Trompenaars says this is important when looking at
companies because have mode of working that are
potentially at odds with local cultures. He says that
"Integrated technologies have a logic of there own
which operates regardless of where the plant is
located. Cultures do not compete with or repeal these
laws. They simply supply the social context in which
the technology operates." [22].
Hofstede built upon Hall, Trompenaars and others to go further by actually looking at cultural differences in a large number of individuals and cultures at a global company. Hofstede’s work is the standard against which other studies are judged.

3. Temporal Perception Differences

This section characterizes and defines the types of temporal perceptions that have been measured by sociologists. Garfinkel’s [23] work on the “normalcy” of everyday life explores the relationship between regular, routine patterns and human temporal expectations. He argues that our daily cultural experiences with time lead us to judge what is acceptable and not acceptable time behavior, in short, what our temporal expectations are. We refer to this concept as the Temporal Rigidity of a group of people. Zerubavel [24] also suggests that culture imposes regular temporal sequences to our activities and that our expectations gradually develop from them. For example, some cultures regularly serve soup before the main course while others do not and members of each group come to have very different expectations.

One of the consequences of this sequencing is that deviation from the ‘norm’ is described as fast or slow. If a person skips steps they are described as fast and urged to slow down. While the person who does not respond appropriately to a step is described as slow. This work refers to this sense of time as Temporal Urgency.

Another concept within this realm is Standard Temporal Locations. Temporal locations can be described as the time slot in which an event happens, and especially applies to events that recur; such as a class from 2:00 to 3:00 or local news at 6:00 PM. Temporal location assume scheduling, which is a typical Western phenomenon that does not appear in some other cultures. But within the Western Culture, as business and personal lives merge more and more, people schedule the majority of their activities as can be seen in the every day usage of personal data assistants to help coordinate business and family activities. This scheduling is based on a Clock-Based Time perception system as opposed to an Event-Based Time perception. Carmel et al [2] found an example of Clock-based vs. Event-based conflicts when Korean customers accused an Indian outsourcing company of becoming “too American” in that they were focusing too much on documentation and deadlines.

Bluedorn’s [25] work is concerned with the notion of monochronic and polychronic individuals or a person’s preference between doing one thing at a time versus two or more things simultaneously. He found that individuals with polychronic orientation tended to emphasize relationships rather than tasks. Monochronic people tended to emphasize promptness, privacy, and have short-term relationships with people. Organizations and cultures can also display this trait in terms of the amount of polychronicity the culture will accept, that is, individuals may vary in polychronicity but within the norms of a culture. We refer to this characterization of multiplicity of task as a Chronicity Orientation.

A large study looking at cultural differences is House et al. [26] which is known as the Globe Study. This study looked at culture, leadership and organization in 62 different societies around the world. They grouped the societies into 10 clusters and used these clusters in their characterization of cultural dimensions, one of them being Future Orientation. Cultures with low future orientation or high Present Orientation are able to enjoy the moment, be spontaneous, free of future anxieties, may be incapable or unwilling to plan a sequence to accomplish a desired goal and may not recognize signals that current behavior will negatively impact the realization of those goals. High future orientation is described as having a capability and willingness to imagine future possibilities, develop future goals and strategies for reaching those goals.

4. Temporal Issues in Teams

Teams have been shown to be affected by temporal issues such as: Time Urgency [27-29], Clock-based Deadline Orientation [29], Future Orientation [25, 26] and Temporal Rigidity [24] among others. The overall thrust is that people perceive time in a variety of ways that differences in some of these perceptions may be due to differences in individuals, but may also be due to differences in cultures. Few of these studies have been done on geographically-dispersed teams.

A concern of Carmel et al. [2], is Temporal Distance, the fact that dispersed work depends on asynchronous technology to overcome the inability for a person or persons to meet on a spontaneous basis. Such things as email, voice mail, online discussions, and other similar tools are argued to not supply the communication effectiveness provided by impromptu ad hoc meetings. There is recognition that work can be within a time-zone band and so facilitate synchronous communication, but different time zones present additional problems of having sufficient hours for synchronous communication. This requires that some other means must be used to facilitate that
communication which would normally be synchronous or that groups adjust their working hours to meet these synchronous demands. This work hour adjustment may not match the temporal patterns of a particular culture, e.g., some cultures have well-established family times.

5. Research Questions

From the literature review in the previous sections, it has been shown that virtual teams have been found to perform less effectively and that some of this performance can be attributed to communication and coordination difficulties. Some of these difficulties are also related to general cultural differences that prevent some team members from understanding the needs, language, implications, etc. of other team members.

The specific effects of temporal cultural differences on virtual teams are less-well established. The literature review noted that individuals have different perspectives and orientations towards the concept of time leading to different behaviors associated with time-related decisions, e.g., how hard someone will work to meet a well-defined deadline. It has also been demonstrated that individuals have perspectives of time that are a result of the influences of culture and of the various groups and organizations they belong to. It has not been shown if the temporal cultural differences affect virtual team coordination and communication although anecdotal evidence exists that suggests this. Therefore this research will:

- Attempt to identify and formalize a set of temporal cultural perspectives different cultures might have.
- Attempt to measure these cultural differences.
- Attempt to identify and measure temporal organizational perspectives that would have a mitigating effect on temporal cultural perspectives.
- Attempt to uncover a relationship between temporal cultural perspectives and virtual team coordination and communication efficacy.
- Attempt to build a correlation model showing the impact of temporal cultural differences that eventually affects virtual team performance as moderated via team communication and coordination efficacy.

In conjunction with the above proposed research, our key research questions are:

- Do cultural time differences affect team coordination?
- Do cultural time differences affect team communication?
- Does this impact on coordination and communication affect team performance?

To do this work, the following set of time constructs have been developed (see Appendix for definitions and example questions): (1) Clock-Based Deadline Orientation, (2) Time Urgency, (3) Future Orientation, (4) Chronicity Orientation, and (5) Temporal Rigidity. The relationship between these constructs and communication efficacy will be examined with non-significant correlations being discarded. The resulting temporal constructs will be used to test the simplified correlation model shown in Figure 1.

The model represents hypotheses drawn from the research questions presented. In the model, additional intervening and moderating influences such as trust, conflict, time distance, team diversity, team maturity and task type will be used to refine the model. The contribution of this research will both be in the operationalization and validation of the cultural time perspective measures and in the teasing out the effect those differences in these measures may have on the communication and coordination efficacy, and thus, on team performance and satisfaction. A fuller understanding of cultural time differences can facilitate staffing and management of effective software teams in the global context.

6. Method

To help in this investigation, a questionnaire has been designed to take advantage of the technique of Gap Analysis. This technique described by Brown [7] utilizes a series of questions that asks about an individual’s perception of himself and also that individual’s perception of how another would answer the question. As an example, consider two locations, with a team in location A and another team in location B. We ask people in location A: “In our team we believe it is never okay to be more than a few minutes late for a meeting at work”. This is coupled with: “The people that we interact with in location B believe it is never okay to be more than a few minutes late for a meeting at work”. These same questions are also asked of the people in location B. An analysis is then done looking at the difference between AB and BA. This difference represents the Gap in perception between the two groups of people.

This analysis is not done to look for differences between individuals but between groups of people. In this investigation the groups of people we will be looking at are geographically dispersed. A pilot of the survey has been performed using students working on team based projects. A copy of the survey can be found at http://. This survey does not have the gap
structure instituted and was performed to find and correct problems with the questions themselves.

We will be obtaining team performance measures from the parent company, which will be used to ascertain the successful operation of each team. We will compare the performance measures with team member satisfaction and culturally based time orientation variables to see how teams are affected by these differences.

7. Appendix A

1. Clock-Based Deadline Orientation – a measure of a team’s perception of how socially acceptable it is to not meet a deadline in various scenarios. EX: It is never okay to be more than a few minutes late for a meeting at work unless a team member has a good excuse.

2. Time Urgency – a behavioral measure of how oriented a team is towards being concerned about the passage of time. EX: We would rather be early than late for something.

3. Future Orientation – a measure of how oriented a team is towards planning for tomorrow as opposed to focusing on current activities. EX: We believe that the accepted norm in this society should be to: solve current problems/plan for the future.

4. Chronicity Orientation – a measure of how oriented a team is towards doing multiple things at the same time. EX: Our group likes to be working on several tasks at the same time.

5. Temporal Rigidity – a measure of how focused on time rules and temporal norms a team is. EX: People in our work group prefer meetings to follow an agenda.

8. References


