Social acceptance of proactive mobile services: observing and anticipating cultural aspects by a Sociology of User Experience method

Fabrice Forest [(1)] *& Leena Arhippainen* [(2)]

[(1)] Maison des Sciences de l'Homme – Alpes (MSH-Alpes/CNRS), 1221 avenue Centrale, Domaine Universitaire, Grenoble, France
fabrice.forest@msh-alpes.prd.fr

[(2)] University of Oulu, Department of the information processing science, P.O. Box 3000, 90014 Oulu, Finland
leena.arhippainnen@oulu.fi

Abstract

This paper describes the method of a sociological inquiry achieved in France and Finland within the ADAMOS project. The goals of this inquiry are to understand the social factors of the acceptability for proactive mobile services and identify the cultural differences between French and Finnish users. A prospective vision of the proactive mobile services has been conceptualized and depicted in a demonstrative film. It was shown to French and Finnish people selected according to their user profiles in relation to their ICT usage: the way they conceive of ICT's in their daily lives. Individual reactions and group dynamics have been filmed and sociologically analyzed. They reveal slight differences between French and Finnish reception of the exposed concept. It suggests how the social acceptability of high-tech services could depend on archaic aspects of the user's culture.

1. Introduction

ADAMOS [1] is a French and Finnish research project which is aimed at designing parameters for proactive services on mobile devices (smart phone and PDA) using both a theoretical and an experimental approach. In order to anticipate the social acceptability of proactive services and to observe the cultural differences that impact the social acceptance of ICT innovations, scientists of sociology and Human Computer Interaction (HCI) involved in this project have completed a study of French and Finnish users. This study was based on the methods and concepts developed by the Sociology of the User Experience team in MSH-Alpes. This approach is complementary to usability and user experience issues during the design process of ICT's (Information and Communication Technologies). By means of qualitative methods, this technique considers how the user experiences with a new ICT device or service in his daily life according to his background. Then, we observe the user's *new experience*: this first level of the analysis considers how the user thinks and conceives the new situation instigated by the new device or service according to his personal "ways of doing" [2]. We observe also the user's *integrated experience*: how an innovative ICT is adapted or not to the user's way of being. This second level considers user experience as a life history which has built the user's social identity: user profile.

This sociological approach to the user experience is well adapted to a study about social acceptance because it enables an understanding of how technical innovations make sense for the user and of whether or not ICT's are meaningful to the user. It enables also an understanding of whether or not innovative ICT's are suitable to the user's culture, identity and social lifestyle.

Then, the goals of this compared study about the acceptability of proactive services in France and Finland became:

To identify the potential limits to the social acceptance of proactive services and technologies.

To identify ideas of new proactive services which make sense for their users.

To understand cultural differences in the social acceptability of proactive services between French and Finnish users.

To provide ADAMOS partners with anticipative recommendations for the development of meaningful proactive services well-adapted to the social identity and the cultural context of the users.

This paper presents the method of the sociological inquiry carried out in France and Finland. The chapter 2 describes the first phases of the inquiry process from conceptualization to film realization. The inquiry is presented in the Chapter 3. The Chapter 4 describes results: cross-cultural differences in the acceptability of proactive services and working hypotheses for interpretation.

2. From the Concept of Proactive Services to the creation of the ADAMOS film

In order to test the acceptability of proactive services during the design process, it is necessary to expose the potential users to this innovative concept. Three steps were followed: firstly, the conceptualization step; then, the scenario production phase; and finally, the realization of a demonstrative film.

2.1. The concept of proactive services

The conceptualization step consists of the combination of a long-term vision of proactive services with the technical constraints and platforms of the industrial and technical partners of the project: it is important to obtain a common vision of this concept with all the partners in order to facilitate the suitability and appropriation of the final outcomes of the study. Then, the industrial and technical partners of the project provided to sociologists the technical features that they intended to integrate into the concept (smart phone [3] and PDA [4]) to be tested and studied. These technical features are generally based on outdoor and indoor geo-positioning technology (WI-FI and GPS) and RFID tags.

Keeping in mind these technical constraints, we selected, from within our definition of the concept of proactive services, the features that were to be potentially addressed by the ADAMOS partners. This is a definition of the proactive services specificities from the user's point of view. Scientists and technical actors of the computing evolution divide it into three successive ages [5]: the "centralized age" (yesterday), the "personalized age" (now) and the "pervasive age" (starting now and continuing through the next years). These

three ages are defined by the relationship between the user and ICT's. Proactive services are characteristic of the pervasive age because this phase is qualified by the user's rapport with an environment of smart and pervasive devices otherwise known as "ambient intelligence". This "ambient intelligence" allows a new generation of services based on the environment awareness towards user profile and situations. Thus, the concept of proactive services tested in this inquiry is based on the main characteristics of pervasive computing: ambient intelligence and context awareness.

2.2. Scenario conception

Two main constraints were taken into consideration during the scenario construction: user mobility and sociological issues to be tested. Thus, in order to explore mobility issues, the scenario was structured around the user's many context changes. From a sociological point of view, when the user is moving or travelling in daily life, it means that he switches between different social spheres. Typically, he switches between private sphere, public sphere and professional sphere. This context switching affects the continuity of the user's activities in mobile circumstances (Fig.1).

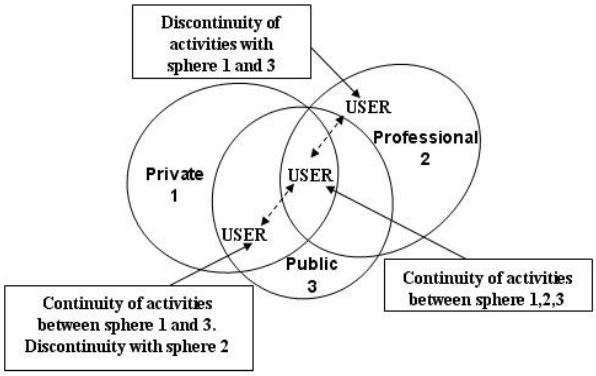

Figure 1: Continuity and discontinuity of activities according to user's mobility among social spheres.

Then, in our scenario, the user experiences several use cases in a typical work day by moving through the various social contexts: he wakes up at home, he goes to work by bus, has lunch at restaurant, comes back to his workplace, plays tennis in the evening and then he comes back home. This context switching aspect enabled the staging of various proactive services that could be provided to the user in mobile situations and in a mobile lifestyle. For example, in the scenario, the user starts to manage his bank accounts on Internet with his personal computer at home but suddenly he has to leave. Later in the bus, his PDA proposes to him that he continues the management of the bank accounts: the service has followed him through the switching of context by using geo-positioning technology. The scenario allows studying the social acceptability of proactive services which modify the traditional relationship between the social sphere and activities. For example, in our scenario, the user's relationship to an activity that is usually done in the private sphere, managing one's finances, is transferred to the public sphere, the bus. This incongruence between the confidentiality requirements of the management of one's personal finances and the public nature of the environment on the bus allows for the study of the first main sociological issue: how proactive services affect the elasticity of activities from one social sphere to another? How could this system affect the porosity of the social sphere towards activities and information? In practical terms, the example of bank accounts management will help us to understand what kind of personal activity could be extended from private sphere to public sphere by considering the privacy levels of these activities.

During this user's typical day depicted in the scenario, the user has characteristic relationships within the three social spheres: with family, friends, unknown people in the bus, at restaurant, at tennis club and also with colleagues at work. These situations allow the sociologists to study the acceptability of proactive services by considering the second main sociological issue: the impact on social relations. For example, what could be the impact of proactive services which communicate to the user some elements coming from the profile data of another user? What could be the impact on social relationship if the user is informed that his best friend or his girl friend is in the area close to him? What could be the effect on the user's relationship if these services were to permit one to lie to his friends or companion about his location? Competition in relationships, manipulation of interactions, competition between individuals and social issues, social software interferences: the scenario puts into perspective this range of sociological issues. It allows testing the conditions for the acceptability of users who experiment with exactly this kind of features and situations.

Therefore, this scenario is not a realistic vision of the future everyday life with proactive services. It's a synthesis of very sensitive issues addressed by proactive services in order to facilitate the observation of pre-existing sociological issues and hypothesis suggested by proactive services. By the conception of this kind of scenario, we try to anticipate how the ICT innovations could affect the current sociological knowledge about usages and users' social relations. It is a "problematized" scenario made to provoke reactions and debates amongst potential users: this point has to be considered constantly during further analyses in order to avoid projecting this bias onto the acceptability results. Indeed, potential users submitted to this scenario could consider this vision to be a very bad dream of their future. However, this kind of storytelling is suitable to an acceptability approach if we consider the thoughts of Hans Jonas. In his thought considered as fundamental concerning ethical issues addressed by scientific and technical development [6], the German philosopher suggests that researchers invent stories and use a narrative process in order to put these innovations into perspective. From this point of view, science fiction stories have the social function of helping society to check the acceptability of technical possibilities. By these stories, human plays frightening. If the vision of the future outlined by these technologies provokes fear to people in a society, then the social diffusion of the innovation concerned should be reconsidered: it means that something strong has been affected in the human being. Using storytelling tales in a study of social acceptability is in line with an old ritual of narration in society.

2.3. The making of the demonstrative film

In order to submit the potential users to the scenario, the decision was taken to use an audiovisual demonstrator. The first reason is linked to the nature of the inquiries about social acceptability: this kind of study must be of an anticipative nature in comparison with the current knowledge and technological feasibility of the project partners in order to provide them with long-term results. The second reason is that it was practically impossible to realize use tests by using a simulation of features because of the innovativeness of the

features (eg. interfaces were not developed), because of the large area necessary to provide a realistic concept and because of the necessity to provide the same testing conditions to several test users at the same time in order to observe social phenomena. This difficulty was increased by the necessity to repeat the similar experiments in France and Finland. A movie format was chosen instead of a cartoon style because it gives a more realistic impression to potential users: the demonstrative film is like a documentary report about daily life with proactive services.

We observe a double action phenomenon when potential users are watching this film: first they identify easily to the character shown in the scenario because its realistic nature, and secondly they project themselves in the same situations or they imagine new situations of uses with this concept in their daily life. So, they take their distances with the main character presented in the film, they criticize him, they compare themselves with him, and they imagine new and better usages (or worst) than the usages described in the scenario. The efforts made during the steps of conceptualization, scenario conception and movie realization are very important because it ensures the identification and the projection of potential users when confronted with the innovation.

The demonstrative film is a key tool in the sociological acceptability approach. This type of tool should be considered as an "intermediary object" [7] of the design process. This notion has been studied and developed by the sociology of innovation and industry. According to these studies, the demonstrative film carries out the three main functions usually performed by "intermediary objects":

"Representation": the demonstrative film is an intermediary idea of the concept between the initial idea and the final device/service like the designers are conceiving it at that moment of the process.

"Translation": the demonstrative film supports the partners of the project speaking, conceiving and designing the same object but with their different disciplinary languages, professional and technical jargon. It's the "common vision" effect of this tool in a project: then, it is also a management and organization tool.

"Mediation": this function is the main objective performed by the demonstrative film which supports the three way negotiation:

1. between designers (linked to "translation")
2. between the concept and the potential users (meaning of uses negotiation)
3. between potential users themselves (social negotiation)

The Sociology of the User Experience study examines the negotiation between the concept and potential users and also the negotiation among users.

Finally, the demonstrative film has been realized in both French and Finnish in order to be projected to people from both countries. The playing time of the film is ten minutes which is a reasonable length for a concept presentation to potential users in a sociological inquiry.

3. Across borders: the French and Finnish experiences

The sociological qualitative study was carried out in both France and Finland. The demonstrative film has been shown to sample groups of potential French and Finnish users selected according to user experience criteria and sociological criteria. The User experience criteria take into account the level of experience of ICT use. The criteria divide users between experienced and inexperienced users depending on how much they have used different information and communication technologies.

Sociological criteria take into account the user profiles in their relation to ICT's: how users conceive and experiment ICT's in their lives according to their social identity. These four profiles have been identified and observed by the MSH-Alpes sociologists [8] and are depicted as following:

The *Fans*: they are aficionados of ICT's enthusiast towards these devices and services. ICT's are considered as a strong element of their identity. Their way of life is based on ICT uses.

The *Utilitarians*: they are rather open to the uses of ICT's on condition that it makes life easier and support them in the achievement of their objective. They pay a lot of attention to the usability, to the usefulness and efficiency of ICT's.

The *Humanists*: they consider the ICT with a critical eye. Uses of ICT's are strongly dependent on the priority that user gives to the human relations, human being and values.

The *Detractors*: they are strongly reluctant to use innovative ICT's and they are extremely hostile to ICT's on principle. They conceive it like an aggression against their values, their identity and their way of life.

We decided to organize the focus groups by selecting the participants according these user profiles in order to ensure the representation of these various conceptions of ICT's in the sample groups. Thus, a selection tool based on sociological criteria has been specially developed in order to detect, before the focus groups, the user profile tendency of participants. This pre-selection also enables us to make up the sample groups by controlling a priori the distribution of users' sensibilities towards ICT.

Practically, during November and December 2004, two focus groups have been organized in Oulu (Finland) and two focus groups in Grenoble (France). In each country, one focus group was carried out with eight experienced ICT users and the other with eight inexperienced users. Exceptionally, in Finland only seven inexperienced users participated to the focus group. The participants were aged from 21 years old to 59 years old. An equal male to female ratio was respected. The thirty-one participants were principally urban people and workers with mixed social and occupational profile.

One of our informal hypotheses was that for every eight people in the French society, one would be a *Fan*, three would be *Utilitarians*, three would be *Humanists* and one would be a *Detractor*. Hence, the focus groups were modelled after this informal hypothesis (Fig. 2). The legitimacy of this hypothesis is confirmed by the first results of a quantitative survey currently being done in France by the MSH-Alpes about the social proportions of user profiles towards ICT's [9]. However, the difficulties we had in the detection of some user profile tendencies in France (*Fans* especially) and the ease of finding others (*Detractors*) compared with the inverse phenomenon observed during the selection process in Finland gave way to the hypothesis that the social distribution of user profiles is probably very different in both countries. Are there more *Fans* in Finland? Are there more *Detractors* in France? Due to the small size of our samples, only a quantitative survey in Finland could provide answers to this question. Nevertheless, this option must be considered to counter the results obtained in France because the social proportion experimentally made up in our focus groups is probably more valid for French society than Finnish society.

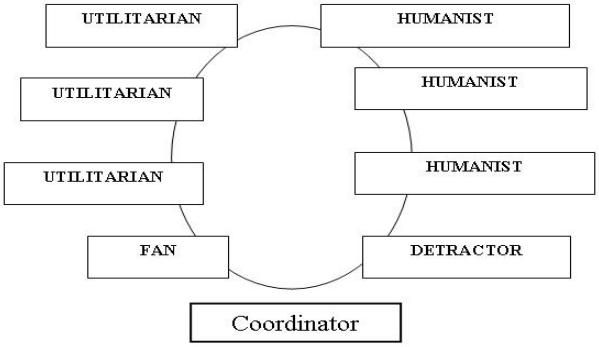

Figure 2: Distribution and position of user profiles tendencies during the focus group.

The fact that the focus groups are mixed (different profiles) and that the participants are strategically placed according to their profile allows the researchers to observe geographically what happens sociologically. It helps the leader in the live coordination of the focus group: for example, he can keep in mind what the profile is for each participant and boost user profiles that remain silent on each topic discussed in order to get the point of view from each profile. It makes the focus group sessions more efficient. It supports also the analysis of the focus groups recordings by sociologists because it makes really visible the sociological phenomenon they have to identify.

With the combination of user profiles during the focus groups, sociologists can observe experimentally two aspects of the social acceptability (Fig.3):

Individual relation of each user profile towards the concept of proactive environment. How it make sense for each participant according to his profile tendency (two-way black arrows);

Social relations between user profiles centered on the concept: how group dynamics works and how this experimental social debate leads to acceptance or not (dash line arrows).

The duration of each focus group was about three hours. The focus groups were filmed and led by MSH-Alpes researchers (French sessions) and University of Oulu researchers (Finnish sessions). After the projection of the demonstrative film at the beginning of each session, the spontaneous reactions of the audience were collected and the focus group was led according to the same guideline in both countries. This guideline was designed to explore the general ideas of the participants towards the concept of proactive services and later, their specific conception of characteristic features of proactive services. Extracts of the demonstrative film were shown again in the second phase of the focus in order to support this work about features.

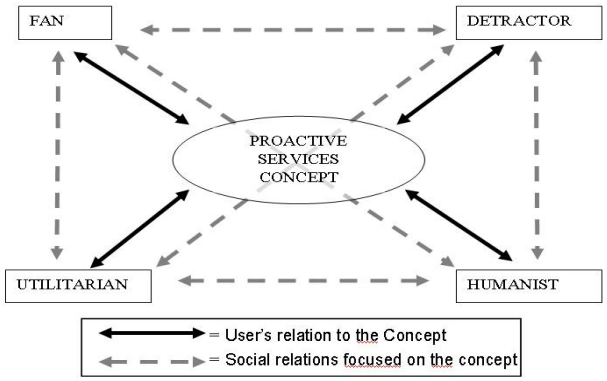

Figure 3: Individual and social relations to the concept

The film recordings have been analyzed by MSH-Alpes and University of Oulu researchers. This common analysis is very important for the understanding of cultural effects and differences. During deliberations, participants use a lot of cultural references. For example, when Finnish participants compare the main character of the demonstrative film to a Finnish celebrity that is totally unknown in France, it is important to understand what this reference signifies for them because they associate the concept to this symbolic personality: it represents a part of the common background of Finnish users that sets them apart from French people.

From the concept elaboration to the final analysis, the close cooperation between French and Finnish researchers is also very important to manage languages bias. A sociological inquiry has to be achieved in the local language of observed people, especially when cultural effects have to be identified. This point is very important in order to have a representative sample of users and to let them express their vision with their usual words and speaking with cultural connotation and nuances. However, Finnish and French researchers need English as intermediary language. This third language leads to potential meaning distortion when researchers are sharing analysis about focus group transcriptions that have been previously translated in English. Close cooperation enable to verify and validate all the interpretations of observed facts and users' speech.

4. Cultural aspects within French and Finnish acceptability of proactive services

When analysing the focus groups through the user profile perspective, the inquiry reveals some French/Finnish regularities in user profiles reception of the concept. On the other hand, if we observe users' feedback from the angle of a French/Finnish focus group comparison, some striking differences arise from the cultural ground.

4.1. User profiles feedback towards the concept

When we analyse user profiles tendencies in French and Finnish focus groups, we observe similar group dynamics. This French/Finnish parallel is not surprising, however it is very important to notice that the user profiles dynamics is not peculiar to French people. Even if their social distribution could be different from a country to another as suggested earlier, we can say that users profiles toward ICT's are not culturally dependent in the sense that the nationality of users makes no differences in the role they play in a group. It does not mean that French *Humanist,* for example, has the same

user's identity and values than a Finnish *Humanist*: it just means that they play the same role in a social group.

Then, in the experiment rooms the placement of user profiles is respected. For example, *Detractor* plays the role of the *Detractor*, reacts to the concept as a *Detractor* and express opinions as a *Detractor*. The sample groups react to the concept and to each topic proposed during the focus group with a quite anticipated manner. In other words, participants react and interact with others like they are supposed to do. For example, they agree usually with people who have the same profile tendencies and they disagree with people who have other tendencies. Then we observe some momentary alliance strategies among participants depending on the topic tackled in the focus group. For example, we observe a strong debate between *Utilitarian* and *Humanist* people concerning the role of proactive services in the professional context: from the *Utilitarian* point of view, these services are quite suitable if they provide more efficiency in professional relationship than current systems provided by human people. But from the *Humanist,* the replacement of human relations by user's relations with machines is absolutely unacceptable. This opposition experimentally observed in our focus group was predictable if we consider the knowledge we had beforehand about the *Utilitarian* preference for efficiency and the *Humanist* inclination to human contact [8].

We observed also momentary alliance strategies between user profiles when they found an agreement to face other profiles. For example, it is common to observe the association of *Utilitarians* and *Humanists* in opposition to *Fans* or *Detractors* who were expressing very strong adoption feelings (*Fans*) toward the concept or extreme defiance opinions (*Detractors*). Once again, it is not surprising because *Utilitarians* and *Humanists* are known as moderate user profiles with strong aptitude for negotiation [9]. Inversely, *Fans* and *Detractors* are known as non negotiator profiles with strong identity issues in the ICT adoption or rejection. Then, negotiator profiles are used to interact with extreme profiles in order to moderate their point of view. They play this temperance role all the more naturally as *Fans* and *Detractors* are often so strongly confronted that it provokes their negotiator background to lead the debate to a compromise.

4.2. Cultural differences between French and Finnish users

The full analysis of the focus groups reveals recurrent differences between French and Finnish people in the way they live and they conceive the proactive mobile services. Whatever cultural hypothesis we can suggest in order to interpret these variations, it could have a strong effect on the social acceptance phenomena in both countries.

4.2.1. Conception of labour

It appears that the concept is more adapted to the conception of the labour in Finnish life style than the conception of labour in French way of life. The demonstrative film depicts a system which organizes the whole life of the user in order to improve his work efficiency: organization of time, travels and social relations. French and Finnish participants think that it increases the combination of private and work sphere to the great benefit of work time. However, Finnish people are attracted by this improvement of work activities instead of French people who think that it assigns too much importance to work in their life style. As an example, Finnish and French people use the same metaphor in order to depict how they conceive the user depicted in the demonstrative film: "He is an ant". Finnish users resorted to this "ant" figure in a very positive way instead of French users who used it in a pejorative way. We can suggest an interpretation of this connotation according to the cultural background of Finnish and French users. From Finnish users' point of view, the ant refers to the picture of the hard worker devoted to his job, to his company, to his family welfare and to his country interest. In Finland, dedication and priority given to labour is common and fulfilling. It is not exactly the same connotation in France. When French people compare the user of proactive services to an ant, it is important to keep in mind "The Cicada and the Ant", the fable by Jean de la Fontaine, which symbolizes properly the ambivalence of the French perception of labour. It means that, even if work is materially essential (that is the moral of the tale), French people are sensitive to Mediterranean side of their identity, that is to say pleasure and futility. Then, it is not so gratifying in France to devote his life to his work because it is often considered as the alienation of worker who forgets his own identity and life meaning.

4.2.2. Women and men roles in society

The concept of proactive services is not gender neutral depending on the country. During Finnish focus groups, women insist, sometimes by jokes but persistently, on the usages they could have with the proactive services in order to enhance their authority on men in private and professional sphere. For example, they imagine how the system could improve how their husband pays attention to their well being or how they could control his activities (or children activities) with the help of geo-positioning. We do not observe this kind of phenomenon during French focus groups. French women tend to consider the concept as a system designed for men: managers and experts on high technology. They feel the proactive services to be influenced by male principles: control on each others, force relations and strategy. So, it seems that Finnish women adopt more easily the concept of proactive services than French women.

As a beginning of explanation, we could make the hypothesis that this phenomenon rely on the power of women in Finland. The voluntarist policy of Finland concerning the women/men parity led to the increasement of the responsibilities given to women in all the institutions: family, companies and political affairs (Finnish women have the right to vote since one century and Finland is one the rare countries in the world having a lady President). Inversely in France, like in Latin countries in general, women have not the same level of power in society: as an example, the question of men/women parity in responsibilities and salaries is still a well-known problem in French companies.

Then, if devices and services are not gender dependent during the design process, the social field lends to technology the gender of real uses. Thus, proactive services are female technologies in Finland and male technologies in France.

4.2.3. Relation to natural world

Finnish users express the idea that the concept of proactive services is not so new. It refers to a traditional relation to the environment in which natural objects have already an existence and interact together. Proactivity is seen as the way to live in accord with urban and modern environment as it was possible in the past to live with natural environment. French people are more reluctant to accept the notion of "proactivity", especially because of the autonomy of devices. They have not confidence in the independence of machines:

"it could fail", "it could be dangerous"... The user must keep the control because he could lose freedom of conscience.

One hypothesis is that the Finnish vision of the environment as a system of the objects which has his own logic is impregnated with the Lapp culture (Lapland, northern Finland) in which each natural element is animated and live in relation with other elements. Then, according to this vision of the world, it is familiar to Finnish people that human has to live in symbiosis with the devices "ecosystem". The French vision is typical of an industrial civilisation where nature is domesticated by human. Object and beings are given a role and a statute and this must not change. In this traditional master/slave relationship between people and machines, the human being must keep control of all of what happens in his device environment. Only few French participants who have environmentalist interests (and we know that environmentalist issues are influenced by Nordic cultures) are attracted by this wild facet of devices which enchants the environment: "It makes the things magical".

So, the inquiry reveals how the perception of a technical innovation could be based on archaic aspects of the users' culture. When designing new ICT devices and services, it is important for designers to keep in mind these kinds of cultural aspects in order to supply the users with systems that take into account their lifestyle, their values and their beliefs. Therefore, proactive mobile services designed either for French or Finnish users should not be exactly the same.

5. Conclusions

This paper describes a sociological inquiry which investigates the user experience of ICT's with the intention to observe and anticipate cultural aspects of the social acceptance in France and Finland. This inquiry was carried out in order to assist designers of proactive mobile services during the design process of their prototypes. Thus, the first step of this inquiry was to design a prospective vision of the proactive mobile services through a demonstrative film which puts in perspective the sociological issues addressed by proactivity in the user's mobile lifestyle.

Then, the demonstrative film was presented to French and Finnish people through focus groups organized according to the Sociology of User Experience method: two focus groups in France and two focus groups in Finland. It allowed investigating how people experience proactive mobile services.

Finally, the compared analysis of the focus groups leads us to observe that the acceptability of proactive mobile services is submitted to a similar social negotiation amongst French and Finnish people. This social negotiation is regulated by the user profiles of participants. However, when comparing the French and Finnish focus groups, the analysis highlights persistent differences between French and Finnish people in the way that they conceive of proactivity. It could be explained by archaic values and beliefs that come into the picture when the high tech innovation is confronted to users' life style. Designers should base their considerations about features they will offer to the users on these sociological observations of cultural differences.

Acknowledgements

We want to thank the Academy of Finland and the French Ministry of Research for funding the ADAMOS project. We appreciate all project partners for their contribution to this inquiry. Special thanks to Michel Brun, André Favier and Philippe Mallein (MSH-Alpes) for their contribution to this study. In addition, warm thanks to focus group participants.

References

[1] ADAptive MObile Services (ADAMOS, 2003-2006; http://www.vtt.fi/virtual/adamos/): University of Oulu, VTT, CNRS, CEA, Université Joseph Fourier, France Telecom, ST Microelectronics. PROACT framework (French Ministry of Research and Academy of Finland).

[2] de Certeau, M. (1984) *The Practice of Everyday Life*, University of California Press, Berkeley

[3] Rantakokko, T. and Arhippainen, L. Adamos Menu: Towards Adaptive Service Selection. Proc. *PROW 2004.*

[4] Rantakokko, T., Arhippainen L., and Tähti M., Evaluation of Sensor-Based UI Adaptation and Control in a Map-Application for Mobile Terminals, PSIPS, (2004)

[5] Privat, G. (2002) *Objets Communicants, Information Ubiquiste, Communication Pervasive*, ISDN-Jeudis du Numérique (04/04/02), Grenoble - France

[6] Hans, J. (1984) *The Imperative of Responsibility: In Search of an Ethics for the Technological Age*, The University of Chicago Press, Chicago.

[7] Blanco, E., Garro, O., Brissaud D. and Jeantet A. (1996) *Intermediary object in the context of distributed design*, CESA, Computational Engineering in Systems applications. Lille: Ieee-smc.

[8] Brun M., Cros M., Favier A., Mallein P. (2004) *Les enjeux identitaires des Technologies d'Information et de Communication :les profils d'identité située dans l'usage des TIC [*Identity issues of Information and Communications Technologies : users' profiles towards ICT*]*, in Le consommateur au cœur de l'innovation, Jean Caelen (dir.), CNRS Editions, Paris, 2004)

[9] NECIA project, 2004-2005, MSH-Alpes, CERAG, CIDSP, (Grenoble).