

# Experiences in using role-playing, computer game and physical acting to enhance user involvement in design of future applications

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## **ABSTRACT**

The amount of information technology in everyday life is increasing and getting more and more ambient in our daily environments. The environments are supposed to be intelligent, adaptive, intuitive, interactive and proactive in the future. User participation for future concept building is essential but challenging when designing appliances that might be unfamiliar in their appearance, functionality and impressiveness compared to the user's current everyday life. New allocated methods and viewpoints are needed for user experience design and evaluation of intelligent environments to build systems that naturally support the users in their daily life. In this paper three methods are presented as tools (role-playing, PC game and physical acting) for early concept definition phase in the area of ambient intelligence and ubiquitous computing.

## **Author Keywords**

Early design, concept definition, role-playing, computer game, ubiquitous computing, context-awareness, proactivity.

## **ACM Classification Keywords**

Design studies, Human factors

## **INTRODUCTION**

VTT has studied and developed ubiquitous computing in many projects from concept design up to working artefacts and environments. For a few examples in Kontti (Context-aware services for mobile users) project the user's information needs were thought to be anticipated and responded to in a more automatic manner through automatically or manually activated user context or situation. [8] In WWM (Wireless Wellness monitor) a home network and ambient intelligence prototype for

wellness management and home automation applications was developed and evaluated [13]. In ongoing MIMOSA (The MICROsystems platform for MOBILE Services and Applications) project context-awareness and proactivity is enabled by developing microsensors and short-range communication exploiting, e.g., RFID tags. Human-centered design approach in Mimosa includes the studies how ambient intelligence and low-range communication with environment and objects could be best utilised in the everyday life of different consumer user groups. The continuous feedback from end users and application developers guides the development of core technologies, ensuring the usability, utility and acceptance of technologies. [9] In Nomadic Media project we are trying to find solutions that allow consumers to enjoy their content and use interactive services at the times and in the places they prefer, using the devices that best meet their circumstances. Project aims to develop systems that adapt more readily to users personal preferences, are enjoyable to use and provide low entry thresholds for all sections of society. [10]

Also in these projects new methodological challenges have been recognised particularly in the early stages of the product development process. Intelligent compound systems where many users and devices communicate simultaneously clearly require new approach to the system design and evaluation. Also system automation, proactive features and personalisation have been noticed to be rather troublesome to study with so called traditional usability and user study methods.

In VTT's methodology development project, Käykse (Usability issues of ubiquitous computing) we moved from ethnography (user observing and interviews) to methods, where parties together sketch an intelligent environment that suits them all. Because technical building and prototyping of intelligent environments is expensive, illustrations and modelling are needed to allocate resources effectively. [15]



**Figure 1. Session participants**

The aim of Käykse project was to recognise the problems in designing and evaluating intelligent environments and evolve the research frame. The intention was to increase the dialogue between technology developers, system designers and users. The project targeted to design methods that help in adjusting user needs and technical possibilities to each other. [15]

There have already been several attempts recently to renew the role of participants in designing solutions for future environments. Active participating roles for the potential end-users have been achieved by utilising e.g. drama, props and role-playing. [1,2,4,5,6,10,11,16] Improvised acting and scenario playing contain many of the elements we sought, so we decided to base our methods on them [15]. We develop our approach mainly to the improvisation but in next chapters I focus on presenting one of the latest sessions of the project. In this session we collect user innovations and requirements especially for the future context-aware systems. In this session we tried still another new approach for enhanced user involvement with some potential users.

**BRAINSTORMING FOR UBIQUITOUS COMPUTING AND CONTEXT-AWARE APPLICATIONS**

The information and service needs vary according to the user's contexts of use. A context-aware service responds to the user's current situation by offering contextually relevant information. By identifying the relevant situations and the information needs users have in them, services can be made more topical, personal and easily available. [3, 14]

In order to study the technology and concept of context-awareness, the Kontti project developed a context-aware mobile portal. The portal was developed from an earlier media conversion and adaptation proxy for mobile devices. [7]



**Figure 2. The game projected to the screen**

The series of user evaluations were carried out in the Kontti project. In the last field trials with functional prototype we also study future concepts with potential users. [8]

For 5 students, an additional group interview was held to brainstorm the future development ideas for ubiquitous computing environments and especially context-awareness. The task was to build together an intelligent housing system with special regard to technology-human and human-human interaction. Also travels in an intelligent vehicle to the ski resort and holiday cottage was envisioned.

Three methods were used in the user ideation session. The first medium for aiding the group to create and innovate was a PC game "The Sims". The game allows players to create and computer simulated control people. [17] The second medium for user innovation was role-playing method: the participants were given roles in particular situations. Thirdly users were also asked to physically present the usage of the imagined system e.g. haptic interfaces.

**GET A LIFE! – BUILD YOUR HOME – THE SIMS**

In the beginning of the session we started to play the Sims. These users had previous experiences of the game so it was rather easy for them to start building their own new intelligent home. The group decided that the first immediate need was to create a bathroom. After a short discussion the bathroom was equipped with a screen for watching audio-visual material. The system should identify the visitor in the bathroom to be able to adjust its offerings for the user. Several methods for identifying the user were proposed:

- ◆ Fingerprints
- ◆ Smell detection
- ◆ Iris scanning / retina identification



**Figure 3. Interface of the Sims**

Lights in the bathroom should adapt to the user's preferences and adjust appropriately according to time of day. The bathroom should be categorised as a private zone. All contexts/situations in life when you are not available or want to maintain your privacy could be named under this zone. The exact definition and contents of 'the private zone' depends on the users. Proactive features for the bathroom were clearly thought to be the "nice to have" ones but no further discussion of the usage details or problems were not commented.

Intelligent kitchen was the next room that was created in the session. The potential users envisioned a very automated kitchen. An intelligent refrigerator would maintain a shopping list of the items that are missing or running out. The user should of course be able to add some more items to the list if necessary. Shopping list would be automatically sent to the shop. The delivery of the shopping could be arranged many ways. Most practical would be a designated errand boy, who could be identified and allowed to leave the shopping inside the house. Proactivity of the kitchen appliances could be rather easily enhanced and no disadvantages of the automated system was not coming up to these user's minds.

Next the discussion centred on communication in an intelligent house: monitors, loudspeakers and microphones were imagined to be everywhere. One can glance at a context-sensitive system to see who is coming to visit: screen (but not in the middle of a television program), mobile device etc. The visitors are identified either by their physical appearance (camera) or some other method (e.g. retina identification). The house dweller should be able to block undesired or unidentified visitors from entering the household area/building plot.

Since in the Sims you can define the physical and psychological (emotional) characters of the people and you can monitor their vital functions (e.g. bladder) it was also considered in ideation if this kind of elements should also to

be seen in context-sensitive and proactive systems. Emotional expressions (e.g. fun, energetic, social) were approved in general. These emotional, psychological or physiological person profiles were thought to be informative and also possible to control manually by the user. Comment was also given that e.g. hunger could be automatically detected so for example restaurants could send their offerings for potential customers or when arriving in your accommodation meal would be ready and just perfect for you. Proactive solutions were in general considered useful but no further details were commented in this stage of the session.

### **GOING TO THE SKI RESORT – ROLE-PLAYING SESSION**

The role-playing sessions with the potential users considered a trip to a ski resort they assumed to be an intelligent one. In the beginning of the session the initial state of the scenario was defined and the casting of actors carried out. Group of friends (three) was starting their trip to their holiday cottage. Two other participants were acting the roles of the system (e.g. technological features), the rest of the family, authorities etc. In the following just two examples of the contextual situations are presented as problems and user innovated solutions to these problem.

**Situation: A group of people travelling in the same vehicle. The travellers want to listen to some music.**

Problem or challenge: Traditional disagreement of agreeing on which music and radio channel to listen (similar to who has the TV remote control).

Solution: Everyone can have their own interface (earpiece, a kind of a helmet or personal area) to select and listen to their own favourite music.

Disadvantage: Communality of the group is scattered.

**Situation: Group has started their trip.**

Problem or challenge: How does an intelligent system respond to the group's actions, desires and goals?

Solution: Intelligent system monitors the users and their actions.

*Male A (Playing the role of the intelligent system): "I did notice that you're still 500 kilometres away. Putting on heating so that it'll be exactly 20 degrees when you arrive and...I recognised you talking in the car [Speech recognition – identifying the user]. Based on the speech information I ordered food from the store and set the temperature to 22,5 degrees".*

*Female A: "What food?"*



**Figure 4. Participants using imaginary interfaces #1**

*Male B: "Our favourites of course." [Personalisation – adaptation – recommends favourites initially. In discussion we went through everyone's favourite dishes.]*

*Male A: "And what's for drinks?"*

*Male B: "Pepsi Max...."*

*Female A: "Everything possible."*

*Male B: "Use your imagination...Oh, I forgot you're a machine."*

Disadvantage: Personalisation of the system requires a huge amount of information and preferences of the individual users. Adaptation of the system to 'human fickleness' is a great challenge. It may be solved for some with an "all is available" approach. However, this is not really adaptation.

In multi-user environments (like in car) proactive applications confront many challenges. Personalising the service may be in conflict with other user's preferences in the same environment. Also defining user need for some proactive applications may be quite laborious. The users want to have choices in the service delivery and content but this is rather difficult to command and realise with these so-called more demanding, "I want to have everything", users.

#### **ACTING OUT FOR GESTURE INTERFACES**

In the latter part of the session participants were also asked to physically act gesture interface for television menu control.

*Q: "How do you for example change the channel?"*

*Male A: "I sit here near front of a television and on the top of it there is a kind of detector camera. Ok, and then I switch the channel. Like when you can't reach the television so there could be in the upper corner of a television kind of menu. You imagine pushing it (although you can't reach and touch it) and a menu comes down that detects your movements and understands three-dimensional movement, when it's usually two-dimensional... So if you do like this*



**Figure 5. Participants using imaginary interfaces #2**

*[showing how moving his hand] the menu detects the touch..."*

*Male B: "It could be something like the Ericsson has...that you press [pressing an imaginary button] and the you do the number three there [writing the number in the air.]"*

*Male A: You could customise it the way you want it...Writing a plus sign will give you Channel+, any way you want it*

In the discussion several issues about the threats of computerisation were brought up; power failures, loss of control and privacy, contrived interaction with technology. The participants made lots of references to science fiction (movies, literature – e.g. "2001: A Space Odyssey", "Fahrenheit 451", "Terminator", "Star Wars" and "Minority Report"). Much usage related ideas were brought up from these. For example talks about artificial intelligence with a mind of it's own came up from envisioning waking up in the morning in an intelligent house. Soon participants were reciting movies where this has been pictured. Interfaces for the future computing applications were also borrowed and shaped from e.g. movies (display in your retina or in your eyeglass – Terminator; robotdog – Fahrenheit 451).

*Discussion about morning awakening with future technology:*

*Male B: "When does artificial intelligence create a mind of it's own?"*

*Female A: "Space Odyssey 2001."*

*Male A: " or Terminator"*

*Male B: " or Honey, I Shrank the Kids, where....."*

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*Interface examples from movies:*

*Male H: "You could open your fridge from distance like vhuoooo. You would have a touch like Darth Vader"*

Especially the pointing method to control different kinds of devices was seen as a possible future method for user interface input.

## CONCLUSION

The discussion gave us lots of ideas about adapting new technology to everyday life and ability to imagine new features for the system (e.g. proactivity) but not without restrictions and criticism. Three-fold method seemed to be suitable for early phase concept definition and especially for designing of complex systems that require "off the desktop" kind of activity (i.e. ubiquitous computing especially).

The earlier tested method including physical improvised acting of usage situations is not an easy one and it is much more easier to start with simple role playing sessions than plan, carry out, analyse and report an interactive scenario session. However the results show clearly that when spatial and e.g. user's physical interaction in space with futuristic interfaces are issues, then physical acting of scenarios bring out aspects (ideas, innovations and problems) that would not been recognised so obviously in any other way. Even though the method requires more work (e.g. preparation) and practice one of the rewarding points have been that all the participants (including research team) had very cheerful time in these sessions. Also this speaks up strongly to utilise and develop the method further on in the future projects. [13]

However three-fold method including computer game, role-playing and acting out of e.g. interface usage seemed to be very suitable method when participants of the session are not so willing to do any improvised acting and physical acting is not the main goal of the session. The Sims computer game was for these users familiar and they commented that it was nice to play and concurrently discuss and innovate about different features of the imagined system. The use of a computer game in this kind of user ideation sessions as a reasonable tool naturally demands further studies. Therefore in the future we are going to develop and test further these methods in the projects related to the context-awareness and proactivity.

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