

Social Dimensions of MobileMAN

Opportunities and Constraints in adopting Participatory Approaches in ICT Projects

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ABSTRACT

MobileMAN stands for Mobile Metropolitan Ad hoc Network and is a European Community Project funded within the Framework Program 5. One of the innovative aspects of MobileMAN is its interdisciplinary approach. Indeed, right from the beginning the project aimed at keeping into account social dimensions and at involving potential end-users in the development process. This paper presents the early approach followed by MobileMAN as to keep into account social issues. A critical review will be offered of the opportunities and challenges faced by the project's interdisciplinary team to adopt a user-centred methodology known as participatory design.

I. INTRODUCTION

MobileMAN aims at developing an ad hoc network of metropolitan dimension for communication and information exchange services. Its innovative paradigm has the core in the fact that it is totally autonomous and self organized. There is no authority and no central control, since it is entirely made of users' devices (nodes), which are both service consumers and service providers for other users. The underlying model is one of collaboration: in order to ensure the functioning of the system, nodes need to collaborate. Accordingly, there have to be mechanisms granting equilibrium between use for proper goals and use for "networking services".

The project's second innovative aspect is that from the beginning it considered important to reflect upon the value of this technology for society. The research team was aware that technological development can potentially lead to social exclusion of specific categories of people, based for example on their socio-economic status, gender and age. Hence, particular attention was paid to the concept of digital divide [6], that is, the difference between those who have the access to information and those who have not. Bearing in mind this potential risk, the research team intended to reflect upon the social impact that MobileMAN

may have on potential end users, and especially on those categories of people who are typically the last ones to be reached by technological innovations. The main focus of this paper is on a pilot project developed by MobileMAN to address the expectations and concerns of potential end-users.

II. BACKGROUND AND OBJECTIVES OF MOBILEMAN

MobileMAN (<http://cnd.iit.cnr.it/mobileMAN>) is a project funded by the Future and Emerging Technologies arm of the IST Programme of the European Commission. As shown in Figure 1, the project aims at evaluating the MobileMAN paradigm from three different perspectives: a technical standpoint, a social standpoint and an economic standpoint. The partners involved in the project are the University of Cambridge, the Institut Eurecom, Helsinki University, NETikos, the University of Applied Sciences of the Italian Part of Switzerland and the Istituto di Informatica e Telematica of the National Research Council in Italy, which is also the project Co-ordinator.

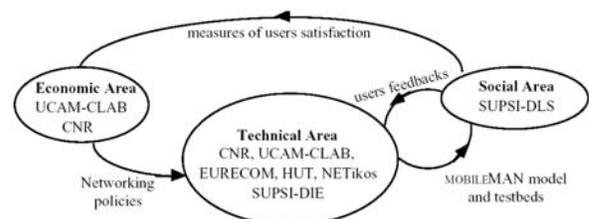


Figure 1: Relationships among the project activities

MobileMAN aims at investigating the potentialities of the Mobile Ad hoc NETWORKS (MANET.s) paradigm. More specifically, the project's goal is to define and develop a metropolitan, self-organizing, and totally wireless network

area that we call *Mobile Metropolitan Ad hoc Network* (MobileMAN) [8].

In this new networking environment, *the users' mobile devices are the network*, and they must cooperatively provide the functionality that is usually provided by the network infrastructure (e.g. routers, switches, servers). In this autonomous, self-organized, wireless multimedia network, built up solely from user devices, no infrastructure is required. Accordingly, collaboration between users will be one of the most important features of the MobileMAN network and of the virtual communities that will adopt this new technology.

III. SOCIAL DIMENSIONS OF MOBILEMAN

Over the last two decades information and communication technologies (ICTs) have dramatically changed the social organisation of modern western societies. However, it has also been noticed that not all categories of people have benefited from these changes. Some social groups have been excluded from the benefits that the information society promised, leading to the so-called digital divide.¹ Concerns about the growing social inequality that accompanies the introduction of new technologies have led governments and international organizations to pay increasing attention to the social dimensions of ICTs and to their potential role in overcoming the digital divide. These issues were extensively addressed at the World Summit on Information Society that was held in Geneva in December 2003.

MobileMAN has the potential to improve the social inclusion of marginalized people as it may enhance access to information and communication systems in areas where it is currently constrained by high infrastructure cost and bandwidth constraints.

Involving people from the very beginning of the development of a new technology may increase the chances that the technology will respond to their real needs [5]. This may be achieved, for example, by adopting a users-centred methodology known as “participatory design”.

IV. PARTICIPATORY DESIGN IN ICT PROJECTS

Participatory design (PD) is a user-centered approach to the development of technological systems that places a premium on the active involvement of real or potential users in design and decision-making processes.

A user-centred approach in technological projects implies for example that the user is not seen as a passive recipient of a ready product, but as an actor entitled to collaborate with engineers and designers in product development.

PD is a functional way to increase the effectiveness and productivity of a new technology. Hence, important business companies in the field of Information and

¹ By access we do not mean physical access only through a computer and an Internet connection but also the ability to use the resources, understand and look for the information itself.

Communication Technologies (ICTs) – like Microsoft, Xerox and Intel – adopted PD as they have realized that its benefits outweigh by far the costs and difficulties of following this approach. In fact, dysfunctional products and errors can be avoided resulting in an opportunity to save money and time [3]. MobileMAN’s interest in adopting this methodology was based on these considerations.

A. Factors that need to be considered to realize Participatory Design

In some contexts PD may certainly be considered the most effective approach to the design of new technologies and products, for the advantages that it brings are very important and tangible. However, within the framework of the development of entirely new systems, the adoption of PD poses several challenges that need to be solved:

- 1) **Motivating developers to work with inexperienced end-users.** “*Developers and users may discover that they have different values, work styles and even languages, hindering communication*” [4].
- 2) **Identifying appropriate users.** It often happens that developers have an idea of users that at the end may result to be incorrect. Further, the product may undergo such important changes, that at the final stage, its users may differ from the ones identified at the beginning.
- 3) **Obtaining access to users and/or motivating them to participate.** Sometimes it is not easy to contact end-users. Another problem is motivating them to participate. Particularly, “*potential users can be less motivated if they do not see how the planned product would benefit them personally*” [4].
- 4) **Benefiting from user contact.** User involvement is really a source of benefits only if developers and users can “talk the same language”. To reduce the importance of verbal interaction, one possibility is to use prototypes, although prototypes might be an obstacle in showing implementation constraints.
- 5) **Obtaining feedback from existing users.** It may happen that the feedback obtained from the users is of no practical use to developers. [4].

In order to have real benefits from the adoption of PD these challenges need to be carefully kept into account.

V. A TENTATIVE USE OF PARTICIPATORY DESIGN METHODS IN MOBILEMAN

A prerequisite for the keeping into account end-users needs and concerns in product development is the existence of a common language understood by both system developers as well as system users. Based on these considerations the first activities undertaken by MobileMAN focused on the development of user-friendly information material. This exercise implied a ‘translation’ of technical project descriptions into a language understandable to common people. This was a communication issue, and a

preliminary study and the realization of such user-friendly material was based on the following considerations.

A. *Communicating with potential end users*

The difficulties in achieving successful communication are systematically underestimated. In particular communication between people belonging to different cultures (such as for example system developers and system users) may be affected by many factors that make it difficult to reach a mutual understanding and hence a successful communication. Indeed:

- 1) Designers and users need to share what Clark [2] defined the “**common ground**”, that is, some knowledge that is knowingly owned by both. If this minimum common ground does not exist, it becomes very difficult to communicate. The bigger the common ground between communication partners, the higher the probability that communication will be successful.
- 2) It is important that the object of the communication is semantically near to both partners: it would be hard to talk about a technology that is neither known nor perceived as useful to someone. When a technology is **semantically near** to the user and the designer, they can more easily represent and imagine a scenario for it. This will lead to a practical representation in a real context, which may be more interesting and closer to users’ concerns. [1]

Although we tried to use these two concepts in the realization of the structure and the content of the user-friendly material, this was not enough to create a common ground, because MobileMAN is a technological system still in the early design and development phase. Accordingly, non-experts found it difficult to relate to the basic concepts and objectives of MobileMAN. For these reasons, it turned out to be difficult to involve potential end users in a meaningful discussion about MobileMAN. In fact, our pilot developed and application of user-friendly information material, which will be briefly presented in the following sections, came exactly to this conclusion.

B. *Studying the response to user friendly information material*

The study [1] was considered as a pre-test of the developed material to be presented to end users. It involved a random sample of 80 university students among whom 22 accepted to participate. They were first given a questionnaire that would categorize them as having a low, medium or high expertise level about ICTs. Secondly, they were presented a booklet with a story that was structured to allow the reader to make choices about how the story would continue. The story had the aim of presenting the MobileMAN technology in a real life situation that was very near to the social reality of the reader, so that they would be able to relate to it as to something potentially interesting and useful to them. After this exercise the participants were given a second questionnaire aiming to

test how much of the concepts in the story they understood. Open questions were provided, since we assumed that the story would stimulate the respondents imagination and make them think of other possible applications from the ones we had illustrated (one-to-many communication, teamwork management, documents and resources sharing). This, however, was not the case. We interpreted the result of this experiment as a clear difficulty of visualizing the place and the value of a technology that does not exist yet. If this cannot be achieved, how can people participate with engineers in developing and designing new technologies?

C. *When is Participatory Design more appropriate?*

The experiment showed that PD instruments may be effective in relation to the refinement of already existing technologies, but somewhat inadequate to explore the viability of possible applications related to future technologies.

For example, the VCR and cell phones nowadays are found in most households but are far from responding in all their technical details to the needs and preferences of end users. Many functions that have been included at high R&D costs are hardly ever used, whereas others potential applications are missing. These are examples of technologies whose improvement would strongly benefit from the adoption of a PD approach.

What interests users if they are given an opportunity to participate in the development of a new technology? Most certainly, they are not interested in the low levels functioning architecture. They often do not even know how a device or system works at such levels. What they are interested in is the application level, and more specifically, the domain in which they can give an important contribution is the user-interface. We are talking, here, about the issue of usability. This may seem obvious, for it is logical that users have to find it easy and quick to understand and use an interface. However, in the last years, devices have become more and more complex and with a great number of new functionalities. This is a trend that we can see in all advanced technologies: telephones, VCRs, cameras, washing machines, etc. The complexity and the idea of “the more functions the better” have been pursued at the expense of a user friendly interface. This prevailing approach does not focus on the user as the centre, but on the technology itself. The user interface has become too complicated and in many cases does not trigger a desire to adopt new technologies. For example, if we would ask a group of elderly people whether they would use a mobile phone if it had only basic functions, we believe they would be more willing to try.

These considerations show –as we experienced in MobileMAN– that PD might not be effective at the initial stage of technology development, but can be valuable later on, when it may allow to tailor the product to the intended users requirements, by focusing on the application and the interface sides.

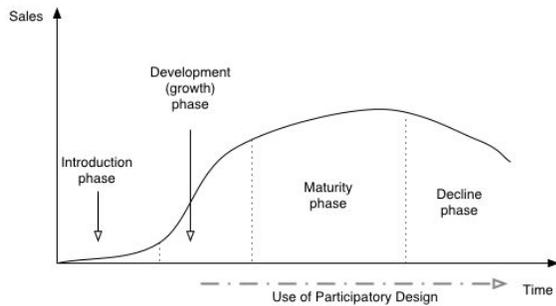


Figure 2: the product life cycle. Source: adapted from [7].

For the development of a new technology it is difficult to use PD, since in its initial phase it is not clear what the product will serve for, who the users will eventually be, and the centre of the activities are to solve technical problems and less on the applications and the interface. As illustrated in Figure 2, the relevance of users' perspectives increases during the successive phases, when the activities focus on applications and usability and no longer on the low-level functioning architecture.

VI. TOWARDS A NEW APPROACH TO ASSESS SOCIAL RESPONSES TO MOBILEMAN

As a consequence to the experience presented above, we redefined the approach we will pursue to anticipate the social responses to MobileMAN. We still aim at ensuring transparent citizens' information and communication through a user-friendly interactive website, which may provide a platform for an exchange of ideas and concerns between system users and system developers. However, having recognised the limits of anticipating relevant social issues on the basis of such a dialogue, we are currently also analysing the social dimensions of relevant ICTs in use as to anticipate some social issues that could apply to MobileMAN. We are thus studying similar technologies, which are more advanced in their lifecycle, and evaluating the aspects that are similar to MobileMAN. This allows us to predict some social responses and impacts on society. For example, to anticipate what could be users responses to MobileMAN, we chose to analyse social issues of the already established cell phone. The following table shows some of the aspects that can be found in both systems and that justify the comparison. These will be the variables to study in the cell phone. Such a study can provide us with important information about "lessons learned".

CELL PHONE	MOBILEMAN
	Portable device
	Wireless technology
	Text messaging (sms, email)
	Other possible wireless services
	Necessity to use a size-limited interface
	...

Figure 3: Features common to the cell phone and to the MobileMAN device.

With the results of this study we aim at raising awareness among MobileMAN designers and engineers about social factors that need to be kept into account in product development and to contribute to achieving a technological system that really to users' needs.

VII. CONCLUSIONS AND FUTURE WORKS

This article illustrated the early attempts made by MobileMAN to adopt Participatory Design as a strategy to include the ideas and concerns of potential end-users in product development. A pilot study that was carried out to this aim showed however that involving users at the very initial stage of product development is not very effective. Based on the lessons learnt from this study, MobileMAN did not abandon its commitment to maintain a dialogue with a virtual community of potential end-users. With this objective in mind, MobileMAN is in fact currently setting up a user-friendly interactive website. Yet we are aware that this type of dialogue may be necessary but not sufficient to anticipate social responses to MobileMAN, for example because it does not allow to reaching people who do not make a regular use of the Internet. Based on these considerations we are currently also exploring the viability of studying social issues related to wireless technologies-in-use that show some analogies to MobileMAN. With this methodology we expect to raise awareness among engineers and designers about the issues that need to be kept into account as to develop user-friendly and socially viable ICTs and to be able to predict some of the future social responses to MobileMAN.

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