

# An Investigation of iDTV User Needs in Brazilian and Italian Communities: Preliminary Cross-Cultural Findings

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**Abstract.** The development of Interactive Digital Television (iDTV) represents a new paradigm of interactivity. Being a massive communication mean, the emerging applications of this new technology should take into account the different cultural aspects involving the user experience. When viewers with different needs and cultural aspects are users of a same iTV application, the elaboration of appropriate interaction design solutions for these applications becomes a challenge. In fact, user experience with technology is a subject that has also gained ground in HCI research as a way to maximize user satisfaction. The need of focusing on users and their cultural aspects increase when the use of the same technology and applications involves extremely different users like the ones located in very distant geographic locations and immersed in diametrically opposed cultures. In this work, we describe an investigation of user requirements in such a context consisting of two communities, one in Brazil and one in Italy. We also present how cross-cultural aspects may be mapped into specific features useful for early design of an iDTV interactive system.

**Keywords:** iDTV, cross-cultural users' studies, user requirements, Brazil, Italy

## 1 Introduction

Developing technical products for the global market has always been considered as a challenge in the field of HCI. The complications arise mainly from the fact that identical products may not be fully adapted neither to different socio-technical environments, nor to the needs of different cultural groups. Empirical evidence for such problems has been given by a number of studies. Two major groups of problems have been raised by these studies, i.e. 1) technical problems (e.g. compatibility of technical standards, [1]) and 2) user-related problems. This paper presents early results of two user studies conducted in two different countries for defining the design of interactive Digital Television (iDTV) applications. It focuses on the definition of user requirements for such applications based on preliminary cross-cultural findings. Therefore, it is centred on user-related problems.

In previous work user-related problems have been mainly explained by the following clusters of cross-cultural differences:

- aesthetic preferences and direction of visual scanning [2];
- comprehension of visual and textual metaphors [3];
- users' experience and activity with a product in a particular context of use [4,5];

Different approaches have been proposed in order to solve the problems arising from the cross-cultural differences mentioned above. These approaches could be summarized as follows: internationalisation, localisation, and a combination of these two referred to as "glocalisation" [6]. The first two approaches will be briefly discussed below.

### **1.1 Adaptation of Products Intended for Cross-Cultural Use: Major Approaches**

Internationalisation concerns the process of extracting all the culturally-specific content from an application, originally developed for a given market, in order to prepare its "export" to other cultures and markets. In a sense, internationalisation is the "acculturation" of a product [6]. From a more technical point of view, internationalising an application means developing a source code, which enables and simplifies the creation of different language versions of this application [7]. Internationalisation could also be considered as a necessary step for the second approach referred to as localisation.

Localisation is the process of adapting an existing application for a specific local population. This includes the translation of the software, the semiotic adaptation of all figures and symbols, as well as the redesign of menus, dialogue and functions [8]. Thus, localisation could be considered as an "enculturation" of a given application [6].

At a practical level, internationalisation and localisation are realized by two groups of methods. The first group of methods brings together different types of expert evaluations of products already existing on the target market. These expert evaluations are done in order to extract relevant "cultural markers", defined as "those elements that are most prevalent and possibly preferred within a particular cultural group" [9]. They may be colours, national symbols, formats of time and date. Though very useful for the establishment of design guidelines, expert evaluations have two major limits: 1) they are usually done in late design, when it is expensive and difficult to introduce any changes, and 2) they give very few indications on user's reactions and preferences.

The second group of methods concerns different types of user studies in order to investigate users' satisfaction, experience, activity as well as their social, cognitive and cultural constructs when interacting with a product [5]. Thus, these methods try to overcome the major limitations of expert evaluations by implicating users in early design. The studies described in this paper have also been done with this objective. In this sense, we are closer to the view of developing a product "from within a cultural context" [6] than to the view of the global product adapted for a target culture. In our project, this product refers to services that will provide users' access to TV with interactivity.

There are a number of recent studies with and on iDTV viewers (for a review, please see [10]). Most of these studies originate from the UK or Scandinavia. Consequently, they mainly present results about viewers' activity and experience in these cultural contexts. In Brazil alternatives of interaction design for iDTV tasks (such as to start an application, to vote) were defined and validated with Brazilian users [11]. To our knowledge, there is no extensive literature on internationalization of iDTV. Therefore, we wanted to investigate the way that people watch TV in a cross-cultural context. We were also interested in what TV represents to them, among other factors. The context of the user studies described in this paper will be briefly presented in the following section.

## **1.2 Context of the User Studies in SAMBA Project**

SAMBA project (System for Advanced interactive digital television and Mobile services in Brazil) is a recent international initiative funded by European Commission under the framework of 6th Framework Program for International collaboration on iDTV between Europe and Latin America. The main motivation of the project stands in the fact that even though digital TV technology is a reality in European countries, it is not yet so in Latin America. In SAMBA, we sustain that iDTV presents an ideal way for bridging the Digital Divide, especially in developing countries such as Brazil where low income population does not have access to computer technology due to its high cost and required expertise.

SAMBA pursues the creation of a framework for enabling local communities to produce iDTV content and broadcast it through Community Access iDTV Channels. In this way, citizens, including low income population, will be empowered with a way to participate in the process of creating and accessing digital content and in the services derived from it. For meeting this requirement of participation, SAMBA will study the use of already existing Power Line Communications (PLC)-based networks as return channel of low cost set-top-boxes (i.e. devices that connect to a television and some external source of signal, and turn the signal into content then displayed on the screen). The definition of an end-user solution for receiving iDTV content able to use the PLC network as a return channel was motivated by the fact that the Brazilian powerline network covers almost 95% of populated areas and this coverage is much greater than telephone and data networks.

This project that started in January 2007, involves stakeholders from different Brazilian and European organizations and universities. In initial project workshops, we noticed that stakeholders knew neither who the users were nor what services they wanted. For this reason and also taking into account that iDTV is as a product intended for cross-cultural use, a user study was started. SAMBA users will belong to two different categories:

- primary users, meaning end users of the content, and
- secondary users corresponding to community content-creators.

During the initial project workshops, the above-mentioned target users groups were roughly defined and two studies of user requirements (one in Brazil and one in Italy) were launched. The preliminary results of users' requirements and cross-cultural aspects obtained from the users studies are presented in this work.

### **1.3 Research Questions and General Orientation of the SAMBA User Studies**

As mentioned earlier, we decided to focus our research on users' cultural differences by investigating their "experiences" with technology (i.e. the users' practice and living with technology in their contexts, [12]). The notion of "experience" has been analysed by professionals such as ethnographers, designers, psychologists, having a good understanding of real situations experienced by users. Several questions were addressed: What are the users' real needs? How familiar is the technology to the users? In what context is the technology being used? For example, observing these situations lead professionals to understand better users' preferences, their limitations and their emotions (How easy is this to use? How fun is it?), as well as to identify users' profiles. These observations and investigations were performed in the two different cultural contexts of the project.

The studies did also try to go beyond purely usability aspects in order to provide designers with concrete culturally-rooted recommendations. Furthermore, it was in the intentions of the study to identify and outline a number of methodological assumptions for how to analyse users' activity and experience in different countries (e.g. what kind of indicators to use).

## **2 Methodology**

### **2.1 User Samples Selection**

In Brazil, the user study took place in the town of Barreirinhas. There, the participants were selected taking in consideration the place where they live, work or study. This place had to be up to 2km away from the transmission tower that emits signals allowing internet access via PLC. Some of the people, who were part of the sample, were chosen in a random way (e.g. people walking by, who were invited to participate in the study). Others were selected according to their profession: teachers, businessmen, salesmen, Federal or State employees, housewives and students.

In Italy, the user study took place in the province of Alto-Adige-South Tyrol. There, the majority of the participants in the study were working in one of the buildings hosting the main transmission center for DTV. PLC experimentation is currently running in this building. Thus, the people working there were easily accessible potential primary and secondary users.

### **2.2 User Sample Description**

The participants in the studies in Barreirinhas and South Tyrol were partially representative of future iDTV users because of their characteristics (e.g. age, educational level, income, etc). These characteristics are synthesized in the Table 1.

This table shows that the Brazilian user group is more heterogeneous than the Italian user group as far as the age is concerned. The smaller dispersion of the age of

the Italian sample could be partially justified by the fact that South Tyrol is a relatively young Italian Province. Thus, 78% of its population is aged from 0 to 59 years [13]. As for the gender, the two user groups are comparable.

The table also shows that the future users in Barreirinhas spoke only Portuguese, while the future users in South Tyrol spoke both German and Italian, because this province is officially bilingual. Consequently, questionnaires were provided in all these three languages.

The Brazilian sample is also more heterogeneous than the Italian one as for the educational level. Furthermore, in general, the Italian participants have a higher educational level than the Brazilian participants. These two observations are also valid for the income level.

Last, Table 1 shows that the Italian participants have easier access to computers than the Brazilian one. However, there is no difference as far as TV possession is concerned.

**Table 1.** User sample description

	<b>Group 1</b>	<b>Group 2</b>
<b>Place / Nationality</b>	Barreirinhas / Brazilians	South Tyrol / Italians
<b>Age</b>	24% : no answer (n=28) 23%: 8 to 18 (n=27) 26%: 19 to 34 (n=30) 19% : 35 to 49 (n=22) 3%: 50 to 60 (n=4) 5%: over 60 (n=6)	0: no answer 0: 8 to 18 71%: 19 to 34 (n=69) 24%: 35 to 49 (n=23) 2%: 50 to 65 (n=2) 3%: over 65 (n=3)
<b>Gender</b>	58% M (n=68) 42% F (n=49)	53% M (n=51) 47% F (n=46)
<b>Language</b>	100% (n=117) Portuguese	52% Italian (n=50) 48% German (n=47)
<b>Education</b>		
No answer	5% (n=6)	0% (n=0)
Post-graduate	6% (n=7)	17% (n=16)
Graduate	14% (n=16)	42% (n=41)
High-school	48% (n=56)	36% (n=35)
Junior-high	27% (n=32)	5% (n=5)
<b>Income</b>		
No answer	29% (n=34)	0% (n=0)
More than 2 min wages (w)/ month (m)	19,5% (23)	18% (n=18)
Up to 2min w/m	37% (n=43)	60% (n=57)
Less than 2 min w/m	14,5% (n=17)	18% (n=18)

<b>Computer ownership</b>	18,1% (n=19 of 105 living in different houses <sup>1</sup> )	78% (n=76)
<b>Computer access</b>	62% (n=72)	97% (n=93)
<b>TV ownership</b>	97% (n=114)	97% (n=93)

### 2.3 Data Collection and Analysis Techniques

Two data collection techniques were used at both sites, namely questionnaires and semi-structured interviews.

In Barreirinhas, this research took 5 days to apply 150 questionnaires, from which 117 were received back, having an acceptable total loss of 33 questionnaires (22%). From the 117 questionnaire respondents, 26 people were selected, among primary users (11), and secondary users (15) to participate in interviews. Ninety-seven questionnaires were distributed and filled in South Tyrol. Fifteen people (11 women and 4 men) who had filled in the questionnaire were also interviewed.

In both countries, the interviews were done using a previously defined interview guide. The questions in this guide concerned actual users' experience with TV, computers, Internet and on-line communities, as well as users' needs for community-oriented iDTV applications.

Both in Brazil and in Italy, the questionnaires were analyzed using basic uni- and bivariate statistical techniques. The interviews were analyzed using classical content analysis techniques [13]. The unit of analysis was the basic idea expressed in one or more phrases. Then, basic statistical analysis was also performed on interview data.

## 3 Results: A Cross-Cultural Comparison

### 3.1. Implementation of the Studies in Both Locations

Initially, both studies had to involve an ethnographic investigation in order to observe users' experience with technology (i.e. computers and TV) in their daily environment. This was actually done in Brazil: we went to users' houses and workplaces, took pictures, recorded the way they use the TV and the remote control, etc. Some interviews took place in these moments. However, such a study was not possible in Italy. Future users did not want to accept an observer in their home environment because of privacy concerns.

Brazilian future users had different concerns. For example, they were not confident that this kind of research could bring them benefits. They had already participated before in other users' field studies, and they had never received any feedback about the results. In contrast, such problems were not posed by the users in South Tyrol.

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<sup>1</sup> From 117 questionnaires applied just 105 people live in different houses. Twelve belong to the same home.

In Barreirinhas, another difficulty referred to reliability of the communication resources we had. Thus, various e-mails came back and many calls were not returned back. We suppose that as participants use pay phone, they did not have credit to call back. Therefore, in many cases, the team went directly in people's houses during the recruiting process.

### **3.2 Preliminary Findings of the Major Results of the Two Users Studies**

After the analysis of the questionnaires and the interviews in both geographical locations, a number of cross-cultural differences were put forward. We present the major differences below. More detailed results could be found in [15].

**Hours of watching TV.** Most of the participants from South Tyrol (73%, n=71). stated they watched TV less than 2 h/day and not every day. The rest of the participants watch TV between 2 and 5 h/day. This result is consistent in all age ranges.

In Brazil, the situation is quite different, since the people stated watching a lot of television. Most of the Brazilian participants (66%, n=77) declared watching TV between 2 to 5 h/day. Only 18% of the participants (n=21) said watching TV less than 2h/day. The age group that watches TV the most is the one from 8 to 15 years. Sixty percent (n=6) of the users in this group watch TV more than 5h/day.

**Preferred TV programs.** The Italian participants stated preferring news and movies (91%, n=88). Then comes sports, which is preferred by 45% of the people (n=44), and documentaries, which are preferred by 44% of the people (n=43). Only 4% of the Italian participants stated watching soap operas. The Brazilians participants also stated preferring news (71%) and movies (62%). However, in contrast to Italian participants, they also watch soap operas (54%). Both in Brazil and South Tyrol very few participants declared having taken part in phone shows or quizzes (6% in both locations).

**Contexts of watching TV.** The contexts of watching TV are quite comparable in both countries. Thus, most of the participants stated watching TV with their families (63% in Barreirinhas and 57% in South Tyrol). One-third of the participants watch TV alone (29% in both countries). A small fraction declared watching TV with friends (5%, in Barreirinhas and 8% in South Tyrol).

**Handling of the TV Remote Control (RC).** The Italian participants declared that it is usually the father (41% of the cases) or the mother (20%) who handles the remote control, when the family is watching TV. However, almost one fourth of the Italian participants did not provide an answer to this question. In Barreirinhas, it was identified that the kids handle the TV remote most often (51%). Parents control the interaction in 31% of the cases.

This control of the interaction is explained by similar reasons both in Brazil and in Italy. The explanation obtained in most of the cases is that the person, who is controlling the interaction is the one who watches TV most often (34%, in Italy and

26% in Brazil) or who likes switching between the channels during advertisements (29%, in Italy and 44% in Brazil). Very few Italian participants explained this behaviour by the fact that this person knows how to use the remote control (n=1) while regarding Brazil, this reason is mentioned more often (in 19% of the cases).

On the basis of our raw results and from a review of specific features of exiting community-oriented sites (e.g. support for discussion, content sharing), we derived some preliminary user needs and expectations of iDTV. These needs are described in Table 2 and are ordered according to the highest frequency in subjects' answers.

### 3.3 Major user needs and expectations regarding iDTV

In Barreirinhas, the need of communication was very often evoked by users as one of the fundamental usages of the intended technology. For the Brazilian participants, this need is perceived as an opportunity to actively participate in different subjects, from which they feel excluded. In fact, as only 18% of the Brazilian participants have a computer at home, they expect to obtain via the TV the access to information that they would have been given if owning a computer.

The second and the third group of users' needs in Barreirinhas are related to the possibility to have access to information and to improve education.

**Table 2.** Major users' needs in Barreirinhas and Alto Adige-South-Tyrol

<b>Barreirinhas</b>	<b>Alto Adige-Adige-South Tyrol</b>
1- Applications that allow interaction/communication among people	1- Applications that allow shopping and communication/discussions about shopping (82% of the needs)
2- Applications that allow content elaboration with diverse information (health alerts: STD-aids, vaccination campaigns; education; citizens' rights, alerts to the community: child labor, prostitution; tourist information and other services)	2- Applications that allow booking of travels and tickets and communication/discussions about travelling (82%)
3- Programs that allow to transmit and visualize information	3- Programs that allow easier access to governmental services and discussions/suggestions about these services (55%)
4- Programs that allow to have more control over what they watch	4- Applications that allow interaction among people (36%)
5- Programs that allow interactivity (as voting, games, buy something)	5- Programs that allow to have more control over what they watch (27%)

As seen in Table 2, the last two groups of user needs are related to the possibility of participating in TV programs, and to have more control on what is being watched.

These groups of needs could be partly justified by the situation of underdevelopment existing in Barreirinhas. Specifically, in that location people have

difficulties in accessing other neighbourhoods/towns; there are strong limitations to Internet access; there are only few high-schools and no college courses nearby and finally, there are few entertainment options for youngsters and children.

#### **4. Discussion**

From the results shown in table 2 we found that even if the users studies were conducted in both regions by following the same methodology and using the same questionnaires and application scenarios, the attitude of users towards the implementation of the studies as well as their expectations from the proposed technology were substantially different.

##### *Attitude towards the implementation of the user studies*

1 – In the case of Barreirinhas two main characteristics were identified. Regarding users' attitude towards the implementation of the user study, people were in general *proactive* and participative. They were open to interviewers for conducting the study and for observing their use of technologies (even in their homes) and were not very worried about privacy concerns while answering the questionnaires.

2 – During the users' studies in South Tyrol, users' attitude was in general positive, but a little bit more *conservative* towards the interviewers. Thus, users in South Tyrol were somehow less collaborative than in Barreirinhas. An example of this was the resistance of the users to be observed in their own homes while using technologies.

However in both sites some specific questions in the questionnaires regarding privacy-sensitive information were not informed (even if the questionnaires were anonymous). In Brazil, many participants did not answer the questions concerning their age, personal income and educational level. In the Brazilian case, through interviews, we could deduce that this fact was probably related to their low self-esteem. As their education level is very low, they were ashamed to inform their age and salaries. Although it is only an assumption that deserves to be investigated, Heckman identified this aspect as the major problem in the Brazilians' behaviour [16]. In South Tyrol, some participants did not provide any information about their personal income. Again, we could suppose that this result is due to privacy concerns.

##### *Attitude towards the potential use of the future technology*

1 - Concerning the main usages foreseen for the future technology, the users in Barreirinhas were more enthusiastic about the potentials of iDTV for providing mechanisms to interact more within the local community and even for *actively producing* content useful for others.

2 –As for the Italian sample, users most frequent requirement concerned leisure activities (e.g. shopping and booking of travel packages and tickets). One possible explanation to this is that nowadays in the Western society, TV has acquired an important role as a technological mean used in a leisure context, in contrast to Brazil, where it has a very important role in a communicational/informational context.

This result confirms similar findings reported in previous work [17]. The observed situation could be explained by at least two factors. First, in the Western society, TV is an information and communication source among many others (e.g. Internet, mobile phones, radio, and newspapers). Second, people have in general an easy access to powerful communication means and information sources both at their workplaces and at home.

The opposition *community-oriented vs. individualistic* was somewhat confirmed by other studies in other domains. For example, Osroni & Pasteur [18] studied different discursive practices (e.g. communication of a sad event to someone; oral narration; legislative texts) in Brazil and in France. They conclude that, compared to French discursive practices, the Brazilian ones reflect a greater proximity between interlocutors and, thus, a greater sense of community.

On the basis of the findings described before, we classified both groups of users as *Proactive-Producers* (PP) for the case of Barreirinhas and *Conservative-Consumers* (CC) for the South Tyrol users. As a preliminary analysis of these two categories, we believe that both PP and CC attitudes have a strong liaison to cultural aspects inherent to Brazilian and North-Italian people stereotypes. For the first case, living in a collectivist culture, PP users were open and very community-oriented in general while CC users, belonging to a more individualist culture, were more resistant to any invasion of their personal privacy and less interested in interacting with the community.

Certainly, these differences between the Brazilian and the Italian user group may also partly be explained by the differences between age, educational and income levels. Thus, the Italian user group was much more homogenous as far as the age range was concerned. We could suppose that we would have obtained different results if we had compared two groups with similar age range, income and educational level in Brazil and in Italy.

In addition, another finding about the implementation of a cross-cultural methodology and users expectations was obtained. It was observed that when talking about an innovative technology, users had difficulties in formulating their needs either because they lack knowledge about the potential usages of the innovative technology, or because they are influenced by their habits of using traditional technologies. In particular, in the case of Barreirinhas users, there was a need for researchers to present iDTV potential usage in a more familiar way to users and closer to their everyday life in order to involve them in design and thus stimulate them to imagine possible iDTV applications. In contrast to Italian users, our target Brazilian users did not know how to give information on their iDTV needs, since they did not even know what Digital TV was. Therefore, we produced a prototype that simulated operations of Web content creation and their respective content visualizations on TV. Users were observed during the use of this tool. This practice provided them with more confidence to describe their expectations of the future technology.

## **5. Conclusion and future work**

This work presents preliminary cross-cultural findings in Brazilian and Italian communities useful for the identification of iDTV user requirements under the

framework of SAMBA European project. The investigation goals of this work have been achieved through the application of a common methodology in both contexts where the investigated artefact (the TV) is a product intended for cross-cultural use. In particular, it was found that Brazilian people use the TV as the main (and in many cases, as the only) source of information and entertainment, while in Italy it is considered just as *another* information source together with Internet, newspapers, etc.

Besides, it was found that Brazilian users were in general more open and *proactive* during the users' studies, while the Italian ones had more concerns for their privacy and, in general, were more *conservative* towards the interviewers. Regarding the expectations of iDTV technology and its potential applications, Brazilian users seemed to be in general more motivated to potentially become content *producers* while Italians show their interest to act as content *consumers*. Based on these findings we classified the two groups of Brazilian and Italian users as *Proactive Producers* and as *Conservative Consumers* respectively.

The implementation of the users' studies allowed the necessary data gathering to propose a preliminary definition of users' needs and to find out the matches and the mismatches of users' cultural aspects. We believe that the preliminary findings of this work are useful, in general, to other international technological projects as cues for defining better methodologies for dealing with cross-cultural issues: They are also particularly useful for SAMBA project as a mean for identifying adequate user requirements for iDTV in culturally-diverse communities.

Future work will consist in a deeper analysis of the preliminary results considering the relationships between technology, applications and culture that may lead to the development of specific and ad-hoc methodologies for future cross-cultural user studies. Another aspect of our future work will focus on a more detailed analysis of the similarities between the two user groups in Brazil and in Italy. If possible, we will try to compare similar groups in terms of age range, income and educational level, in order to differentiate the weight of these socioeconomical factors from the weight of "purely" cultural factors.

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