

# The Cultural Construction of Ubiquitous Computing

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## 1. INTRODUCTION

More than fifteen years ago Mark Weiser's vision of Ubiquitous Computing was revealed to the world. His vision of a world full of computational devices calmly operating in the background of our lives satisfying every conceivable information need is one that over the years has taken a strong foothold within the HCI community [8]. Given the large spectrum of applications being developed under the "ubiquitous computing" banner and given the areas where these technologies are supposed to be operating (i.e., every single area of life), it could be argued that UbiComp is the quintessential collaborative technology. Through its two constitutive research paths – mobile computing and pervasive computing – the UbiComp research agenda aims at "enhancing" the environment through computational devices that will, purportedly, help us achieve a tighter control over inanimate items and a closer link with other human beings. Because of its spectrum of application, that is, the world where we live, and because of its ultimate goal of enhancing our relationship with that very world, UbiComp could be both termed the largest and the most complex collaborative technology. Thus, throughout this paper we will use both terms interchangeably.

However, although for some researchers the overarching goals of UbiComp have been settled, others have observed that the current research agenda behind UbiComp has a strong North American bias both in the extension of its application and in its goals; elements that might fall short when extended to a different cultural milieu [2]. For instance, Bell's fieldwork around home technologies has raised awareness of what she calls the "secret life" of information and communication technologies, that is, the uses given to these technologies outside their traditional work/entertainment model to satisfy other important areas of people's lives like love, sexuality, and the expression of spirituality among others [1]. By illustrating how ICTs are appropriated for a purpose other than those originally intended, Bell has shown that the use of ICTs is heavily influenced by the surrounding culture. Furthermore, Bell and Dourish have gone as far as to say that the vision of UbiComp is one that no longer belongs to the near future, but one that is alive today, although in a manner different to that which Weiser envisioned [3]. Interestingly, what Bell and Dourish see as present-day UbiComp is taking place far from North America; it is taking place in countries like South Korea and Singapore, places where the motivation to achieve UbiComp seems to be linked to different types of socio-cultural concerns.

## 2. DEALING WITH CULTURE IN HCI

Acknowledging the influence of culture in the design of collaborative technologies (UbiComp) is but a first step towards the development of computing technologies that respond both to the needs of "non-traditional" users and to models of computation beyond the work/leisure one. Broadly speaking, two trends could be distinguished within the HCI community to deal with these issues.

On the one hand we have those who take the work of Geert Hofstede as their theoretical model [5]. Hofstede introduced the concept of mental software – "the collective programming of the mind which distinguishes the members of one group of people from another" – to describe a tacit knowledge particular to every culture that silently governs social interaction. These cultural traits are expressed through different rankings in what Hofstede termed cultural dimensions including power distance, individualism, masculinity, uncertainty avoidance, and long-term orientation.

Hofstede's cultural dimensions have been used in the HCI community to try to understand how the socio-cultural context influences the use of technology. Marcus and West Gould [7] argue that cultural traits are indeed visible in the layout and navigational structure of websites developed in different parts of the world. Their view seems to be in harmony with Hofstede's claim that culture is so ingrained in people's life that is difficult to consciously notice its influence in everyday living; an awareness of a cultural influence is actually possible when its traits are absent.

Choi et al. [4] used Hofstede's cultural dimensions (and other concepts introduced by Edward Hall) to evaluate mobile services in Japan, Korea and Finland. Their study highlights the influence of culture in the development and use of new technologies in a particular society. More importantly, Choi et al. illustrate what could be seen as a weakness inherent to any cultural classification, that is, the applicability of a classification to an entire population. Choi et al. acknowledge the fact that there will always be individuals who do not adjust themselves to the defining characteristics of a culture. This, however, does not necessarily imply that cultural groupings are irrelevant, but that some individuals are exceptional (See also [6]).

In my opinion, the concept of cultural dimensions does not attempt, and cannot be used, to predict the isolated behaviour of individuals within a society. The concept of cultural dimensions, however, seems to be useful for HCI to understand the behaviour of groups of people within a country/culture. For instance, in Choi et al.'s study, the concept of cultural dimensions was used to explain why different countries would favour different mobile services.

The second trend that can be distinguished within the HCI community to deal with the role of culture in the design of computing technology is generally known as fieldwork. The work of Bell [1-3] is representative of this trend. Bell has conducted ethnographic work around Europe and Southeast Asia to understand how home technologies acquire their significance in everyday living outside the North American milieu. Bell's work has been useful in illustrating both the use of technology under different constraints (e.g., power supply, network availability, social customs, etc) and for different purposes (e.g., to express a religious identity), and in raising awareness of the fact that a silent technological evolution might be naturally taking place beyond the North American influence.

### 3. CURRENT WORK

Influenced by these two trends, we conducted a pilot study to understand the role of the socio-cultural context in shaping the use of collaborative technologies. Several research questions have guided our approach. Is the behaviour described by Hofstede's cultural dimensions distinguishable in the use of ICTs among people from different countries? Can cultural dimensions be used to predict acceptance or rejection of novel technologies? And, in a larger scope, can cultural dimensions be used to understand the use, appropriation and naturalization of UbiComp technologies?

In our pilot study we conducted in-depth, semi-structured interviews with three international students from China, Spain and Brazil between the ages of 18 to 22 years old, who, at the time of writing, have been in the United Kingdom for not more than five months. We used this method of qualitative research assuming it could produce a rich narrative around the reasons why a subject would exhibit a particular behaviour towards collaborative technologies including Internet messaging, mobile phones, online social networks, etc. Having come from different socio-cultural contexts, but all of them coalescing under the "normalizing" circumstances of university accommodation (i.e., similar living arrangements, a personal laptop computer, and permanent connection to the Internet at home), the interview sought to understand a) participants' previous experience with ICTs and b) how this behaviour might have been altered since their arrival to the UK. Therefore, questions ranged from landmarks such as the time and circumstances of their first contact with computers and the Internet, to their previous use of collaborative technologies, to their current use of these technologies to remain in touch with current and past friends, acquaintances and family.

Given the limitations of this pilot study and the bias necessarily introduced by our sample of students, we are still far from having been able to provide even partial answers to any of the questions posed. However, we have gained some insight into some of the issues we are researching. For instance, a current topic of interest in collaborative technologies is the use of online social networks. While questioning about this topic, we found varied responses; these ranged from a complete aversion to the use of these technologies because of privacy concerns and unnecessary exposure to unknown people, to indifference, to a steady use. For example, our Chinese participant sees in online social networks the means to remain involved with a group of people that, though geographically scattered, actively participates and indirectly promotes a continuous exchange of tokens of friendship (e.g., blog comments). Although this positive attitude to online social networks could be interpreted as the expression of a collectivistic identity in the digital realm, it could also be the natural integration of collaborative technologies to a life style because of a longer exposure to these technologies. It is also interesting to note that the other two participants exhibited behaviour different from what could be "expected" from collectivistic cultures like Spain and Brazil. Again, this not necessarily implies that cultural groupings are irrelevant, but that some individuals are exceptional. We must acknowledge, however, that our limited sample prevents us from providing a more insightful explanation to this issue.

### 4. FUTURE WORK

As indicated, we are interested in understanding how UbiComp, arguably the ultimate collaborative technology, is culturally

constructed. To continue exploring this issue, we are planning to expand this pilot study interviewing a larger sample of people from five countries (tentatively China, USA, Germany, France and Greece), whose cultural dimensions index varies widely according to Hofstede. However, we recognize that our current approach is limited in at least the following ways. First, the classic sample of university students may provide information that, while culturally-diverse, will be restricted to a very particular segment of the population from each country surveyed. Second, conducting interviews in a second language like English seems to prevent participants from fully expressing their inner thoughts even when questioning revolves around such trivial circumstances as the use of mobile phones. Finally, our limited exposure to the countries and cultures indicated means that valuable information might be lost because of the lack of a common cultural background that might be used to interpret, in its proper dimension, past and present experience.

Notwithstanding, the above weaknesses are precisely the type of research challenges for which this workshop seems to be an excellent forum. Thus, we would like to request participation from researchers from around the world to conduct a cross-cultural study on the cultural construction of UbiComp, that is, the socio-cultural influence in the design, use, appropriation and naturalization of collaborative technologies. Understanding how meanings are associated to computer technologies because of a particular socio-cultural context might help us expand our view as to the overarching goals of collaborative technologies. In turn, this increased understanding might help us design more culturally-sensitive computing technologies that extend both far from the traditional work/entertainment model and from the "typical" user, the very realm of UbiComp.

### 5. REFERENCES

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