

# The Appropriation of Information and Communication Technology: A Cross-Cultural Perspective

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**Abstract.** In this paper we explore the process of appropriation attempting to broaden the set of topics considered significant on it. We present a model of appropriation derived from two studies conducted in the UK, Japan, South Korea and China. We describe our model based on a characterisation of elements supportive of appropriation in the context of use (discussed in terms of space/place, social practices and activity) and in the ICT itself (described in terms of meaning, relevance and triviality). We emphasise the pre-eminence of context in achieving the appropriation of ICT.

**Keywords:** Appropriation, ICT, context, infrastructure, layout, marketing, business, domestication, socialisation, peer support, media, triviality, commoditisation, meaning, relevance, space, place, social practices.

## 1 Introduction

One standing concern of the HCI field is facilitating the introduction of new information and communication technology (ICT) into society by lowering the barriers they might experience through an ongoing cycle of design, development and refinement of features. Interest in this problem arises from a preoccupation with the fast-paced change of technological development and the seemingly limited ability of society to cope with this deluge of change. The study of such a phenomenon broadly falls within what has been termed the appropriation of ICT. Appropriation is here understood as the “processes by which individuals and communities consciously take both conceptual and operational control of an idea, a tool, a technology, etc. within the context of their real and perceived culture” [15].

It could be argued that in the HCI field there is an assumption that by achieving the right combination of features in a new technology it is possible to produce a technology that ‘naturally’ fits practice. This view of appropriation as a single trait that can be captured and endowed upon new ICT seems to prevent us from considering a wider range of influences that might affect this process.

This crusade to find the technology that can be seamlessly appropriated does not say anything about the fact that many people, every day, continue using new technologies like mobile phones, mp3 players, IM clients, etc. regardless of their proficiency operating them. There are other reasons beyond the technology itself that influence people in appropriating it. Elucidating what those other influences might be

is precisely the purpose of this work. In this paper we will first review a popular approach to the study of appropriation in HCI through the concept of cultural dimensions highlighting some of its shortcomings in this regard. Later we will present alternative approaches to the study of appropriation of ICT. Drawing from this, we will then introduce our work arguing on its relevance to describe the appropriation of ICT.

## 2 Cultural Dimensions and HCI

An approach in HCI to the appropriation of ICT is through a discourse centred in the cultural differences observed among people living in different milieux and in creating technologies that, arguably, capture and embody these differences. Geert Hofstede's concept of cultural dimensions is a popular theory used to justify this approach [3, 10, 11]. Several reasons may account for this circumstance. First, it provides a simple, tested and ready-made model of culture that can be used as a theoretical platform for a research enquiry; second, it is supposed to be based in "quantifiable" traits of culture (power distance, collectivism, uncertainty avoidance, etc.); and thirdly, it was cited in one of the earliest books dealing with culture and HCI by del Galdo and Nielsen [8].

The cultural dimensions concept has drawn a considerable amount of criticism, primarily due to its reductionism. For instance, it claims cultural homogeneity among the members of a culture; disregards behaviour and values that are not necessarily determined by a particular cultural setting; ignores variations in the expression of cultural traits because of changing situations; and does not account for differences in the importance assigned by different cultures to specific cultural traits [9, 12, 14].

### 2.1 What in the World Is Culture?

From the perspective of cultural dimensions, culture is conceived as a monolithic and fixed entity. The idea of culture as a monolithic entity is nowhere clearer than in Hofstede's definition of culture as "the collective programming of the mind which distinguishes the members of one group of people from another" [6]. Interestingly, but perhaps quite frequently ignored, even Hofstede denied the homogenising implications of his definition by conceding that cultures cannot be attached to specific geographical settings since cultures can be found both as integrated social systems and as smaller parts of those integrated social systems [6]. Hofstede's model also characterizes culture as a fixed entity; therefore, the values and norms of a culture remain static (subjective dimension) even when its symbols may change (objective dimension). For Hofstede [6], the slow pace of change in values accounts for the emergence, over hundreds of years, of what he termed cultural dimensions. The fixedness of culture advocate by this theory prevents it from providing an intelligible account of, for instance, the rapid embrace of computer-mediated communication. This can be illustrated in a study by Wurtz [16] analysing McDonalds websites around the world in 2003 with their counterparts in February 2009. Clear-cut issues of low- vs. high-contextuality and individualism vs. collectivism, like those found in Wurtz's study, are difficult to distinguish in the current design of those websites. An immovable culture such as that portrayed by Hofstede's cultural dimensions would prevent a society from adapting to a changing environment by learning new ways of performing tasks and solving problems [9].

In our opinion, trying to define users in cultural dimensions' deterministic manner and then embodying those definitions in a technology is problematic. We believe that a more sensible approach to the integration of ICT into a person's real or perceived setting [15] is found by identifying common elements and forces shaping this circumstance. An analysis of successful ICT across countries might provide us with a number of elements that influence people to embrace certain technologies regardless of their cultural differences. An investigation of those elements and their role in encounters between people and technology might be more helpful in providing the conditions necessary to introduce and sustain use of novel digital technology over the long term. With this idea in mind, we now consider other approaches to the study of the appropriation of ICT, and how they explore the influence of different elements beyond culture in this phenomenon.

Dourish defines appropriation as "the process by which people *adopt* and *adapt* technologies, fitting them into their working practices" (emphasis added) [4]. This highlights two sides of this process: (1) the social element whereby people modify their activities to integrate a technology into their practices and, thereby, create new practices, and (2) the technical features of a technology embedded in its design that can be modified according to a predefined set of options. For Dourish, the problem of designing for appropriation seems to be both a technical issue that arises from dated software structures and a social issue. This observation is interesting when we observe that technologies that continue relying in "old" technological structures continue being appropriated all around us. Dourish's view does not diminish the role of humans in the process of appropriation, but does focus on the "shortcomings" of current technology and how technological alternatives might address them.

Carroll has introduced a model to describe the appropriation of ICT [2] and to aid in the design of technology [1]. Carroll's model is the result of her exploration of mobile technologies and CRM systems. Carroll suggests the cycle of appropriation is completed only when, in the design process, a new set of requirements is gathered from the different ways in which a technology is appropriated ("design from appropriation"). New requirements and new uses are then incorporated into the design process for future iterations of a technology ("design for appropriation") in order to incorporate the features designers did not foresee in the early iterations of a technology [1]. Carroll's cycle highlights the essential role of users in completing the appropriation cycle. However, given the myriad people that every day embrace ICT, satisfying the needs of new users would appear to demand a never-ending cycle of requirements gathering and redesign. Clearly, this infinite cycle is not happening and yet many people continue embracing ICT.

Ito suggests that Japan's adoption of keitai—as mobile phones are known there—is due to a self-feeding loop carved in the particularities of Japanese popular culture (e.g., animation, video games, comics, food and other cultural elements of this nation) [7]. Yet popular culture alone does not account for the adoption of mobile phones and the mobile Internet in Japan. At least two more elements also have an important role in this phenomenon: business practice and mobile technology design. Complex relationships between use, design of mobile technology and business practice provide a better understanding of the adoption of keitai and mobile Internet in Japan [7]. For instance, in his account of mobile phone adoption in Japan, Okada [13] traces the development of the technologies that made the mobile phone possible describing how

the addition of a simple LCD on pagers made possible the transition of this technology from a business tool to a personal one. However, even these technological achievements would have had little impact among people if the corporations developing these technologies had not battled each other to penetrate the Japanese market through constant price reductions [13].

It would appear then that the appropriation of ICT is influenced by a constellation of elements beyond the people that use a technology or the features of the technology itself. Analysis beyond these latter two issues seems to be absent from standard research approaches into this phenomenon. To compound this issue, those other elements influencing the appropriation of ICT seem to fall outside traditional areas of concern in HCI. Several questions naturally arise from this observation: What are those other elements influencing the appropriation of ICT and what are their relationships? And how is a deeper understanding of the appropriation of ICT useful for the HCI field as we create novel technologies?

### 3 A Model of Appropriation of ICT

To address these questions we explored the appropriation of common ICT (e.g., computers, Internet, mobile phones, IM, online social networks, blogs) in settings other than work where these technologies are used on a voluntary basis over the long term. First, we conducted an ethnographic study over a three-month period with a sample of fifteen international students from China, Greece and India enrolled in Masters degree courses during the school year 2007-2008 at the University of Glasgow. We did this assuming the process of appropriation of ICT and the dynamics associated with these changes, would be magnified among people relocating to a new milieu.

Our study centred on weekly 30-minute interviews with each member of our sample from October 2007 to January 2008. We followed this approach for two reasons: (1) to explore at a high level events that remain imprinted in our sample's memories regarding their reasons to adopt an ICT, and (2) to track behavioural changes in their use of ICT, and their justifications, over an extended period of time. We analysed transcripts and other collected materials using the Grounded Theory approach [5] identifying forces and elements that shape this process within this community.

In this manner we identified elements in the context of use and in the ICT itself that play a decisive role in the appropriation of ICT. In order to increase the relevance of the findings of our first study we decided to undertake fieldwork in other countries to account for different elements in diverse contexts. We believe this experience improved the ecological validity of our findings and of the resulting socio-culturally informed model of appropriation of ICT we built from our data.

One of the authors visited Japan, South Korea and China to carry out similar studies to the first, but this time interviewing people in their native countries. In Sapporo, Japan we interviewed two Japanese students and four Japanese workers, as well as four foreign students from Brazil and India. In South Korea we interviewed eleven local students at Ajou University in Suwon. In China, twenty local students at Nankai University in Tianjin were recruited. Interviews lasted forty minutes on average and, with the exception of Japan, where each participant took part in more than one individual interview, all other participants took part in one single individual interview.

Participants were recruited through advertisement on the BBS of each university and through word of mouth. The only requirement to take part in the study was the ability to conduct a simple conversation in English.

The second study was complemented with observations of people's conduct and ICT use in public transportation and private and semi-private spaces (e.g., restaurants, classrooms, airports, streets, shops, etc.) across the countries surveyed.

Based on the above two studies, we drew out six elements whose interactions seem to provide the necessary conditions for the appropriation of ICT in everyday life. Outlined in Figure 1, and explained later in this section, our model covers the key issues of this phenomenon in all the contexts (and countries) we have analysed.

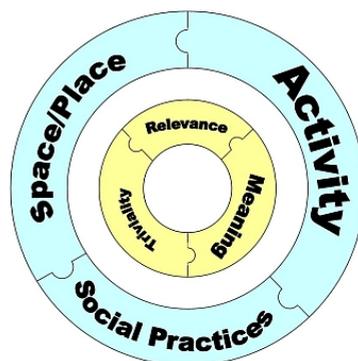
The following example illustrates the use of our model of appropriation of ICT:

*"When I was in High School the Internet became very popular in China. Everyone would have a computer at home and in their offices. Everyone would be talking about chatting and QQ. I started using QQ in High School. It was very popular in my environment among my friends to communicate with each other, so I applied, downloaded and installed the software. However, I would seldom use QQ. At that time our work schedule was very tight. My best friend, my classmates, all were very keen on their studies, so we seldom used it. It was common to have a computer, but students would seldom use it."* (Yan, 23, China)

On a micro-level (inner ring in Figure 1), like any other high school student, this participant needs to communicate with her peers. To do that, she needs to use a technology that satisfies the task she is supposed to perform (i.e. it is *relevant*), one she can afford (i.e., *trivial*), and one that is in accordance with the practices enacted by her peers (i.e. *meaningful*).

At a macro-level (outer ring in Figure 1) use of an ICT does not take place in a vacuum, it takes place within the structure of a particular context or environment (Meizhou, Guangdong, China in this case). Thus, the use of QQ as a communication technology is set within the following context: 1) it appears to be that around the time of this event (2001-04) a general adoption of computers and the Internet took place, at least in this town; the absence of computers and the Internet would prevent this event from happening at all (*space/place*); 2) that QQ is even considered as an alternative for communication is only possible because the company who developed this IM client has invested reasonable resources to position itself as a communication channel for the younger generation (*social practices*); and yet, 3) the use of QQ is opposed by the specter of the Chinese National College Entrance Examination during 'Black June' that represents a life-defining moment among the Chinese youth (*activity*).

This example illustrates how the appropriation of ICT is achieved through a delicate balance between the characteristics of the ICT itself and the context of use. We will now describe more fully the six elements mentioned, but in doing so we note the



**Fig. 1.** Our model of appropriation is constituted of three micro-level features—*relevance*, *meaning* and *triviality*—and three macro-level features: *space/place*, *activity* and *social practices*

importance of understanding how these elements influence each other. This exercise can serve to remind ourselves of the limits of our sphere of influence as technologists.

### 3.1 Relevance

The practical issue addressed here is based in the fact that in everyday life people continually face challenges they need to solve. Individuals are continually making choices as to what they want, need or should act on. A large part of the success of an ICT resides in its ability to continue opening new possibilities to disseminate information and facilitate communication, and in its ability to sustain existing practices around these issues. The relevance of an application to support these activities might be *practical* or *perceived*. For instance, participants across the countries surveyed usually relied on Skype for voice communication abroad because it was the only service that, among the existing alternatives, offered a free service and/or a competitive price. Skype, within this context, is a case of practical relevance as it effectively makes voice communication affordable. Conversely, in China we found participants who would embrace applications such as MSN assuming this move would be to their advantage upon securing a job since the use of QQ is discouraged in a work setting. The case of MSN here is one of perceived relevance.

### 3.2 Triviality

As people address their challenges in everyday life, they may consider whether digital technologies may help them in meeting these challenges. Accordingly, people may frame their problems in terms of the possibilities of ICT within the horizon of expectations engendered by the media, their perception regarding the ease of use of any given ICT, and the costs, if any, associated with operating (or acquiring) an ICT. The practical issue for individuals here is the choice, from among the ICTs that they have at hand and that they can afford, of the most 'trivial' one to use. Different factors contribute to this including commoditisation, usability issues and the media.

Moore's Law maintains that the number of transistors (microprocessor performance) doubles every two years. One of the main consequences of this law is the *commoditisation* of digital goods. Perhaps the best example of the commoditisation of technology is mobile phones. Some participants received their first mobile phone as early as 14 years of age. Some of them are now using their fifth mobile phone.

Although not a reason enough to secure appropriation, a high level of *usability* in ICT facilitates this process. ICTs need to reach a level in which even first-time users can operate them with some degree of proficiency in a short period of time. For instance, before the creation of YouTube it was possible to share video online, but this operation would require skills and resources reserved to a few. The creation of YouTube facilitated the task of sharing video online to such a degree that none of the skills previously required were needed any longer.

In our view, *the media* contributes to the trivialisation of ICT by ingraining it into the public consciousness. It could be argued that the media is one of the most important factors in promoting ICTs, in shaping what ICTs are widely known, and even when and how ICTs are to be used. Needs finally solved by ICTs, images acquired by the use of the latest technologies, and new horizons arguably opened by novel gadgetry seem to be the standard discourse about ICTs in the media.

### 3.3 Meaning

Users assign subjective and often intangible meanings to ICT, making it meaningful in individual ways, as well as taking up more clear-cut objective functional patterns of use. In the case of information gathering, most cases observed were an individual activity, and meanings assigned to information technology were given on a discrete basis. Tools used to develop an activity become interlocked with the feelings experienced during the task (e.g., success or relief) influencing any future use. The appropriation of an information tool continues over the long term until meanings associated with a technology are lost because the tool is proved to lack the very same faculties and appeal that led to its adoption, or because a superior or more attractive technology comes on stage (e.g., Google's appropriation in the face of AltaVista's demise).

The case of communication technologies seems to be more complex. Meanings bestowed upon communication technology do not seem to depend only on the activity they are supposed to satisfy but on a larger constellation of issues. A common behaviour observed in the sample was that of mixing and matching various communications technologies (e.g. IM, social networks, etc.) according to different circumstances such as: 1) place where they were used (e.g., bedroom vs. lecture hall vs. library); 2) message that was transmitted (e.g., chit-chat vs. more substantial issues); 3) 'listener' or the person at the other end of the communication link (e.g., friend vs. family vs. lecturer); 4) level of involvement with listener (e.g., friends vs. boyfriend/girlfriend); and even 5) time of the day and season of the year when communication takes place (e.g., day vs. night, holidays vs. term time). Users appropriate communication technologies according to these various scenarios of daily use imbuing them with multiple meanings and making them coexist within a constellation of other technologies.

Besides addressing an activity in terms of the most trivial ICT at hand, previously established patterns of use also have a significant effect on people. People tend to appropriate those technologies already appropriated by their peers. The practical issue here is which ICT is the most appropriate to communicate a given message to a given person at a given moment, with regard to both sender and receiver.

### 3.4 Activity

ICTs are constantly being assessed by their users according to their abilities to continue satisfying evolving and emerging needs (cf. *relevance* above), and their expression in everyday *activity* such as play, communication, study, etc. according to the trends of our time. Not surprisingly, then, the ability of ICTs to continue addressing real and perceived needs (and the activities these needs engender) is another element influencing their appropriation. Broadly speaking, among our participants ICTs were used to satisfy three types of activities: 1) study and work activities that are paramount in their list of priorities and to which all other needs/activities are secondary; 2) leisure and entertainment activities that play an important role in balancing everyday life; and to a lesser degree, 3) economic-related activities that might produce a financial benefit (e.g., purchasing clothes online at a lower price than in a bricks-and-mortar store).

### 3.5 Space/Place

The manner in which an activity or need is satisfied does not depend entirely on the tool used to this end, but also on the place where the tool is used. Thus, even when mobile technologies might extend the spatial range where social interactions mediated by ICT occur, their use is still restricted by two elements of the space/place where action takes place: the infrastructure and layout, and the marketing and business practices of a given milieu. In a sense, these elements determine what ICT is *trivial* in any given setting.

Some of our participants across the countries surveyed were housed in university accommodation. Having to live under these conditions forced participants to readjust and modify previous habits to cope with the restrictions and possibilities of a new *infrastructure and layout* that is shared with non-family members. Thus, while mobile technologies might open new horizons for use, they might not be appropriated because they are effectively constrained by service availability (e.g., a mobile provider without a good signal in certain areas) and by other physical barriers (e.g., a bedroom for six students) that must be negotiated with regard to other people's activities.

Strong influence on the appropriation of ICT comes from the *marketing and business* practices of a given milieu. This influence is not only shaped by the technical possibilities of a technology, but by business competition. ICT thus exists only within the possibilities made available by different corporations for whom the commercialisation of ICTs and their features are a source of revenue. Within this structure, it would seem obvious to say that users can only appropriate ICTs that are commercially available, as well as affordable or free. We believe the influence of marketing and business practices cannot be ignored in any study of the appropriation of ICT.

### 3.6 Social Practices

*Organisational regulation* in places such as schools and offices exerts considerable influence in making certain ICT the de facto standard to conduct an activity. For instance, at Nankai University in China students would conduct most of their internal communication through the school's BBS. Whoever enters those spaces/places is tacitly forced to comply and adapt to the ongoing practices of these environments. *Government regulation* is another considerable influence on the appropriation (or not) of ICT. For instance, for Korean males, military service is a duty characterised by deprivation of any means to communicate with the exterior except through regular public phones inside the base. As indicated above, *the media's* influence in the use of ICT was observed as having a significant effect.

Existing and evolving practices of a co-located or dispersed social group make certain technologies the chosen option to conduct various social practices such as the expression of friendship and communication. Thus, the appropriation of ICT is not necessarily a question of the technical features of a technology, but a question of how the environment leads a group of people to embrace an ICT and incorporate it into its existing and ongoing social practices making it *meaningful*. Two groups are especially relevant in this regard: the family, and friends and acquaintances.

The *domestication* of technologies takes place when these become part of a household dynamics. ICT are also adopted and integrated into the ongoing activities of a domestic environment. For instance, across the countries surveyed, parents were

always highlighted as the original facilitators of ICT such as computers and mobile phones. The provision of a mobile phone was invariably a form of monitoring enacted by anxious parents.

The integration of ICT into the dynamics of a group of friends, acquaintances and classmates—the *socialisation* of ICT—also seems to be fundamental in its appropriation. For instance, in South Korea the most popular IM client among our sample was NateOn; in China it was QQ. Use of a different client was seen as an oddity and discouraged among our participants and their friends.

## 4 Conclusion

In this paper we have avoided focusing on a structural or functional analysis of ICT, and whether or how structure and function directly determine appropriation. Instead, we took a step back to consider the forces acting on the context of use in terms of space/place, social practices and activity. From this viewpoint, we observed how the presence of certain characteristics of ICT (collectively summarised as triviality, meaning and relevance) with a given context of use seems to encourage, and in some cases impose, the use and appropriation of ICT. We suggest that this model might be applied to other countries and contexts of use beyond university students, as it focuses on elements and characteristics that can be consistently found across diverse settings. By laying out the interplay of the six aspects of our model of appropriation, as they appear in a particular case, we believe it is possible to provide a fair picture of the appropriation of an ICT in everyday life—or the lack of it. However, we invite readers to apply the conceptual framework presented here to other settings, communities and countries so as to assess and improve it.

The breadth, openness and interdependence of these aspects makes them difficult to experiment with holistically in controlled lab settings, or to encapsulate in fixed and formal software engineering terms. Most difficult for such approaches, we believe, are uncontrollable and unpredictable aspects of large-scale social activity, such as economics, marketing and the mass media. Our findings suggest that such areas are often essential parts of the adoption and appropriation of ICT, even if they are not conveniently or traditionally part of such approaches. This confirms the need for more situated practices of user study well-established in HCI, such as those based on ethnography, but it also reminds us of the breadth of perspective needed for—and inherent difficulty of—design for appropriation that reflects and respects its dynamism, detail and variety.

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