Analyzing Intercultural Factors Affecting Global Software Development – A Position Paper

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Abstract

This position paper presents the efforts we have undertaken to study the impact of intercultural factors on global software development projects. A bottom-up approach looks at the effect of individual intercultural factors on software practices, while a top-down approach strives to identify positive or negative organizational and behavioral patterns.

1. Introduction

Global software development projects may succeed or fail for reasons that have nothing to do with the technology, with the time differences, the (tele-) communications mechanisms used, or the product being built, but because of subtle intercultural factors. The issues at stake are not superficial matters of ways of dressing, working, speaking, in small daily behaviors, but are founded in the fundamental differences in the systems of values that govern our lives. A first step that global organizations have taken in the last 15 years was to raise the level of awareness of their employees world-wide on the cultural differences, through various programs of intercultural or diversity training. But cultural awareness is not sufficient to overcome many of the obstacles that cultural differences bring in the way of global project success. We have started two efforts: first, to take a more systematic look on how intercultural factors affect positively or negatively the outcomes of software development practices. Second, to identify patterns and anti-patterns (i.e., patterns with negative effects) of organizational behavior that impact the outcome of outsourcing or off-shoring of software development projects.

2. Global software development

A lot of attention has been drawn on the outsourcing or off-shoring phenomenon, in particular with the successes of Indian software companies. An estimated half a million jobs would have "fled" from North America to India by 2015 [17]. This is not just pure tabloid hype: I have friends in Vancouver who have lost their software development jobs to … some other friends in Bangalore. IT projects are the second largest class of outsourced activities after call centers.

Most of this attention has been on the economic aspects, on the labor issues, and as well as on the communication mechanisms and tools [4], less on the processes [6], little on culture [16, 18]. A great deal has been published on how to behave or not to behave when doing business in this or that country. While useful and accurate, they often completely lack any depth and analysis of the fundamental mechanisms at play.

Only recently have a few researchers started to look at the specific issues of intercultural factors on technical professions and global projects: Laroche [14], Carmel [4], Karolak [13], Schneider and Barsoux [20]. Most of the work published today keeps referring to Hofstede [10], a study on a large population, indeed, but now almost 40 years old, and performed inside one single company, IBM.

3. Overall approach

The first part of the study is to identify the *impacts of intercultural factors on software development practices*. The overall approach for this study is as follows:

1. Identify and sort out intercultural factors
2. Identify and sort out a set of practices, representative of software engineering
3. Identify interesting cultural groups and their profile on the selected set of intercultural factors
4. Using expert advice, literature studies, and possibly surveys, make a first attempt at identifying pairs [practice + intercultural factor] that are significantly affected.
5. Then, for some elements of this "hot" list of affected practices, set up experiments to validate and quantify the effect.
6. Or use post-mortem analysis of real-life projects to identify occurrences of affected practices

In parallel, proceed with some case studies of outsourced or global projects, looking at outcomes,

lessons learned and doing a root cause analysis. It could also provide the basis for point 6 above

The second part of the study is to identify *behavioral patterns* that enhance or hinder the outcome of global projects.

The method used will combine ethnographic studies, with content analyses, surveys, experiments, trying to avoid ethnocentrism in the study itself [23], and not to lose of the specific "emics" elements of a culture.

4. Intercultural factors, or variables

As the primary source of intercultural factors or variables, we are using the classic works of Edward T. Hall [9], Geert Hofstede [10, 11], Alan Fiske [6, 7], and Fons Trompenaars & Charles Hampden-Turner [25].

4.1 Edward Hall: Beyond Culture

One of the pioneers of this field, Edward T. Hall has looked at communications, and discriminates cultures on high context and low context communication. Hall also looked at the way cultures handle time—monochronic cultures (M-time) versus polychronic cultures (P-time). Hall also has plenty of other interesting observations on situational dialects, actions frames, and education.

- Low-high context
- M-time and P-time

Other ideas of Hall about physical distance between individuals, what he calls *proxemics*, may not be too useful in the context of global development.

4.2 Hofstede: Groupthink

Although Hall's work is based on his own observations—he had lived with several tribes in the US Southwest (Hopi, Navajo), and in several countries in Asia—the Dutchman Geert Hofstede took a completely different approach. He was given access to a vast amount of data, uniformly collected across tens of thousands of employees of a large multinational company (IBM) in the late 1960s and 1970s, and he used sophisticated (at the time) multivariate analysis to extract and then interpret major discriminating factors across cultures, crudely defined by country.

Here are the five views he came up with, and compared two by two:

- Power distance
- Collectivism versus individualism (see also [24])
- Femininity versus masculinity
- Uncertainty avoidance
- Long-term versus short term orientation

4.3 Trompenaars & Hampden-Turner: Reconciling the opposites

Similarly to Hofstede, these two researchers have defined a slightly different set of discriminating factors, based on the studies they've done as part of a consulting practice for large multinational companies. They too distinguish several "views":

- Universalism vs. particularism
- Individualism vs. communitarianism
- Neutral vs. emotional
- Specific vs. diffuse
- Achievement vs. ascription (attitude toward titles, degrees,…)

And a few secondary ones, such as:

- Attitude to time
- Attitude to the environment (i.e., nature)
- Gender, race, class, religion

Less known than Hofstede's, their factors may prove more usable to analyze a business situation.

4.4 Fiske: Four elementary forms of sociality

- CS: communal sharing: do people treat all members of a category as equivalent.
- AR: authority ranking: do people attend to their positions in a linear ordering.
- EM - equality matching: how people keep track of the imbalances among them.
- MP: market pricing, how people orient to ratio values.

This is a large number of factors. To reduce the spectrum of possibilities offered by a wide range of intercultural factors, we may be able to exploit the concept of synthetic culture profiles introduced by Gert Jan Hostede (Geert Hofstede's own son) in [12]. This would also avoid polarizing on anecdotes and stereotypes ("Japanese vs. American", "Brits vs. Greeks").

5. Software practices

The software engineering practices that are likely to be affected are not so much the ones fully supported by machines, automated, or the repetitive, human-intensive ones, or the ones close to the code or to the bits. The practices affected are the ones that involve human to human communication, either at the time they are performed, or later, in their consequences. Some would say: "this is covering most of what we do in software". Not quite. If we looks at the systematic "CMM level 3" type of software processes used in global outsourcing projects, a lot of the nitty-gritty daily work is specified there, and does not involves too much human interaction. We can certainly look at how these processes are

themselves tainted by the cultural backgrounds of their authors (and I am looking at the Rational Unified Process [15] with that critical eye).

5.1 Agile practices

To find more likely candidates we may look at the agile set of methods and practices [2], which precisely have come to rely much more on direct person-to-person interaction and less on "follow the plan", "fill the template", and "check the boxes" approaches.

The twelve XP practices [3] constitute a good representative set:

- Collective ownership
- Planning game
- Pair programming
- Customer interaction
- Whole team. *Etc.*

We should add the practice of:

- Scrum [21].

Unfortunately these practices are often confined within a single, co-located (and therefore often culturally homogeneous) team and they are not visible at the hinges between two cultures in global projects. One exception however is the interaction with the customer (see §6.2)

5.2 Other practices

- Reviews, inspections and walkthrough
- Retrospectives and post-mortem, process improvement process
- Wideband Delphi, and other approaches using expert knowledge
- Planning and estimation, especially scheduling
- Management milestone and other "critical" decision-making meetings (Project Review Authority, Change Control Board, etc.)
- Performance reviews, and other HR processes
- Organizational structure, and communication

The matrix of [factors x practice] is quite large. Some clustering maybe necessary, identifying groups of practices that are affected in similar ways, and maybe using one of them at the canonical representative.

6. Examples

To illustrate the approach, here are two [factor, affected practice] pairs and one pattern.

6.1 Reviews and chronicity

Several impacts have been identified, for example by Laroche [14]. One such impact he calls:

"*time is up*: M-time people tend to end the meeting or conversation at the scheduled end-time, P-time people tend to end when the conversation runs out of steam and rarely at the scheduled end time. When they work together, polychromic people may think that the meeting ends abruptly, before they have a chance to say their whole piece. In contrast, M-time people may consider that polychronic meetings go on past the point of effectiveness."

Laroche identifies several other issues: agenda (implicit or explicit), etc.

Example of occurrence: Quebecers working with Ontarians, or Spaniards with Germans. Note that none of the party would either deny the benefits of a review, or challenge the process, and the mishaps are independent of the actual technical issues raised.

6.2 Requirement management and power distance

Thanasankit and Corbitt have studied the factors of power distance and uncertainty in Thai culture [22]. These factors contribute towards hierarchical forms of communication and decision making processes in Thailand, especially during Requirements Engineering. Their research shows that the decision making process in Thailand tends to take a much longer time, as every stage during Requirements Engineering needs to be reported to management for final decisions. The tall structure of Thai organizations also contributes to a bureaucratic, elongated decision-making process during information systems development. In eliciting/validating/prioritizing requirements, often who said what and where that person seem to appear in the hierarchy is more important than the needs or the technical issues.

6.3 The proxy pattern

More efficient than across the board intercultural training, hoping that all will behave in a harmonized and cultureless fashion, some organizations have found ways to exploit the talent of very rare individuals, which are used as proxies. Their life story has made them "bi-coded" as a colleague calls them: able to operate equally at ease in two different cultures.

For example, a typical proxy was born and raised in Asia, came to North America to study, stayed some 6 to 8 years, returned to his country, had a quick and rather successful career, and then returned to North America to man a "beachhead" of outsourcing. The proxy operates relative to his company as a true full-fledge citizen, but he also has internalized the values and associated behaviors of North American high tech culture, and actually spends most of his or her time doing some "impedance adaptation" between the two cultures.

There is a related “anti-pattern.” Not everybody can play the role of the proxy. If an individual has not assimilated completely the 2 cultures, and is for example promoted from Asia to a position of proxy in North America merely as a perk, as an award for good performance at home, that person may effect more damage in the relationships between supplier and purchaser of outsourcing.

7. Conclusion and Future Work

There is not much to conclude, this early in our study. My hope is that a systematic look at impacts and at patterns will give us insights on how to describe, express, configure and enact software engineering processes for global software development, in ways that respect the specific cultures of all nations and groups involved, or that even take advantage of the strength of certain groups.

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