

# The Impact of Culture on Collaborative Technologies

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## ABSTRACT

The increase in globalization, international trading, and outsourcing in the world's economy has led to an increase in the demand for cross-cultural collaboration. Organizations, today, frequently consist of individuals with diverse cultural backgrounds and skills. This creates a pressing need to better understand how the interplay of culture and collaboration in technology can influence productivity and outcomes. In this paper we'll discuss the cultural constraints affecting collaborative technologies, provide insight to help increase the understanding of cultural issues in collaborative technologies, distribute research findings in the domain, and provide guidelines to follow when designing cross-cultural collaborative tools.

## 1. CULTURAL CONSTRAINTS AFFECTING COLLABORATION

There are certain factors and characteristics of behavior that are common within certain populations depending their culture. Knowing these social and cultural constraints is important when developing collaborative systems. We mention three main constraints to consider when developing interactive systems.

### 1.1 Language

Language is one of the biggest constraints faced in cross-cultural collaboration. There are cases, such as the 1977 Tenerife disaster, where linguistic differences have led to fatalities.

There are language characteristics that make the understanding of certain behaviors easier or more difficult than in the case of other languages. Sakuma and Yaguchi presented a questionnaire based on Smith's, [10], investigating the strength of cultural stereotypes. One of the questions can be used as to show the extent of the differences that can arise on the basis of linguistics is: "Working with a fire crew the hose-man calls '*Pressure High!*' What should be done? Raise the pressure or lower the pressure?" They presented the question to four different cultural groups. Most of the Americans answered "lower", while all the Dutch answered "raise"; even though most of the Dutch speak fluent English.

### 1.2 Population/Cultural Stereotypes

There are characteristic patterns of behavior that are common within large populations. Populations from different cultures respond to stimuli differently. One classical example is the light switches. In the U.S., for instance, flipping the switch upwards would turn it on, while in Europe such an action would turn off the lights. In Japan, on the other hand, the light switch is from side-to-side, where a right flip would turn on the lights.

As the growth of globalization proceeds, and as military equipment is shared among multi-national forces, taking population stereotypes into consideration becomes extremely important. Violation of population stereotypes could be a source of human error, especially since a lot of equipment nowadays is made up of components supplied from different cultural backgrounds. Something as simple as flipping a switch in the wrong direction, especially in an emergency where the response is

automatic and dominates performance, could lead to dire consequences. This is confirmed by Jost's Law (1897) [11] that states that the stereotypical habit acquired over many years in one population will from time to time interfere with performance even after much practice, and particularly in an emergency when a rapid "skill-based" reaction is required.

### 1.3 Anthropometrics

Factors as simple as differences in anatomical dimensions can be considered cultural as well. Fernandez et al. [7] studied Korean factory female workers, and found that while there was little difference between Korean and Western workers' anatomical characteristics on many measures, there were some very significant differences. They found that the difference in the eye height is significant enough to cause difficulties if Asian women have to look over a high control panel when operating equipment manufactured in the West.

Therefore, when designing tools, whether or not for collaborative purposes, body dimensions should be scaled and the tool designed to be specialized for populations with the same culture.

## 2. DESIGNING CULTURALLY-ORIENTED COLLABORATIVE TECHNOLOGIES

The question that arises now is, are these previous constraints all that we need to take into account when designing a collaborative system? What yet needs to be explored? How can we create culturally-oriented collaborative systems?

The global interaction between different cultures involves sharing the knowledge of all interacting users and sometimes they define their own "communication culture" to interact. Bourges-Waldegg [1] put it nicely when he said,

"...Design changes culture and at the same time is shaped by it. In the same way, globalization is a social phenomenon both influencing and influenced by design and therefore, by culture..., both globalization and technology have an effect on culture, and play a role in shaping them."

Therefore, we need to look into teams in today's workforce and the impact of cultural diversity on them. What can be learned from previous research in that area to help in the design culturally-oriented collaborative systems?

### 2.1 Affect of Cultural Diversity on Teams

The increase of globalization has increased the opportunities for workers of different cultures to interact and work together. In addition to this exchange amongst workers from different countries, the increasing proportion of minority workers in American companies has resulted in a culturally diverse workplace. As a result, work groups in many U.S organizations are receiving more attention from researchers; because a thorough understanding of these groups and their performance can improve overall company productivity.

Cox, Lobel, and McLeod [3] conducted an empirical study where they compared the performance of teams from four ethnic groups, Anglo-American, African-American, Asian-American, and

Hispanic-Americans, in performing the “prisoner's dilemma” task. They concluded that organizations with an ethnically diverse work force may be better suited for intra-team cooperation than those with teams made up exclusively of inherently less cooperative workers (i.e. Anglo-American). They further noted that there was significantly more research needed in this area by stating that “there is a need for studies addressing the differences between homogeneity and heterogeneity more generally.”

However, Gersick, [8], looks at it from a different perspective and argues that while it may be true that culturally heterogeneous teams might perform better, it is only in the later stages of team development that this happens. He argues that process losses occur due to the lack of a common set of language, norms, and expectations. Such losses can be damaging to performance in the first stages of team development; commonly known as “forming” and “storming”.

## 2.2 Designing Collaborative Systems for Culturally Diverse Teams

In an age of globalization, culture orientation is one essential component for successful user-centered designs. Therefore, the culture has the same importance as other factors such as the user's profession, choice of operating systems, learning style and other elements.

There exists the need for communication that goes beyond the borders of countries and cultures. The global interaction between different cultures involves sharing the values of both interaction partners. The key problem of inter-cultural design is how the designer can get his message across to the user of another culture. This is not simply a question of language. The most important fact is that the designer and the users of different cultures agree on the information meaning and its interpretation. There must be a significant element of shared meaning between the user and the developer. Therefore, based on our discussion and previous research, we propose some ground rules to take into consideration when designing your system:

1. Identify and classify the kind of system you are designing.

Röse, [9], mentioned two established approaches for inter-cultural design: *Internationalization* and *Localization*. Internationalization describes a basic structure with the consideration of future integration of culture-specific requirements. This design concept takes into account some general culture specifics (like language, format, etc.) and is often designed for flexible switching between different user cultures. Localization, on the other hand, focuses on one specific user culture. (In application areas like the aerospace and car industry, a third approach called *global design* is used.)

2. Know the users' and cultural requirements

User requirements include the analysis of user preferences for specific tasks, products and cultures. Resulting from this, a culture-oriented design is not possible without the empirical analysis of the user requirements in each culture, and the product to be developed for the respective markets.

Cultural requirements for the targeted market, such as language, cultural stereotypes, and anthropometrics, should be well addressed as well. There are still questions about how the system designers could go about determining these requirements based on the analysis of the targeted culture and then create a basis for his or her design. A good understanding of culture could provide the designers with clues to answering their questions.

3. Look at existing work, especially when designing culture-specific user interfaces, before creating your own design.

del Galdo [4] and Fernandes [6] work, for instance, included colors, icons, symbols, date formats, time formats, number formats, language translations and more for different cultures. Other design issues such as menu direction, interface structure, information flow, etc. have also been addressed by Choong [2], and Dong and Salvendy [5].

4. Do not neglect other “hidden” cultural constraints that could still affect collaboration when designing; such as attitudes, behaviors, problem-solving strategies, thinking patterns, etc.

Furthermore, there are also many design issues that should be taken into consideration that are beyond the user interfaces but are actually closely related to the user's interaction with machines. Röse, [9], listed some of the most prominent ones: machine functionality, appropriate technology, service model, technical documentation, and general machine design.

To conclude, this paper was a quick survey of existing work to provide an understanding of the impact of cultural diversity in collaboration. Even with differing opinions on culture and its dimension, proposed differences between groups and teams, and concerns about generalizability of studies, it is still clear that cultural heterogeneity does influence team processes and team performance in some fashion. Thus clearly this field of study cannot be ignored.

## 3. REFERENCES

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