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Trykt av Tapir Uttrykk

Abstract

This thesis focuses on the different aspects of role-play as an approach for user-centred design of mobile information technology (IT). This is done through development of a sequence of workshops and reflecting on the outcome. The motivation for the thesis has been to develop an understanding of the important conditions for involving end-users in the process of understanding user needs and exploring requirements for mobile IT. The need for new methods to understand mobile IT and the focus on user involvement in the traditions of participatory design and user-centred design established the background for the work. Most of the workshops were carried out in a hospital context.

The overall research approach has been to work iteratively by carrying out a set of smaller studies, so-called workshops. The research design was flexible, characterized by a design that evolves, develops and unfolds, as the research proceeds. The current state of the knowledge on role-play called for a qualitative approach with a focus on understanding important issues concerning user role-plays.

The overall research subject of this thesis is: Develop understanding of key premises for using role-play with low-fidelity prototyping to involve end-users in exploring user needs and requirements for mobile IT.

This research subject was further divided into three specific research questions:

- What are the important issues related to planning and running of role-play design workshops with end-users?
- What do system developers perceive as the strengths and limitations of such role-play workshops as a system development method?
- What is the role of the workshop facilitators in such role-play workshops?

Five categories of issues of importance for planning and running of role-play workshops with end-users were identified: practicalities, user role-playing, idea generation, workshop resources and roles in the workshop. The system developers regarded the approach as useful for several reasons including enhancing user involvement, helping developers understand the context of use, and creating a focus in a project. The developers also called attentions to limitations of using role-play; such as a narrow user view on

the system that does not take system development premises into account. One of the issues that emerged as a particularly important factor in the workshops was the role-play facilitator's skills in leading the role-play part and the idea generation process. A framework developed by Yardley-Matwiejcsuk proved useful for understanding how to develop and rehearse these kinds of role-play.

The thesis contributes with an understanding of different aspects regarding role-play workshops with end users in the field of Human Computer Interaction.

Foreword

A colleague at the Norwegian EHR Research Centre, Jorunn Bjerkan, once said that the work towards a PhD thesis could be compared to playing a popular game for children in Norway, the "Stigespillet". In this game one moves the counter of the game according to the number of eyes on the dice. If one hits a square with a green ladder, one is lucky and can leap several fields forward. However, if you land on a square with a ladder going down, you have to move backwards, sometimes almost back to the starting point.

As I have reached the last square of the game I would like to thank everyone who has taken interest in my game and believed that I would reach the goal. First of all I would thank my supervisors, Dag Svanæs and Øystein Nytrø, for having faith in the project. During the climbing up and down the ladders I have met, discussed and been inspired by many people, both at the Department of Information Technology (IDI), the former DIGIMED, and the current NSEP. With this continuously support from the people around me, I have never been tempted to choose another game but to finish. At IDI I would especially give thanks to the colleagues I have shared an office with, Kirsti Berntsen, Yngve Dahl, Glenn Munkvold, Lillian Røstad, Thomas Brox Røst and Ole Edsberg, and at NSEP to the current colleagues Inger Dybdahl Sørby, Ole Andreas Alsos, and Arild Faxvaag. In addition, I would like to thank all women in the Norwegian Female Network for Researchers in Health Informatics for encouragement in the final stages of this work.

I am very grateful to everyone who has participated in the workshops and shared their views on role-play with low-fidelity prototyping as a system development method. And I would like to thank those who have volunteered to be models in the many illustrations in this thesis, especially Anita Das, Tone Hotvedt and Tom Christensen.

Finally, I would like to thank my three boys, Frode, Inge and Tormod for bringing joy into my life. You are the best!

Gry Seland

Outline

Chapter 1: Introduction

1.1 Setting the Stage

To introduce to the main theme, research methods and findings, I have chosen to start the introductory chapter with an illustrative example. The illustration is based on the early empirical work of the thesis. It illustrates some important aspects of the research process, and what we learned about role-play as a method for working with prospective end users to understand their needs and possible requirements for mobile IT systems.

The example scenario is from a workshop with health personnel, and is about an elderly woman's hospital stay. The story is about how health care personnel use information to check if the patient will be able to have a surgery at the scheduled time, and to inform her about what to expect before and after the surgery. The workshop participants called the woman Mrs. Olsen.

The description of Mrs. Olsen's stay is created by a group of nurses from the University Hospital in Trondheim, Norway. The nurses have been gathered in a one-day workshop to develop ideas about how mobile Electronic Patient Record (EPR) systems can be helpful in their future everyday work. The EPR is a file kept on a computer that keeps vital information about the patient's current health and history. EPR systems intend to support clinicians by providing accessibility to complete an accurate data. Such systems may also include alerts, reminders, decision support, links to medical knowledge, and other aids (Coeira, 2003; Dick, Steen and Detmer, 1997).

The workshop participants have identified some everyday scenarios from their regular work, and created a short role-play based on the scenarios. The role-play describes a typical work situation where the health care personnel are in need of specific information. The nurses belong to one of two teams in the workshop, and have chosen to work on the scenario "preparation for a knee surgery". One nurse takes the role of the patient, another nurse acts as herself, and the last nurse in the team takes the role of a physician.

However, the example does not end with a description of everyday hospital practices. It extends into the future and into the workshop participants' perception of how information technology can be useful in their everyday work. By taking Mrs. Olsen's preparation for surgery as a starting point, the participants improvise on how they could use future technology in the setting. The nurses use foam models as props to illustrate the technology, and sticky notes and sheets of paper are used to sketch and document the improvised suggestions. As the participants explore and try out different

proposed solutions, discussions about information needs, ergonomic issues regarding the size of the mobile device, and the role of technology in the patient care process emerge.

Although the example only shows one instance of a role-play, it clearly demonstrates that it is a useful way to develop ideas in context, and helpful for engaging prospective end users in early requirements processes. Both the participants' performance of their current work and possible future work practice, and the discussions emerging in the workshops, give insight into information needs and desired functionality of the new technology.

"Mrs. Olsen's Preparation for her Knee Surgery"

The story starts with a role-play workshop, where a group of six nurses are gathered to explore possible uses of mobile technology in their work practice. The nurses have been working in two teams of three, and each group has developed a scenario. It is 11.30 am, and one of the teams is about to present their role-play performance to the other workshop participants. The role-play presentation is taking place in a staged patient room. One nurse holding the role of a patient is lying in a patient bed and the spectators are sitting in a visitor coach.

The role-play facilitator introduces the scenario by describing the setting for the story, as the group has developed it. He tells that it is Tuesday afternoon, and Mrs. Olsen is sitting in her bed in a hospital room waiting for the physician. She is 75 years old, has a bad knee, and has been waiting for her knee operation for a year. He further states that Mrs. Olsen is excited. Will she finally get the knee surgery? She came to the hospital early in the morning, and has been through several medical examinations since her arrival. She has taken an electrocardiogram (ECG) test of her heart, X-rays of her lungs and knee, and different blood tests. However, she feels that most of the time she has been waiting for information about what is going to happen, and has therefore become a little impatient. She has not yet talked to the orthopaedist who is going to do the surgery. Other participants in the scenario are Dr. Christensen (physician/orthopaedist), and Nurse Petersen (nurse).

<u>The facilitator steps aside and the performance begins.</u>

Dr. Christensen is responsible for Mrs. Olsen's operation. She enters the patient room with one of the nurses on the ward, Mrs. Petersen. Dr. Christensen greets Mrs. Olsen and explains that if her blood test results are fine, the surgery will be done early in the morning. Nurse Petersen is look-

ing for the test results in a paper chart she is carrying, but the results are not there. The results are in another location in the hospital.

This is not an unusual situation in a Norwegian hospital today. Test results are written and sent on paper, and if the results are not available when they are needed, planned surgeries can be delayed.

The physician has several patients to see before her duty is over, and does a quick examination of Mrs. Olsen's knee before she marks the knee with a pen and tells her that Nurse Petersen will give more information about the preparation for the surgery (figure 1). She also asks the nurse to look for the test results and call the lab if they are not found. Mrs. Olsen tries to start a conversation on anaesthetics with the physician, but Dr. Christensen says that she is not the right person to answer such questions: "You must talk to the anaesthetist about your wishes later in the evening. He will probably be here in an hour or two."

Mrs. Olsen complains to the nurse about the physician's hurry, but Nurse Petersen assures her that she will tell her everything she needs to know about the surgery. And if she cannot answer a question, she will talk to someone else who can provide the correct answer. Nurse Petersen says that she is going to describe how she must prepare for the operation: "After supper around seven, you will get an enema". "So I can eat in the evening", Mrs. Olsen asks, and gets the answer "Yes, you can eat, but after the enema you must only drink water". Nurse Petersen further says that they will help her shower in the evening, which Mrs. Olsen is grateful for, because her knee hurts when she is moving.

Figure 1 Preparation for knee surgery

Before the nurse leaves the room she wonders if Mrs. Olsen needs anything, and Mrs. Olsen replies that she would like to have something to relieve the pain in the knee. Nurse Petersen leaves the room to find a pain-reliever, and Mrs. Olsen is left alone in her room.

The first part of the role-play workshop is over, and the three nurses have shared their description of everyday work by acting out their short play in front of the other team. After a short lunch break, one of the role-play facilitators gives an introduction to the next phase of the workshop. This will be on future technology, and the participants will work on developing ideas about how new technology can be of help in the scenarios that they have developed.

The facilitator introduces some modelling materials of foam and paper, and informs the nurses that these represent technology that probably will be available in a few years. The foam blocks are in different shapes and sizes, from the dimension of a cell phone to a Tablet PC. He summarizes the technological potential and limitation without going into details, to ensure that all the participants are knowledgeable of what the technology might be used for, and not restrict their thinking to technology they are familiar with.

Restrictions of the technology are described to avoid science fiction ideas, but details are omitted so that the participants will not be too focused on the technology when thinking of the future.

The workshop facilitator further explains that the workshop participants are going to work on idea generation through a process called *"design-in-action"*, which is the main approach for generating ideas in the workshops. The principle behind this technique is simple: The team acts out their current-practice scenario until someone sees a need for viewing or registering some information, and says *"freeze, stop the play!"* The person who stops the role-play grabs one of the foam blocks and attaches a sticky note to it. He or she sketches the user interface on the note. The suggestion is then explained to the other participants and discussed. The workshop participants continue playing and improvise new technological ideas until they are satisfied with their solution. After acting out the scenario with stops and new starts, the team has implicitly specified core information needs. The specification is based on a particular, concrete situation, but many of the needs described implicitly contain assumptions about a more general system. This becomes obvious as we return to the team's role-play session:

The play goes on.

Dr. Christensen is responsible for Mrs. Olsen's surgery. She enters the patient room with one of the nurses on the ward, Mrs. Petersen. Dr. Christensen greets Mrs. Olsen and explains: "If your blood test results are fine, the surgery will be done early in the morning".

Dr. Christensen is stopping the play herself, grabs a foam model of the size of a handheld PDA and says: *"Stop! On my PDA, I can look up the blood test results!"* She sketches down the reference value for the test on a sticky note and repeats the acting. She pretends that she is tapping on the PDA and says: *"Well, if your blood test results are fine, the surgery will be done early in the morning. Yes, here they are. The values seem fine, which means that you will be scheduled for the surgery tomorrow morning" (figure 2).*

By specifying that she can look up the blood test results directly on her PDA, the physician implicitly assumes that the lab system and the EPR system are integrated, and that the different test results are available on the PDA as soon as they are analysed.

The play goes on.

The physician has several patients to see before her duty is over, and does a quick examination of Mrs. Olsen's knee before she marks the knee with a pen and tells her that Nurse Petersen will give more information about the preparation for the surgery. She knows that the test results are fine, and there is no need for Nurse Petersen to search for them. Mrs. Olsen tries to start a conversation on anaesthetics with the physician, but Dr. Christensen says that she is not the right person to answer such questions: "You must talk to the anaesthetist about your wishes later in the evening. He will probably be here in an hour or two."

Figure 2 Physician looking up blood test results on PDA

At this moment the nurse stops the play to ask the others if it would be a good idea to let the patient specify the type of anaesthetic through the patient terminal. The other actors agree that it might be useful and the facilitator hands over a Tablet sized foam block.

The group starts to discuss the functionality of the system. *"She should be able to specify the type of anaesthetic for the operation",* the nurse repeats, *"and to see her own test results".* The nurse acting the patient continues: *"It would be very useful if I could get specific information about how I should prepare for the operation, and when things are going to happen".* The nurse acting herself remarks that the text on the screen must be large, so elderly patients with partly impaired vision will be able to use the system. The two nurses sketch down the information they would like to show up on the screen (figure 3).

The play goes on.

Mrs. Olsen complains to the nurse about the physician's hurry, but Nurse Petersen assures her that she will tell her everything she needs to know about the surgery. If she cannot answer a question, she will talk to someone else who can provide the correct answer. Then Nurse Petersen points at the "patient terminal" and tells her that much of the information about surgery is available on the screen, and that the system is quite easy to use. Mrs. Olsen is a little hesitant and does not want to try the system, but Nurse Petersen explains how it works: "Here you find a list of how you must prepare for the surgery. You will get an enema after supper, and we will assist you with getting shower before you go to bed".

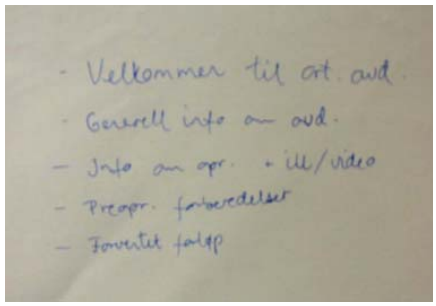

Figure 3 Screen sketch of main menu for patient terminal system [Welcome to orthopaedic department, General information about the department. Information about surgery, including illustrations and video, Preparing for the surgery, Planned steps in the surgery procedure]

Figure 4 Nurse explaining how to find information on the patient terminal

"So I can eat in the evening?", Mrs. Olsen asks, and gets the answer "Yes, you can eat, but after the enema you must only drink water".

Nurse Petersen shows her that she can look at pictures and a short video on the surgery procedure. She says that if she clicks on the last menu item, she will get a list of what will happen after the surgery (figure 4). Mrs. Olsen is not sure if she will use the system, but she tries to point at several items on the touch screen to see what happens.

The second performance ends like the first one, but with one significant difference. In the future scenario the patient knows for certain that she will get her surgery the next morning, and she knows that much of the information she needs about her stay is available through the patient terminal. If she feels the system is too difficult to use, she can ask someone in the ward for help, or simply tell the nurses that she feels uncomfortable with using the system and that she prefer not to use it.

After rehearsing the future role-play a few times, the second part of the role-play workshop is closed by a performance session where the two teams act out their role-plays in front of each other. In the end, all participants, workshop organizers, observers and camera people are gathered to discuss several aspects of the workshop. This includes the participants' feeling about acting and improvising new ideas for technology, the realism of the scenarios, the value of the proposed solutions, and the question of whether or not the role-played future is a desired future.

The participants in the role-play workshop were optimistic to the possible future, but not uncritically. They also made some reflections on problematic aspects of information technology, such as that danger of becoming a hinder for nurse-patient communication. The participants, who were non-technical, judged the proposed ideas based on their own work experience. They felt that several of the ideas would have been useful. As the nurse holding the role as the patient in the play said: *"I feel that in the case of patient information, the system we sketched would have been very beneficial for the patients. We know that we give the same information again and again, and the patients forget what we have told them. This could have been an excellent tool, making information readily accessible, and the patient could read the same information again and again. If I hand out some information on paper, it is lost within an hour. But with this system, they have it available to look at themselves. Now, I am not thinking of the patient journal, but about general information on their stay. This would have been really great for the patients."*

With the discussion, the role-play workshop goes to an end and the participants leave.

1.2 Aim and Motivation of Thesis

This thesis focuses on the different aspects of role-playing as an approach for user-centred design of mobile IT, through development of a sequence of workshops and reflecting on the outcome. The aim of the thesis is to develop an understanding of the central requirements for using role-play for enhancing user participation in early development phases for mobile IT systems.

The term *role-play,* as used in the thesis, could in most places have been substituted with enactments, as the focus is mainly to describe how end users act themselves in given situations. However, the term role-play is a well-known concept in the Human-Computer Interaction (HCI) literature, used to describe different aspects of acting in relation to design, and is therefore preferred in this context. Expressions such as drama and performances are considered as synonyms for role-play in this work, as these concepts are not used to signify systematic differences in the literature.

Eight years ago, Kuutti wrote that "As now, engaging in theatre performances for design has not been developed as a proper *design methodology*" (Kuutti, Iacucci, & Iacucci, 2002, p. 101). As will be evident from the literature review in chapter 2 this is still the case. This thesis is an attempt to improve on this.

1.2.1 Personal Motivation for Selecting Role-Play as Main Subject Matter

The reasons for focusing on role-play in the thesis can be described as a combination between interest and curiosity. The quest for understanding drama as a system development method started in 2001, when I was introduced to four PhD students and their supervisors in a research project on MOBile ELectronic patient record systems (MOBEL)[1]. At the time I was introduced to the group, I had been admitted to the Norwegian University of Science and Technology as a PhD student with a project description on

[1] A description of the MOBEL project is given in (Sørby, et al., 2009)

"Developing and Evaluating User-Centered Methods for IT Development in Hospitals". As a newly started PhD student with a multidisciplinary educational background in psychology and computer science, I was introduced to the project group to learn about health informatics and to get to know other PhD students working in the domain. In the fall of 2001 the members of the MOBEL project were about to prepare a presentation for their industrial partner. However, as the presentation was early in the project, empirical results were limited. The doctoral students and their supervisors therefore decided to create a role-play presentation about their vision of how a mobile EPR system could be used in the future. I was present at a few preparation meetings with the project group. My role was to observe, but shortly before the presentation I was given a role as a nurse, as an extra was needed.

The performance became a great success in terms of communication of ideas. The audience was able to understand the underlying concepts in the MOBEL project, and we were even asked to show the performance for another audience in connection with a presentation of the new technical solutions for Trondheim University Hospital. The second presentation was performed in a 1:1 sized architectural model of a hospital ward. Again, role-play proved the capability of presenting and sharing ideas.

However, during the rehearsals, I made an observation that has followed my work on this topic. During acting one of the physicians in the project exclaimed *"every time we rehearse the play, we discover something new about the technology or the situation in which we use the new technology!"*. This evoked my curiosity to how a role-play seemed to be a spring for new ideas, as well as communicating. I consequently started to ask questions about *"what could we learn about mobile technology through role-play?"* and *"is it possible to take advantage of role-play as a way of exploring requirements for mobile technology?"*

Based on this observation, I decided to organize a role-play workshop to explore use situations for mobile IT systems in hospitals, and invited people interested in health informatics to participate. The idea of the first workshop was to explore to what degree role-play could be used in idea generation, as it already had proved efficient in communication. I did not know exactly how to organize the first workshop, but from my observations of the MOBEL project participants, I felt that the group would have been much more efficient in developing and rehearsing their play if someone with dramaturgical experience had taken part in the preparation of the presentation. I therefore invited some colleagues to a half-day session, and hired a professional drama instructor to lead the workshop. This became the first of

several workshops on role-play, which are described, analysed and reflected upon in this thesis.

1.3 Background

The thesis is situated in the field of Human-Computer Interaction (HCI). The main purpose of 1.3.1 is to provide the background for why role-play has been put forward as an important approach for mobile IT design, and the scope of the thesis lies within this field. Most of the empirical examples are gathered from the domain of hospital work. Subsection 1.3.2 provides a brief background on the characteristics of hospital work, and describes how this has an impact on IT systems development in the domain. The work is done in Norway in the heritage of the Scandinavian system development tradition of participatory design, but is also influenced by user centred design, and constitutes a vital part of the thesis work. The concept of user involvement is central in the thesis, and is reflected upon in subsection 1.3.3. A brief description of the scope of the thesis in terms of choice of focus on users and design philosophy is given in section 1.4.

1.3.1 Studying Mobile IT in HCI

HCI is a multidisciplinary field, drawing on knowledge and methods from natural sciences, social sciences, and design traditions. HCI can be defined as the study of the "interaction between people and artificially-constructed artefacts" (Mackay & Fayard, 1997, p. 2). Mackay and Fayard illustrate the multidisciplinary aspects of the field as portrayed in figure 5.

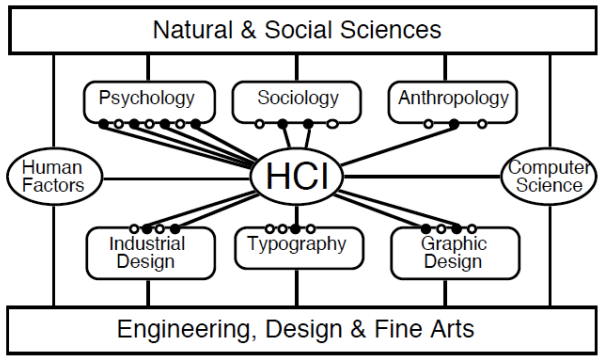

Figure 5 HCI is informed by both scientific and engineering fields. (from Mackay & Fayard, 1997, p. 225) .

In this figure, the ovals represent multidisciplinary fields. Concepts and methods from different scientific and design fields are shown as small circles. According to the authors, the figure is not exhaustive, but intends to illustrate how some disciplines inform HCI (Mackay & Fayard, 1997).

In order to proceed, some clarification of terminology used is needed. The term *method* in HCI can signify both *design method* and *research method*. For example, usability testing can be used as a design method in formative evaluation of a system in a design process, with the purpose of improving the system being tested, while usability testing can also be used as a research method in HCI, e.g. comparing the efficiency of different interaction techniques. In this text, the term *method* refers to *design method*, unless otherwise specified. The concept of *design method* is broadly defined as any method used by users, designers or others, as a tool in a design or evaluation process.

Focus and challenges with mobile devices in HCI

Within HCI, new research forums and conferences have evolved during the last decade, such as the *International Conference on Human Computer Interaction with Mobile Devices and Services* and the *International Conference on Ubiquitous Computing*, to address the increased usage and challenges with mobile devices. There has been an increasing number of contributors on conferences targeting mobile technology (Iachello & Terrenghi, 2005), which reflects that the single user sitting in front of a computer is no longer an appropriate model for how information technology is used today. Mobile devices have become reliable, small and light, and ordinary people in large parts of the world use mobile devices such as cellular phones on a daily basis. Such technology has become an integrated part of everyday life, and is used for both work and leisure. Technology is no longer something we only use at work to perform specific tasks, but has become something that is carried around.

Mobile technology provides many challenges to HCI. Interaction designers must create systems for users on the move, for widespread population without formal training on using the device, for limited input/output facilities, for incomplete and varying context information, and multitasking in environments where interruptions are highly likely (Dunlop & Brewster, 2002). Mobile devices must offer applications that will be used across a wide variety of "contexts, settings and activities" (Sa & Carrico, 2008, p. 127). According to Sa and Carrico, a particular challenge with mobile technology is the transition between different contexts, resulting in different requirements for the same system in different conditions. For example, a

person is able to use a device with two hands in one situation, but must be able to use it with one in another situation. Light and noise levels might be different in two locations, which put further demands on the system.

Understanding mobile technology

During the last decade there have been several attempts to understand the conditions needed for design methods targeting mobile technology. For example, Kjeldskov and Stage (2004) conducted a set of usability tests in laboratories to explore techniques that could facilitate evaluation of mobile systems in a controlled environment. Their study focused on physical mobility, and the laboratory results were compared to a field test. The experiments revealed no clear cut results, but Kjeldskov and Stage pointed out that other factors involved in mobile technology usage such as social, physical and temporal factors, might be more important than physical movement, which was in focus in the study. Po, Howard, Vetere and Skov (2004) evaluated three variations of heuristic evaluation (HE) by incorporating contextual factors important for the use of mobile technology. *Heuristic Walkthrough* (HW) was HE combined with scenarios, while *Contextual Walkthrough* (CW) was HW carried out in the field. In this study, it was found that HW revealed more critical usability issues than a conventional heuristic evaluation. CW identified some unique problems not identified in conventional HE or HW. Svanæs, Alsos and Dahl (2008) tested a number of prototypes of mobile clinical information systems in a laboratory furnished as a ward section. Based on the results the authors presented a set of recommendations on the conduction of usability tests of mobile systems. These studies show that HCI methods are not static, but must be changed to address the particular issues of mobility.

Kjeldskov and Graham (2003) reviewed 102 studies on mobile technology conducted in the period 2000 – 2002 to evoke a discussion on research methods in mobile HCI. The studies reviewed were grouped with respect to eight research methods (case study, field study, action research, laboratory experiment, survey research, applied research, basic research and normative writing) on one axis, and to the purpose of the study (understanding, engineering, re-engineering, evaluating and describing) on another axis. According to the authors, the results showed that there was a bias towards artificial laboratory research settings at the expense of research in natural settings. To face these limitations Kjeldskov and Graham suggested using field studies to explore use contexts and the users´ perspective, with the aim of promoting understanding. In addition, their results showed that surveys and case studies were infrequently used, and Kjeldskov and Graham

advocated using such methods to collect large amounts of data from end-users and to increase learning from existing implemented systems.

As an extension to Kjeldskov and Graham´s study, Hagen et al. conducted a review on "new methodological approaches that are emerging in response to the complexities of mobile technology, rather than categorising research approaches according to existing research methods" (Hagen, Robertson, Kan, & Sadler, 2005, p. 2). According to Hagen and co-workers, methods that have conventionally been favoured by user-centred researchers, such as direct observations with notes, photography and video recording are not conductive in environments of mobile use. Their research was based on papers reporting studies on mobile technologies between the years 2000 and 2004, and the results showed that there are three groups of responses to methodological challenges of understanding new mobile information technology:

***1. Mediated Data Collection*:** Participants and mobile technologies mediate data collection about use in natural settings. Examples of studies in this category are diary studies, where the participants log how they use a device; gathering of information about usage, generated automatically by the mobile device while it is in use; and data collection by devices that the participants wear on their bodies, such as mini cameras.

***2. Simulations and Enactments*:** Simulations and enactments are used to make available experiential information sensitized to real contexts of use. In the category made by Hagen and co-workers, simulations are characterized as studies of quantifiable aspects of mobile technology use such as timing, error rates, and workload. These are considered as tools that allows for immersion where data about existing or potential use is assessed through some form of pretending. In simulation studies, physical, ergonomic or environmental props are most often used within the lab, to simulate aspects of use in the real world. Enactments are viewed as more qualitative in nature than simulations, and "use tools such as role-play, imagination and enacted scenarios to make available information about existing user experiences of mobile technology, and ways in which mobile devices and applications might fit into future use practices" (p. 6).

***3. Combinations*:** Established techniques, such as interviews, questionnaires and focus groups, and/or mediated data collection and/or simulations and enactments are combined to allow access to complementary data. Different methods allow researchers to access different types of data. An example given by Hagen et al. of a combinatory approach is the use of questionnaires, diaries, focus groups and direct observations in a single

study.

The work described in this thesis falls into Hagen et al.´s description of how new methods are developed, used and explored in response to challenges of understanding mobile technology. More particularly, if falls into category 2: *simulations and enactments*, where role-play is used to discover user needs and requirements for mobile technology, and to envision how the technology might be used in the future. Although new approaches such as simulations and enactments are being used to complement the lack of power of existing design methods, methodological issues have received limited attention. This will be elaborated on in chapter 2.

1.3.2 The Backdrop: Technology that Supports Mobile Work in Hospitals

Most of the workshops conducted as part of the thesis are carried out in the context of hospital work. Therefore, I will therefore provide a brief background on the characteristics of hospital work.

From an IT perspective, it might be difficult to understand why hospitals are different from other domains, and what is special with IT system in health care. Or formulated in another way: "Computers can land people on Mars. Why can't they get them work in a hospital?" (Jones, 2003, p. 410). To answer this question, it is necessary to understand that hospital work is characterized by a number of factors, which have an impact on the IT systems that must support such work. Some of the major challenges, considered here, are summarized below and described in more detail in the forthcoming paragraphs.

- Health care personnel is *highly educated and specialized*
- Health care personnel perform *knowledge work* by continuously making decisions on diagnosis and treatment
- Much of the knowledge health care personnel have is *tacit*, gained through experience
- Work is characterized by *collaboration* between different professionals
- Health care personnel need information in *different locations* in the hospital, as their work is *mobile.*
- IT systems are only a *small part of the workflow*. Many other resources are used in addition to the IT systems.

- Systems that provide *data are essential* for hospital work. Decisions on diagnosis and care are based on these data.
- All new IT system must *fit into the existing workflow and the existing systems*. It is impossible to build from scratch.
- In addition to the primary users of clinical IT systems (such as physicians and nurses), it is an increasing need for supporting *secondary use of patient data,* for quality assurance and research.

Characteristics of hospital work

Health care personnel accomplish very complex tasks in their everyday work, best described as knowledge work in an environment characterized by high information intensity (Lærum, 2004). Physicians have to continually use their knowledge to set and evaluate patient diagnosis and the outcome of different treatments. Nurses must carefully observe patients' progress and provide the best day-to-day care. As there may be several causes for the same symptoms, health care professionals are dependent on reliable information to make valid decisions. Physicians, nurses and other health care professionals are highly educated, and the learning process continues as long as they work. Medical knowledge is continuously evolving, and it is the health care personnel's responsibility to be updated on new knowledge.

However, much of the knowledge health care personnel use is not explicitly learnt through textbooks, but is implicitly learnt through experience. This knowledge is tacit, and can be defined as "knowledge embedded in holistic work situations, implicitly gained and an integral part of the accomplishment of working tasks" (Herbig, Büssing, & Ewert, 2001, p. 688). Tacit knowledge does not depend on awareness for learning, and its content is often not reflected upon and examined. The implicitly learnt knowledge has an impact on decision-making in diagnostic and care situations. In the study of nurses carried out by Herbig et al. they found that the tacit knowledge was important for determining the correct diagnosis for a patient with diffuse symptoms. Nurses who were able to set the correct diagnosis had a "feeling" about the significance of a particular symptom that the nurses who were not able to solve the task did not have. This "feeling" was, according to the authors, the tacit knowledge that the experienced nurses had acquired through many years of working. In another study, it was evident that explicit knowledge was regarded as a small part of practicing anaesthetists (Smith, Goodwin, Mort, & Pope, 2003). The authors concluded that restrictions to apprentice-like training might threaten the acquisition to anaesthetic expertise.

In addition to the knowledge intensity that characterizes hospital work, health care personnel are constantly on-the-move between patients and meetings. In a study of physicians´ work in Norway, Røhme and Kjekshus found that physicians in average perform 12 different tasks each day, with frequent switching between the tasks. In addition, they are interrupted half an hour every day (Røhme & Kjekshus, 2001). However, as noted in the report, the definition of "interruption and unplanned work" varied among the physicians, as many considered emergency situations as part of normal work, and not an exception.

To treat a patient it is often necessary to involve different types of specialists, who have their own areas of expertise in relation to specific problems and diseases. Today's hospitals are highly specialized and differentiated organizations. The specialization of the hospitals and the skilled work has led to the establishment of complex relationships among a multiplicity of hospital services and departments (Strauss, Fagerhaugh, Suczek, & Wiener, 1997). To ensure continuity of care for patients, it is necessary with co-ordination and collaboration between different professions, specialist departments in the hospital, and different organizational units (such as the general practitioner and the hospital). The collaborative work takes place through a wide array of sources: electronic, paper-based and oral. Suuch a mixture of systems may cause several problems as relevant information may be spread across the sources. Different groups of healthcare workers have their own documentation systems, which imply that important information for a patient may be difficult to locate.

Requirements for IT systems in hospitals

The characteristics of hospital work put demands on the requirements for IT systems. First of all, such systems must support mobility, giving health care personnel access to information where they need it. This can be solved for example by providing mobile devices, or by making stationary computers or laptops available throughout the organizations with fast log-on routines. Secondly, IT must support coordination and collaboration between different professionals and organizational units. Finally, IT must support secondary use of patient data, for quality assurance and research (NCVHS, 2007). Today information used for these purposes is mostly collected separately from the clinical information systems, which is expensive and work demanding.

The EPR systems can be considered as one of the most important modern tools of the hospitals for documenting and finding information about patients (Berg, 1996). However, simply allowing health care professionals

to access all information available in the stationary system in a mobile device does not make it an immediate useful and useable system. Buchauer, Pohl, Kurzel and Haux (1999) installed a regular EPR system on a PC-based pen computer to study to what extent users would like to have mobile access to the EPR, and to investigate how such a system could be integrated into clinical practice. They found that the present system was not suitable for mobile clinical use. The participants in the study wanted current patient information and access to clinical knowledge on the device, not all information available in the EPR. In addition, they wanted communication support and access to order entries.

Clinical IT, such as EPR systems, have a potential of being more than a documentation system, but the benefits of such systems have yet been difficult to prove. In a review of the impact of health information technology on quality, efficiency and medical care, Chaudhry et al. (2006) found that the benefits of health information technology was realized only by a small number of organizations with internally developed IT systems. These organizations had implemented multifunctional systems with integrated clinical decision support. The technology use in these organizations resulted in enhanced monitoring and surveillance activities, reduction of medication errors, and decreased rates of utilization of potentially redundant or inappropriate care. The quality of the health care services were realized mainly as a result of enhanced adherence to clinical guidelines, but also to clinical monitoring based on large-scale screening and aggregation of data. However, Chaudhry et al. noted that the systems in these organizations were developed incrementally over years, and that strong academic research communities lead the projects. The benefits obtained for organizations that implemented vendor developed software packages were not clear.

There are also certain pitfalls related to the introduction of clinical IT systems. Koppel et al. (2005) found that a commonly used physicians order-entry system facilitated 22 types of medical error risks, such as failure to discontinue a medication, choosing the incorrect patient and selecting the wrong medication. The failures were both attributed to the lack of integration of the system with other systems, which caused fragmentation, and flaws in the user interface due to a lack of correspondence between the system and work practice. Kushniruk and associates (2004) investigated the relationship between usability problems and medical errors in a handheld prescription system. In this study they found that 41 % of the usability problems on “ease on use” were associated with medical errors. These studies show that technology introduced in this domain can pose at threat to patient safety.

To sum up, hospital work is characterized by many challenges for IT design. EPR systems have a great potential for supporting clinical work, but the benefits are difficult to realize. Such systems may also pose dangers to patient safety.

1.3.3 User Involvement in Participatory Design and User-Centred Design

The participatory design tradition was part of a Scandinavian movement for democracy at work in the 1970s, which aimed at giving employees the right to influence their own work situation. In the Scandinavian countries, several acts were passed encouraging democratic control over the introduction and use of new technology. In Norway the Law of Workers' Protection and Working Environment was passed in 1977, giving workers the right to influence their works situation through work arrangements and participation in decision-making (Ministry of Labour and Administration, 1977). In Sweden, The Joint Regulation Act was passed at the same time, giving workers and trade unions the right to codetermination in production issues, such as design and use of new technology (The Riksdag, 1977).

As a part of the same movement that created these laws, several research projects were carried out in the Scandinavian countries to explore different aspects of participation in software development processes. The DEMOS project in Sweden was initiated in 1975 and aimed at identifying possibilities for the trade unions to influence the design and use of computer-based systems in local companies (Ehn, 1993). Many of the early efforts were directed towards indirect participation with trade unions and not with direct participation for employees, and it became clear that not all the projects met the expectations about user participation. Despite the efforts to enhance the democracy at work it soon became evident that the trade unions had small chances of influencing the design of production planning by participating in project groups (Ehn, 1993, p. 54). The UTOPIA project, which aimed at developing skill-enhancing computer tools for graphical workers, is an example of early successful direct user participation (Bødker, Ehn, Kyng, Kammersgaard, & Sundblad, 1987). In the beginning of the project, the users and the developers had communication problems due to the design- and communication methods used. In the early phases more or less formalized methods such as scenarios and data flow were used, but these did not function well as communication vehicles with the graphical workers. However, “the situation was drastically improved when we built a

mock-up to simulate computer-based page make-up" (Bødker, et al., 1987). The project became successful with respect to understanding how skilled workers and software developers can work together to develop technology that support quality work. Another early project in the participatory design tradition was FLORENCE in Norway, which aimed at enabling nurses to gain control over computers at work (Gro Bjerknes & Bratteteig, 1987, p. 282). The project was based on the idea of mutual learning between developers and nurses, where the developers performed extended observation studies of nurses at work. In addition, the nurses learnt theoretical and practical aspects of computer science as part of a development process.

Later descriptions in Participatory Design of why users should be included in the design process are more extended than the initial notions about work democracy. Bjerknes and Bratteteig (1995, p. 74) present three main reasons for including users, summarized briefly:

1. To improve the knowledge upon which systems are built
2. To enable users to develop realistic expectations and reduce resistance to change, and
3. To increase workplace democracy by giving the members of an organization the opportunity to participate in decision-making that is likely to affect their work.

Bjerknes and Bratteteig argue that the first two reasons are rather practical and not unique for the Scandinavian approach. The third rationale is politically and legally bound and as already mentioned rather unique to the Scandinavian countries. The Norwegian Law of Workers' Protection and Working Environment (Ministry of Labour and Government Administration, 1977) states that workers have the right to influence their works situation through work arrangements and participation in decision-making. Since most IT systems introduced in the workplace are aimed at creating some kind of change, users should be able to have a vote or a say in the change process.

During the same time-period as the participatory design tradition arouse as a consequence of the movement for democracy at work in the Scandinavian countries, the user-centred design movement in the US evolved to address the need for user feedback on the usability of graphical user interfaces. Most of the software in the US was developed for the general market and not for specific organizations, which created a need for general usability and not for democratic processes as such. The overriding objective of user-centred design was to produce systems that were easy to learn and use by their

intended users, and safe and effective in facilitating the activities that people wanted to undertake (Preece, Sharp, Benyon, Holland, & Carey, 1994). Since the users are not always known to the developers until the marketing of the products, active user participation is challenging in user-centred design (Grudin, 1991). According to Grudin, system development can be categorized in three types, a) competitively bid contract development, b) product development and c) in-house/custom development, which influence the nature of user involvement possible. Most systems created for the mass marked with UCD fall into category b, where Bjerknes and Bratteteig´s second and third reasons for including users are not relevant.

Although the reason for incorporating users in the design process may be different in participatory design and user-centered design, many of the methods for involving users are the same. In addition, there is a general assumption in both traditions that user participation in the development process will make the end users more satisfied with the final product or system. This refers to Bjerknes and Bratteteig´s first rationale.

User participation and satisfaction

The relationship between user involvement and satisfaction has been confirmed by numerous empirical studies. As early as in 1986, Baroudi, Olson and Ives performed a survey of 200 production managers, and found that user participation had a positive impact on user satisfaction. This, again, had an impact on system usage (Baroudi, Olson, & Ives, 1986). In recent years, several studies have confirmed the relationship between user involvement and end-user satisfaction. McKeen, Guimares and Wetherbe (1994) studied the relationship between user participation with user satisfaction, and found that the relationship between participation and satisfaction was moderated by task complexity and system complexity. In projects where there was a high level of task complexity or system complexity, the relationship between user participation and user satisfaction was significantly stronger than in projects where task complexity or system complexity was low. Task complexity was defined as McKeen and associates as “the ambiguity and uncertainty that surround the practice of business” (McKeen, et al., 1994, p. 433), while system complexity was something that “originates in the developer’s environment and refers to the ambiguity and uncertainty that surround the practice of system development” (ibid). In a follow-up study McKeen and Guimares (1997) investigated the impact of user participation under different system development conditions. The authors measured user satisfaction, user participation, task complexity and system complexity in 151 projects, and found that users were more satisfied in projects where they actively

participated. The researchers identified five participatory behaviours that should be the core of all projects with a need of user participation (users should be members of a feasibility team, be interviewed to obtain requirements, approve the requirements, participate in the definition of user interface components, and be members of the project installation team). For projects with high task and/or system complexity, the users should also be responsible for project definition, and be involved in project management. In fact, when comparing the impact on factors such as attitudes towards system, organizational support and perceived usefulness of system, user involvement seems to have the largest effect on user satisfaction (Mahmood, Burn, Geomets, & Jacques, 2000). Obviously, a user-centered process does not ensure user satisfaction, but it increases the chances of success.

The concept of *user involvement* denotes not only different reasons for participation as described by Bjerknes and Bratteteig (G Bjerknes & Bratteteig, 1995), but can also classified by different degrees.

Degree of user involvement

User participation can be viewed as a continuum given by several variables. For example, Mumford (1984, p. 99) presented a socio-technical framework called "the Ladder of Participation", to describe levels of participation in the industry.

On the top of the ladder there are methods where the user has a great deal of power in the decision-making process. The participant can for example have control over certain parts of the process (delegated power), or be a partner in a project. Further down the ladder there are methods where users are asked about their opinion and informed about decisions made, but they are not leading the process. The lowest parts of the ladder are concerned with methods where the user does not really play an important role, but is lead and manipulated.

Although it can be discussed whether terms as "manipulation" are fruitful in a debate on user involvement, the "Ladder of Participation" provided an early illustration of user participation as a continuum, which still is relevant. The participative behaviours as proposed by McKeen and Guimares and enlisted above can be positioned on different steps of the ladder. "Approve the requirements" and "participate in the definition of user interface components" are behaviours that belongs to the middle of the ladder, while "responsible for project definition" would be situated near the top of the ladder.

In ISO 13407, the Standard for Human-Centred Design Processes for Interactive Systems, there is an emphasis on *active user participation* (ISO13407, 1999). By stating that user involvement must be *active,* there is an implicit understanding of user involvement as possible being *passive.*

In this standard, it is stated that four human-centred design activities should take place in a system development process (figure 6):

- To understand and specify the context of use
- To specify the user and organizational requirements
- To produce design solutions
- To evaluate designs against requirements

According to the standard, the human-centred approach should start at the initiation of the project, and should be iterated until the system meets the requirements. There is an emphasis on developing simulations and mock-ups, and allow users to use these to perform tasks. The basis in ISO 13407 is that prospective end users must take active part in the design work, and not only respond passively to design ideas and prototypes. Users are viewed as a source of knowledge on tasks, context of use, and how they are likely to use the system or product in the future.

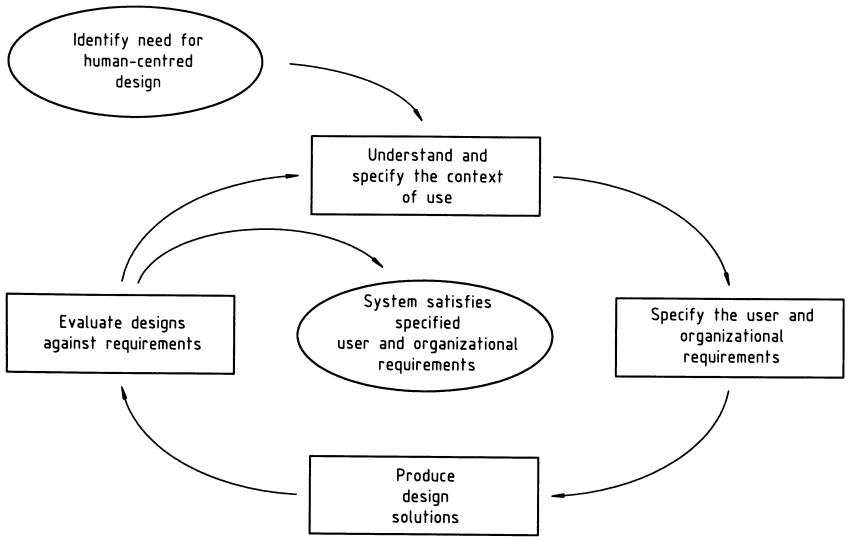

Figure 6 The interdependence of human-centred design activities (ISO13407, 1999, p. 5)

A related approach to *degree of involvement* for reflecting on user participation is to consider the relationship between designers and clients. Nelson and Stolterman (2003) characterize five generalized types of relationships between designers and clients, signifying how the nature of the designer role depends on who dominates the relationship (figure 7). The ideal relationship is, according to Nelson and Stolterman, a relationship where "both sides are fully and authentically engaged in a dynamic design process" and "both roles – designer and client – are *inclusive of a part of the other*" (ibid). Other types of relationship are considered unbalanced, as either the designer or the client has a disproportionate influence on the nature of the relationship.

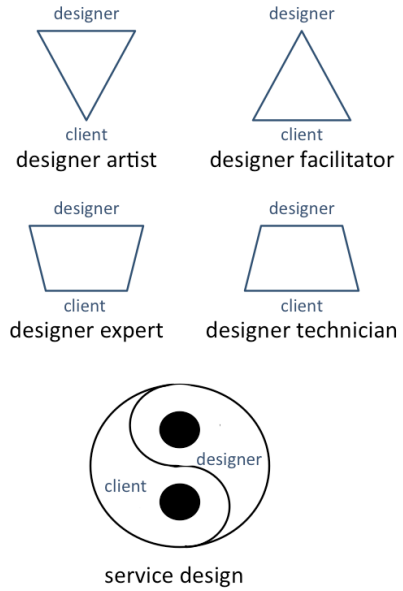

Figure 7 Designer/client relationship (Nelson & Stolterman, 2003, p. 57, reproduced in the thesis)

1.4 Scope and Delimitations of Thesis

This section describes the scope and delimitations of the thesis concerning three aspects of the work: 1) a focus on primary end users, here defined as the users who potentially will be dependent on the future systems in their daily work, 2) a focus on giving the end-users as much power in the workshops as possible, and 3) a focus on role-play as a tool for developing

everyday, technologically feasible requirements for IT in hospitals through creativity with a small "c".

A focus on nurses and physicians

As described in the subsection 1.3.1, the domain of health care is complex, and it is indisputable that many stakeholders should be involved when introducing EPR systems in hospitals. There are many potential users of clinical information systems, e.g. health care personnel, managers and researchers, who all have various aims for employing patient information, such as creating diagnosis, providing treatment, planning of organizational strategies and research. In this work, nurses and physicians are particularly chosen as end-users and in the health care related workshops. This choice was inspired by the writings of Berg and associates, who discussed design considerations for EPR systems in a socio-technical perspective (Berg, Langenberg, Berg, & Kwakkernaat, 1998). According to the authors, a technical system is intertwined with the work practice in which it functions, and it is therefore important to understand these practices when implementing systems. Based on the evaluation of an EPR system in an intensive care unit, Berg et al. argued, "it is crucial to ensure that the usage of the system will yield immediate benefits for primary users. The system should support work, not generate it" (p. 243). The authors further stated that an EPR, which will only benefit those who would like to draw upon the record for secondary purposes such as research and management, would fail. From this perspective, IT systems that do not support the primary users will not succeed.

The second reason for focusing on what Berg et al. call the primary users (nurses and physicians) is grounded in a lack of focus on this in many IT development processes in Norwegian hospitals. Svanæs and Gulliksen (2008) describe a number of cases where user-centered design is restricted by factors such as organizational structures and tender processes. For example, in the Norwegian University Hospital, all system requirements were established at the moment the tender contract was signed: "User involvement happened through user participation in project meetings prior to the call for tender. After the contract was signed, there was no planned user involvement" (p. 356). Consequently, the degree of organizational complexity led the real users to be estranged to the system developers. Thus, if a developer would request a meeting with an end-user, the demand would have to pass through 4-5 separate companies. At another hospital, the end users participated in the development team, but as time passed they gradually changed their way of thinking and speaking. The end user representatives literally changed their mindset, and the new way of using the

language was difficult to understand by users outside the team. Although the representativeness of these examples can be questioned, there is without doubt only limited focus on end-user involvement within the health care domain, which this work aims to improve on.

On the top of the "Ladder of Participation"

With respect to the workshops described in the thesis, the goal was to understand how role-playing can be used as an approach for being on the top of Mumford´s "Ladder of Participation", and even bring it further than active participation in ISO 13407. Using Nelson and Stolterman´s ideas on the relationship between designers and users, it was not the intention to create a balanced relationship between users and designers in this work, but rather to provide end users with role-play as a tool or a language, which they could use to explore and express their information and technology needs. The intention was to give more power to the users than to the developers, which in Nelson and Stolterman´s view would reduce the designer´s role to "facilitator" or "designer technician".

It is important to note the distinction between a complete design process and a time-limited approach such as a role-play workshop. The design philosophy is not such that users should lead every design process. However, giving end users a first priority in this particular setting is the result of a desire to work with an approach that potentially can enhance user contributions with ideas and experiences in a design process at times when this might be fruitful for the overall process.

A pragmatic approach: creativity with a small "c"

In addition to focusing on a restricted group of end users, the choice fo centring the attention to role-play as a pragmatic way of developing user requirements was made in accordance with Vavoula and Sharples (Vavoula & Sharples, 2007). According to Vavoula and Sharples, socio-cognitive engineering is similar to participatory design with regard to focus on user involvement, but additional aspects such as collaboration, strategies for working, patterns for communication etc. are analysed at a group level. In their view, "[pragmatic] identifies those activities that meet a human need and also could conceivably be designed by practical present-day engineering methods" (p. 394). With respect to the role-play workshops in this thesis, particularly the second part of the definition, *could conceivably be designed by practical present-day engineering methods*, has been important.

The reason for this choice is, as with respect to focus on end user, grounded in the particular characteristics of the health care domain. In hospitals, every IT system must fit into existing work practices and be integrated with current IT system. It is not feasible to create a system independently of what already exists. The idea behind the approach described in the thesis has not been to understand the necessary conditions for creating new, revolutionary ideas, but to be an alternative to conventional methods used in current health informatics projects such as surveys and focus group discussions, and potentially capture the tacit knowledge that is characterized by hospital everyday work.

Creativity is often associated with design, and can be defined as the development of ideas that are both novel and useful (Mayer, 1999). Research on creative processes has often been associated with understanding the individual genius, such as a person who develops a new original idea of how to run a country or a company, develops a new type of music, or develops a new technique or knowledge that have a profound impact on society (Paulus & Nijstad, 2003, p. 3). This type of creativity has sometimes been called ´big C´ creativity, in contrast to ´little c´ creativity, which is "creativity in everyday life as people try to solve problems at work and at home or in the road in between" (ibid). The term creativity as used in this work is in line with the idea of ´little c´ creativity. It can be considered as everyday problem solving and idea generation, not as genius innovation. This is also grounded in the requirements for IT systems in the health care domain, as described in section 1.3.2.

1.5 Research Questions

The overall research subject of this thesis is:

Develop understanding of key premises for using role-play with low-fidelity prototyping to involve end-users in exploring user needs and requirements for mobile IT.

This can be further broken down into three specific research questions:

RQ 1. What are the important issues related to planning and running of role-play design workshops with end-users?

RQ 2. What do system developers perceive as the strengths and limitations of such role-play workshops as a system development method?

RQ 3. What are the roles of the workshop facilitators in such role-play workshops?

1.6 Structure of Thesis

This thesis consists of seven chapters. The relationship between the chapters and the research questions is briefly described below.

Chapter 1 gives a general introduction and the context for the thesis. In the first chapter personal motivation, background and research questions are outlined and discussed.

Chapter 2 is based on theoretical considerations, and gives an overview of previous research on role-play in IT projects, focusing on how role-play has been used, for what reasons, variations of role-play, and theoretical fundaments. This chapter also presents some issues, which can be used to categorize such studies.

Chapter 3 describes and discusses the overall research approach taken in this study.

Chapter 4 presents the workshops carried out, lessons learnt on role-play conduction, and identifies important issues on planning and conduction of role-play workshops. This chapter addresses ***RQ 1***.

Chapter 5 focuses on system developers' view of role-play as a system development method, concentrating on strengths and limitations, and answers research question ***RQ 2.***

Chapter 6 contains reflections on our role as role-play facilitators, and answers research ***RQ 3.***

Chapter 7 brings the thesis to end by reflections on the overall research approach and a conclusion.

1.7 Publications

Parts of the thesis have been published in peer-reviewed conferences proceedings and book chapters. Table 1 gives and overview of which publications are related to which chapters.

Table 1 Relationship between chapters and publications

Chapter	Publication
1	E
2	B
3	
4	A
5	B, D
6	C
7	E

A Chapter 4 is an extension of Svanæs, D., & Seland, G. (2004). *Putting the users center stage: Role playing and low-fi prototyping enable end users to design mobile systems.* Paper presented at the Conference on Human Factors in Computing Systems (CHI´04), Vienna, Austria.

B Chapter 2 and 5 builds on Seland, G. (2006). *System designer assessments of role play as a design method: A qualitative study.* Paper presented at the NordiCHI 2006, Oslo.

C Chapter 6 builds partly on Seland, G. (2009). *Empowering end users in design of mobile technology using role play as a method.* Paper presented at the HCI International, San Diego, USA.

D Results from an evaluation of drama improvisation in the context of requirements engineering has been described in Sørby, I. D., Melby, L., & Seland, G. (2005). Using scenarios and drama improvisation for identifying and analysing requirements for mobile electronic patient records. In J. L. Maté & A. Silva (Eds.), *Requirement engineering for socio-technical systems*. Hersley: Information Science Publishing.

E The overall thesis project is described in Sørby, I. D., Melby, L., Dahl, Y., Seland, G., Toussaint, P., Nytrø, Ø., et al. (2009). The MOBEL project: Experiences from applying user-centred methods for designing mobile ICT for hospitals. In K. Khoumbati, Y. K. Dwidedi, A. Srivastava, B. Lal (Eds.), *Handbook of research on advances in health informatics and electronic healthcare applications: Global adoption and impact of information communication technologies*. Hershey: IGI Publishing.

Chapter 2: Role-Play in Design

2.1 Introduction

What is role-play in the context of IT design?

Role-play is often associated with words as “pretence”, “play-acting”, “imagination”, “a story” and “a game”. In the context of design, role-play has been used as a term to describe different activities, from helping designers to imagine their ideas in specific use contexts, to aiding users in communicating how they would use specific artefacts in their work. In a design process, elements of role-play such as play-acting and imagination are valued. Role-play has been used as a window or perspective into reality, to see possibilities for new design solutions that presently do not exist.

In a discussion on *third spaces* in HCI, defined as practices that neither take place in the workers’ domain nor in the software professionals’ space, Muller (2003) summarizes a number of claims of benefits on role-play. Muller argues that software professionals and end-users have different knowledge and practices, and many methods used in software development either are abstract (suitable for a software professional’s organization, such as rapid prototyping), or concrete (suitable for work with users, such as ethnography). Methods in third spaces are, according to Muller, practices in between the extremes of the abstract and the concrete methods. In his view, drama is one of several approaches, which can be used to create third spaces. “Drama bring a strong overlap of the world of end-users and the world of software developers, showing concrete projections of ideas from one world into the other world – and, in most uses, allowing modifications of those ideas. Drama is marginal to the work domains of most software professionals and most end-users, and thus moves all parties into an ambiguous area where they must negotiate meaning and emerge as their multiple voices and perspectives are articulated through this rich communication medium” (p. 1060).

According to Muller, it is difficult to find clear statements of benefits of drama in HCI, but that practitioners and researchers have made the following claims of advantages:

- ***Building bridges*** between the world of software professionals and users
- ***Enhancing communication*** through the use of embodies (i.e., acted-out) experience and through contextual narratives
- ***Engaging small and large audiences*** through direct or actor-mediated participation in shaping the drama (influencing the usage and design of the technology)

- ***Increasing the designers´ empathy*** for users and their work
- ***Simulating us of not-yet-developed tools*** and technologies ("dream tools", Brandt & Grunnet, 2000) to explore new possibilities
- ***Fuller understanding*** by focus group members, leading to a more informed discussion

This chapter seeks to extend the claims provided by Muller by describing the diversity of different uses of role-play, and providing an analysis of these from several perspectives. It gives an introduction to role-play in design, and provides the context for the following chapters. To understand how role-play can be used to involve and engage prospective users in IT design, it is important to appreciate the distinctive uses of role-play reported in the literature. This chapter creates an understanding of these different practices. As the uses of role-play in product design and IT design are highly related, studies in these two categories are treated equally.

The chapter is organized as follows: Subsection 2.1.2 provides a brief outline of how role-play has been used in HCI in the last decades. Section 2.2 describes studies in role-play in detail to explore and understand various utilisations of the approach. The presentation of the studies is to a large degree in chronological order. The studies are analysed from three perspectives in the forthcoming sections. Section 2.3 analyses rationales for the use for role-play. Section 2.4 discuss how end-users have been involved in role-play studies, and section 2.5 gives an overview of the theoretical foundations in these studies. Finally, section 2.6 summarizes some issues identified by Buxton (2007), which can be considered as an initial list of topics to be used to guide grouping of role-play studies in an assessment.

2.1.2 The Big Picture: Role-Play in Different Research Traditions

Participatory design and user-centred design

To obtain an overview of the use of role-play it is useful to study how the different researchers have referred to each other's work. By following links of inspirations and references to persons and projects, it is possible to create at map showing connections between different researchers and projects on role-play. The "Citation map of role-play" (figure 8) illustrates the relationships between different authors' work on role-play in the last decades. The map is created from explicit expressions about inspiration, and explicit and implicit references to researchers and projects. The drawing does not show

all associated links, as this would have reduced the readability of the figure. However, it illustrates the main associations.

Following the inspiration and citation links in figure 8, it is evident that role-play has been used mainly in two different HCI research traditions: participatory design and user-centred design. The work on role-play in the participatory design tradition has frequently been concerned with user involvement in the design process, while the work in the user-centred design tradition has been more concerned with drama as a design tool for understanding users and user needs. Following the citation links it is also evident that some authors have been inspired by both traditions, and cannot easily be classified as belonging to one or the other group.

User experience, participatory design and embodied interaction

In an editorial on the role of performances in HCI and interaction design, Macaulay et al. (2006) provides an other analysis of the literature on role-play in terms of research programs. According to the authors, the interest for performances in design grew out of three programs in the 1990s: *user experience*, *participatory design* and *embodied interaction*.

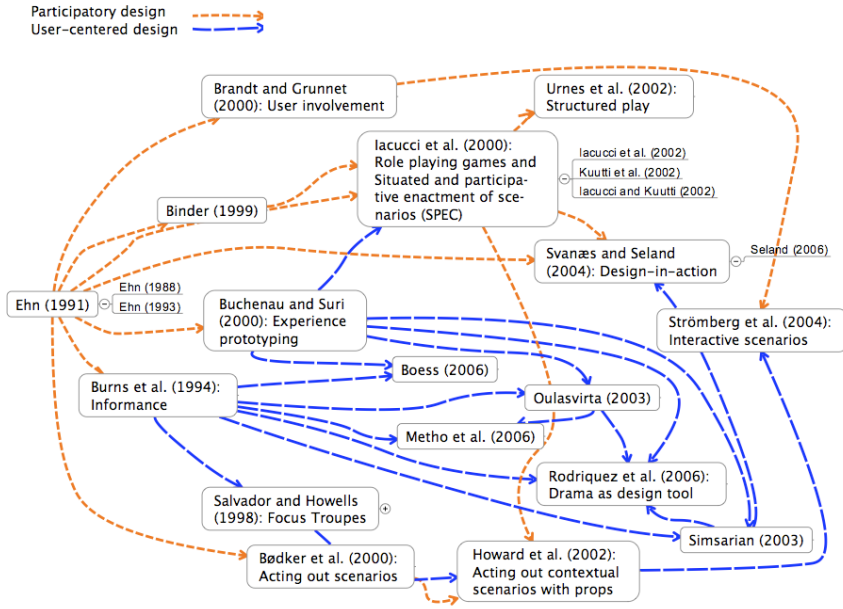

Figure 8 Citation map of role-play. The arrows go from cited sources to descriptions of studies.

Macaulay and co-workers described the *user experience* paradigm as a movement where researchers and designers aim at a holistic understanding and evaluation of interaction. This included going beyond ergonomic and cognitive aspects of a design, and focusing on issues such as enjoyment, pleasure and emotions. The *participatory design* tradition has, according to Macaulay and colleagues, changed its focus from cognition and task-based approaches to design and towards understanding the behaviours of groups of users interacting in complex ways within organisational settings. Dramaturgical techniques, within this tradition, have been used to bridge the gap between observation studies and design. In addition, the use of such techniques have been motivated by a long tradition of using techniques for representing work, which offers common languages between users and designers. The third research program, *embodied interaction*, is motivated by the use of performances for research on tangible computing and embodied interaction. In this approach, the stage for interaction is moved from the virtuality of the screen to the physical environment. According to the authors, role-play has been used to address new interaction modes, which includes bodily movements.

Both these categorizations indicate the use of role-play in practice and research cover a wide variety of reasons in different research traditions.

2.2 Description of Role-Play Usage in Design

2.2.1 Role-Play in the Early Days

Role-play as a method has been regularly reported in the last decade; however its earliest use can be traced back to Pelle Ehn and the UTOPIA project, where skilled graphic users used mock-up simulations to pretend that they were doing a page makeup (S. Bødker, Ehn, Kyng, Kammersgaard, & Sundblad, 1997; Ehn, 1988). In the early stages of the project, more or less formal methods were used for communication with users, such as scenarios and data flow diagrams. However, these methods did not work well. They therefore created mock-ups to simulate computer-based page make-up, which was a more successful approach in enabling the workers to participate. In this project graphic workers and system designers were sitting together while the graphic workers did page make-up. The designers sketched screen on the mock-ups, and they discussed possibilities and limitations of the sketched, possible future system.

According to Ehn, a focus on non-linguistic artefacts in the project helped to create an *experience beyond language*, e.g. as practical use of prototype or mock-up, or participation in a role-play (p. 148). In Ehn's view system development processes can be described as language-games, stating that the users may know things they can express in action, but find more difficult to express explicitly in language. The concept of language-games comes from the philosopher Ludwig Wittgenstein. Ehn describes the Wittgensteinian concept by means of action and social games: "To have a concept is to have learned to follow rules as part of a given practice. *Speech acts* are, as a unity of language and action, part of practice" (…) "To use language is to participate in *language-games*, the Wittgensteinian notion of practice" (…) "Language games like the games we play as children are social activities" (Ehn, 1988, p. 146). According to Ehn, the idea of language games implies that if the users are given a language in the form of tangible prototypes and an ability to physically demonstrate how they would like to use future system, they will be able to share their ideas.

In the 1990's there were several interaction research groups that started to experiment with different variations of role-play in design. Burns et al. (1994) introduced the concept of *informance* as a design technique where designers role-played as users, with simple prototypes as "props." The "prop" was a simple prototype on a computer, created with Macromind Director™. The informance was shown to clients, peer designers or users, and results in an informed dialogue between the designer "actors" and the audience. The conversation between the stakeholders often led to further development and discussions of the design case. Further, Burns and associates described how designers began to use informal improvisation to act out and explore alternative design proposals in their brainstorming sessions (Burns, et al., 1994). This activity was later known as *bodystorming*.

2.2.2 Focus Troupes, Experience Prototyping and Drama with Props

Salvador and Howells (1998) introduced the concept of *focus troupe* as a design meeting where designers and professional actors act out scripts to initiate discussions with users about new products in early development processes. The idea behind the work was to create a method that can be used for evaluating products that do not yet exist. The technique is further described by Sato and Salvador (1999).

A focus troupe meeting typically start with a presentation of a dramatic vignette by which the idea of a new design concept is explained. After the initial scenario presentation there was an alternation between short actor monologues and structured group discussions about pros, cons and different aspects of the product. The discussion is lead by a moderator and part of the conversations is recorded. The short monologues show positive and negative aspects of the concept (Salvador & Howells, 1998). As a variation of the focus troupe technique, the Sato and Salvador provides an overview of different drama techniques, which they suggest will be useful as variations of focus troupe meetings. These includes techniques such as "have the audience act out skits", "have same person act all roles" and "act out everyday situation, provide fairytale props" (p. 39).

Buchenau and Suri (2000) established *experience prototyping* as a technique to understand subjective user experience with respect to design. They went a step further than Sato and Salvador by suggesting that designers should role-play situations themselves, and not use actors. The authors described experience prototyping as "any kind of representation, in any medium, that is designed to understand, explore or communicate what it might be to engage with the product, space or system we are designing" (p. 425). The rationale behind their approach was that designers and clients with informed subjective experiences with a product idea would easier understand the implications of the design. Designers should make discoveries themselves about how it would feel to use a product or system.

Buchenau and Suri provide several examples of how experience prototyping is used. For example, a group of designers carried a pager to simulate how it would be to be a cardiologic patient with a pacemaker implanted. The designers were paged at random times during a day to simulate a defibrillating shock, which could knock a person off his feet. The designers recorded their circumstances and feelings when they were paged. After the exercises discussed their experiences, which ranged from anxiety from holding an infant son to communicate to onlookers what was happening. The experiences were used to inform the design process, by incorporating new features in the product, such as warning signals before a shock and information to bystanders about the condition of the person.

In another exercise, a design team took a train journey to simulate different experiences during a trip (see figure 9). To increase the number of incidents at the train a professional actor gave the participants tasks such as "buy tickets for yourself", and "find something to eat". During the trip the design team experienced a wide variety of possible train events.

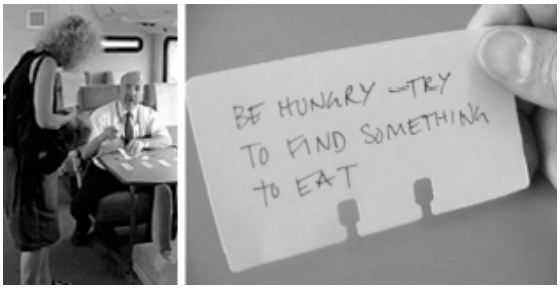

Figure 9 Experiencing a train journey (Buchenau & Suri, 2000, p. 247)

The designers felt that role-playing in a train made them able to observe and understand the experience of travelling.

Further, Brandt and Grunnet (2000) used drama with props in several projects with similar aims as in Buchenau and Suri's experience prototyping: The authors argued that role-play introduces a bodily dimension into the design process, which would help designers to work physically as well as intellectually. In addition, Brandt and Grunnet argued that role-play is useful for making users active in a design process, because drama becomes a communication language for users and designers.

In their initial work on role-play and design the designers role-played different user characters based on field work and detailed analysis of work tasks. For example, a design team created a character description of a refrigeration technician, who was called Allan. The members of the design group pretended to be Allan, and acted the way they thought he would do in both work situations and outside work to get a bodily understanding of the work. Drama was used to get empathy with Allan, and to develop ideas for how a "Smart Tool" would be helpful in his work. The "Smart Tool" was an idea of a future electronic service tool for refrigeration technicians serving cooling systems in supermarkets, restaurants etc. In Brandt and Grunnet's work, the design team used simple mock-ups of possible tools. Whenever a new functionality idea appeared, it was written on a sticky note, attached to the mock-up, and acted out in scenario. After the initial design work, scenarios incorporating different mock-ups were shown to prospective users. A short scenario from a technician's was shown to a group of refrigeration technicians.

They scenarios were relatively open, and in a discussion following the performance the refrigeration technicians gave supplemental information on their work as needed.

Figure 10 a With the help of the "Dynabook prop" they [Mike and Joachim] try to find out what is wrong with Mike´s car (Brandt & Grunnet, 2000, p. 16)

Figure 10 b Later Mike and Joachim use the ´Dynabook prop´to check the prices of spareparts and to find the way to he car workshop (Brandt & Grunnet, 2000, p. 16)

In addition, the users came up with many ideas about how a "Smart Tool" could be helpful for them, and the designers acted out the ideas in a role-play.

In a later project presented in the same paper, Brandt and Grunnet described how users and designers used drama to create collaborative ideas (figure 10 a and b). In the Dynabook project users were equipped with simple mock-ups in their own home environment, and role-played how they could make use of the device in front of the designers. The mock-up signified an electronic book, to be used at home. In Brandt and Grunnets' view, both designers and users should use drama; designers to create empathic understanding of users, and users to share their ideas.

2.2.3 Improvisation by Users *in Situ*

Binder (1999) made simple "props" and organized user sessions with users in their own environment, with the goal of creating collaborative spaces between users and designers (figure 11). In a typical user session, the organizers showed short videos of situations where they believed that technology might have a role. A set of simple props was presented to the users to represent new technology, and the users chose which models to work with. After the selection of mock-ups, a discussion followed about "what the thing is". When the discussion came to an end, the users were asked to show how they would use the mock-up. In general, a user volunteered to improvise the use of the new artefact, and the performance was video taped. This resulted in a captured video, which was regarded as a design artefact to be used later in the project.

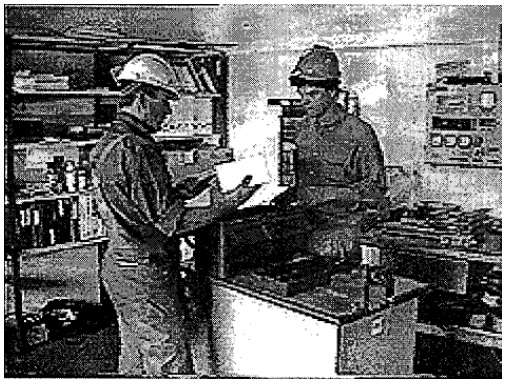

Figure 11 An electrician improvising work with a new tool. A foam mock-up is used as a 'prop'. (Binder, 1999, p. 231)

In another project, Iacucci, Kuutti and Ranta (2000) developed *role-playing games with toys* and *situated and participative enactment of scenarios (SPES)* as ways to make prospective users active in early concept development of mobile services and devices. In the *role-playing games* users acted themselves through a toy character with a magic mobile device (figure 12). Iacucci and associates experimented with different types of role-playing games, and typically displayed some predefined game rules and predefined events, as well as bringing unexpected incidents into the game through incident cards. In some games a designer acted as a game master, who introduced incidents and decided on whom to play. The role-playing games provided the designers with valuable insight into group interaction and context of use, but not with many creative ideas about mobile devices.

In *SPES,* users were equipped with simple mock-ups of future mobile devices (figure 13). A designer shadowed each user during a day or two while he or she was carrying out ordinary activities. As interesting scenarios appeared either the designer or the user suggested things to do with the mobile mock-up, and one of them would immediately enact the ideas (Kuutti, et al., 2002). This method resulted in rich contextual data, and allowed for co-discovery and co-development of device and service features between the designer and the user.

In later work by Iacucci and associates, the authors described how they used performances to develop scenarios (Iacucci & Kuutti, 2002), to communicate and test ideas (Iacucci, Iacucci, & Kuutti, 2002), and to explore design options (Iacucci, et al., 2002).

Figure 12 Role-playing game (Iacucci et al., 2000, p. 197)

Figure 13 Sergej with the mock-up (Iacucci, et al., 2000, p. 198)

For example, Iacucci and associates (2002) used video to shoot small improvisation sequences with prototypes in naturalistic settings to explore design solutions, and carried out simple usability tests with prototypes in the field.

Bødker, Nielsen and Petersen (2000) worked with the development of design tools to stimulate idea generation in collaborative situations involving designers, engineers, software developers, users and usability professionals. The research has its base in the participatory design tradition. Although the authors did not focus on role-play in particular, role-play was used as part of a larger design approach. For example, in a Bang-Olufsen project users were asked to "talk to" a "Wizard-of-oz" television to explore new ideas about interaction methods. A researcher was pressing the button on a remote control according to the users' comments, giving the users an impression that they had the power to control the TV by voice. The video recording of the "Wizard-of-oz" session was edited and used as in the project as an example of creative user input. In a design workshop after the "Wizard-of-oz" session the film was shown at a user stand, and employed as an inspirational artefact to develop mock-ups of PC-TVs. In the design workshop some designers spontaneously started to act out how the mock-ups could be used. Another designer followed up, and acted another way of using the prototype. These demonstrations became a part of the discussion on the ideas, but were not planned for by the workshop organizers.

Figure 14 Movie making: two users act operator and apprentice in a scenario where a hand-held device was used during the daily round at the plant (S. Bødker & Buur, 2002, p. 159).

In a related project Bødker and Buur (2002) presented the *design collaboratorium* as a place and a process for usability design. The *design collaboratorium* grew out of a collaborative effort between the usability groups of three industrial companies in Denmark and the HCI researchers from the University of Aarhus. As part of an iterative development process users were asked to act out and film scenarios at their workplace (figure 14). The video clips created were used as design artefacts later in development process, and were regularly related to and discussed.

2.2.4 Stimulating Creativity

Howard, Carroll, Murphy and Peck (2002) used role-play as an aid in creative design workshops. The authors were motivated by Iacucci et al.'s work on situated and participative enactment of scenarios (Iacucci, et al., 2000). However, in contrast to Iacucci et al., who focused on active user participation, Howard and his colleagues used drama as a design tool for designers to envision and test ideas in situ. According to Howard et al., they employed drama to highlight contextual situational factors, and not to focus on user characteristics and goals. Professional actors were used on the stage, and a professional theatre instructor was helping with personalizing scenarios and directing the performance. In Howard and al.'s workshops, an actor was introduced to a scenario created by the design team and started to personalize it. He or she picked a prop to be used in the scenario and created an initial performance (figure 15). The act was followed by a discussion of properties and functionalities of the prop among the design team.

Figure 15 Sample props used in the research: cycling jackets, pizza box, balza wood, 'palm', spectacles and various wearables (Howard, Carroll, Murphy, Peck, & Vetere, 2002, p. 9)

The designers were doing most of the work on enriching the prop, and the actor incorporated the prop in the performance. The discussion was followed by a new performance, where the designers were able to stop the play and to discuss design issues with each other and with the actor.

Further, Simsarian (2003) described how role-play is part of many design processes at the design firm IDEO. Different types of role-plays are used depending on the phase: In early stages designers utilize role-play to recreate and share field observations. In visualization stages bodystorming replaces or is used together with brainstorming. And in an evaluation and refinement phase scenarios of use are worked through with drama. Finally, project ideas are shared in informances.

To stimulate user creativity Urnes, Weltzien, Zanussi, Engbakk and Rafn (2002) asked workshop participants to picture an ordinary day in their lives, and to use figures made of clay and a doll house to enact typical situations from their ordinary life (figure 16). The aim of this work was to stimulate creativity and exchange contextual information. Urnes et al. called the role-play with the dolls *the pivot method*, referring to the dollhouse as a pivot helping the users to go in and out of roles and reflect on his or her own practices. The authors described the *pivot method* as consisting of structured dialogue and interaction. It was structured in the way that the session took place in a micro environment (a dollhouse), and managed by a designer. Further, the participants were interacting with each other and with the designer by role-playing with miniature figures in the dollhouse.

Figure 16 A toy dog symbolizes all kinds of pets. Large cut-outs on the wall represent home entertainment equipment, a central theme of the concept development sessions (Urnes, et al., 2002, p. 191)

In an attempt to understand the relevance of the environment on user creativity Oulasvirta, Kurvinen and Kankainen (2003) explored the use of bodystorming to develop ideas in different physical contexts. In one of their trials, they asked a group of researchers and industry representatives participating in a workshop to solve a set of design questions by acting out. The workshop participants were working in pairs, and were given design problems and roles by a leader. For each problem they had to generate design solutions. The workshop leader recorded the ideas, and selected some for sketching on paper and acting in a short scenario. Oulasvirta and associates observed that several of the participants overacted and felt that the acting frustrated them. This was interpreted as a result of the lack of practicing acting before the workshop. In addition, many of the ideas generated turned into science fiction, because the participants were not allowed to build their ideas on existing practices and services.

In the PASION project, Vogiazou, Freeman and Lassiter (2007) used improvisational role-play exercises as one of several techniques to generate creative ideas about collaborative work and social gaming. In this project researchers and students were asked to act out in a non-verbal way different situations related to the workshop themes. They could choose among different situations, and decide whether to present the situation by drawing on paper, acting or making a sound. The workshop was organized as a game, where people not presenting were to guess what was being re-

presented. The authors experienced that using role-play as part of a game encouraged the participants to focus on developing interesting ideas instead of trying to be a good actor. The different ways of expressing themselves resulted in many creative ideas, which were used as input in the PASION project.

2.2.5 Enhancing User Participation

Strömberg, Pirtillä and Ikonen (2004) developed the *interactive scenario method* to support the process of building technology concepts in early stages of ubiquitous computing projects. Strömberg et al. described three different workshops where role-play was used to increase the dialogue between professionals and users related to product development. In the first workshop amateur actors were improvising short scenes from a smart home. The researchers in the audience gave input to the role-play by writing short sentences on paper notes about ubiquitous computing, which the actors used as a basis for improvising. In the second workshop four users were included in the audience. This workshop started with a similar improvisation performance based on pieces of papers with ubiquitous technology ideas, followed by a discussion with the users on the ideas. As a result of the discussion the actors improvised several new scenes, incorporating new ideas about technology. In the last workshop only researchers and users participated. This workshop started with a presentation and a discussion about ubiquitous computing concepts, and two designers from the research team acted out a short scene to familiarize the participants with role-playing. The participants talked through the ideas and the scenarios, and explored a few through acting.

Strömberg and associates experienced that the improvisational actors were experienced in generating many ideas in short time, and could therefore easily identify with the usage situation. They further felt that including users required much more preparations, and that the participants´ background should be considered when preparing such sessions. The authors felt that role-playing as a method might not be suited for everyone, and concluded that when organizing role-play workshops it is important to give the participants a choice of whether or not to act.

In another study, Rice, Newell and Morgan (2007) used a Forum Theatre inspired approach to gather requirements for technologies for older adults (figure 17 and 18).

Figure 17 Actors interacting with the mock-up TV system

Figure 18 Discussion between audience, actors, facilitator and researcher

The Forum Theatre was developed by the Brazilian theatre director Augusto Boal, as a technique for involving spectators in performances of social problems (Boal, 1995). In short, a Forum Theatre starts with a performance with a social dilemma, and the audience is encouraged to change the outcome of the story suggesting alternative behaviours. More details about the Forum Theatre are given in section 2.5.1.

According to the Rice et al., many traditional methods in user-centred design fail to take account for sensory, physical and cognitive characteristics of older users. They therefore suggest using the Forum Theatre as a possible approach for establishing a common "ground" for reflection between designers and users. Based on interviews and focus group discussions with older user, a professional script writer created a series of short stories illustrating the used of interactive TV applications. Three scripts were chosen for further elaboration, and the script writer was instructed to make the scenarios be short, concise and open-ended. Forty-five older adults were recruited to take part in one of two theatre sessions, based on their experience with computers. The sessions started with a facilitator posing open questions on everyday use of technology. Then professional actors showed one of the scenarios, and following this the facilitator leaded a discussion between the audience, the designers and the actors-in-role. According to the authors, this approach enabled the older adults to address important issues regarding novel design concepts. By focusing on how the systems may work in social situations, the participants were able to identify important issues regarding the technology, and give input on new ideas that the design team had not thought of before the meeting.

2.2.6 Combining Role-Play with Other Methods

Metho, Kantola, Tiitta and Kankainen (2006) found drama methods are positive for understanding user experiences, to strengthen group identity and to explore and represent the future as it might become. Metho et al. applied a wide range of drama techniques in a number of user sessions, from play-back theatre to Forum Theatre, dramaturgical reading, informance and bodystorming in the *Drama project*, which was a cooperative project between Helsinki Institute for Information Technology and Helsinki Polytechnic Stadia, Department for Performing Arts.

A play-back theatre starts with a user's story, which is played back by actors. By observing one's own story, the user is able to observe her experiences in a new perspective. Dramaturgical reading is a technique where the material to be presented is represented in different ways. In Metho and associates´ workshops, a set of monologues was written based on user observations. Actors improvised short scenes based on the users stories, with good and bad variations. In the authors view, the Forum Theatre was too rigid in its original form to be useful in the early explorative phases. In their experience, play-back theatre and dramaturgical reading were more suitable methods for understanding users in early concept development.

In the evaluation and refinement stages of a product development process, Metho and associates suggested employing a combination of a forum theatre and a drama workshop called a *forum workshop* (figure 19). In this proposed format the drama evolves from the audience's stories in the workshop, and not from prewritten scripts. Metho and co-workers believed that stories should be created and problems explored in the same setting. Preferably users should do the acting.

Figure 19 Satuma forum-theatre play in action (Metho, et al., 2006, p. 990)

Rodríguez, Diehl and Christiaans (2006) developed a toolbox for use by designers to understand unfamiliar contexts. The toolbox was divided into five clusters of tools that would gradually increase the understanding of a new context. Role-play was one of the tools.

In a test the toolbox, graduate product design students participated in a two-day workshop. The aim of the workshop was to make the students familiar with health problems faced by people in India, and it was organized into four units: To understand, generate, develop and communicate. Besides the planned activities, the students received food from India. Before the workshop, the students received different types of written information about India to understand the background and the context. The workshop started with drama warm-up exercises. After the warm-up session, the students role-played a person to engage with the context. The students decide which character to play based on a number of written personas descriptions and videos of the persona. The students choose a scenario and act out their character in the scenario. After the performance different issues related to the problems detected were discussed. The agenda for this workshop is given in figure 20.

	Day 1	**Step**	**Tool**
	8.30	Context Breakfast	
Under-stand	9.30	Understand characters	Personas and video-personas
	10.00	Warm-up games	Physical exercises and character game
	10.30	Role-play	Scenarios
	12.30	Context lunch	
Generate	13.30	Idea generation	Red health issues cards
	17.00	Idea selection	Green solution cards
	18.00	Context dinner	
	Day 2	**Step**	**Tool**
	9.00	Context Breakfast	
Develop	9.30	Warm-up games	Context twister
	10.00	Bodystorming	Props
	12.30	Context Lunch	
Com-municate	13.30	Informance	Props, dress and accessories
	17.00	End of day	

Figure 20 Outline of experience workshop (from Rodriguez, et al., 2006, p. 968)

In the generative phase the students brainstormed on solutions. In the development session the students developed mock-ups and new scenarios, and bodystormed new ideas until common agreement was reached. Finally, the ideas were developed into a scenario and presented using informances. Rodríguez and co-workers observed that the students valued experiencing the personas themselves by acting. In addition, the authors emphasized that role-play was very helpful to create common understanding about new concepts developed in the workshop and to communicate the ideas to an external audience.

In another study, role-play was used in a final stage of a design process for creating services for enhancing motorcycle bikers´ social interaction during traffic encounters (Esbjörnsson, Juhlin, & Östergren, 2004). The study started with a fieldwork, where one of the researchers participated in biking tours etc. In addition, an Internet board for bikers was studied. From these studies a number of topics emerged, and the service for social interactions was chosen as the theme. The researchers created a "Hocman" prototype, which allowed exchange of HTML documents between bikers on the road. In two role-play simulations, three bikers were placed on different locations on a route. The bikers were equipped with a PDA with the "Hocman" application, and were requested to ride the bike on a predefined route. When one of the bikers met another "Hocman" biker, a sound clip was played. After the rides, the bikers were individually interviewed. The participating bikers enjoyed the system, and had several suggestions for the type of information that could be exchanged in such a system.

2.2.7 Role-Play as a Design Method

Boess et al. (2007) reflected on practical problems of integrating role-play in design education and design processes based on a number of workshops organized. Boess and associates were looking at whether role-playing exercises helped designs students and researchers to relate to user data in experiential and emphatic ways, and whether drama exercises were of help in idea creation.

Their results indicate that the attempt to increase experiential awareness was only partly successful. For example, in a "storywalk" project students were more focused on dramatizing their story for presentation than experimenting with being in the story.

Figure 21 Designing, building and evaluating through role play an interactive tangible memory game (Boess, et al., 2007, p. 281)

In a design process, Boess and her associates wanted to use role-play in design meetings to direct attention to results from relevant contextual research. However, the role-play did not fit into the meeting format in a natural way. In addition, the performances in the meetings were video taped, which lead to self-consciousness among the participants. This hindered the role-play.

In a more successful project on interaction, students were divided into groups where each group had one responsibility: to create scenarios, to act out scenarios, to create props or to observe the role-play (figure 21). In this workshop the students responsible for acting were given scenarios and props, and time to practice and personalise a short performance. This resulted in a valuable experience for the students, who were able to personally experience the use of different prototypes in the role-play, and share the experience in the subsequent discussion about the effect of the prototypes. Based on these examples, Boess et al. concluded that it is important to be attentive to the set up of role-plays to have the desired effect. Preparing the students for the role-play and providing prototypes for acting seems crucial for exploring tangible and embodied interaction, which is design that has moved from the computer screen to the physical environment.

2.3 Rationales for Using Role-Play

As described by the examples in the in the previous sections, role-play has been used for various purposes in design by different researchers and designers. In a recent literature overview on rationales for role-playing in

the design school tradition Boess (2006) identified three main rationales for using role-play in design:

1. Enhance communication within the design process
2. Help designers deal with a growing technical complexity of new products and systems, and
3. Help designers understand users emphatically.

In addition, Boess added a fourth motivation based on her own experience with role-play in design: 4) as a vehicle for social change. By social change Boess meant that role-playing workshops with users help designers understand user problems more profoundly, which again results in design ideas that may change the users' everyday life to the better.

Concurrently with Boess I did a similar analysis, reported in (Seland, 2006). The categorization is based on the explicit and implicit description of the rationales for using role-play by the authors on different studies on role-play. Five categories were identified, (details are shown in table 2 a and b):

1. Understand users and context of use
2. Explore, test and communicate ideas
3. Involve users
4. Enhance the design process, and
5. Other reasons (for example design of mobile systems)

A comparison of the two categorizations shows that there is a certain overlap between the groupings. There is no one-on-one relationship between the classification schemes, but several of the sub categories, which I identified, fit with Boess' elements. Boess rationale 1 (enhance communication within the design process) and 3 (help designers understand users emphatically) are covered by category 4 (enhance the design process) and 1 (understanding users and context of use) respectively. Boess rationale 2 (deal with technological complexity) is covered by the last category (mobile systems). In addition I identified two other categories: explore, test and communicate ideas, and involve users.

However, the main reason why there is an overlap but not a one-on-one relationship between the two studies can be explained by different research viewpoints. Boess' categories are highly influences by a designer's perspective on role-play as a design tool, thus, attending to designer-relevant causes. My focus has been on users, user involvement and participatory design. And with the user perspective in mind, studies on user involvement

are easily spotted. Categories as "to involve users" therefore appear as a natural category in such a view.

Table 2a Overview of reasons for using role-play in design (adapted from Seland, 2006, p. 233)

Reasons for using role-play in design		**Study**
Understand users and context	Understand user experience	Brandt and Grunnet (2000) Buchenau and Suri (2000) Strömberg et al. (2004)
	Understand context of use	Buchenau and Suri (2000) Simsarian (2003) Rodriguez et al. (2006)
	Create context for product	Sato and Salvador (1999)
	Create interactive experience	Sato and Salvador (1999) Urnes et al. (2002)
	Create realistic scenarios	Iacucci and Kuutti (2002)
	Make culture and context explicit	Iacucci et al. (2000)
Explore, test and communicate ideas	Explore design ideas in context	Brandt and Grunnet (2000) Buchenau and Suri (2000) Bødker et al. (2000) Howard et al. (2002) Iacucci et al. (2002) Iacucci et al. (2000) Iacucci and Kuutti (2002) Kuutti et al. (2002) Sato and Salvador (1999) Simsarian (2003) Strömberg et al. (2004) Svanæs and Seland (2004) Urnes et al. (2002)
	Experience early design ideas	Iacucci and Kuutti (2002)
	Evaluate design ideas	Buchenau and Suri (2000) Iacucci et al. (2002) Sato and Salvador (1999) Esbjörnsson et al. (2004)
	Communicate design ideas	Buchenau and Suri (2000) Howard et al. (2002) Iacucci et al. (2002) Rodriquez et al. (2006)
	Explore design details	Simsarian (2003)
	Manifest ideas physically	Howard et al. (2002)

Table 2b Overview of reasons for using role-play in design (adapted from Seland, 2006, p. 233)

Reasons for using role-play in design		Study
To involve users	Involve users, active participation	Binder (1999) Brandt and Grunnet (2000) Bødker et al. (2000) Iacucci et al. (2000) Iacucci and Kuutti (2002) Kuutti et al. (2002) Strömberg et al. (2004) Svanæs and Seland (2004) Urnes et al. (2002)
	Help users reflect-in-action	Iacucci and Kuutti (2002)
Enhance design process	Enhance creativity	Bødker et al. (2000) Iacucci et al. (2000) Iacucci and Kuutti (2002) Urnes et al. (2002)
	Initiate discussions about product	Sato and Salvador (1999)
	Generate ideas in short time	Strømberg et al. (2004)
	Create focus around design task	Simsarian (2003)
	Shared focus for design team	Simsarian (2003)
Other reasons	Design of mobile technology	Howard et al. (2002) Kuutti et al. (2002) Svanæs and Seland (2004)

2.4 User Involvement

As shown in table 2b, it is stated in several papers that "involving users" is an important reason for using role-play. Looking at details in these studies, it becomes evident that term "user involvement" does not necessarily have the same meaning across the studies. As recalled from chapter 1 Grudin (1991) distinguishes between user involvement for competitively bid contract development, product development and in-house/custom development. All these studies enlisted adhere to the participatory design tradition, which would be classified by Grudin as in-house/custom development, where both the users and the developers are known at the project outset. However, even though the studies reviewed belong to the same tradition, the degree to which users have take part varies.

With respect to user involvement in role-playing sessions, there are a few factors that can be used to categorize the degree of user involvement: Who are acting? Is the acting based on a scripted scenario, or is it improvised in situ? If a scenario is improvised, is it improvised freely, or is it restricted by

input from the audience? Is the session held in a lab or in the field (in the users environment)? And finally, to which degree do emerging ideas about future technology have their origin in users or designers?

Table 3 gives an overview of the degree of user involvement in studies of role-play conducted to involve users. In this table acting by actors, designers or researchers are considered to decrease the degree of user involvement, while acting by users enhances participation. Similarly role-play improvisation is viewed to enhance participation more than scripted performances. Finally, the physical environment where the role-play takes place is regarded to have an impact on user involvement. Organizing a role-play session in the users environment instead of in a lab does, in my opinion, give some premises for the process. Coming to the users instead of inviting the users to a laboratory may enhance user involvement. This is also in accordance with Muller´s thoughts of third spaces, where system developers and users meet (Muller, 2003).

It should be noted that the picture painted in table 3 do not capture the details of the different studies. Nevertheless, it gives an impression about how these studies were organized with respect to user involvement. In several of the studies there were more than one role-play session, one in which designers or actors acted, and others where users acted. This might indicate that several researchers felt that they had to understand themselves how role-play can be used to before they invited users to participate. It further can point to role-play facilitation as a learning process, where certain skills must be acquired to lead such processes.

Table 3 Overview of projects where role-play has been used to involve user in the process. (Degree of user involvement: Low Medium High)

PROJECT	ACTORS	TYPE OF ACTING	PLACE	IDEA GENERATION
Brandt and Grunnet (2000): ***Smarttool Project***	Designers	Scripted	Lab	Designers came up with and acted new ideas Users "increasingly expressed their ideas" when watching the designers' role-play
Brandt and Grunnet (2000): ***Dynabook***	Designers	Scripted	Lab	Designers discussed funct. in pauses of the role-plays
	Users	Improvised	Field	Users show how they would use Dynabook
Bødker et al. (2000): ***PC-TV***	Users	Improvised	Lab	Users by talking to TV
	Designers	Improvised	Lab	Designers inspired by user perspective stand
Strömberg (2004): ***Improvisation acting in design***	Actors	Improvised with input from designers	Lab	Designers wrote sentences on ubiq. comp. tech., and the actors pretended that they used the technology
	Actors	Improvised with input from designers and users	Lab	Designers presented ubiq. comp. tech. to users and actors, and actors pretend that they use the technology. Users gave input to the acting.
	Researcher	Improvised after discussion	Lab	Designers presented ubiq. comp. tech. to users
	Users			Discussions between users and researchers
Rice et al. (2007): ***Forum Theatre***	Actors	Scripted	Lab	Actors showed short scenarios with technology to older adults. Ideas discussed between older adults, researchers and actors-in-role.
Iacucci et al. (2000): ***Game***	Users	Improvised	Lab	Users created ideas by playing: Improvised with toys according to game rules
Iacucci and Kuutti (2002), Kuutti et al. (2002): ***SPEC***	Users	Improvised	Field	Users imagined use of "magic devices" in their everyday life. Designers suggested function-ality based on user observations
Binder (1999): ***Improvised video scenarios***	Users	Improvised	Field	Users discussed and showed how they would like to use future technology
Urnes et al. (2002): ***Unimote project***	Users	Improvised	Lab	Users improvised with toys the use of future technology

2.5 Theories to Explain Role-Play

As described in this chapter role-play have been used for different purposes since the early use by Ehn in the 1980s. The theoretical rationales for using role-play provides yet another perspective on the literature. There is no unifying theory behind the use of role-play in design. In fact, researchers who have employed role-play as a part of a design process have built their background around four main perspectives in the literature: Theories and concepts from the theatre domain, theories and concepts related to social sciences, system development practice, and philosophy (see table 4). Each of the four theoretical perspectives are described in the following sub-chapters.

Table 4 Overview of theories and concepts to explain role-play in design

Theories and concepts to explain role-play		**Study**
Theatre theories and concepts	Boal (1995): Forum Theatre	Brandt and Grunnet (2000) Iacucci and Kuutti (2002) Iacucci et al. (2002) Kuutti et al. (2002) Sato and Salvador (1999) Rice et al. (2007)
	Johnstone (1979): Improvisational theatre	Brandt and Grunnet (2000) Kuutti et al. (2002) Strömberg et al.(2004)
	Stanislavski (1940): Empathy of actor	Brandt and Grunnet (2000)
	Barba and Savarese (1991): Theatre anthropology	Iacucci and Kuutti (2002)
Social sciences theories and concepts	Schön (1991): Reflection in action	Iacucci et al. (2000)
	Cognition: Representations and contextual cues	Oulasvirta et al.(2003)
	Communication through games	Urnes et al. (2002) Iacucci et al. (2000)
	Tacit knowledge	Bødker et al. (1997)
System development	Scenario based design	Binder (1999) Iacucci et al. (2002) Iacucci et al.(2000)
	Participatory design	Bødker et al. (1997) Urnes et al. (2002)
	Prototyping, use of mock-ups	Buchenau and Suri (2000) Iacucci et al. (2000) Iacucci et al. (2002) Howard et al. (2002) Ehn (1988)
Philosophy	Toulmin (2001): Knowledge and acting	Kuutti et al. (2002)

2.5.1 Theatre Theory

As presented in table 4, a number of studies refer to theory and concepts that are connected to Augusto Boal and Keith Johnstone, who both worked with improvisational theatre. In addition, Konstantin Stanislavsky and Eugenio Barba have been an inspiration for some researchers.

The Brazilian theatre director Augusto Boal developed the Theatre of the Oppressed during the 1950s and 60s to transform theatre from a "monologue" of traditional performance to a "dialogue" between audience and stage, making the spectators active and involved in negotiating the outcome of a staged scenario (Boal, 1995, 2002). The Forum Theatre is one of several approaches to applying the principles of the Theatre of the Oppressed, and is the most prominent theatre inspiration source for researchers using role-play in design. Boal's Forum Theatre starts with a presentation of a problem in the form of a theatre performance. After the problem presentation the audience take part in the performance and influence the course of events of the play by calling out ideas about how things could be different, or start acting the roles from the original performance in a different way. This leads to an exploration of alternative outcomes for politically and socially oppressed people. From a design perspective "Forum Theatre can be seen as a way to open up for participation in the design process" (Brandt & Grunnet, 2000, p. 12). The format of the Forum Theatre gives users a legitimate power to contribute to the design agenda. This can also be seen in Rice et al.´s (2007) use of Forum Theatre to include older adults in the design process. According to the researchers, many traditional requirements techniques fail to take into considerations the sensory, physical and cognitive characteristics of older adults. By using a Forum Theatre approach the researchers were able to communicate design ideas to older adults, and have a fruitful dialogue about possible features of the technology.

Besides Boal, another important inspirational source for many role-play users have been Johnstone's improvisational theatre techniques (Johnstone, 1979). In Johnstone's view it is easier to improvise with restrictions and guidelines than without. This implies that it is easier to act a specific defined character than a general, average person. A central concept in Johnstone´s theatre practice was the use of status transactions as a term to describe the changing relationship between two or more people. In any relationship or discussion the members will take a high or low status, which is shown through language and body behaviour. A harmonic relationship is characterised by the constant switch between high and low status. According to Brandt and Grunnet the concept of status is relevant for interaction design,

because it gives insight into needs and possibilities for different type of users (Brandt & Grunnet, 2000). According to Brandt and Grunnet, it is important to focus on internal relationship between users to understand different needs.

Another basis for inspiration has been the Russian actor and director Stanislavskij (C. Stanislavski, 1940). He is especially famous for his attention on the empathy of the actor. According to Brant and Grunnet (2000), Stanislavski meant that actors should envision themselves in the position of the acted person, and ask question like "if the character was in this particular situation, what would he have done?" Brandt and Grunnet (2000) believed that the "what if"-questions easily could be transferred to interaction design by using phrases such as "what if the user was in this situation. How would he solve the problem?".

A final inspiration from the theatre world is from Eugeno Barba. Iacucci and Kuutti (2002) explain their experiences with drama as fostering reflective thinking in much the same way as in Barba's concept of "theatre anthropology" (Barba & Savarese, 1991). Iacucci and Kuutti argue that according to Barba, we use our body differently when we engage in every-day activities than in performances. In everyday practices we are not conscious of what we do, but when we are doing a performance we are. In Iacucci and Kuutti perspective, their SPES sessions are successful because the performances help the users to reflect in action. For example, the authors reported how they followed a woman called Diana during shopping. The authors observed that she behaved differently in the SPES session than she would usually do. In the SPES session she was more conscious of her actions.

2.5.2 Social Science Theories and Concepts

As many studies refer to theatre theories as their theoretical background, there is also a group of studies, which relate to social science theories and concepts, such as reflection-in-action, cognition and communication.

Iacucci and Kuutti (2002) refer to Schön's idea of reflection-in-action as a concept of how professionals learn and reflect on their practice while they are doing their work (Schön, 1991). According the Schön, experts adapt and experiment with new ways of doing things in divergent situations where known methods are not sufficient to solve a given problem. Reflection-in-action refers to thinking about what one is doing while doing it. In Schön´s view this may lead to an experience of surprise. When applied to role-play

as a method in design, Iacucci and Kuutti (2002) argue that role-play sessions enhance "reflection-in-action", because the role-play provides the participants with relevant contextual cues. According to the authors, the performances evoked reflections, as they are carried out in the everyday world of the participants. Scön´s concept of design-in-action has also been used to discuss the findings on the idea generation process. See section 4.5, "Idea generation process".

Oulasvirta et al. (2003) put forward concepts from cognitive psychology to explain why bodystorming may enhance design idea generation. According to Oulasvirta and associates, simulation in an environment similar to reality will provide contextual cues to the participants, who will be able to direct their attention to central design issues. The authors further state that the direct observable environment will "free mental resources for decision making, problem solving, and reasoning needed in the design phase" (p. 126). This means that the participants can focus on their design tasks instead of keeping information in short term memory. The idea of creating a physical setting similar to the workshop participants´ everyday work environment has also been used in the thesis work. See section 4.5, "Workshop resources".

Further, games and structured play are described as activities that create a common language for design. Iacucci et al. (2000) are inspired by Ehn and Sjögren's early use of games to support situated and shared action and reflection (Ehn and Sjögren, 1991, cited by Iacucci et al., 2000). According to Iacucci and associates, the early descriptions of games by Ehn and Sjögren created an understanding of how such games can be used to create a shared understanding, and ideas about how to organize their own user games. Urnes et al. (2002) extend Iacucci and colleagues notion of role-play for communication, and use games to enhance creative participation of potential users. In the view of Urnes and associates, simple play with miniature worlds help to facilitate creativity.

2.5.3 Concepts from System Development

Reasons for using role-play in design grounded in system development are explained in the traditions of scenario-based design, participatory design and the use of mock-ups and prototypes.

A scenario is a story, which is created for a purpose and have several characteristics: It includes a setting, involves agents or actors who have a goal or objective, and have a plot with a set of actions and events (Carroll,

1995). A scenario makes the use of a system or artefact explicit, as it describes how a particular user would interact with the system. Scenarios may have different roles in different part of a system development process, from supporting idea generation to testing of prototypes and making user requirement visible for a system. Scenarios are similar to theatrical performances, which can also be described in terms of settings, roles, actors and the actors' goals. With respect to the use of role-play in design, role-play performances can be regarded as design artefacts similar to scenario (Simsarian, 2003), which can be used to access everyday situations as they unfold and deliver experiences to participants (Iacucci, et al., 2002). In this perspective role-play can be used to study and design for situations where technology is not limited to defined tasks and where interaction between devices are complex (Howard, Carroll, Murphy, & Peck, 2002). Scenarios have inspired research in different ways, and the link between written scenarios and performances is close. A performance is viewed as an active, enhanced scenario.

As recalled from chapter 1, users are valued as active participants in the design process in the participatory design tradition. In this tradition, it is desirable that users are involved in different processes, from initiating ideas, to evaluating prototypes and refining possible solutions. A great challenge with respect to design is how to create a meeting place between users and developers where users fully understand the design implication. Here role-play games as a method has been suggested to have the necessary characteristics to support participatory design (Urnes, et al., 2002). According to the authors their approach support users and developers in reaching a common understanding of the design problem.

Similarly, a role-play by itself can be a seen as a design artefact to support active user involvement. Prototypes and mock-ups integrated with role-play can help exploration, understanding and evaluation of design ideas. In Ehn's view design artefacts create a familiar resemblance for the users with the "language game" they play in ordinary use situations (Ehn, 1988). The concept of "language games" was developed by the philosopher Wittgenstein, and is described in section 2.2.1 and in 2.5.4. Prototypes provide participants with an opportunity to describe their needs both by telling and showing. Howard et al. (2002) state that the form factor of a physical model in a role-play session influence both the performance and the design discussion, and it is therefore important to choose an appropriate form.

2.5.4 Philosophy

Kuutti, Iacucci and Iacucci (2002) propose that detached, analytical characteristic of conventional design methods, where the designer has an explicit role as an observer in the world, may lead to the difficulties with developing new design ideas. In Kuutti and associates' view the philosopher Toulmin important thoughts on thinking as it take place in the practical world" (Kuutti, et al., 2002, p. 96). In the view of the authors, the thinking in the practical world should be taken into consideration in design.

The authors describe that "according to Toulmin, there is a long tradition in the history of human thinking that emphasizes the specificity of the knowledge needed in acting in the word, knowledge that is particular, local, and timely, as contrasted to general knowledge" (p. 96). As referred by Kuutti et al., Toulmin trace the tradition to Aristotle, by arguing that Aristotle described three types of knowledge in antiquity: intellectual, theoretical knowledge *(episteme)*, knowledge on how something is done in practices *(techne)*, and knowledge needed in dealing with concrete, actual problems as they arise *(phronesis)* (ibid). Initially all these types of knowledge were considered to be equally important, but in the 17th century the balance was changed. As described by Kuutti et al. logical rationalism became the model of scientific thinking, where the observer was to reveal objective truths about the world. Phronesis lost its status completely.

Kuutti and colleagues summarize Toulmin's philosophical thoughts by declaring that there is a long tradition that "valuates acting in concrete situations as a valid form of producing new knowledge" (Kuutti, et al., 2002, p. 97). With connection to design the authors aim at exploring how performances can be used to acquire phronesis, particularly for situations where new technology does not yet exist.

2.6 Assessing the Efficiency of Role-Play?

As described in this chapter, there are numerous variations in how role-play has been used in design and the usage can be described as heterogeneity at best. Role-play has been used for different purposes, using various procedures, within different research traditions and with a number of theoretical positions. To my knowledge, there does not exist any system for assessment of the effectiveness of the heterogeneity of uses.

However, Buxton (2007) provides an overview of some issues extracted from the literature on role-play in design, which that he regards as useful for

expanding one's repertoire of techniques in interaction design (p. 100 – 101). These can be viewed as way to categorize different studies, and is to a certain degree overlapping with the categories used for assessing the studies performed with the goal of involving users in design (see section 2.4):

> ***Script****:* What is the level of scripting? Is there a general scenario on which the actors improvise or is it more scripted? If the latter, by whom?
>
> ***Director***: Is there a director or coach, and if so, who? In some cases it is the designer or the people building the product. In others, someone with professional experience in theatre is brought in.
>
> ***Actors***: Who is doing the acting? If we are designing a system intended for use by nurses or hairdressers, are representatives from those professions doing the acting, or the designers? Although there can be benefit in having the designer "walk a mile in the customer's shoes, there are limits. (…) One can play the role of an old person to significant effect. (…) There may be little effect on having designers act out the role of a neurosurgeon.
>
> ***Audience:*** For whom is this piece of theatre? (…) Designers may act out scenarios for the intended users. (….) Designers may be the observers while a scenario is acted out by the users. It may be that designers and users watch professional actors, or that designers are the audience for the same performance in which they are acting.
>
> ***Setting:*** The scenarios may be acted out "in the wild" (on location, so to speak), in some mock-up simulation thereof, or in some generic spaces such as in a conference room at the designer's office. The actual location may help build up the design team's understanding of the eventual context in which a product will be used. (…) On-site explorations may be disruptive, inappropriate, or may overly bias ideas by the status quo.
>
> ***Performance or rehearsal?*** Does the director or audience let the actor go right through the scenario without interruptions, as in a performance, or can it be stopped, mid-stream, in order to ask questions, give notes, make suggestions, or change the script?

> ***Props:*** Props can have a large impact on what scenarios you can do and how they are played out. This is not just a question of whether props are used. If so, which ones? Who designed them? Who built them? When were they introduced? (…)

In my view, these issues are a starting point for grouping of different studies to in an initial assessment, and as a tool for making researchers and practitioners of role-play more reflected about their choices. However, the list is by no means complete with respect to planning how to use role-play, or assessing the quality of such approaches.

As a consequence of this chapter 4 and 6 of this thesis is devoted to develop a deeper understanding of issues of importance for role-play usage. Chapter 4 ends with and identification of emerging factors involved in planning and running of role-play workshops with end-users, which is based on an analysis of lessons learnt from conducting seven workshops. Chapter 6 provides reflections on one aspect of the conduction of our role-plays, the role-play facilitator's roles, which was found to be particularly important for the conduction of the workshops.

Chapter 3: Research Perspectives and Design

3.1 Introduction

As recalled from chapter 1, the overall aim of the thesis is to develop an understanding of the necessary conditions for using role-play with low-fidelity prototyping to involve end-users in the process of understanding user needs and exploring requirements for mobile IT.

This chapter describes the main research perspectives taken in this work, including the underlying methodological choices. Specific details on how the data was gathered and analysed are given in the method sections of the following chapters 4 – 7.

This chapter is organized as follows: Section 3.2 provides an initial discussion on how to develop knowledge on user-centred design methods, and a description of the overall choices made. Section 3.3 presents the general research approach of the study, while section 3.4 describes the research design for the three research questions. Section 3.5 introduces Klein and Myers´ principles for conducting and evaluating field studies in information research, which have been found useful for reflecting on the overall research approach in the thesis. The description and the discussion of the principles is given in chapter 7, section 7.2.

3.2 Doing Research on User-Centred Design Methods

As already described in the introductory chapter of the thesis, section 1.3.1, methods for user-centred design are continually evolving. Then how is it possible to develop new knowledge about such methods? A common approach is to carry out comparative studies, either by comparing different types of methods, or by comparing different variations of the same method. As new design methods are required, these methods are compared and discussed by researchers in relation to existing methods.

In its simplest form, two methods are used to evaluate a system, followed by a comparison of the obtained results. For example, Law and Hvannberg tested a platform for sharing of e-learning resources with heuristic evaluation and usability testing, and compared the results (Law & Hvannberg, 2002). The researchers found that the heuristic evaluation only moderately could predict the problems revealed in the usability test. Some of the problems were identified in both tests, but some were also unique. In a comparison of two variations of the same method, Nielsen et al. (2006)

studied the value of usability testing in the field and in the lab. They found that the field condition revealed some problems with cognitive workload and interaction styles that were not identified in the laboratory setting.

In addition to studies that compare one or two methods, there are several examples of studies that survey of several different approaches. Mao and Vredenburg (2001) surveyed user-centred design practitioners about which methods they use, what the cost and benefits of each approach were, and what the organizational impacts were. In this survey they were able to rank the most common methods in use, according to the practitioners´ view of the relative importance of each method. Gulliksen et al. (2004) did a similar survey in Sweden, where they asked usability professionals to judge a number of methods and techniques that they had used, on a scale from "very good" to "very bad". This resulted in a list comparing 25 different methods.

Quantitative vs. qualitative research

In the various studies referred to above, a quantitative research approach was used to develop new knowledge. Quantitative, in this context, refers to an approach where one attempts to measure numerically the difference between two or more design methods, and test for statistical significance. As another examples of a quantitative research approach, Law and Hvannberg (2002) compared the number of common and unique major and minor problems identified with heuristic evaluation versus usability testing. This was done to calculate the degree to which problems in the usability test could be predicted in the heuristic evaluation. Nielsen et al. (2006) counted the number of problems identified in a laboratory study vs. a field study, found significant differences between the two. The authors classified the problems in terms of efficiency, effectiveness and satisfaction, to compare the type of problems revealed in the laboratory and in the field. Efficiency was measured by the time used to complete a task, effectiveness as the ability to complete a task, and the degree of satisfaction by a rating of the overall satisfaction with the system. The authors found that more problems were identified in the field than in the laboratory with respect to cognitiave workload and interaction styles. In the surveys of both Mao and Vredenburg and Gulliksen and co-workers, the goal was to develop an overview of the use of user-centred design practice (Gulliksen, et al., 2004; Mao & Vredenburg, 2001). Both papers provide descriptive statistics of the use of different user-centred methods among usability professionals, and an evaluation of the perceived effectiveness of the methods in use.

Such quantitative approaches for developing knowledge about user-centred design methods, as described in the examples above, are well suited for

comparing well-established methods. A well-established method implies a high degree of understanding about how the method should be used and for what purpose. A prerequisite for conducting a survey comparing HCI methods is that there is a strong agreement among the respondents on the definition of each method, as described under the definition of well-established methods.

However, how is it possible to develop an understanding of an approach where there is no a common standard for its usage, and when different variations of the method have been used for a number of purposes? An example of such a method is role-play workshops with end users as participants.

As described in chapter 2, role-play has been used regularly during the last few decades, and for various reasons, but not very frequently. The rationales for using role-play are dispersed, and the theoretical justifications can at best be characterized as heterogeneous. There are several claimed benefits for using the different variations of role-play in design, but there are limited criteria by which role-play workshops can be planned, conducted and judged. In other words, role-play is not established as a HCI method. This implies that it is difficult to compare with other user-centred methods. At the moment it is too early to include role-play as an HCI method in surveys similar to the one done by Gulliksen and associates on the usability profession in Sweden (Gulliksen, et al., 2004). Furthermore, it can be questioned whether role-play will ever fit into a quantitative survey about methods in user-centred design. The diversity of its use, implicate that this is not "one method", but that its use depends on the user and the context in which it is employed. For example, designers´ use of role-play to experience a user's feeling about a product, is very different from a role-play simulation with users in the field.

The current state of the art of role-play therefore calls for a qualitative research approach, where the focus lies in *understanding* important issues in role-play rather than judging quantitative benefits and limitations compared to similar approaches. A possible model for such research is to experiment with different variations of role-play, similarly to what Oulasvirta et al. did (Oulasvirta, et al., 2003). They conducted four different brainstorming sessions, and discussed the differences between the sessions in terms of quality of the ideas, and memorability. In a qualitative paradigm, reality is viewed to be value-loaded, which means that an objective, neutral researcher is not possible. According to this view, researchers always have a perspective on the research, and the data is interpreted within this perspective. This thesis will therefore be embossed by a desire to understand

role-play as a method to support end-users in the design process. As the work evolved, two additional perspectives hemerged: (i) A focus on the system developers´ qualitative perspectives of role-play as a system development method, and (ii) the roles of the workshop facilitator.

Pragmatic research

Even though the distinction between quantitative and qualitative research is clear in textbooks, it is just not that straight-foreward in practical research. Within both traditions there are different views on ontology (the nature of reality), epistemology (what can we learn about the world), and methodology (in which ways can we obtain knowledge about the world). However, even though philosophical research epistemologies might be dissimilar, the distinctions are not always clear cut in practice (Myers, 1997). Instead of adhering to one particular worldview, Goles and Hirschheim (2000) argue that a pragmatic view of research is needed in the field of information systems research, instead of a positivism or anti-positivism approach. Positivism refers to a quantitative approach, and anti-positivism refers to a qualitative approach. The thesis work agrees with the pragmatic view of science, where the research question is placed above considerations on methodology and underlying philosophy. "Pragmatists take the position that there exists an objective reality, existing externally to the individual. However, this reality is grounded in the environment and experience of each individual, and can only be imperfectly understood" (Goles & Hirschheim, 2000, p. 261). Instead of focusing on particular methodologies, working systematically and thoroughness are central in pragmatic research.

Fixed vs. flexible research design

As an alternative to the categorization of research in qualitative and quantitative research, it is possible to classify research in fixed and flexible designs. A fixed research design includes a substantial preparation before data gathering about what you are going to do and how you are going to do it (Robson, 2002). Laboratory experiments and survey studies are typical examples of methods used in a fixed research design. Before the study is carried out the conceptual framework or the theory, must be determined. Extensive pilot testing must be undertaken to establish what is feasible and not. Fixed designs are mainly quantitative.

In contrast to fixed research design, flexible research design requires less pre-specification. The research design evolves, develops and "unfolds" as the research proceeds (Robson, 2002, p. 5). "Flexible method research is

defined primarily by the procedures used to gather data and their origins, and only secondarily by the type of data gathered, which is typically unstructured" (Anastas, 1999, p. 57). Flexible designs may contain methods that result in both qualitative and quantitative data. Examples of study types in flexible designs are ethnography and case studies. In a flexible design, the purpose of the study is likely to be clear, but the theoretical framework might not be set in advance. Obviously, a set of methods must be decided upon in the initiation of a study. However, the approach is likely to change due to personal involvement and early data collection (Robson, 2002, p. 164). In other words, new methods for data gathering may be called for as the study evolves and the understanding of the research questions and the domain improves.

Returning to the fact that role-play as a method is yet not established in the same way as heuristic evaluation and usability testing, the process of developing understanding may benefit from a flexible approach where preconditions are not settled fully in advance. In fact, as this study initiated, new questions were expected to arise in the research process as a result of a better understanding of different aspects of role-play. The starting point for the study was set, but not the end, and this called for a flexible research approach.

Studying role-play as part of development process vs. as isolated method

Even thought the decision of using a pragmatic and flexible approach for developing an understanding of the important aspects for employing role-play workshops with end users were made, the research question can still be approached in several ways. IT system development is a complex process that involves cultural, social and technical processes. One way to study the subject is to investigate the use of role-play as part of a real development process. By doing this, it is necessary to take into consideration the complexity of the project, and how role-play as a method fit into the complete picture of the project and of the organization in which the project is a part of. Another approach is to carry out a set of smaller studies within "fake" development projects, where one conducts experiments with different variations of role-play and reflects upon the outcomes. With this experimental approach, the complexity is reduced because the conduction of the studies is not dependent on other activities in a project. For the same reason, it is easier to control what questions to ask the users and to decide what topics to focus on. However, studying a method separately from an ongoing process also means that the transferability of the knowledge may be

questioned, as it can be discussed to which degree an understanding of role-play acquired through small studies applies to a real project.

In the thesis, a combination of the two approaches is chosen with the goal of building an understanding of role-play as a system development method by organizing and reflecting upon role-play workshops in a set of smaller studies. Five of these have been organized for the purpose of the thesis only. In addition, results from two workshops are reported here. These workshops were organized on request from ongoing research and development projects. The viewpoint taken here is that examining role-play as an independent method can result in valuable insight into practical and theoretical aspects of the approach. By focusing on role-play with prototyping in particular, it is possible to identify important issues involved in role-play conduction.

Focused discussions with developers enabled us to reflect on strengths and limitations for system development. Obviously, it would have been beneficial to carry out a sequence of workshops in a particular real project as action research in addition to the workshops described, but this was unfortunately not possible at the time when the workshops were conducted. Action research refers to research "which pursues action (change) and research (knowledge and understanding) at the same time" (Bloor & Wood, 2006, p. 9).

3.3 Overall Research Approach

The overall research approach in the thesis has been to work iteratively by carrying out a set of smaller studies. At the initiation of the first workshop, we wanted to explore role-play workshop as an approach for developing requirements for mobile IT. How this was to be obtained was not clear, as it was not possible to reveal from the literature how to do this. In the beginning of the process, not all questions were clear about what to explore in these workshops, and this paved the way for an iterative process.

The research process has several similarities with an experiential learning process, and I have therefore found it useful to introduce the key elements of an experiential learning process to describe the research process. Such a process can, according to Boud and colleagues, be characterized by three phases (Boud, Keogh, & Walker, 2005, p. 9):

1. Preparation
2. Engagement in activity
3. Processing of what has been experienced

In the preparation phase students starts to prepare for what is required in the learning activity, including the demands of the activity, resources etc. In the engagement phase the students are part of actual experiential activity, as for example observing in the field or working in a childcare centre. This active phase may be overwhelming, as "new observations may rapidly follow each other with insufficient chance for them to be organized" (Boud, et al., 2005, p. 9). Many students are not able to connect their learning experience in the active engagement period, and this is only possible when the students return to an educational setting where they are able to reflect on their experiences.

A model of the experiential learning process, that has several similarities to the overall research process in the thesis has been developed by Kolb (see figure 22). Kolb´s model assumes a four stage learning cycle:

Concrete experience refers to the student actively experiencing an activity. *Observations and reflections* refer to the stage where the student reflects upon the experiences. In *formation of abstract concepts and generalization* the student makes an attempt to develop a model or theory of what was experienced. *Testing implications of concepts in new situations* refers to the student planning how to test the model or the theory, or plan for the next experience.

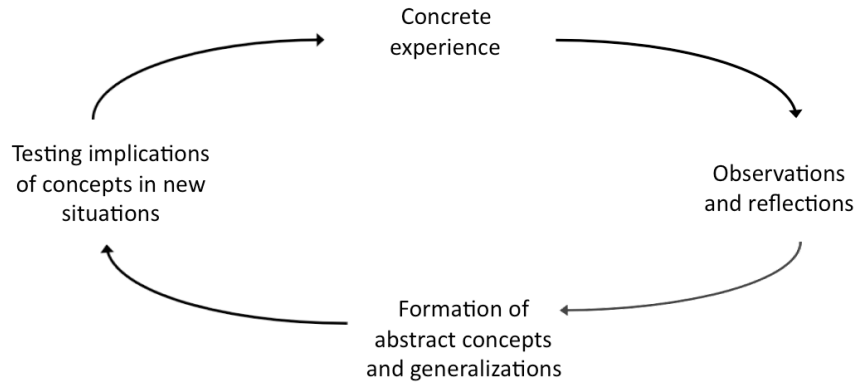

Figure 22 Kolb´s description of the learning cycle (Kobl and Fry, 1975, as cited by Boud, et al., 2005, p. 12, reproduced in the thesis)

Application of Kolb's model to overall research process

As described in the beginning of this section, the research process in the thesis has similarities with Kolb's experiential process, hence being iterative.

Figure 23 describes the overall research approach. The blue symbols signify activities (e.g. planning of workshop), while green symbols denote artefacts (e.g. workshop plan). The red dotted squares in the figure map the thesis´ phases to Kolb's model: To understand how role-play workshops could be used, we planned a process with the conduction of a number of role-playing workshops, but where the exact number was not set in advance. The process started with the planning of a first workshop (1), which was carried out and resulted in *concrete experience* (2).

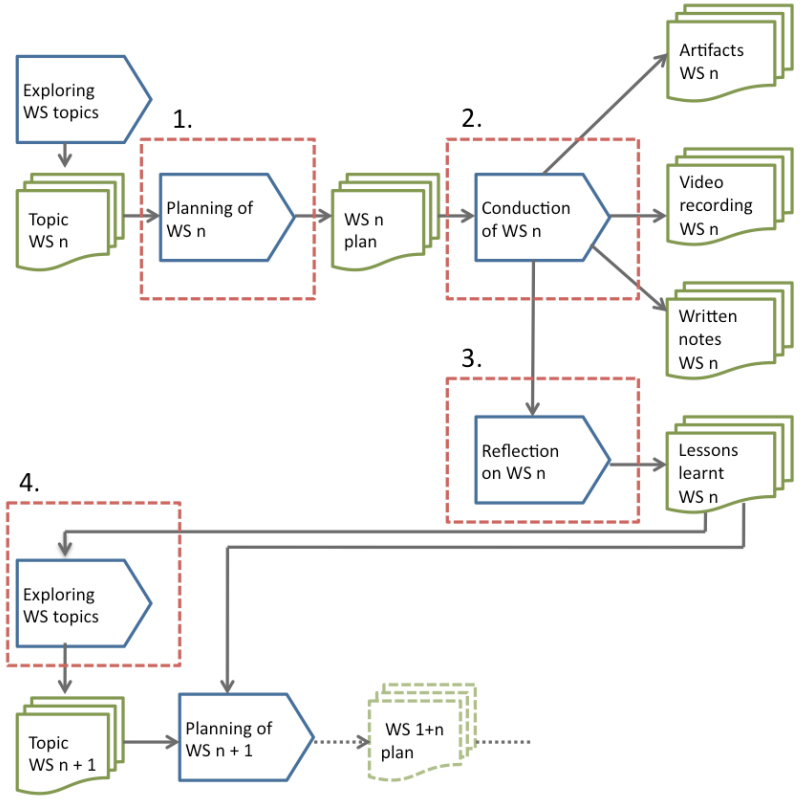

Figure 23 Overall research approach. Red dotted lines signify the Kolb´s stages in his experiential model.

The experiences were reflected upon in *observations and reflections* (3), which further led to lessons learnt in *formation of abstract concepts and generalizations* (4). These lessons learnt were used as input into the planning phase of the forthcoming workshop in *testing implications of concepts in new situations* (1).

For each workshop we formulated a new question on role-play conduction in the form of a topic we wanted to explore. The full list of topics explored in the workshops is given in chapter 4, table 6. The process of planning, conducting and reflecting on the workshops has gradually improved the understanding of important concerns involved in role-playing and idea creation, and what the necessary skills are for running such user-centred workshops. As we did not know what the outcome would be of these workshops, we were not able to plan the process in its entirety before the initiation of the project (i.e. a flexible research design).

3.4 Research Design

The work on this thesis began with a goal of understanding role-play as a system development method, and this work is centred around three research questions. This section outlines the various approaches employed in order to gain insight on these.

3.4.1 **RQ 1:** What are the Important Issues Related to Planning and Running Role-Play Design Workshops With End-Users?

As a result of the iterative research approach described in section 3.3, a number of lessons learnt on how to organize role-play workshops were identified. These lessons learnt were analysed across the workshops to reveal issues of importance for planning and carrying out such workshops.

Figure 24 Research design RQ 1

The aim of the analysis was to identify and reflect on issues that were relevant for role-play workshops with users in general, and not only tied to a single workshop. The process is illustrated in figure 24. The analysis was done in two iterations, and the process is described in section 4.5.1. The analysis resulted in five groups of issues, which are described and discussed in section 4.5. These issues answer RQ 1.

3.4.2 **RQ 2:** What do System Developers Perceive as the Strengths and Limitations of Such Role-Play Workshops as a System Development Method?

After the second workshop we had gained an initial understanding of the necessary requirements for carrying out role-play workshops, and some experience with the type of requirements that evolved from such workshops. However, there was still a need to investigate if this approach could be useful in system development. In parallel with conducting the workshops, a process started with an evaluation of role-play as a system development method. This resulted in the use of a number of methods, which are described in detail in section 5.3. However, the main routes to gathering data about the system developers´ view are shown in figure 25.

First of all, system developers, organizational developers and interaction designers took part in some of the workshops. Before ending each session we conducted a focused group discussion with everyone involved in the workshop, from participants to observers. To develop an understanding of role-play as a *system development method*, we extended the final discussion in each workshop with questions about role-play as a method.

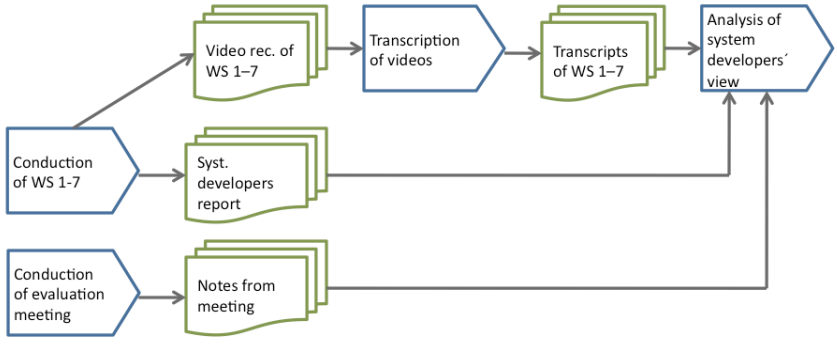

Figure 25 Research process for assessing role-play workshops as system development method

In addition, individual questionnaires with the same questions were handed out to everyone. The discussions were taped on video and transcribed. The transcriptions were together with the results from the questionnaires used as a basis for an analysis of the system developers´ view of role-play.

Secondly, in two of the workshops we engaged four computer science graduate students to take the role as system developers. The students were given a particular task of summarizing the requirements from the two workshops and shortly describe their view of role-play as a system development method. In addition, they were interviewed shortly after the workshops to get their view of the method. The student reports and the transcribed interviews consisted a second part of the data material.

Finally, a group of system developers in health informatics were invited to participate in an evaluation meeting about role-play as a system development method. In this meeting, the approach made in this work was explained, including a brief description of the scenarios and the IT requirements that evolved from the workshops. A discussion followed about role-play as a method, and the participants filled out a short individual questionnaire with open questions on the approach. The transcribed video from the meeting and a summary of the questionnaires became the third set of data in the analysis of the system developer view.

The analysis resulted in a list of benefits and limitations of role-play with end users, as seen through the eyes of system developers, which answers RQ 2.

3.4.3 **RQ 3:** What are the Roles of the Workshop Facilitators in Such Role-Play Workshops?

As a result of our experiences with facilitating a number of workshops, both positive and negative, we identified the facilitator's role as a particular important aspect of the use of role-play.

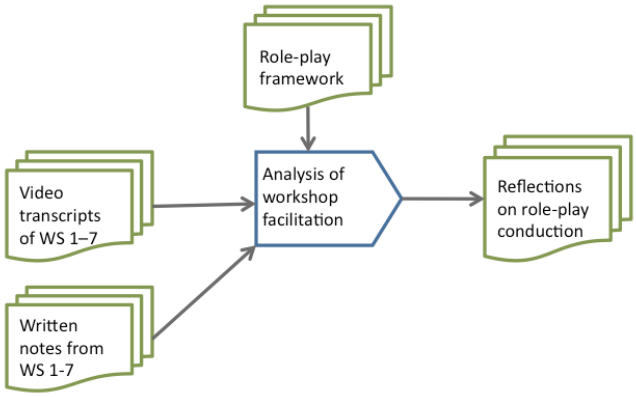

Figure 26 Research process for developing understanding of the role-play facilitator's roles.

To develop an understanding of aspects of the facilitator's roles, a framework on role-play conduction developed by the psychologist Yardley-Matwiejczuk was found to be useful (Yardley-Matwiejczuk, 1997).

The analysis process is illustrated in figure 26. All the workshops were video taped and transcripts analysed to investigate facilitator-user interactions by means of the framework. In addition, written notes from the workshops were included in the analysis material. The analysis consisted of two parts: An analysis of the development role-play scenarios, and secondly of the development of ideas about information desires. The result of the analysis led to several reflections around the facilitator's role in planning and conducting role-play workshops. The reflections answer RQ 3.

3.5 Guiding Principles for Conduction and Evaluation of the Study

As described in the section 3.1 – 3.4, the research approach chosen in this study has been both iterative and qualitative. The selected research designs for the different parts of the thesis have evolved as a consequence of the experiential learning process with conducting the workshops and subsequent reflections drawn.

The question now is then how is it possible to discuss this process? Klein and Myers have developed seven principles, which here are considered useful for reflecting on the conduction and the evaluation of the overall

research approach (Klein & Myers, 1999). The principles were originally developed as a response to a discussion about how interpretive field studies in information system (IS) research should be conducted, and how the quality could be assessed According to Klein and Myers, "IS research can be classified as interpretive if it is assumed that our knowledge of reality is gained only through our social constructions such as language, consciousness, shared meanings, documents, tools, and other artefacts. Interpretive research does not predefine dependent and independent variables, but focuses on the complexity of human sense making as the situation emerges. (…) It attempts to understand phenomena through the meanings that people assign to them" (p. 69).

When the principles were developed, these were though of as guidelines, and not as bureaucratic rules of conduct. However, not all principles will fit every project, but it was assumed that a systematic consideration of the principles might improve the quality of interpretive field research in information systems. The authors did not claim that their principles are the only relevant ones for guiding such studies. However, they state that the principles are particularly relevant for studies of a hermeneutical nature, that are studies that shift between the focus on the distinct parts and the wholeness, where the wholeness guides the interpretation of the individual parts, and the understanding of these parts increases the understanding of the wholeness.

Although the principles are developed for another purposes, they have proven useful for reflecting on the research process in the thesis, as the iterative and experiential process has many similarities with a hermeneutic process. In section 7.2 Klein and Myers´ principles are applied to reflections of the resulting research process as a whole.

Chapter 4: The Role-Play Workshops

4.1 Introduction

As described in chapter 2, role-play has been regularly but not very frequently used in IT development in the last decades. Role-play has been used for different goals: from exploring design concepts to evaluating ideas. There are large variations in the different rationales for using role-play, and consequently big differences in how the sessions have been organized. Chapter 2 revealed that there is a lack of shared criteria through which different role-play workshops can be judged. Given the diversity of rationales and evaluation criteria, we have chosen an open and explorative research approach, as outlined in chapter 3.

This chapter seeks to identify a set of issues of importance for role-play workshops with users, based on our experiences with running seven workshops, and reflecting on topics that emerged during planning and conduction of these.

The chapter mainly addresses ***RQ 1*** of this study: *What are the important issues related to planning and running of role-play design workshops with end users?*

The chapter builds on, but is not limited to the paper "Putting the users centre stage: Role-playing and low-fi prototyping enable end users to design mobile systems" (Svanæs & Seland, 2004). The paper includes two workshops carried out by Svanæs (DS) before the start of the PhD project (workshop 1 and 2 in the paper). These workshops are not part of the empirical work in the thesis, but as they had an impact on some of the decisions made, they are briefly described in subsection 4.2.4, Prototyping Material. In addition, workshop 3, 6 and 7 of this thesis, are not described in the paper. Besides elaborating the workshops in more detail than in (Svanæs & Seland, 2004), important issues are identified based on reflections on the workshops conducted as a whole.

The chapter is organized as followed: Section 4.2 describes methodological aspects around the organization of the workshops, such as participant characteristics, recruitment procedures and prototyping material. Section 4.3 gives a brief overview of the workshops, and section 4.4 presents the workshops in the order they were conducted. This includes lessons learnt concerning with organization of the role-play workshops. In section 4.5 our experiences and lessons learnt are analysed and grouped, and five classes of issues of importance for using role-play workshops with end users are identified and described.

4.2 Method

4.2.1 Workshop Participants

In our workshops a number of different types of participants were involved. An overview of the number and types of participants in each workshop is given in table 5. The "main participants" were those who were actively involved in the workshops by acting and developing ideas about requirements for new technology. "Other participants" included drama instructors, workshop organizers/facilitators, camera persons and observers.

The participants were recruited by way of different means, from advertisements at the hospital to direct recruitment through superiors. When recruiting the main participants, we emphasized that previous role-play experience or IT skills were not a necessity to take part in a workshop.

Table 5 Overview of the participants in the workshops and route of recruitment. The number given in parenthesis shows the number of participants in the different roles.

Workshop	*Main participants*	*Other participants*
1: Fall 2001	Researchers in health info. (7)	Professional drama instructor (1)
2: Fall 2002	Nurses (6) from Gynaecological, Orthopaedic, and Surgical Department	Professional drama instructor (1) Facilitator (2) Observers (2) Camera person (1)
3: Spring 2003	Petrol station employees (5)	Professional drama instructor (1) Organizational developers (2) Facilitators (2) Designers/researchers (2) Camera persons (2)
4: Spring 2003	Nurses (5) and physician (1) from Cardiologic Department	Graduate students as system developers (2) Facilitators (2) Camera persons (2)
5: Spring 2003	Nurses (4) and physician (1) from Cardiologic Department	Graduate students as system developers (2) Facilitators (2) Camera persons (2)
6: Fall 2005	Tele-company employees (7) High-school students (2)	Facilitators (2) Camerapersons (2)
7: Fall 2005	Interaction designers (30)	Facilitator (1)

For the first workshop we invited colleagues in health informatics to join. For the second workshop we recruited people from the local hospital by e-mail, advertisements, and by the hospital intranet. For workshop 4 and 5 the Head Nurse and the Head Physician at the Cardiologic Department from Trondheim University Hospital recruited participants. In workshop 3 and 6 we were hired externally to organize the workshops, and were not involved in the process of finding people to take part. Workshop 7 was part of a tutorial of a larger conference, and people interesting in learning about role-play enrolled voluntarily.

The main participants in workshop 2, 4, and 5 were paid NOK 1000 for their contribution; participants in workshops 1 and 3 were given an ordinary salary from their employer for their partaking. The participants in workshop 7 were professionals participating in an interaction design conference.

4.2.2 Workshop Facilitators

There were two workshop facilitators in the workshops besides the hired drama instructors: The main PhD supervisor (DS), and myself (GS). The first workshop was only lead by an external drama instructor, and the last one was lead by me. Both DS and myself facilitated workshop 2 – 6. The second drama instructor was in charge of the role-play part in workshop 2 and 3.

The facilitators´ background and skills with respect to IT, role-play and teaching are shortly summarized:

- **DS** is professor in HCI, with an education in computer science and philosophy, and a PhD in interaction design. He has also an interest and experience in psychodrama, and has been a member of an amateur theatre group in Trondheim (BUL). He has many years of experience with teaching, and some experience with organizing user workshops.
- I have an education in psychology and computer science, and have participated in several amateur theatre performances. Some teaching experience from different domains (languages, dance, HCI), but little experience in leading user-centred activities before the initiation of the thesis work.
- **Drama instructor 1** was recommended by a member of the BUL. She is a professional drama instructor by living.
- **Drama instructor 2** has an education in theatre science. She has been acting in a number of amateur theatre performances, and has

also been a member of BUL. She has many years of experiences with leading children and teenagers in music and drama, but did not have any experience in leading user-centred activities before the workshops.

4.2.3 Physical Environment

Workshop 1, 3, 6 and 7 were held in meeting rooms spacious enough to be used for improvisation of role-plays. We divided the rooms into a scene section and an audience section, and used chairs, tables etc. as props when needed. Workshop 2, 4 and 5 were held in a 1:1 architectural model of a hospital ward, built as part of the planning for a new University Hospital in Trondheim. The model contained several patient rooms, as well as a reception area, a clinical chemistry laboratory, and a meeting room. The model was partly equipped with furniture and technical equipment to give an impression of a future ward.

4.2.4 Prototyping Material

Based on recommendations by the drama instructor, the prototyping material in the first workshop consisted of pen and paper. As this workshop was the first exploration of the use of role-play to develop requirements, working with simple prototypes was judged as meaningful.

For the remaining workshops, the prototyping material consisted of foam models with attached cardboard of different shapes ranging from the size of cellular phones to Tablet PC-s to wall-wide screens (figure 27). The number and sizes of the material was adapted to the specific themes of each workshop. We deliberately choose shapes that would signify technology that might be common in the near future (5-10 years).

The choice of material was guided by two factors, 1) the system development context, for which the workshops were planned, and 2) previous experience with working with users on developing ideas for future technology.

Figure 27 Low-fidelity prototypes made of foam and paper (arranged pictures)

The idea of using role-play as an approach for enhancing user participation in workshop 1 had its origin in a system developer paradigm in the health informatics domain, targeting hospital work. We wanted to give the users a tool, which we called role-play, that could help users in expressing everyday technology needs. The idea was to understand role-play as a medium for sharing everyday knowledge, and not to enhance the creativity of the users to develop new original ideas for new technology. We wanted the ideas to be grounded in work practice. In addition, we wanted to explore an alternative approach to surveys, user meetings and product demonstrations, which are currently the most common methods used to understand users´ needs in Norwegian hospitals. For this purpose we choose prototyping materials that are similar in size to technology that might be available in a few years time.

Houde and Hill (1997) define a prototype as "any representation of a design idea regardless of medium" (p. 3) and describes three different types of prototypes which can be created for different purpose: An "implementation" prototype is created to show how an artefact actually works. A "look and feel" prototype is intended to create a sensory experience for the user of what he/she will see, feel and hear while using it. A "role" prototype is created to cover the function of the artefact in a user's life – "the way it is useful for them" (p. 3).

For the planned workshops we wanted to explore the *role* mobile devices may have in hospitals, and therefore we chose to keep the form factor simple and focus on prototyping material representing realistic technology.

The second reason for the choice of materials was connected to results from two design workshops on telecommunication devices with high-school students conducted by DS before the initiation of the PhD. (These two workshops are described as WS 1 and 2 in Svanæs and Seland, 2004).

The first of these was conducted to explore the potential for new mobile devices and services. In this workshop, the high-school students started with creating and dramatizing everyday scenarios about situations where teenagers meet. The participants then used clay to create a number of forms, signifying creative prototypes of new technology. The teenagers were blindfolded and worked individually on creating the forms. After the clay exercise, they worked in groups and used the forms as a basis for developing ideas of future technology by adding simple electronic parts such as LEDs, wires and switches. They had to give the prototypes a name and come up with three possible uses of each. The resulting artefacts sparkled of creative thinking, but were unfortunately not technologically feasible (figure 28). It was also difficult to integrate the prototypes with the scenarios: "The participants struggled with finding ways to use their objects in the scenarios, and this was reflected in their presentation. The resulting future scenarios included their fantasy objects, but it was evident that the object did not "fit in". (…) It was in most cases obvious that we were not watching a future product in use" (Svanæs & Seland, 2004, p. 480).

In the second workshop run by DS before the start of the PhD, the focus was on evaluating the market potential for direct terminal-to-terminal radio communication and ad-hoc wireless networks for teenagers.

To restrict the design space and make the participants focus on the particular technology, foam models of different sizes were created to signify watches, cellular phones, PDAs, laptops and tablet PCs. In addition, the students were provided with sticky notes, wires and clay for the prototyping. As in the previous workshop, the students started with identifying relevant scenarios, and then worked on creating mock-ups. This time the ideas generated were easier to integrate with the scenarios, and were judged to be more relevant and feasible (figure 29). The constraints of the prototypes made it easier for the teenagers to develop feasible ideas.

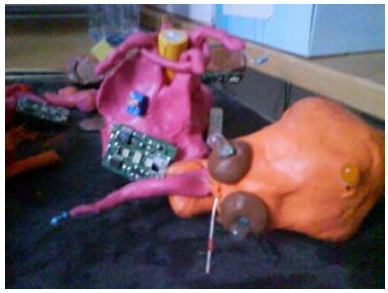

Figure 28 Fantasy objects created by high-school students

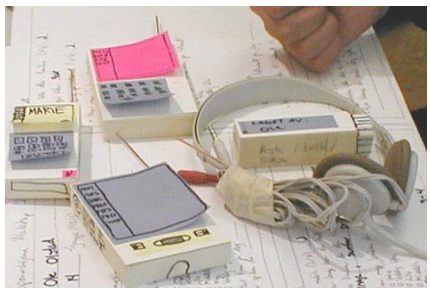

Figure 29 Prototypes of PDAs, cellular phones and wireless headset

With the experience from the teenager workshops in mind, and with a desire to support the users´ idea generation around near future technology, we decided to create a set of foam prototypes similar to the ones in the second teenager workshop.

4.3 Overview of the Workshops

As described in chapter 3, we did not start out with a fixed research design. For each workshop we focused on one question on role-play as a user-centred approach, and added a new element to investigate the question. In this process, observations of and reflections on the results from one workshop pushed the process forward and acted as a source for new questions in the next. An overview of the questions for the different workshops is given in table 6.

Workshop 1, 2, 4 and 5[2] were conducted as a part of the thesis work only. These were organized with the goal of *developing knowledge on the use of role-play with users* to develop requirements for mobile IT in hospitals.

Workshop 3 and 6 were part of ongoing research- and learning processes in two major Norwegian companies operating the field of petroleum and telecommunication respectively. In these workshops DS and I were hired to lead the workshops based on the experience gained from the previous workshops.

Workshop 7 was part of a half-day tutorial organized in a Norwegian conference for usability engineers and interaction designers. The goal of the workshops was to teach the participants the necessary skills on how to organize such workshops. The tutorial was organized as a workshop similar to 1-6, where the tutorial participants took actively part in the workshop as end users.

In addition to the workshops, I organized an evaluation meeting with health informatics developers between workshop 5 and 6. The goal of the meeting was to investigate to what degree role-play could be integrated with system development practice. The results from this meeting are mainly described in chapter 5, but are also briefly described here as some of the input from the meeting influenced the organization of the last workshops.

[2] Called WS 3, 4, 5 and 6 in (Svanæs & Seland, 2004)

Table 6 Overview of workshop questions

Workshop	*Question*
1	How can a drama teacher, through basic dramaturgical skills, help us understand how mobile Electronic Patient Records can be useful?
2	Can health care professionals dramatize and create ideas for mobile IT systems?
3	Can people from another domain (petrol station) dramatize and create ideas for IT systems for their workplace?
4	What role should software developers have in the workshops?
5	Does starting the workshop by viewing a field video add any value to the workshop?
Evaluation meeting	How can the use of role-play be integrated in a system develop process?
6	Can such workshops be used for exploring future business ideas?
7	Can interaction designers be taught how to use the method in their everyday work?

4.4 Descriptions of the Workshops

4.4.1 **Workshop 1**: Exploring the Potential of PDAs in Hospitals

Based on the observations of the preparations for the early role-play presentation in the MOBEL project as described in subsection 1.2.1 (Sørby, et al., 2009), I invited a professional drama instructor to help organize a role-play workshop. The purpose of the first workshop was to explore how drama could be used as an idea-generating tool in the context of health informatics. The theme for the day was "exploring the use of PDAs in hospitals". Before the workshop the purpose and the conduction of the workshop were discussed with the drama instructor on the phone. The instructor proposed a program for the day, which was approved.

The participants in this first workshop were mainly academics belonging to the MOBEL project. Everyone who had taken part in the previous perfor-

mance was present, except for the project leader (a physician), and a sociologist (who was also an experienced patient). In addition, a person working in health informatics research in Trondheim participated. As a result, none of the participants were hospital employees, and we had no "experienced patients" as participants. Drama improvisation was not part of the participants´ educational background. However, at the point of time the characteristics of the participants were not considered as problematic, as the participant were mostly the same as in the MOBEL presentation group.

The drama instructor started the three-hour workshop with an introduction to people-to-people communication theory, before introducing some warm-up exercises on attention and communication. The initial warm-up practice was followed by exercises on use of verbal behaviour and body language to change the social status between people in communication processes. For example, a person could raise the status of her role character by acting an expert who was taking the lead in a conversation. Another way to raise the status could be to stand up from a seated position during a talk.

After the initial exercises, we started improvising some scenarios about the use of EPR systems in hospitals, following the drama teacher's instructions. These situations were mainly concerned with developers trying to persuade health care professional to try their products. In a typical scenario acted out, a person was given the role as a developer, who was instructed to tell a busy nurse about the new features of a handheld clinical IT system. Another participant got the role as a nurse, who was instructed to fold sheets of paper to signify busyness, while talking to the developer. The roles were arbitrary given. The person holding the role as developer had to work hard to get the attention of the "nurse", who was busy working on the folding exercise. Consequently, getting attention became the focus of the scenario instead of a dialogue about possibilities of the mobile system. The participants felt that it was difficult to act the given roles, and we did not learn anything new about the technology or about situations where such technology might be useful.

Lessons learnt workshop 1

After the workshop we summed up our experiences and lessons learnt from the day to understand how the next workshop could be organized differently.

First of all, we experienced that the drama instructor misunderstood the purpose of the workshop, and it became too much "drama class". We intended to use the workshop to explore ideas about mobile EPR systems,

and thought that drama could be a medium for communication. However, the control of the workshop was handed over to the drama instructor, and this resulted in a workshop where we acted out situations that were not relevant with respect to the workshop goal.

This experience gave us an important lesson on using drama: Everyone involved in the workshop must fully understand its purpose. People hired to assist in the process must understand the rationale behind the process. This point may seem obvious, but it turned out that the concept of "drama" was not interpreted in the same way by us and by the drama instructor.

Secondly, the participants had a hard time acting out the scenarios in the workshop, and some of the participants felt that the role-play was intimidating. As the participants were mostly the same as in the MOBEL presentation, which was considered to be a success in terms of learning about the technology, this was not expected. However, two people were missing from the project, and this had an impact on realism of the scenarios developed in the workshop and the participants´ confidence in acting. From this we concluded that it necessary to involve people with domain knowledge in such user workshops, which in our case indicate that real users should have been involved.

4.4.2 **Workshop 2**: Involving Users in the Workshop

After the initial workshop I received funds to explore the use of drama for creating ideas about mobile EPRs. I decided to pay health care personnel for participation in the second workshop because of the problems experienced in workshop 1, and to hire a new drama instructor to lead the role-play part.

In this workshop I was particularly interested in finding out if ordinary health care personnel would be able to develop and role-play everyday work scenarios, and whether they would be able to develop ideas about requirements for technology that could be helpful in their everyday work practice.

The participants in the second workshop were six female nurses, working in three different wards in Trondheim University Hospital. Before the workshop, three physicians had agreed to take part, but on the day of the workshop they failed to show up.

The fact that we had to start the workshop by calling absent people was a disturbing factor. This early experience with recruitment made us aware that

it is important to ensure that people feel committed to participate, so that they will show up when the workshop begins.

Planning of workshop 2

Before this workshop we planned the day in detail together with the drama instructor. We decided to divide the day into two parts; first to focus on the current work situations, and then to focus on possible future work situations (figure 30).

We wanted the ideas to be grounded in the participants´ experiences, and therefore choose not to introduce any ideas about technology before the end of the first part of the day. The division of the day was based on DS´s experiences with conducting workshops with teenagers, (see section 2.4.2, this thesis), and can be described as a basic workshop plan with a three-step-process for the idea generation: 1) scenario developing through role-play, 2) technology exploration through low-fidelity prototyping, and 3) integration of the prototypes into the scenarios. In our plan 1) belonged to *current practice*, and 2) and 3) was part of *future work practice*.

CURRENT PRACTICE
- Welcome, introduction to workshop goals and methods
- Introductory warm-up drama exercises (all)
- Short break with coffee and fruit
- Brainstorming on possible scenarios (in groups)
- Development of a basis scenario (in groups)
- Improvisation of the scenario (in groups)
- Presentation of scenarios with and without unexpected events (all)
- Lunch

FUTURE PRACTICE
- Introduction to mobile technology: Possibilities and limitations
- Introduction to paper prototyping and foam models
- Warm-up drama exercises with foam models (all)
- Paper prototyping (in groups)
- Integration of prototypes in scenarios (in groups)
- Presentation of scenarios with prototypes, with and without unexpected events (all)
- Discussion on workshop organization and proposed solutions (all)
- End of workshop

Figure 30 Overview of basic workshop plan

The drama instructor prepared an extensive warm-up section to make everybody comfortable acting in front of the others, with the goal of avoiding the problems of acting in the previous workshop.

When choosing warm-up exercises, she emphasized techniques, which could be useful for both part one and two of the day. For example, she proposed one improvisational technique, which turned out to be central to the workshop in more than one way. The exercise is called “Freeze!” In its original version two people improvise a short scenario when the instructor says “Freeze, do not move!” A new person takes the place of one of the two actors, and starts to improvise a new scene. The origin of the new scene can either come from the drama instructor, who hands out note with catchword of the content of the new scene (figure 31).

When preparing the workshop we decided to use a version of the “Freeze! ” exercise to create more variations in the performances by the participants. We planned that each group should show their current and future scenarios twice: first as rehearsed, and secondly with “freeze”-breaks. In the second performance the drama instructor would stop the play and present “unexpected events” based on input from the people watching the play, which the participants had to react to. Hospital work is characterized by interruptions and changing tasks (Bardram & Bossen, 2005), and we envisioned that presenting such unexpected events would create more dynamic and realistic role-plays. We also planned to introduce unexpected events for the presentation of the future scenarios with the aim of creating an initial test the robustness of the suggested IT solutions.

Figure 31 Warm-up exercises. A participant draws a paper note in the “Freeze!” game.

When planning the introduction to the prototyping material, we decided to limit the design space to ideas that could possible be realized in 5 -10 years, to ensure that the ideas generated would be realistic. With this perspective in mind, we wanted to provide the participants with an understanding of the general possibilities and limitations of this technology without going into details. We were unsure of the nurses´ knowledge of the technology, and therefore planned an oral presentation of capabilities and limitations of the technology, so the participants would have a common knowledge base upon which they could explore their ideas, and not restrict their thinking to technology they were familiar with. In addition, we wanted to open the participants´ thinking on how the technology could be used in more than one way. The drama instructor therefore prepared some improvisational design games for use subsequently after the presentation of technological possibilities and limitations.

Conduction of the workshop

The day started with a general introduction by DS on different ways of developing information systems and to user-centred methods in particular, followed by a presentation on possible benefits of using drama as a method for IT design. After the verbal introduction the theatre instructor led the participants and the organizers through different improvisational exercises. After the warm-up session one of the workshop organizers gave an introduction to brainstorming, and the nurses were divided into two groups of three. For each group there was a facilitator who helped the participants when needed and assisted the theatre instructor.

The two groups went to different rooms, which simulated patient rooms in a hospital. The rooms were equipped with a bed and other common furniture for such rooms. The nurses were instructed to write as many situations as they could think of from their everyday work on sticky notes and put them on the wall (figure 32). Quantity was valued over quality. They organized the sticky notes in related events, and picked one fairly complex situation where a least one person would search for, document or use clinical patient information. The initial brainstorming was individual, while the refinement of the ideas was done in the group. The brainstorming session was done in accordance with the guidelines published by Rossiter and Lilien (1994). The participants refined the situation, which became the basis for the role-play with the help of the theatre instructor and the facilitators. We asked questions based on our experience from amateur theatre: Who are the characters? What is happening? When does it happen? And where does the situation take place?

Figure 32 Nurses brainstorming on everyday work situations

The nurses divided the roles, improvised their chosen scenario, and rehearsed it a couple of times. Group 1 decided to create a role-play on a pre-round meeting between a nurse and two physicians. The pre-round meeting is an interdisciplinary meeting where the participants discuss the patients and plan the ward round. Group 2 chose a situation with a patient, a nurse and a physician on information exchange and preparations before a planned knee surgery.

After practicing their scenario all the participants were gathered, and the two groups acted out their scenario in front of the others. While one of the groups acted out, the nurses of the other group wrote down realistic incidents notes on what else could happen in the scenario.

Then the two groups acted out their scenarios once more with the "freeze!" technique. The drama instructor "froze" the people acting several times during the performance to introduce unexpected events into the play. When she "froze" a person she handed out a note on an incident such as "a medical student enters the room and asks if he can join the meeting" or "the patient starts to feel worse". The person-in-role had to improvise a reaction to the incident, and change the direction of the play if needed (figure 33).

The second part of the day was devoted to exploring ideas for possible futures. It started with a general presentation of possibilities and limitations of IT technologies expected to be available in the next five years. DS first introducing the technological concepts, and then he showed the prototyping material that had been prepared. After the technology presentation we had a few warm-up drama exercises to direct the participant's attention to start working with role-play, and to start thinking of future solutions.

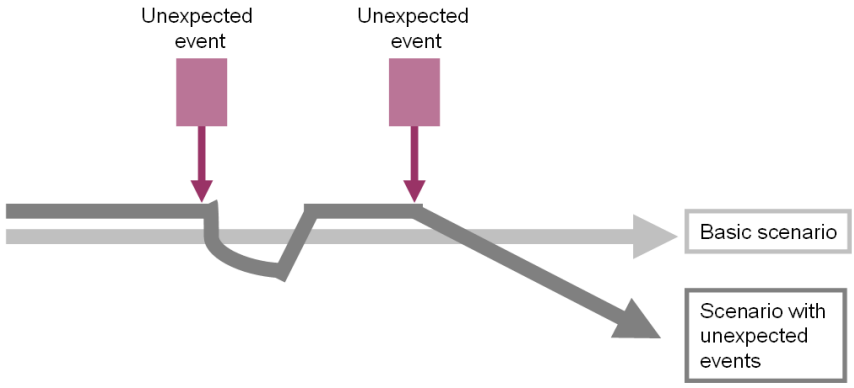

Figure 33 A schematic display of a scenario presentation without and with unexpected events

The two groups split to work on idea generation for their chosen situations, and took two different strategies for developing their ideas about needs for technology:

The pre-round meeting group sat around a table discussing what they would like to have on the screen as nurse or physician, and they sketched the screen-shots on paper sheets. After drawing the sketches they started acting out the scenario, incorporating the foam models into the play. Some of the sketches were insufficient, and the drama instructor or the facilitator (GS) asked the group to make the sketches more complete. This group worked according to the planned three-step process for idea generation (1: "develop scenario", 2: "develop ideas", and 3: "integrate ideas with scenario").

The pre-surgery group started off in another way. The group members commenced choosing a foam model each, which signified a device they would liked to use in their current work practice, if it had been available today. The facilitator (DS) asked the group to act the role-play as a reminder of the current work practice. As they began to act out their short scene a nurse started to tap on the foam model in her hand, pretending that she pushed a button to review some information. The facilitator requested the group to "freeze", and asked the nurse to sketch what she "saw" on her prototype. The nurse sketched a screen on a sheet of paper, which the group facilitator glued to the model (figure 34). Then the group continued acting until a new need appeared. This group reduced the workshop process to two steps (1: "develop scenario" and 2: "develop ideas while role-playing"). We named the latter activity *design-in-action* (figure 35), to signify that the user developed ideas in a given context, in a role, performing a given action.

Figure 34 A workshop participant sketch an imagined screen on paper. The system developer is observing the role-play

Steps in *design-in-action:*

1. Play the scenario until somebody sees a need or potential for new technology.
2. "Freeze" the scene and pick a device to fit the need
3. Sketch the imagined screen on paper and attach it to the model
4. Continue playing until next need appear

Figure 35 Description of design-in-action

After creating the low-fidelity prototypes and rehearsing the role-play, the groups showed the play for each other. As in the performance earlier in the day, the play was acted out twice, with and without unexpected events. However, when the participants were asked to write notes about unexpected events after the last performance, there was a large bias towards technological unexpected events, such as "the system breaks down", and "a message about a meeting pops up on your screen". This was criticized in the group discussion after the workshop, and we concluded that it is important to keep a record of the unexpected events from performances on current practice scenarios, and to introduce both technological-related and process-related events as disruptions in the future scenario presentation.

Finally, all the participants of the workshop, including the facilitators, observers and the camerapersons discussed the workshop in a led discussion. The realism of the scenarios was discussed and how the nurses felt about acting. The nurses were also asked to make comments on the technological solutions they had come up with, and indicate whether they would have liked to use the technologies if they had been available. DS lead the discussion.

Lessons learnt workshop 2

In this workshop we made several observations, which had consequences for the planning of the next workshop. We discovered that the nurses most of the time played their roles very naturally and did not have any problem improvising when unexpected events arose.

We discussed this as facilitators after the workshop, and came to a preliminary conclusion that nurses' work is physical by nature, which may be an explanation for the ease by which they role-played these situations. In addi-

tion, health care work is characterized by changing tasks and interruptions, and this may explain why they reacted to unexpected events without hesitation. In this workshop the drama instructor lead the participants through selected drama warm-up exercises, which may have had a positive impact on the role-playing.

The exception for the natural acting was in the pre-round meeting group, where the two nurses holding the role of physicians strongly exaggerated their acting, which resulted in a stereotypical presentation of the physicians' role. In the presentation, one nurse acted herself in the pre-round meeting scenario. Her task in the type of work situation performed is to inform the physicians about the progress of the patients, to enable necessary actions concerning further decisions on the treatment of the patients. In the scenario presentation, the nurse acting herself started to describe the progress of a particular patient. Instead of listening to her and creating a dialogue, the two nurses acting physicians ignored her and started to talk about an irrelevant event, a seminar (see illustration in figure 48, p. 159).

Our impression was that the nurses acted as stereotypical physicians because there was no physician present in the workshop, who could have created a better balance in the role-play. From this experience we learnt that is not sufficient to involve real users in role-playing workshops, but all relevant users must be represented to avoid stereotypical presentation of people in particular roles. In addition, the workshop facilitators must be aware of the pitfalls of stereotypical acting, and give specific instructions on not to overact. We found it likely that if we had given stricter instructions, the nurses might have role-played more average, typical physicians.

With respect to the prototyping material, we learnt that it served its purpose, by allowing the nurses to explore ideas for new functionality of future technology in selected scenarios. In addition, we experience that the prototypes worked well in a two-step idea creation process, where the nurses first created their scenarios, and then develop the ideas while role-playing through *design-in-action*.

4.4.3 **Workshop 3**: Exploring the Use of Drama in Another Context (Petrol Station)

The third workshop was ordered by a major Norwegian petrol company to give input to a project on learning at the workplace, and the use of electronic media for learning. The company viewed e-learning as a strategy for reduc-

ing the turnover rate among its employees, by giving the employees more enjoyable work conditions. The background and the results of the project is described in detail in (Mørch, Engen, & Åsand, 2004).

The drama instructor from workshop 2 and DS were together hired to organize the petrol station role-play workshop. This workshop was not developed as part of the thesis work, but I was allowed to be present as observer, and to report on results of importance for the thesis theme. Initially, I was given a role as a non-participatory observer in the workshop, but because of the experiences from the previous workshop, it became natural that the drama instructor and I facilitated one group together, while DS was leading the other group. The drama instructor helped with identifying and developing a scenario, while I was leading the initial brainstorming and the design-in action process.

The main participants were four young petrol station workers, who had participated in several user-centered activities in the project before the workshop day (interviews, focus group discussion). In addition, the product manager of the petrol company joined one of the groups as an active member. The core project team, consisting of two interaction designers and two organization developers, attended the workshop as observers.

The goals of the workshop were given by the e-learning project. The workshop was organized to develop ideas about how employees at petrol stations could learn about new products using mobile IT systems, primarily in situations where they did not work directly with customers. Secondly it was carried out to develop ideas about how technology could help the employee help the customer (figure 36). For me this workshop was an opportunity to observe role-play in a context not related to health informatics, with a new type of participants.

Based on the experience with the previous workshop, the petrol station workshop was planned and carried out in the same way as workshop 2, except for a few changes:

- The workshop started with a 30 minutes fieldtrip to a nearby petrol station, and one of the workshop participants explained how the station was organized.
- The participants were strictly instructed not to exaggerate while acting to avoid overacting.
- The development of the ideas for the IT systems was done by design-in-action.

- Two organizational developers were observing one group each during the group work. One of the organizational developers had to take two roles as extra, “customer” and “experienced employee”, due to the shortage of people to fill the roles in the chosen scenario.
- After the workshop an evaluation meeting was held with the project members and two external system developers. In this meeting the two external developers were shown video highlights from the workshop showing present and possible future work situations, and part of the participants’ discussion in the end of the day.

As in the previous workshop, the participants were divided into two groups. They were able to freely brainstorm around everyday situation on learning, and this resulted in the development of two scenarios on working with customers. This was originally the secondary focus of the day, but none of the participants reflected on the primary goal of the workshop, which was learning *without* customers. Except for the shift in focus from e-learning to customers, the workshop was carried out mainly as planned. One of the groups created a scenario where the customer had a petrol company bonus card, where he had registered some information about the car. When he wanted to buy oil for the car, the correct type was shown on a screen as a petrol employee swiped the card. In the current practice situation, the employee would have to look for the information in a catalogue, or call an experienced colleague.

Figure 36 Role-play from a future petrol station: A customer waiting in line is helping himself by consulting an information display (Mørch, et al., 2004, p. 147)

The other group created a situation with a self-serve machine with a large display, where the customer could seek information and make simple payment. The group believed that such a system would reduce the line in front of the cashier.

It is worth noting that one of the ideas from the workshop was developed further into a running prototype and eventually a product (Mørch, et al., 2004).

Lessons learnt workshop 3

The participants did not have any problems coming up with situations from their everyday work life and improvise scenarios. They used their personal experience to work with scenarios, and did not refer to the fieldtrip at the petrol station. They easily improvised ideas about technology through design-in-action. In the discussion concluding the day, the participants stated that they felt the ideas created would have been useful in everyday work. The suggested solutions were simple and sophisticated, and were grounded in everyday work practice experiences.

The observations of the easiness of improvisation indicate that it is not something inherent in the work of nurses that makes it easy for nurses to role-play and create ideas through role-play, but it can be applied to other contexts as well.

In the first part of the workshop the interaction designers were disappointed because none of the groups chose to work on situations without customers. However, in the final summing up discussion after the workshop it was revealed that the focus of the overall project probably had been unrealistic. For a petrol station employee the customer has first priority, learning about new products is only a secondary concern. In addition, the project team imagined that the employees could use mobile devices in the shop to learn about new products, but the workshop participants did not want portable systems. They said the systems must be wired, or they would be lost or stolen. The change of focus in this workshop supported one of our ideas behind exploring role-play as a user-centred approach: Role-play workshops with end-users have a potential for grounding a project in the users´ everyday practice.

4.4.4 **Workshop 4**: Finding a Role for System Developers in the Workshops

Workshop 4 was initiated to investigate how system developers could be involved in a participatory design method with role-play and prototyping (figure 37). Should a system developer observe the role-play as a "fly on the wall", or be given a role to play? Before workshop 4 system developers had not taken part in any workshops at all.

The setting for workshop 4 was mobile EPR in point-of-care situations. Point-of-care is here defined as close to the patient, e.g. at the bedside or other places where health care personnel and a patient interact directly. The main participants were five nurses and a physician, recruited by the Head Nurse and a former Head Physician at the Department of Cardiology at University Hospital in Trondheim.

Two graduate computer science students were hired to take part in the workshop as system developers. One had a particular interest in health informatics, and the other was about to start her professional career in an EPR company. As part of their participation the students wrote a report on the results from the day, and were interviewed about their opinions on role-play as a method in system development.

The workshop was carried out in the same way as the two previous ones, with a few exceptions:

Figure 37 Finding a role for system developers (Gemini, 2 June 2005, photo: Rune Petter Næss)

- Based on the experiences from the previous workshops we felt confident enough to take the role as drama instructors ourselves. DS and I were sharing the role-play instructions between us.
- The drama warm-up session was reduced in length.
- Each student was assigned to a group, which they observed.
- We planned that the system developers should have an observer role in the workshop, acting as a "fly on the wall" in the room where the participants developed their role-play and the prototypes. The system developers should not take part in the idea generation process.
- In our workshop agenda, we allotted the graduate students a 15-minute timeslot after the current practice and the future reality performances. We intended that the system developers should use the time slots to ask questions about whatever was unclear in the role-plays and in the idea generation processes.

When the group started working on their scenarios, it became evident that there was a need for an extra person in one of the groups. This role was given to the system developer observing that group. The computer science student was physically "put into bed" as a patient. By taking a role in the play, he became a more active member of the group than intended. From the interview following the workshop, he told that becoming a part of the play gave him a valuable understanding of the scenario, even though he lost some details of the situation because he was lying in a bed with his eyes shut most of the time.

Lessons learnt workshop 4

When planning the workshop we wanted to give the developers a 15-minute timeslot to ask questions after the performances, but as it turned out, the developers had questions during the workshops that had to be answered to enhance their understanding of the scenarios and the ideas developed. We therefore allowed the system developers to ask questions in the course of the play as long as it did not disturb the work. In short, we learnt that it was much more natural for the system developers to ask questions while they observed a concrete situation than to separate the questions from the rest of the action in the workshop. In addition, the system developers made use of the coffee and lunch breaks to talk to the health care personnel and ask for their opinions about IT systems at the hospital. The system developers found these conversations very valuable.

The system developers summarized the technological ideas from the workshop in a requirement report, which was based on observations and notes

from the workshop day. In the interview following the workshop they told that it was difficult to write the requirement document based on what they remembered from the day. The system developers thought that access to the video material would have been valuable to enable the possibility of reviewing details when memories and notes were insufficient. In the system developers´ opinion, it would have been valuable to extend the workshop by a conventional requirements meeting, where the system developers and the workshop participants could have discussed the suggestions in more detail. The main results from the system developers´ report are given in the introductory example in chapter 5. It shows that the users are able to express a number of ideas during a one-day workshop. The ideas are obviously not verified or complete, but give some ideas of the direction of possible solutions.

4.4.5 **Workshop 5**: Using Field Data as Input in the Workshop

Workshop 5 was initiated to investigate whether field data in the form of a video would be valuable for the scenario development process in the workshop. In the previous workshops, it was up to the participant to come up with scenarios quite freely. In this particular workshop we decided to limit the idea generation process to the pre-round meeting, and to introduce the workshop theme by showing a video of a pre-round meeting at the local hospital (figure 38).

The technology in focus in this workshop was mobile EPR systems for hospitals. Four nurses and a physician were recruited as participants from the Department of Cardiology at the University Hospital in Trondheim.

Figure 38 Field video was used as an introduction to workshop 5

Figure 39 Physician and nurse role-playing a pre-round meeting in workshop 5

Two graduate students in computer science were present as system developers. They had similar experience in health informatics as the students in workshop 4, and were required to write a summary of the health personnel's ideas after the workshop.

The basic workshop program from workshop 4 was followed with a few exceptions:

- After introduction to goals and methods, a 10-minute video from a pre-round meeting at the department where the participants work. The video was obtained a few days before the workshop.
- We choose to let the participants create scenarios for pre-round meetings at the hospital, and not to brainstorm freely on all types of clinical situations (figure 39).
- No drama instructor was present. We did the role-play facilitation ourselves

Lessons learnt workshop 5

When we showed the field video, one of the nurses exclaimed: "So, this is how we work!" She obviously noticed something she was not aware of because it was part of her daily routine. However, when the participants went about to develop their own scenarios of morning meetings, they did not base the role-play on the video, but on their own experiences. The participants did not refer to the videos at all in the workshop. A lesson learnt from this experience is that a field video can be valuable to create a common understanding of current practice, but in this particular case, it was not necessary for the development of the role-plays. The situation in focus, the pre-round meeting, usually takes place in a meeting room with a given number of participants. The patients in the ward set the agenda for the meeting.

Although the meeting may be disturbed for example by a nurse coming into the room and asking a question, the situation is relatively predetermined compared to many other hospital work situations. It can be speculated if video could have been more useful in a more complex situations, involving different professions in different physical locations.

4.4.6 **Evaluation Meeting** on Role-Play as System Development Method

In addition to the workshops, we organized a meeting to evaluate role-play as a system development method. After the fifth workshop seven system developers from the regional health IT organization were invited to share their opinion on the value of role-play with workshops for system development. In addition, they were asked to elaborate on how they could have used the results from a workshop as part of a requirement process, if a role-play workshop had been organized as part of one of their projects. The details on the result from this meeting are described in chapter 5, "Role-play workshops from a system developer perspective", but the main findings are briefly described here.

The meeting was divided into three sections: 1) a general presentation on role-play and low-fidelity prototyping as a method, 2) a presentation of video highlights from two of the health related workshops, and 3) a discussion on the role-play as a system development method. As part of the discussion, the participants individually filled out a short questionnaire on the utility of the method, and suggestions for other situations where role-play could be applied.

The main result from this meeting was that role-play was perceived to be a useful method for communication with users, as a supplement to conventional system development techniques. We were told that if role-play had been used in a system development process, it would have been easy to use the scenarios and some of the product ideas in for example use cases. We asked the developers for an example of how they would have created a use case, and one of the developers spontaneously wrote the use case in figure 41. The use case was based on the scenario described in figure 40, which was created in workshop 4.

Further, the system developers emphasized that giving the participants knowledge on possibilities and limitations of the technology is important to avoid science fiction solutions. We made a note of and incorporated the last point of the system developers' discussion by presenting high-level details about technological possibilities and limitations in the final workshops.

"Visitor faints in patient room – future practice scenario"

An old man, Bernt, is visiting his wife on the hospital, Elise. While they are talking, he suddenly falls to the ground. Elise pulls the alarm and a nurse arrives. When the nurse sees the man on the floor she pulls the alarm to make an additional nurse come to the room. She speaks to the person to make contact and asks Elise for his name. Another nurse arrives and both nurses try to speak to the man, calling him by his name. Finally, he wakes up, and they are able to put him into the bed. One of the nurses presses the button "physician on duty" on her PDA, to call the physician. The physician receives the message on his PDA. He talks to the nurse while quickly walking towards the patient room.

In the "current practise scenario" she would have to leave the patient to call the physician on duty.

Figure 40 Scenario developed by nurses and physician

Use Case: Nurse calls physician

Actors: Nurse + physician + room (?)

Preconditions:

1) Physician has registered that he is on duty
2) Both nurse and physican have their own PDA

Basic course of events:

1) Nurse clicks on button on PDA: "physician on duty"
2) The system identify "the PDA of the physician on duty"
3) The system presents a call on the physician´s PDA including room information
4) The physician accepts the call
5) The system create a connection (while the physician is running)
6) Nurse or physician shuts down call

Open questions:

1) How does the nurse´s PDA know where the nurse is?

Exceptions:

1) The physician has already a call on the PDA
2) The physician is busy using both hands

Figure 41 Use case description created by developers on evaluation meeting

4.4.7 **Workshop 6**: Helping System Developers to Think Creatively about New Concepts

The sixth workshop was ordered by a major Norwegian company in communication services, and was, therefore, not part of the planned work for the thesis. However, I had the role as one of two workshop facilitators in the workshop, and was allowed to report any results of interest for the thesis' theme. The second facilitator was the PhD supervisor, DS. The goal of the sixth workshop was two-folded:

1) *To develop new ideas around technological solutions of relevance for the company*, a) home entertainment in a modern family, and b) coordination of activities in a mobile family (figure 42).

2) *To create an interest in a need for and use of user-centred development methods in concept development*.

The person in the company who ordered the workshop recruited the workshop participants. Seven of the participants were employed in the company, and two were high school students in media communication. Originally, the workshop was intended for internal use with only company employees as participants. However, because of problems with creating valid role-play scenarios in workshop 1 and 2 due to a lack of representative users, we as organizers demanded that both teenagers and grown-ups had to be involved, both male and female. Due to this emphasis, one of the telecommunication company employees brought his son and one of the son's friends to the workshop.

The basic workshop program was followed with one exception:

- When the prototyping material was introduced we presented the characteristics of the technology in focus (figure 43).

Figure 42 How can technology be integrated with our homes?

Lessons learnt workshop 6

As in the previous workshops the participants were divided into two groups, working on one topic each. The participants based the role-play on experiences from their own life, and either acted themselves or took a role of a person they understood in depth. None of the participants had any problem role-playing. Even one of the technical employees who told "this was not something I would usually do", was able to act.

The idea generation process was done by design-in-action, which worked well for the idea generation. The person who ordered the workshop was surprised by how the physical context and the role-play situation formed cues for creativity in design-in-action. After the first part of the workshop with the role-play of today's situation, she did not expect the group to come up with a lot of new ideas. However, after the technological improvisation part she felt that the role-play was useful, indeed, to explore the topics.

The main lesson learnt from this workshop was that role-play as an approach can be used with a variety of different people, as long as the actors play roles they are familiar with and feel confident playing.

Network and other signals:
ADSL minimum 10 Mbit in / 2 Mbit out
IP-telephone
Cable TV
…
Wireless network in the house
WLAN b & g (11, 54 Mbit).
Other: BT, wireless control of heating system etc.
…
Elctronics
PCs: stationary and laptops
Xbox, PS2, Xbox360, PS3 with wireless controls
DVD player
Mp3 player
…
Cell phones
2G/3G phones
Integrated camera and video recorder
Integrated HDD 40 Gb, MP3 player

Figure 43 Example list of available technology

4.4.8 **Workshop 7**: Teaching Interaction Designers how to Organize Role-Playing Workshops

The last workshop was organized for teaching purposes, given as one of four workshops in connection with Yggdrasil 2005, a yearly conference for interaction designers and system developers, arranged by the Norwegian Computer Society. The goal of the workshop in relation to this thesis was to explore to what extent it was possible to teach system developers and interaction designers to use role-play and low-fidelity prototyping as a system development method. I was leading the workshop. The intention behind the organization of the workshop was to provide the participants with hands-on experience with role-playing workshop, so the participants could gain a personal experience of the approach and be able to decide themselves whether the role-play could be useful or not for own projects and organizations.

The workshop had 30 participants, who were mostly employed in industry. The participants had enrolled to the workshop by choice. Due to time restrictions, the workshop was given in a shortened form of four hours instead of seven. As workshop theme "coordination of activities in a mobile family" from workshop 6 was chosen.

Due to the large number of participants and the fact that the time was limited, some changes to the workshop format and organization were made:

- A scene area was created in the middle of the workshop room, and tables for the individual groups were aligned along the walls to give each group a work area.
- One person in each group was given the responsibility to act as facilitator, including summarizing the ideas of the group and making sure that the scenarios were complete. The group facilitators received a one-page instruction on what to include in a role-play description (such as roles, time, place and main theme).
- We did not have time to introduce unexpected events, but the concept was explained after the secondary performance part in the workshop.
- As a close-up on the workshop, all participants were asked to share their view on the day in one sentence.

Lessons learnt workshop 7

The participants worked in five groups of six and since the facilitator role was delegated, I was not able to enforce the use of "design-in-action" in the groups. Most of the groups decided to work on technological ideas sitting around the table and not improvising on the floor. Nevertheless, some elements of "design-in-action" were used as the participants told that they were stopping the idea generation try-out, spooling back to the beginning of their scenario and exploring new ideas.

We can speculate if the physical configuration of the working space for the groups influenced how they worked. In this workshops the groups were given one table each for the brainstorming work, but encouraged to use the entire space in their idea generation process. Results from research in architecture have shown that the seating arrangement in a classroom has implication for group interaction (Sommer and Olsen, 1980). It is not unlikely that the designer preferred to work in a way familiar to them, around the table, instead of using the entire physical space.

The ideas developed were presented in a role-play performance, where the interaction designers did not have any problem taking roles and performing the short scenarios. However, as the designer mainly used role-play as a tool for sharing and not for exploring ideas, the result can be more described as an *informance* than an idea creation workshop.

However, the most important lessons learnt regarding the idea generation process in this workshop is that it is necessary to have a facilitator. Delegating the task of leading the individual groups by providing written instructions is not sufficient.

4.5 Discussion: Issues of Importance for Planning and Running Role-Play Workshops with Users

The previous section described the workshops and our learning process with leading these. This section extends our experiences and lessons learnt from the workshops by analyses the workshops as a whole, with the aim of identifying and discussing issues of importance for planning and running role-play workshops with end-users.

4.5.1 Analysis of experiences and lessons learnt

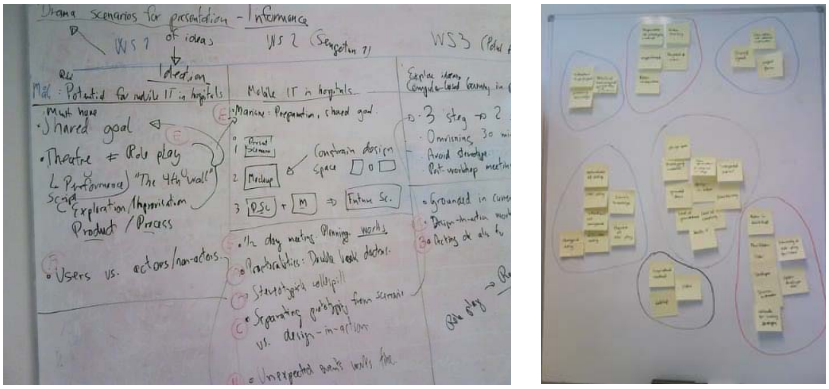

Figure 44 Categorization process

The categories of issues were identified in two iterations. First all types of experiences related to planning and running of the workshops were enlisted (figure 44). All types of experiences were noted, from "recruitment of participants" to "facilitator's role" and "prototyping material". Factors that were similar were marked on the whiteboard to build an initial categorization of important issues. Secondly, the enlisted experiences and lessons learnt were written on sticky notes. Using the categories identified from the first iteration the sticky notes were sorted again. The result of the grouping was five categories, which are described in the following sub-section.

4.5.2 Issues Identified

The analysis process resulted in the following five categories:

- Practicalities
- User role-playing
- Idea generation process
- Workshop resources
- Roles in the workshop

Practicalities

This category includes factors that are important for the practical organization of such workshops. These factors are not part of the core processes of facilitating role-playing and idea generation, but still have an impact on the running of the workshop, and therefore should be considered in the planning process. Within the category of *practicalities*, we grouped "recruitment and payment of participants", "education of co-facilitator to

ensure common goal", "choice of room and room configuration" and "preparation of prototyping material", and "video recording".

Recruitment of participants

In workshop 2 we had problems with physicians not showing up at the workshop day, and not telling that they would be absent. This caused unnecessary annoyance and disturbance in the running of the workshops. If we should have acted differently, we should have followed up all the participants before workshop 2 on the phone/personally, to ensure that they would come. In the later workshops we were not directly responsible for recruitment, but emphasized for those recruiting that it was important that those who volunteered for participation were able to be actively present in the workshop from the start to the end. We felt that this was important for smoothly running of the workshops.

Payment of participants

A related topic to recruitment of participants is payment. We decided to pay the participants, either directly or through their employer, to signify that we valued their contribution. We cannot tell from our workshops whether payment affected the recruitment or not, but in our opinion it was important to give the participants monetary compensation for their job to create a shared feeling on being there on equal terms. In the health care domain, where especially physicians and other specialists are difficult to recruit, payment may be essential for recruitment.

Number of participants

The number of participants in the workshops ranged from 5 to 30. In workshop 3 and 4, there was a shortage of participants to fill the roles in the chosen scenarios, and the roles had to be filled by observers (system developer and organizational developers). Although the developers filled their roles as extras well, it could have been an advantage to have more participants in these workshops. In workshop 7 the number of participants outnumbered the limit for what can be practically lead by one facilitator. It is impossible to estimate an "ideal" number of participants in such user-centred workshops, as the number should represent the number of people involved in the developed scenarios, which is for obvious reasons not known beforehand. In addition, facilitator resources limit the number of possible participants. However, we found it valuable to work with two groups simultaneously, as this enabled us to use the groups to give input into each others´ scenario and ideas. As a rule-of-thumb, there must be one

facilitator for each group in such workshops, and the number must correspond roughly to the problem/idea to be explored.

Education of co-facilitators

In workshop 1 we discovered that there was a discrepancy between our goal with the workshop and that of drama instructor, who was hired as co-facilitator. We desired to use drama in a rather unusual way compared to the instructor's typical work, but this was not well enough communicated to the drama instructor. In workshop 2 we therefore planned the workshop in detail together with the new instructor, to ensure that we had the same understanding of what we wanted to accomplish. Part of this planning was an educational process where we taught the instructor about our experiences from the previous workshop and the ideas about the next. This process can be considered as an important aspect of practical preparations for role-play workshops.

Preparation of prototyping material

The material for use in the workshop must be prepared in advance. The list of material may be similar to those created for paper prototyping, with heavy paper, sticky notes, various markers etc. (see e.g. Rettig, 1994). In addition, it may be necessary to create foam models or other types of models to signify future technology that fit with the workshop theme. A more extensive discussion of the role of prototyping materials follows under "Workshop resources".

Video recording

Video recording of the workshop is extremely important to reconstruct the scenarios and recall all ideas discussed. With an exception of workshop 1 and 7, which were not filmed, one or two persons were responsible for recording everything. Giving the responsibility of filming to a dedicated person was perceived as valuable, as we as workshop facilitators could focus on the group work and not on documenting the process.

User role-playing

The second category of observations from the workshops was related to user role-playing. Our main observation was that role-playing was, with some exceptions, very natural as long as the participants acted themselves, or a

role very familiar to them. The participants responded without thinking to the "unexpected events" during the performances.

Our observations were shared with other people involved in the role-play workshops. The professional drama instructor in workshop 2 and 3 was amazed by the acting skills of the participants. In the final discussion after workshop 2 she said:

> "You are all very good at improvising! You learned how to improvise very fast, probably because it is very natural for you to role-play such situations. Before the workshop, I was very anxious about how you would take improvisation. But you did this indeed, that was not a problem".

Similarly, the cameraperson who recorded workshop 2 exclaimed in the same discussion that:

> "I feel that the acting was very credible. I would really say that. When I was standing there looking through my video camera, I was thinking that it could have been a documentary film I was watching on the video screen".

In other words, we did not experience any problems of acting in most of the workshops. However, when the problems appeared, they became very salient and took the focus away from the theme of the workshop. This paradox, naturalness of acting vs. difficulties with acting, can be considered as a main issue in relation to user role-playing.

For example, in the first workshop the participants had problems acting, probably due to the lack of domain knowledge. The drama instructor gave the roles arbitrary to the health informatics participant, and neither "developers" nor "nurses" knew how to behave and express themselves. As a result, we did not learn anything new about the technology, and felt that the workshop was a failure.

Our experiences in the first role-play workshop are not unique. For example, Oulasvirta et al. (2003) wanted to use acting to encourage empathy towards users. In a design generation workshop users were working in pairs on a number of design problems. They were presented for a problem, and were asked to act out a short scripted play to get an understanding the problem, before generating possible solutions. The participants had to act some roles that were unfamiliar, e.g. a 40 year-old businessman would have to play the role of a 20-year old single woman. "In such a situation, acting seemed as

an unnecessary factor frustrating participants. This frustration was often managed by jocular overacting, very much opposite to the original goal – that is, emphasising users in action" (p. 131). Oulasvirta and associates attributed the problem of acting to a lack of training in acting in the guidance of a professional. They experienced that their participants perceived the acting as frustrating and causing costly preparations. However, they thought that acting could be more useful if the participants became more familiar with it.

To avoid the assumed problems of making users act, Howard and associates decided to use actors trained in improvisational theatre instead of actual users in their performances (Howard, Carroll, Murphy, Peck, et al., 2002). In addition, they used a theatre director to facilitate the process.

The problems of acting that we experienced in our first workshop, and similarly by Oulasvirta and associates, can be attributed to confusion between theatre and user role-play. That is, in both examples, ideas from theatre were applied to user role-play sessions. To make this point clearer, it is useful to highlight the different characteristics between *theatre* vs. *user role-play* (see table 7).

Theatre vs. role-play

In the theatre, the *performance* is central, which is well prepared. The performance is prepared for an *audience*, also called the 4th wall, which must be kept in mind by the actors and the director during preparations for and under the performances. Even thought there are exceptions, the majority of the theatre performances are *scripted*, and not improvised. *Training* of the actors is an important aspect of the theatre, as the actors must be able to play a number of different types of roles.

In contrast, in a role-playing workshop with end users, *performances* may or may not be important, depending on its aim.

Table 7 Characteristics of theatre and user role-play

Theatre	User Role-play
Focus on product (the performance)	Focus on process (scenarios and ideas)
Audience as "4th wall": must always be taken into consideration	Audience may or may not be important
Performance mostly scripted	Performance mostly improvised
Training of actors is important	Users act themselves, no need for training

Is the play used to demonstrate an idea through a performance, or as a tool for developing scenarios and design ideas? In the latter case, the process is more important than the resulting performance as such. Likewise, the *audience* may or may not play a central role, again depending on the goal of the session. The audience may be developers, designers, researchers or other users, which can interact with the user actors. However, in many cases the performance is not created to suit the audience, as it can be the result of an idea generation process. *Training* is of less importance than in the theatre, because the users take a role very familiar to them.

Problems arise the characteristics of theatre vs. user role-play are mixed, and end-users are asked to take unfamiliar roles that requires training and scripts in order to create credible performances. If it is necessary to create a role-play in which end-users will have difficulties in playing without extensive training, Howard and associates solutions of hiring professional actors and a theatre director might be wise (Howard, Carroll, Murphy, & Peck, 2002).

Stereotypical acting

In addition to the problem of acting in our first workshop, we also experienced a related problem, stereotypical acting. In workshop 2, two nurses acting physicians role-played physicians who were ignorant of the focus of the role-play situation ("the pre-round meeting"), who did not pay attention to the nurse-in-role.

I have found the work of Susan T. Fiske (Fiske, 2005, p. 37) on stereotypes relevant for this discussion. She claims that using stereotypes is a cognitive heuristics, simplifying our mental workload in interacting with the environment. People create stereotypical views of people belonging to specific categories (such as athletes, teachers scientists, user and designer), and attribute the perceived qualities to all individuals who belong to the category. Categorization of a person in a stereotype is cognitively economical as it reduces a person's information overload. It is impossible to treat every person as unique, and grouping people into categorical classes helps interaction (Fiske, 2005, p. 37). If a number of people are categorized into a group, they are perceived as very similar to each other. If you know one person in a group, all other group members are assumed to possess the same qualities. Further, stereotypical categorization helps identification when little information is available (Stangor & Schaller, 1996). When one knows that a person belongs to a specific group, the person is identified with the general perceived attributes of the group.

Although stereotypical acting can be attributed to lack of training in many situations, as suggested by Oulasvirta et al., this is not a necessary explanation for the behaviour in workshop 2, as the nurses were well aware of how an average physician behaves. The problem in this situation emphasizes a need for instructing the participant in how to avoid stereotypical acting. In other words, it emphasizes the importance of the role-play facilitator.

Idea generation process

The third category of issues is related to the idea generation process. For the second workshop we planned a three-step-process for the idea generation, (see (i), figure 45). In this workshop the process was later reduced to two, (see (ii), figure 45). In the final workshop the interaction designers did not develop the ideas for the prototypes through design-in-action, but were sitting around the table using our initial three-step-process.

Although, the three-step process worked fine for some of the nurses in the second workshop and for the interaction designers in the final workshop, we experience that the integrated approach with design-in-action revealed some ideas that we are not sure would have been developed in a discussion around the table.

Suchman´s (2007) concept of *situated action* may be useful to understand part of the idea generation process which was part of the context in design-in-action. According to Suchman, people often have plans mapped out in their head, but these must often be changed according to the situation in which they are put into use: "The term [situated action] underscores the view that every course of action depends in essential ways on its material and social circumstances. Rather than attempt to abstract action away from its circumstances and represent it as a rational plan, the approach is to study how people use their circumstances to achieve intelligent action" (Suchman, 2007, p. 70).

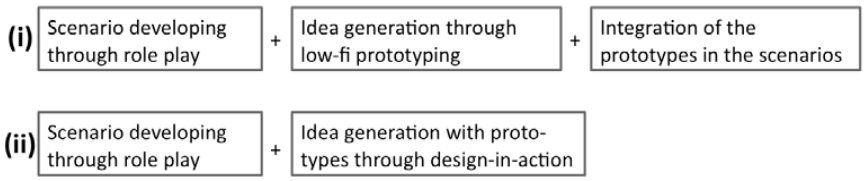

Figure 45 Idea generation processes

As an example of situated action, she describes how a man uses the canoe down a river. He might have a plan about how he will get the canoe down the falls, which can be quite specific. But while he is in the middle of the river, the plan becomes a means of getting him in the best position to use his skills, which will eventually lead him to the goal of going down the river: "your ability to act according to the plan ultimately turns on the embodied skills available to you in situ, which are themselves presupposed, rather than specified, by the plan" (Suchman, 2007, p. 72).

The introduction of "unexpected events" in the performances is an example of how our workshop participants had to change their plans in their role-play. For example, when a facilitator says "the pager is beeping" in the middle of a role-play of a pre-round meeting, the participants had to change their plan (to talk about the "patients"), and react to the interruption (look at the number and take an adequate action).

This idea generation process in our design-in-action can also be understood by the term *reflection-in-action* (Schön, 1991). According to Schön, we sometimes think about what we are doing while we are doing it. When we think in this way, we can adjust our behaviour while in action. To illustrate reflection-in-action he describes a situation named "reflective conversations with the situation." In an example of such a situation he describes how an architectural teacher and his student use sketches to reframe the task of an architectural exercise, the planning of a school. They use pen and paper to explore different possibilities and ways of thinking about the task: "Each move is a local experiment which contribute to the global experiment of reframing the problem. Some moves are resisted (the shapes cannot be made to fit the contours), while others generate new phenomena. As Quist [the teacher] reflects on the unexpected consequences and implications of his moves, he listens to the situation's back talk, forming new appreciations which guide his further moves." (Schön, 1991, p. 94)

Figure 46 describes a situation from workshop 5 which can be understood in Schön's concept of reflection-in-action. When the facilitator says "the pager is beeping!", the person acting the physician immediately reacts to the interruption by using the pager as a phone. (In a real hospital situation at the time the workshop was carried out, the physician would only see the phone number on the pager, and would be required to leave the room to call the number on the display). Then he starts thinking while still in role that maybe the beeping could be a message on a screen.

"Paging in the Pre-Round Meeting"

FACILITATOR *(interrupts the role-play)*: The physician's pager is beeping, 'beep-beep!'
PHYSICIAN *(The physician puts his hand in his pocket, acts as if he takes out a cell phone and answers)*: Excuse me, but I have to answer the call.

The audience is laughing.

PHYSICIAN *(Pretends that he puts the pager/cellular phone back into his pocket. He stands up)*: I must go to answer the phone.
PHYSICIAN *(points towards his Tablet PC)*: or maybe I get the message on my screen?

FACILITATOR: OK, what happens now? Your spontaneous reaction was that you could see it on the screen. Let us follow that reaction. The pager was beeping, and you could see it on the screen. What can you see?
PHYSICIAN: I don't really know
FACILITATOR: but…
PHYSICIAN: There is a number here. I'll call it when we are done, so we can finish the pre-round meeting first.
FACILITATOR: At the screen there is a phone number?
PHYSICIAN: Yes.
FACILITATOR: And when you see this number, you understand what the call is about?
PHYSICIAN: Yes, it's my wife. I'll call her later.

Figure 46 Paging in the pre-round meeting

The facilitator follows up on the idea, and the physician-in-role suggest that he can see the phone number on his screen, because the mock-up is available and easily available in front of him. It is part of the situation. As with Schön's example of the architectural teacher and the student, the person acting the physician has a "reflective conversation with the situation" by exploring and envisioning through which other was the paging message could have been received.

In contrast to the situations where the role-play participants used design-in-action to create ideas, the interaction designers in workshops 7 were sitting around the table creating conventional paper prototypes, which they later integrated with their role-play scenarios. There are several probable reasons for this, the first being an obvious lack of follow-up on the 30 participants, as the facilitator role was delegated to one person in each group.

Further, interaction designers have experience from working on a wide variety of problems, and it is part of a designer's job to be able to envision ideas without being "in a context". Finally, to ensure that all the participants would be able to contribute in the workshop, I choose a theme that was expected to be familiar to everyone ("The mobile family"). By choosing a theme where everyone could contribute with his or her personal experiences the need for using the context as a resource in the idea generation process was probably suppressed.

Workshop Resources

In this forth category of emerging issues in the workshops, we grouped prototyping material and instructions to participants regarding technology, physical room, and field material. In our opinion, these aspects may influence the idea generation process in role-play workshops. Choices concerning these issues should therefore be part of a planning process.

Prototyping material and instructions to participants

In our workshops we decided to present prototyping material, which signified realistic, relevant technology. The rationale behind the choice is discussed in 1.4 and 4.2.4. It is well known among designers that the form factor and the fidelity of the prototypes have an impact on idea generation. For example, Howard et al. (2002) used props, defined as physical instantiations of intended form factors, in their role-play workshops to constrain acting and push the design innovation from "science fiction" to "plausible fiction". In their view, unconstrained acting could turn into situations where little would be learnt. The prop would function as a co-actor, and be a means through which the actor could reach his/her goals. In another example, Rettig (1994) summarizes a number of problems with high-fidelity prototypes as a means to get user input. According to Rettig, users tend to focus on layout instead of conceptual ideas while asked to give feedback on high-fidelity prototypes. On the other hand, hand-made, low-fidelity prototypes force users to think about content rather then appearance, because they do not appear to be finished. The prototyping material is obviously important and must be appropriate for the goal of the session. However, the prototyping material does not only consist of the physical foam material, pens, paper, or other types of material, but also of the instructions given concerning the prototypes.

In our workshops, we wanted the participants to use the prototypes to express their information needs, and presented capabilities and limitations

of possible technology to limit their idea generation process to feasible solutions. In contrast to this approach, in a workshop conducted by DS before the PhD project (see section 4.2.4), teenagers created a number of fantasy objects. These were interesting as creative artefacts, but not very useful for the workshop initiators. To summarize, prototyping material and instructions about the material can be regarded as interconnected factors with regard to idea generation, and the determination of what to present to the participants depends on goal of the workshop, as for example to which degree it is desired that the results should be grounded in user practice or not.

Physical room

Similarly to thinking of prototyping material and instructions about the material as recourses in such workshops, the choice of room and room configurations can be considered as a part of the inspirational material. We organized the health informatics workshops in a space that resembled a clinical ward. The area was chosen on purpose, inspired by early psychological research showing that people who learned material under water would recall the material better under water than on land and vice versa (Godden & Baddeley, 1975).

The choice of a room that resembled the users´ everyday environment was also inspired by the practice by forensic crime scene investigations, where the police return to the crime scene to reconstruct the crime event, sometimes together with a suspect. The ward model in our workshops was used to give the participants cues, which would help remembering important aspects of everyday work situations. This was important in these workshops, because we wanted the ideas to be grounded in everyday practice.

In other participatory design activities, such as the Design Collaboratorium (S. Bødker & Buur, 2002), the place/room for collaborative design is arranged to support inspiration and mutual learning among project members, such as users and designers. In addition, it contained material which reminded the participants of the context in which system to be designed would be used.

Although the minimum requirements for a physical space for user role-play workshops is a place where the participants can work undisturbed, it is important to consider the degree to which the room must resemble the participants´ everyday environment, or provide a setting for inspiration.

Field material

For the particular workshops described in the thesis, the field material consisted of the guided field trip at the petrol station in workshop 3, and the film from the pre-round meeting in workshop 5. In the petrol station tour, everyone in the workshop took part, including petrol workers, observers, interaction designers, organizational developers, facilitators and drama instructor. The aim of the tour was to provide the participants with a common framework for work practice at petrol stations. As far as we observed, it did not impact on the brainstorming or the choice of scenarios. The field video in workshop 5 showed a 10 minutes sequence of a pre-round meeting. The participants did not refer to the video at any time during their work in the workshop.

A field trip or a video can have several roles in a workshop: as inspiration, as a medium for communication, as a reminder of what reality is like, and as a common framework for the participants in the session. Hindsight the conduction of the workshops it can be questioned what we did expect would happen at all by showing the video. Was it to observe if it had an impact on the realism of the scenarios or the idea generation process? In workshop 5, we did not observe any changes in the participants´ work due to the video. However, it is possible that if the work situation in focus had been more complex (e.g. involving more people in different role in different physical locations) we would have observed an impact on the realism of the scenarios or the ideas generated. However, the pre-round meeting is a rather predicable situation. Although there might be interruptions, the work is relatively trivial.

It is also possible that the lack of influence on the participants´ work could be attributed to the role the video was given in the workshop. In other uses of video in idea generation processes, the video has been used more purposefully. For example, in a project by Bødker, Nielsen and Petersen (2000), video was recorded of users who were talking to a “Wizard-of-Oz”-television. This video was used later in the project as input to the design process. Further, Newell et al. (2006) used video to communicate design ideas to, and initiate discussions on, design ideas with older adults and carers. In this session each film showing a short scenario was followed by a 20 minutes discussion. With a more purposeful use of video, such as in these examples, we would have been able to observe other types of reactions by the workshop participants.

Roles in the workshop

We identified five roles in the workshop: participant, facilitators, developer, drama instructor, observer, and support person.

Participant

In the workshops described, I choose to focus on primary end-users as the main participants. One reason for this choice is rationalized by the particular Scandinavian health informatics setting in which the thesis work was carried out. This reason is discussed in chapter 1, section 1.4. The other reason is related to the overall goal of the work: To understand the necessary conditions for using role-play workshops to involve end-users in the process of understanding user needs and exploring requirements for mobile IT. In the process of conducting and reflections on the workshops, I wanted to start simple to keep the complexity of the workshops at a manageable level to ensure that we would be able to understand and analyse the process. In such a process, it was natural to start with the primary users, because the goal was not to develop a working system but to understand important issues involved in using role-play workshops as an approach in system development. In other circumstances, it would be natural to invite much wider variations of users.

For clinical information systems, it is usual to make a distinction between primary users (clinicians using the system for diagnosis and care), and secondary users (management and researchers, using the system for quality assurance and research respectively). I these role-play workshops had been part of an ongoing development project; it would have been natural to involve secondary users in addition to primary users.

Another way of thinking of users is to distinguish between direct and indirect stakeholders (Borning, Friedman, Davis, & Lin, 2005; Friedman, Kahn., & Borning, 2006). Direct stakeholders refer to those who use the system. Indirect stakeholders refer to those who do not use the system directly, but who are affected by it (Borning, et al., 2005, p. 453).

Returning to the health informatics workshops, it could have been natural to involve indirect users such as patients and the patients´ next of kin. Although they would not be the primary users of the system, they would obviously be affected by it.

The choice of participants is important for role-play workshops, and the concepts of primary-secondary users and direct-indirect stakeholders may be useful for determining which types of participants to invite. Leaving out important stakeholders may be detrimental to the overall process. For

example, the early UTOPIA project (section 2.2.1) resulted in an extensive requirement document for the development of information system in newspaper production (Bødker, et al., 1987). The focus of the project had been on page-makeup and image processing, and the requirement document received much attention in graphic trade journals. However, the journalist's organization opposed the used of the requirements, as the journalists´ work had not been attended to in the process of the project.

Facilitator

The second role identified was the facilitator. Through the conduction of the workshops we learnt that we had to acquire a set of skills on how to lead the groups and organizing the workshops as a whole.

This particular role is discussed and reflected upon in chapter 6.

Drama instructor

Although our main experience from the conduction of the workshops was that it was natural for the participants to role-play themselves or a familiar role, there is a need for a person who leads the participants in doing this. Someone with basic knowledge of drama should have this role, but from our experience it is not necessary to hire a professional drama instructor. The skills of leading the role-plays in such workshops can be learnt and being part of the responsibility of the facilitator.

Developer

We included four students as developers in our workshops. In addition, two interaction designers and two organizational developers took part in workshop 3. From the conduction of the workshops we learnt that there are a number of roles developers might have in such processes. In workshop 4 one of the developers had to take the role as an extra, and as a result gained a particular experience of how it would be like to be part of the situation, much in the same way as in Buchenau and Suri´s use of experience prototyping (Buchenau & Suri, 2000). The other students, who observed the acting from a distance, felt that the role-play gave them an overview of the situation. This aspect is discussed in chapter 5. Finally, as will been known from the analysis in chapter 6, one of the student developers had an impact on the idea generation process. This became obvious as a result of a video analysis of the workshops. In workshop 3 the interaction designers had the responsibility of refine the participants´ ideas into prototypes, and had an observing role in the workshop.

When planning such sessions, the role of the developers should discussed, as different types of involvement would lead to different results. Should developers for example take part in the acting, to get a bodily experience of the context of use of the future system? Or should they be participants in the idea generation process but not in the role-play. There are obviously several possibilities for participation, and one should consider the different choices.

Support person

As described as part of "practicalities" under the heading of video recording, this chapter, we had one or two persons responsible for recording the workshops on video. Although this is a role almost invisible in the process, dedicating a support person to recording the process and taking care of other practical issues is very important, as it allows the facilitator and the other participants to focus on the aim of the workshop.

4.6 Summary of chapter

In this chapter, I have described the planning and the conduction of the workshops in detail. The lessons learnt in relation to this process have also been described and discussed. To identify key issues for planning and running such role-play workshops, I have analysed the lessons learnt across the workshops. This resulted in a description of five issues (practicalities, user role-playing, idea generation process, workshop resources, and roles in the workshops), which answers ***RQ 1*** of this study: *What are the important issues related to planning and running of role-play design workshops with end users?* The issues identified can be viewed as a first step to understand the necessary requirements for using role-play workshops with end users. I do not claim that this is a complete "checklist" that can be used directly for all workshops similar to those described here. However, it is a starting point for identification of important issues, and should be tested and improved in use.

Chapter 5: Role-Play Workshops as a System Developer Method

5.1 Introduction

As described in chapter 2, there has been a large diversity of rationales for using role-play in design. The justifications includes enhancing communication within the design process, helping designers deal with a growing technical complexity of new products and systems, helping designers understand users emphatically, understanding users and context of use, and involving users in the design process. These reasons are given by the authors of the different studies, and indicate why role-play can be applied in design processes. However, there have been few attempts to evaluate role-play, Strømberg and associates (2004) being an exception. In their study Strømberg and associates distributed a questionnaire to researchers and users who participated in one of their role-playing workshops. The results showed that the researchers experienced the method as "fresh and open", and useful for understanding the users' point of view. The user participants judged the role-play sessions as useful for collecting their opinions, and felt that it was entertaining to participate. To counterbalance these positive aspects of role-play, Strømberg et al. stated that acting should be voluntary, as it in their opinion was not suitable for everyone. Unfortunately, Strømberg and associates' evaluation is not comprehensive enough to help a system designer decide whether to use role-play or not in a particular project. This leaves us with the rationales of those who have organized role-play sessions as the ground for making decisions about role-play as method.

The lack of systematic evaluation studies might create a bias towards focusing on positive aspects on role-play and a lack of discussion on negative aspects. For those who would like to judge its appropriateness for a particular project, knowing what an approach is not suited for is just as important as knowing its strengths.

The purpose of this chapter is to evaluate role-play as an approach for user involvement in systems development, as seen through the eyes of potential users of the method: system developers. System developer refers here to anyone who works with IT systems, which in this chapter includes software developers, computer science students, interaction designers and organizational developers. The chapter is based on, but not limited to, "System designer assessments of role-play as a design method: A qualitative study" (Seland, 2006).

This chapter summarizes observations of and reflections by 56 potential users on role-play workshops in system development. It is based on descriptions, comments and opinions by developers, who have either participated directly in a role-playing workshop, or shared their expert

opinion on the approach as professional system developers. Most of the evaluators' comments are based on their perception on a particular workshop, and cannot stand alone as an empirical source to understand what are the important conditions for using role-play seen from a system developer perspective. However, when analysing the reflections together, it is obvious that many of the same topics appear by different people participating in separate role-playing workshops. It is the pattern of topics that emerged across people and workshops that is presented in the chapter.

The chapter addresses ***RQ 2*** in this thesis: What do system developers perceive as the strengths and limitations of such role-play workshops as a system development method?

The chapter is organized as follows: First, the summary of the requirements from four different workshop groups is presented. Then details around the methods used to study the system developers´ perspective are described. Further, the strengths and limitations are presented and reflected upon. Finally, I shortly discuss the validity of the results, and compare the findings with earlier studies on role-play.

5.2 Requirements from the Workshops

To provide the reader with an understanding of the typical requirements that a system developer would remember after a one-day workshop, I here present the aggregated results from four different groups.

As part of their job in workshop 4 and 5, the students who participated as system developers summarized the requirements that emerged in the sessions. The students observed four groups: "visitor faints in patient room", "patient has breathing problems", "pre-round meeting 1", and "pre-round meeting 2", and described the requirements by each group. Video recordings were not available for the students while they did this. They generated the requirements´ documents based on observations and notes during the workshops. As these students were not experienced developers, we cannot guarantee that they did not miss aspects of the participants´ idea generation process, but the results give a good indicator of what a novice software engineer would be able to understand.

Analysis of the students´ summaries

As the students observed different groups, I analysed the students´ list of requirements with respect to similarities and differences, to identify the type

of requirements that emerged from the workshops. After this categorization, five key categories emerged, which are described below.

1. **Choice of technical device** refers to the type of technology the participants would prefer to use. E.g. all groups preferred mobile technology such as handhelds and laptops, but some groups discussed the potential for using ID tags on patients and reasons for using or not using the patient terminal.

2. **Data functionality** refers to the type of information the participants would like to register, to be captured automatically, and to be presented on the screen. E.g. the groups "visitor faints in patient room" and "patient has breathing problems" were both working on situations where a patient would need acute care, and developed similar requirements.

3. **Communication functionality** refers to both the type of technology the participants suggested to use for communication between health care personnel, and the format by which this communication should be done. E.g. several of the groups wanted to use a handheld device to call a physician, while some of the participants also discussed that patient information could be sent to the Cardiology Department before the patient would arrive. The two groups working on scenarios in the patient room presented different needs on communication than those working on the pre-round meeting situations.

4. **Integration with other systems** refers to what systems the participant explicitly or implicitly required to be integrated, based on the ideas they worked on in the workshops. E.g. all ideas required a fully integrated EPR system, where patient information including test results would be available.

5. **Interaction style** refers to the preferred navigation style by the participants. E.g. a wide variety of interactions styles were discussed, from menus, speech, scanning of patient bar codes and using knowledge of where a patient is in a treatment process to display the most likely information.

6. **Organization of information in the interface** refers to how the information should be presented to the users. E.g. all groups desired to see the patient information in two different information levels. The first level would provide the users with an overview of

important aspects concerning the patient, while the second level would provide detailed data.

With this list I do not claim that these are the only types of requirements that would be developed in role-play workshops, as other types would results from other workshops organized around other themes, with different types of participants. However, the list shows that a wide of factors emerged in the process, which would have been relevant user input in a system development process.

5.3 Method

To understand how system developers perceived role-play as a system development approach, I gathered data via a range of methods, with a number of different people. Section 5.2.1 gives an overview of the developers who gave their input to this part of the study, and section 5.2.2 provides a description of the specific research methods used.

5.3.1 Description of the System Developers

An overview of the people who shared their opinion on the workshops is given in table 8. In this table an *observer* is a person who was present at a workshop, watching all groups. A *participatory observer* was following one particular group. An *external* had knowledge of the workshops from video highlights, and a *participant* was taking active part in a workshop by being included in the role-play. In total, there were 2 observers, 7 participant observers, 9 externals and 40 participants.

5.3.2 Evaluation Methods

The workshops were evaluated by different qualitative methods. See table 9 for an overview.

The group discussions, interviews and meetings were semi-structured. Before the evaluation sessions we prepared a set of themes and questions, which were covered. However, the questions were not asked in a strict order.

Table 8 Overview of number of evaluators, professional roles, workshop number, and workshop roles

Work-shop nr.	Professional role	N	Workshop role
2	Organizational dev. in health IT org.	1	Part. observer
3	Organizational dev. in oil and gas company	2	Part. observer
3	Interaction researchers in media company	2	Observer
3	Product responsible in oil and gas company	1	Participant
3	System developers in oil and gas company	2	External, video
4	Graduate computer science students	2	Part. observer
5	Graduate computer science students	2	Part. observer
1,2,4,5	System dev. in health IT organization	7	External, video
6	System dev. in tele communication org.	7	Participant
6	High school students studying media com.	2	Participant
7	Interaction designers at Yggdrasil 05	30	Participant

In addition to the questions prepared in advance, interesting topics that emerged in the discussions were followed up on, regardless if the themes were on the original list of topics or not.

In all the discussions, we encouraged all the participants to share their opinions on the different topics. Follow-up questions were asked to clarify the participants' beliefs. Except for the discussions during the first workshop, all workshops, discussions and interviews were recorded on video, transcribed and analysed. The details of different methods are described in the next sections.

Table 9 Evaluation methods used in the different workshops. Focused discussions were conducted after every workshop, but questionnaires were not distributed before workshop 4. Similarly, some of the other techniques were only carried out in workshop 3, 4 and 5.

Evaluation method	Workshop						
	1	2	3	4	5	6	7
Focused discussion with participants	●	●	●	●	●	●	●
Questionnaire with open questions				●	●	●	
Observation of project meeting			●				
Semi-structured interviews				●	●		
Free writing about role-play				●	●		
Evaluation meeting with health IT developers		General discussion					

5.3.3 Questionnaires with Open Questions and Focused Discussions with Workshop Participants

After every workshop there was a 30 minute-discussion with everyone involved in the workshop, including participants, system developers and observers. The questions for the first five workshops were focused around the following themes: a) were the enacted scenarios realistic?, b) were the proposed solutions useful?, and c) to what extent would the participants have liked to use the proposed solutions, if they had been available as products?

As an extension of the group discussion, we distributed a questionnaire with open questions before the final discussion in workshop 4, 5 and 6. The rationale behind the questionnaire was to help the participants start thinking independently about the discussion topics, and provide them with an opportunity to write ideas that might not be shared in the group discussion. For workshop 4 and 5 the questionnaires contained three questions on each of the main discussion themes, as well as a few questions on a) what have you learnt about technological opportunities by participating in the workshop?, b) can you suggest other types of situations where IT could be useful?, and c) can you use what you have learnt today if you were invited to take part in a development project on mobile IT?. Besides, there was a question about d) what the participants had learnt in the workshop and a question on e), how they felt participating in the workshop.

Workshop 6 was carried out in a telecommunication company, with mostly developers as participants. The questions in this workshop were centred on a) how the system developers felt about acting out roles and improvising ideas about future technology, and b) their views of strengths and limitations about this way of working, and c) how they could imagine the use of role-play in their organization.

Workshop 7 was carried out in a tutorial at a Norwegian conference for interaction designers. Due to the large number of participants in this workshop (N = 30), the participants were asked to give a short comment each on what they felt was useful or not about role-play as a system development method. The evaluation was the final part of the workshop, and all comments were written down. The participants in this workshop were interaction designers.

5.3.4 Observation of Project Meeting

Workshop 3 was part of a project on learning at the workplace for petrol station employees. After the end of this workshop there was a two-hours meeting addressing the direction for the overall project. In this meeting the organization developers and the interaction designers who had taken part in the workshop were present, in addition to two external system developers who were about to be involved in the project. I was present as an observer at the meeting, and was allowed to use any results of interest for the purpose of this thesis. This included discussions about role-play as a method.

5.3.5 Semi-Structured Interviews

The graduate computer students holding the roles as system developers in workshop 4 and 5 were interviewed shortly after the workshops they had taken part in. Two and two students participated in the same workshop, and were interviewed together. The interviews lasted about 30 minutes and the questions were constructed around four main themes: a) the usefulness of role-play for understanding the context of use, b) how role-play and low-fidelity prototyping can be suitable for creating a common understanding between system developers and users, c) a judgment of the proposed solutions created by the participants, and d) how this type of method could be integrated into a system development process.

5.2.6 Free-Writing on Role-Play

As part of the graduate students' tasks of observing workshop 4 and 5 as system developers, they were asked to write a requirements draft document based on the workshop participants' solutions (see section 5.2). In addition to summarizing the requirements, the students wrote a page on their view of strengths, limitations and applicability of the workshop as a requirement engineering method. This free writing gave the students an opportunity to share their opinion on the method based on what they judged as important.

5.2.7 Evaluation Meeting with System Developers in IT Department in Local Health Care Organization

After the 5th workshop I organized an evaluation meeting with seven employees in the IT department of the University Hospital in Trondheim. The meeting started with an introduction to role-play and a presentation of some video highlights from workshop 2-5. Then a discussion followed, which was centred on a) strengths and weaknesses of role-play with low-fidelity prototyping as a system development method, b) value and relevance of the method for their work, and c) how to proceed after a role-play workshop if such an approach had been used in a system development project.

The meeting was extended by a two-page questionnaire with open questions. The questionnaire was created to reveal some of the perceptions about role-play, which would not be shared in a group discussion. The questionnaire was handed out after the final part of the discussion, when the developers more fully understood what role-play workshops with end-users was about. The questionnaire contained questions on a) how drama can contribute within a system development process, b) in what system development phases is role-play perceived to be useful, c) what type of methods role-play should be supplemented with, and d) what problems were they concerned about with the use of role-play as a system development method.

5.3 Analysis of the system developers´ perspectives

With the exception of the discussion in workshop 7, where the interaction designers gave one comment each on role-play as a system development approach, all discussions, interviews and meetings were video recorded and analysed. In workshop 7 the comments were documented on paper. The video material was transcribed, and this material was, together with the results from the questionnaires and the students´ free writing analysed with the application Atlas.ti.

The coding of the transcribed text was done in tree iterations. The first coding was data-driven, based on themes that emerged in the text. However, to start the analysis one predefined code, or main word, METHOD, was used to code all quotes on use of role-play as a system development method. The main word was combined with a few words from the quote to capture the meaning of the term as intended by the person who had shared his/her meaning. As new themes emerged, each was given a descriptive main code word combined with a few words from the quote that described the theme.

After the first analysis, the code fragments were checked for consistency, to ensure that the codes were used in the same way in the different texts. If different codes had been used to describe the same theme, the most descriptive term was chosen. In the third iteration, the quotes were organized according to the research question presented in this chapter. In the same iteration, additional code words related to HCI or system development concepts were attached to the quotes if appropriate.

5.4 Themes Discussed

During the evaluation sessions several aspects of role-play were discussed. The results reported in this thesis are a selection of themes that give insight into strengths, limitations and applicability of role-play workshops as perceived by the majority of the people who gave their input to this study. In other words, the focus has been on themes that emerged repeatedly by different types of people across several workshops. An overview of topics emerged is given below. The number of times each topic was discussed is written in parenthesis.

- Premises for use of role-play as system development method (56)
- Improved understanding of present and future context of use (28)
- Active and creative user impact in early system development phases (19)
- System requirements, confirmation of and guidance on project direction (17)
- Reflections on solutions proposed in the role-plays (13)
- Improved user-developer communication and common understanding of problems (10)
- Understanding of technological possibilities and the future role of technology (7)

As the list of is a result of both lead and open discussions the number obviously does not indicate that one topic was considered as more important than another, but is provided as background information for the next sections, which describes the findings in more detail.

5.4.1 Strengths of Role-Play as a System Development Method

The results from the analysis show that the main strengths of role-play as a method are related to the situated and the performance aspects of the approach. Many ideas developed in the workshops because the participants found themselves in a physical situation where they discovered that they needed some information that is not currently available. These were related to ideas that the participants got as a result of being in a role, as a way to enabling users to be active by expressing their ideas by showing and acting, and as a means for providing the developers of a better understanding of the context of use.

To get new ideas that would have been difficult to obtain in other ways

This theme refers to ideas that evolved in the role-plays as a response to the information needs that became evident from the scenarios played. In the workshops where we used design-in-action as an idea generation approach, the development of ideas about information needs and potential uses of technology seemed effortless. The ideas came naturally while they worked through the role-plays.

One of the system developers working in the telecommunication company described the ease with which she came up with new ideas during the role-play in workshop 6. When her group had developed their current practice scenario she thought they would not come up with any new ideas about future technology because of their scenario choice. However, when she found herself in the middle of the role-playing situation with prototyping materials in her hand, she felt that the concrete situation helped her in the idea generation process:

> "I experienced that I got a lot of ideas when I had the foam block in my hands and was drawing. The reason for this was that I was part of a concrete situation [in the role-play], which I could identify with from my everyday life. I do not think that I would have been able to create the same thing by just sitting at a table and doing it."
>
> *System developer in telecommunication company, participant, workshop 6*

Another example of this design-in-action is from a workshop when a nurse holding the role as a physician was about to examine the knee of a "patient". To examine the knee she needed two free hands, and she therefore put her PDA in her pocket. However, within 2 seconds she removed from the pocket and put it on the table beside the patient. Clearly the situation she found herself in acted as a trigger for the movement. The pocket was not the right place to leave the PDA. If she had been in a different situation, e.g. in a requirements meeting discussing the appropriate size of a handheld

computer, she would probably not have envisioned where she would have put the PDA in a point-of-care situation.

Two of the graduate students, who held the roles as system developers in workshop 4, reflected on this apparently unproblematic way of creating ideas in the situations. They felt that the users, who described possible solutions based on their knowledge of everyday work, carried out much of the system developer job. The users came with suggestions and ideas, and did not depend on developers to react on their proposals.

Enabling users to be active

A second theme, which emerged repeatedly in discussions with the graduate computer sciences students and the system developers in both the IT department of the health care organization, and developers in the tele-communication organization, was that role-play seemed suitable to involve users actively in the idea generation process. One of the system developers in the evaluation meeting even used words as "forcing the users to contribute" to describe the impact of the method. The graduate computer science students explained that the active idea generation by the users was useful for several reasons. Firstly, it was useful to see how the users reacted in different situations, and secondly it was valuable to watch what type of situations they would like new technology, and what type of situations it was not desired.

> "I think it would have been very useful to do an observation study at a hospital. But then you do not have the opportunity to 'freeze' a situation in the same way we did with the role-play and ask 'what information are you interested in now'? I felt that was very useful. In addition, the participants were encouraged to think 'what information would have been useful in this situation'? The participants themselves stopped the play and said 'now, I need some particular information'.
>
> In my opinion, it was useful to see how they reacted in different situations, and to see what type of system they wanted. In some situations, they wanted some information, when we as system developers did not think they needed it. Other times we thought that they wanted some information, but it was not necessary, because what they needed to know was something they could ask another nurse about."
>
> *Graduate computer science student, participative observer, workshop 4*

Understanding context of use

One topic that came up numerous times in the analysis, was that the workshop enhanced the developers´ understanding of the context of use. For example, a person who was engaged to documenting workshop 4 and 5 on video said that he was surprised by how modern hospitals are when he was watching the current practice role-plays. On of the graduate computer science students, how took the role of a patient in workshop 4 said the acting gave him insight into physicians' and nurses' work situation. And an interaction researcher, who was present as observer in workshop 3, felt that his understanding of the concept of learning at the workplace changed during the role-plays because he more fully understood what the petrol station employees' work was about:

> "I think the workshop worked very well. Initially, I had some other thoughts about learning, but the focus changed a little during the workshop. And I feel that the change was justified. Learning is probably not the primary activity [for the petrol station employees], but more a secondary activity, which happens because something else [customer service] is working better. And I had not considered the situation where the petrol station employee had the juggle of several customers at once as important".
>
> *Interaction researcher, observer, workshop 3*

The main reason for this understanding, as described by one of the graduate students, is that besides listening to the workshop participants' stories on everyday work, they physically showed how they work:

> "Yes, I have at least learnt something about what it is like to work in a hospital. I did not know all this. When one of the nurses says "then we'll give some Nitro", then I think "well, well…" In my opinion this method is very good because it combines showing and demonstrations with explanation of how things are. This makes it easier to understand what they are trying to say".
>
> *Graduate computer science student, participative observer, workshop 4*

The graduate computer science students had little knowledge of hospital work before the workshop. She did not personally have a role in the role-play, but was allowed to ask questions when she did not understand what happened. She emphasized that demonstrating helped understanding:

> "Watching health personnel ´working together´, even though fictitious, makes you think about things you previously have not considered".

Fast overview of theme

A related topic to understanding the context of use, is a *fast overview* of a relevant aspects of the context of use. One of the developers from workshop 6 stated that role-play and low-fidelity prototyping is useful when the design team do not know a lot about a theme:

> "The thing that characterizes my feelings after this workshop is that is a fast method for getting an overview of a theme. It is an advanced SWOT-analysis in a way, but the form is different. What characterizes this method is that you can get rapid answers on topics you don't know much about. And it happens in an enjoying way. But it requires that the participants are fully present in the workshop. It is not possible to be a passive partner in such a workshop, and that is a very nice thing as well".
>
> *System developer in telecommunication company, participant, workshop 6*

SWOT is an acronym for Strengths, Weaknesses, Opportunities and Threats, and is a method suitable for assessing a strategy, project etc. In early phases of a project it is important to get an overview of the problem domain and not to limit the idea generation. According to the developers, the focus on the particular scenarios helped the developers with getting a first impression of a theme and of the possible design space.

Creating a focus in a project

Since only one of the workshops (WS 3) was part of a specific project, the next issue was only discussed in this workshop. However, it is included in this chapter because it literally changed the direction of the project. In the workshop with the petrol station employees, we experienced that the project team changed their concept of learning during the day. Before the workshop, the project group had difficulties finding the right direction for their project. The project members had a vague notion about how mobile technology could be useful to stimulate the employees' learning process. However, the concept of learning at the workplace was diffuse. By working with meaningful, everyday situations and mock-ups in the workshop the project became more robust. The project members learnt to understand what learning means to their employees by watching the role-plays and the suggested solutions. They valued the needs that the participants sketched as particularly valuable because they made the project ideas specific. This made the project ready for further exploration in the project:

> "I am very satisfied, because I feel that we have got a lot of ideas to elaborate. Things have been diffuse. We have not known what direction the project should take, but now everything is much more concrete. And if we

are able to implement a few of the ideas from this workshop, then the work for our employees will become much easier".

Organizational developer, participative observer, workshop 3

Establishing a good group process

The graduate students, the system developers in workshop 6, and the interaction designers in workshop 7 perceived working together as a team in a role-playing workshop as valuable for two main reasons:

The first reason is related to role-play as play. As the participants were playing with scenarios and possible solutions, they got to know each other in a way differently from how they would have become acquainted by talking about use situations and possible functionality. One of the graduate students got the role as an extra in one of the groups in workshop 4, and got a more active role in the play compared to his fellow students. In his role he was lying in a bed, and a physician and two nurses participating in the play 'worked on' figuring out who he was, and why he had fainted. Being physically part of the play was perceived as useful for understanding the health care professionals' work situation, and he said that having a particular role in the workshop helped him to get to know the users in a positive way.

"I think this way of working may help to create a positive work atmosphere for further work, because we get to know each other in a positive way by having acted together and almost playing together. When you have taken part in a one-day workshop like this… if I had met Gunnar [one of the workshop participants] at Elgeseter Street in Trondheim, then we would probably have started to talk together".

Graduate computer science student, participative observer, workshop 5

The student system developer quoted above further told that if he had been a user representative in an IT project, and the IT organization had suggested to use role-play as a start of a project, he would have developed a positive attitude towards the company. This is because the firm proved itself to try to understand their users and to establish a good group process.

The second reason why role-play and low-fidelity prototyping was perceived as useful for creating a good group process is related to how envisioning solutions and concepts through acting helped creating a common

understanding of the task at hand. This topic was discussed in every single workshop. For instance, one of the developers in the evaluation meeting reflected on problems on communicating with users. She told that in one project the users required the solution to be wireless, and the development team worked hard to explore different wireless solutions. When the design team presented the possible solutions, the users said that there was no need for wireless technology. In fact it did not matter for them if the product had a wire or not. The point of her story was that often developers think they talk about the same as the users, but in reality they talk about different things.

> "[The method is useful] to create a common understanding of a problem or solution: You think that you talk about the same thing in a project, but in reality you talk about different things".
>
> *Interaction designer, participant, workshop 7*

Creating a common understanding of the task at hand is a prerequisite for a good group process, and role-play and low-fidelity prototyping was perceived as useful to create this understanding.

5.4.3 Limitations of Role-Play

Most of the limitations of role-play as a system development method emerged in the evaluation meeting with the health IT developers, because the subject was brought up for discussion particularly in this meeting. However, the comments about problematic aspects of using role-play, which where discussed in the meeting, were supported by my observations of the participants in the different workshops, and by short comments in the focused discussions at the end of each workshop.

Role-play with low-fidelity prototyping must be supplemented by other system development methods

The first problem the developers noted is that role-play workshops perhaps create more questions than answers. When the graduate students worked on creating requirement documents based on the workshop results, they felt that many of their questions were unanswered. Further, when the organizations developers, the interaction researchers and the system developers started to discuss the workshop solutions in the meeting after workshop 3, they began to question the validity of the results. The question that came up was that the participants had perhaps used too little time on

working on idea generation and creating alternatives. In this workshop the participants worked approximately one hour with creating suggestions for solutions after they having developed the current practice scenario.

In the evaluation meeting with the developers from the health IT company, this theme was brought up as a topic. One of the developers in this evaluation meeting explained what he perceived as the problem with using role-play as a method: Role-play gives some instances, some needs and possible solutions, but in his opinion to create a system there is a need for methods with a system perspective.

> "I think it is a great start for a project, but I don't think it is sufficient. I do not think we can stop using conventional methods. The reason for this is that if you think of the system, you must specify what the system needs to know. You need to describe what information the system must present in the user interface, and what input the system needs. You should not think person, but system. And if you start to think about the system, questions like 'where is the nurse'? comes up, which has not been discussed in the workshop."
>
> *System developer in health organization, evaluation meeting*

It was never the intention behind the thesis work that role-play should replace established system development methods. The idea was that role-play could be an alternative to more verbal approaches such as interviews and focus groups, in projects where the users worked with ideas of need for mobile technology. However, when I asked the system developers to share their opinion on the approach, the factors referred above emerged.

Danger of losing overview of system

A second topic which particularly emerged among the IT professionals is related to the fact that only a few scenarios can be elaborated in a workshop, and going into depth in the scenarios forgetting the outside world will make the developer lose the overview of the system. According to the developers, there are always some premises and consequences for a system. And these must be considered when developing new solutions.

> "Danger of losing the overview of all relevant types of situations in the requirement process"

> "Danger of losing some premises, input, foundation and general objective"

> "Difficult to use the method to explore premises and consequences in depth"
>
> *Comments on questionnaire filled in at the end of the evaluation meeting with the system developers in the health IT organization*

Similarly to the fact that the idea behind understanding role-play as a method was never intended to replace all other methods, it was neither thought of as a method through which it would be possible to specify all requirements for a system.

Similarly to the point that role-play should be supplemented with other methods, this danger with loosing overview of the system is connected to what this approach can give and not. From a system developer point of view, it gives a perspective, but is not suited to get an overview of the system requirements given a larger system development context.

Danger of believing that role-play is reality

The last topic described in this chapter was only discussed in relation to one of the first workshops we organized, but the person who came up with the topic felt that this was a serious problem and was very frustrated about it. The problem might be relevant for others using role-play with low-fidelity prototyping, so it is given a little space in this chapter.

An organizational developer who observed workshop 2 felt that the future role-play created by the nurses did not reflect the future. He stated that role-plays were glorifications of reality. In his eyes it seemed like the new technology would help the health personnel to work more efficiently in a role-play, but in his view the reality may be completely different.

Believing that role-play is reality was never discussed as a problem in the other workshops, but I observed that some of the organizational developers in workshop 3 had almost overwhelmingly positive comments on the participants' suggested solutions. They were very content about the project finally beginning to get a direction. This might indicate that the organization developer in workshop 2 had a point: There is a danger with using role-play as a system development method if one does not remember that the role-play is a possible future and not actual reality. However, in reality this will probably not be a problem. For example, after workshop 3, the project team started an iterative development process based on some of the ideas from the workshop (Mørch, et al., 2004). In this process a prototype was made and tested on petrol stations. By testing the ideas eventual "glorifications of the future" disappears, if they are not in accordance with the reality.

5.5 Discussion

In this chapter, I have presented various topics that emerged through a wide variety of methods on strengths and limitations of role-play workshop as a system development method. The results show that the developers perceived role-play to be a particularly useful method for developing ideas which would otherwise be difficult to capture, for enhancing active user involvement, and for helping developers understand the context of use. The method was perceived as mainly useful in early development phases, for fast idea creation, for creating a focus in a project, and for establishing a good group process. Further, the developers pointed out that role-play must be supplemented with other methods, because of the lack of system perspective. Similarly, the developers felt that it was not suited for creating an overview of a system in a system development context, as it only provides the users´ perspective without, taking system development premises into account. Finally, one of the organizational developers thought it was a danger of thinking that the role-play is the reality, and not an ideal reality.

5.5.1 Validity of the Assessment

As the findings of this study emerged through a combination of data from different methods, it is important to question its validity. Would the system developers have judged the same strengths and limitations as were presented here, if they had gained experience with using role-play over time in one or several real projects? Were the people who gave input to my questions representative of the population of possible users, which includes all potential users?

To answer the second question first, the people who discussed and shared their opinions on the workshop approach as a system development method had a diverse background ranging from graduate students in computer science to system developers in a health care organization. We have no control of the professional background of the people who contributed to the empirical material in this chapter. However, I would argue that everyone who shared their perception of the method were possible users of the method, and therefore qualified to evaluate the approach. Both the graduate students in workshop 4 and 5 and the interaction designers in workshop 7 might use role-play workshops in the future, and their perception of advantages and limitations of role-play as a system development method can therefore be considered to be valid.

The first question, are the system developers' first impression of the method the same as would have emerged with use of role-play several times across different projects, can only be settled with long term use of role-play in organizations. By gaining experiences with role-play over time, it is possible to study to which degree the system developers´ view is still valid, or if other factors become more conspicuous.

5.5.2 Relating the Results to Previous Studies on Role-Play

By comparing the results in this study to other authors' rationales for using role-play as a method, one sees that several of the strengths have been described before.

For example, *developing ideas in context* is pointed out in a number of studies, strongly indicating that this is one of the major strengths of role-play as a method. For example, Brandt and Grunnet (2000) explained how the design team created "frozen images" with their body, corresponding to snapshots of user acts. The physical expression by the designers allowed a physical interpretation of the users´ work, in addition to intellectual interpretations. In this study, the designers´ bodies became the context for idea generation. Further, in *Situative and Participative Enactments of Scenarios* a developer shadows a user, who carries a "magic device" (Iacucci, et al., 2002). This device is a representation of future technology. When the user experiences an idea for the use of the "magic device", this is shared with the developer, who gains an insight into both the situation in which the device might be used, and the purpose of its use. Urnes et al. (2002) provided users with a dollhouse, through which they could imagine and explore ideas for future use of technology, by imagining that they were in the house. They physical model of the dollhouse provided a shared understanding of the participants´ imagined future home, and this insight was perceived as useful by the design team. These studies show that role-play has been regarded as useful for creating different types of context, through which ideas can be explored.

Further, *enhance active user involvement* has also been described as a rationale for using role-play by many authors. For example, Binder (1999) claimed the users often are involved in design projects at the designers´ premises. Users are invited to user activities at the designers´ location, where they deprived of their usual context. To enhance user involvement Binder therefore invited users to improvise with design ideas in their own setting, and the improvised acting was captured on video. The videos were

regarded as design artefacts, which were reused in later workshops. In the thesis work I did not go as far a carrying out the workshops in the participants´ setting, but I aiming at providing the users with a setting where they would be able to express their thoughts actively. The health care related workshops were conducted in a 1:1 model of a hospital ward. The other workshops were carried out in spacious meeting room, where we use props (tables, chairs etc.) to recreate aspects of the users´ environment. However, the term of active involvement was obviously not only connected to the setting in which the workshops took place. As in Binder's example, where the users improvised use situations, we asked our participants to act out roles and show what they would do instead of describing it by words. By reducing the complexity of the system to the idea of using it in a specific scenario, we invite to thinking concretely about the system while being in roles. This is probably easier for most people than thinking of the system as a whole, and active participation becomes easier.

A factor that was discussed numerous times by the developers in this evaluation was the *understanding the context of use*. This factor has been pointed out by a few authors as a reason for introducing role-play, but has not been a large focus in most studies. For example, Buchenau and Suri (2000) worked on how designers could understand important contextual aspects of design, such as physical, social and cognitive issues. In their research, designers role-played a set of user situations to *experience* these. Simsarian suggest a number of way role can be used to understand the context of use, such walking through situations to find a focus, and re-create observations from the field. Although it has been brought up in earlier use of role-play, it has not been brought up as a theme to the same degree as by our developers.

Besides, our workshop evaluators perceived role-play as useful for *fast idea creation*. The aspect of *fast* idea creation has not been in focus in many studies, but if creativity is considered to be a related concept, it has been in focus of more authors. Bødker et al. (2000) for example asked users to "talk to your [interactive] TV" to gather creative ideas of what a TV could be used for. And Urnes et al. (2002) used a dollhouse of a "smart home" to enhance the creativity of users, by allowing the users to act out a day in their life using small dolls in the dollhouse, and reflect on the ideas by stepping out of the simulation.

The value of role-play to enhance the group process is not discussed to a great extent in the literature, with the exception of a researcher who has uttered that role-play is useful for creating a focus around the design task and to create a shared focus for the design team (Simsarian, 2003). This

result may indicate that other researchers on role-play underestimate the value of using role-play as a means to start a process. Alternatively it may indicate that it is considered as a matter of course and not worth mentioning.

When looking at limitations on role-play as a method, this has not been a focus in the literature. There are some exceptions, such as Stömberg et al, who stated, “technical features cannot be discussed in detail using this technique [role-play]”. This is a problem in the literature, and the identified problems in this study should be confirmed by other studies on role-play. When describing role-play as a method it is important to consider limitations of the method as well as strengths, to help interaction designers and system developers in deciding whether or not to use role-play in a particular project.

Chapter 6: Reflections on Role-Play Design Workshop Facilitation

6.1 Introduction

As discussed in the previous chapter, role-play as a method has a great potential to add value to IT system and product development. However, role-play is currently not a common part of system development practices. Why do not system developers use role-play as a method?

There may be several answers to this question, including cost concerns and lack of knowledge about the method. However, one key reason is probably tied to the role-play facilitator's jobs. Similarly to other user-centred methods, which are dependent on leadership, a role-play session is not done by itself. It must be directed and facilitated, and the skills necessary to do this job must be learnt. In this chapter the role-play "facilitator" is defined as the person or the people who are in charge of both leading role-playing and facilitating the idea generation process. A facilitator may have a large impact on the validity and the reliability of the scenarios and the outcomes of a role-play workshop. Thus leadership is critical.

When we first presented our lessons learnt on role-play as a system development method, we concluded that leading a role-play workshop is a relatively straightforward task (Svanæs & Seland, 2004). We believed that facilitating role-play design workshops was something everybody can learn; just as paper prototyping and usability testing can be learnt. However, in that conclusion, we might have been biased by our previous experience with role-play. One of the facilitators (DS) had been a member of an amateur theatre group for several years before the initiation of the workshop. In addition, he had a prior interest in psychodrama. The other facilitator (GS) had participated in several larger school theatre projects in her childhood. Both facilitators had built up knowledge on role-play over years, and this kind of understanding is not easy to grasp for someone unfamiliar with role-play. After our initial workshops we felt that it was very easy to make our role-play workshop participants enact everyday scenarios. Unfortunately this might not be the rule in every project.

In some of the studies reviewed in chapter 2, the problem of leading role-play workshops is recognized to a certain degree (Oulasvirta, et al., 2003; Strömberg, et al., 2004). However, explicit discussions about the facilitator's roles are lacking. Oulasvirta and associates (2003) write that "acting out was observed to be frustrating and causing costly preparations. It was speculated, however, that acting could be useful in the long run when participants can get used to the method" (, p. 132). Similarly, Strømberg et al. (2004) described how "none of the users were enthusiastic about acting, so we ended up just talking the scenario through" (p. 204). In our first

workshop, *exploring the use of PDAs in hospitals,* we discovered that we as academics had problems acting health care personnel. As a solution to the problem of making people role-play, we hired an external theatre instructor to lead the drama in our first workshops. Similarly, Rodriquez et al. (2006) stated that "practising and managing a role-play session was seen as a critical step both for facilitators and participants who did not have previous experience with these kind of activities. Therefore, the assistance of a role-play facilitator was requested for the development of the performance session" (p. 974). The facilitation of the creative session is no less demanding than the role-play part. As Oulasvirta et al. (2003) stress: It is important to have a skilful leader, who is "able to probe participants to discuss how design ideas would work in the observable context" (p. 133).

However, how should a facilitator assist users, actors or designers to develop and act out scenarios? In what way should the facilitator work in helping the users to develop and evaluate ideas about technology? Are there any general frameworks or guidelines that can assist the facilitator in the work? These questions are at the core of this chapter, which is devoted to discuss and reflect on the two roles of the facilitator: 1) To help the participants develop and act out scenarios, and 2) to facilitate the creative idea generation process. Our own experiences as role-play workshop organisers and facilitators create the empirical basis for the reflections.

In particular, this chapter is centred on **RQ 3:** What is the role of the workshop facilitator in such role-play workshops?

To understand our experiences with the role-play part of the facilitator's role, I have found it useful to introduce a framework for role-play conduction developed by the psychologist Yardley-Matwiejczuk (1997). Yardley-Matwiejczuk developed a conceptual framework based on an extensive review of different uses and discussions on role-play in research, education and therapy. To my knowledge there are no other theoretical frameworks at the same conceptual level. In her analysis, Yardley-Matwiejczuk defines role-play with a set of 8 characteristics, and provides three important principles for conduction of role-play sessions. The framework is broad and can be applied to many settings, but has previously not been applied to role-play workshops for design.

I start this chapter with a general presentation of the Yardley-Matwiejczuk framework before making some reflections on how the principles apply to our role-play workshops in a detailed video analysis of workshop 2 - 7. Yardley-Matwiejczuk's framework has been used to analyse the workshops in retrospect, and did not guide our development of the workshop format.

For the second part of the role-play facilitator role, managing creativity, Yardley-Matwiejczuk's framework is not applicable. For this part I critically reflect on how we carried out our roles as facilitators in the idea generation part of the workshops, providing several examples of routes to development of requirement ideas.

The reflections made in this chapter can be regarded as a start of understanding the roles involved in organizing role-play workshops, which hopefully will result in a more frequent use of role-play in system development in the future. The themes discussed in this chapter can be considered as a result of "reflection-on-action", which is a term used by Schön to describe reflections carried out on the action after an event or an action (Schön, 1991, p. 278).

6.2 A Theoretical Framework for Role-Play Conduction

Yardley-Matwiejczuk (1997) has developed a general conceptual framework for the requirements of individual role-play events. The starting point for the extensive work was a realization that a large number of studies had been conducted on role-play in social psychology, therapy and education since the 1960s, but there were sparse technical guidelines on how to conduct the sessions. According to Yardley-Matwiejczuk, the full potential of role-play techniques has seldom been realized, and descriptions were inadequate and often not very informative. This critique became the motivation for the development of the framework.

In Yardley-Matwiejczuk's framework, role-plays can be characterized by eight descriptive principles, which intend to describe the necessary and essential features of any role-play. The principles were derived from a theoretical analysis of explicit and implicit definitions of role-play, and emphasize its personal and experiential dimension.

According to Yardley-Matwiejczuk, there is only one feature that distinguishes role-play from conventional experiments and therapeutic encounters. This trait is called the "secondary as-if" status, and implies that the role-play participants create an alternative perception from a normal perception in the role-play. This principle is described in detail below and discussed in relationship to the facilitator's task of leading the participants in our role-play workshops. Besides, "primary as-ifs", is explained because the understanding of this principle is necessary to appreciate the meaning of "secondary as-ifs". However, the six remaining principles are not discussed

here, as these are not unique to role-plays but may apply to other types of experiments and simulations as well.

6.2.1 Primary and Secondary "as-if"-ness

According to Yardley-Matwiejczuk, the primary "as-if"-ness is an "initial framework [which] is set up that serves to separate the events occurring outside it in the mundane world" (p. 77). This means that there is no one-on-one relationship between the experimental situation and a real world situation. In the role-play the situation in focus can be controlled in a way not possible in every day life. However, a role-play is a representation and not a replication of real world people and processes. According to this principle, the enactment that takes place within the role-play is partly disconnected from the mundane world. Therefore, the role-play participants may not be accountable for their behaviour and reactions in an "as-if"-setting. For example, a subject's reaction on social behaviour might not be the same in an experiment and in a real world situation due to demand characteristics, as the subject tries to guess the researcher's hypotheses in the experiment and act accordingly.

Further, the secondary "as-if" is described by Yardley-Matwiejczuk as the constituent conditions (frames and foci), which demand that an alternative perception is made from a normal perception. In Yardley-Matwiejczuk's perspective, the participants' engagement with the secondary "as-ifs" is crucial for their experience of the reality of the role-play. If the role-play participants do not believe in the situation, it is in vain. According to Yardley-Matwiejczuk, the role-play conductor's instructions influence the participants' engagements of the secondary as-if conditions, which are achieved by the principles of *particularization*, *personalization* and *presencing*. The role-play conductor's attention to these principles is therefore important for the role-play success.

However, when applying the ideas of "as-if"-ness to role-play as a design method, the role-play events are not separated from the real world to the same degree as in other usages of the method. When used as a method in a software development project, the role-play is part of an overall process. The participants must work within the goals of the total project. They are accountable for their ideas whether they take part in a role-play session or in other project activities. What remains of the primary "as-if" definition is that the role-play scenarios in design are constructions of realistic and possible everyday happenings, not mirrors of everyday situations.

6.2.2 Particularization, Personalization and Presencing

Particularization is defined as "the explicit detailing of all the secondary 'as-ifs' (thus a chair is a car), so that all these objects are brought into awareness in order that they may be known" (Yardley-Matwiejczuk, 1997, p. 94). This means that all objects in the role-play are made explicitly know to the participants. If an object is used as a prop in the play, all involved have to know the meaning of the object as it is used. This term is related to the attention to details in theatres: Every requisite on a stage is there for a purpose. If the prop has no purpose it should not be there. According to Yardley-Matwiejczuk, "the problem is not in *remembering* or being *constantly aware* of secondary 'as-if' conditions, which would focus the participant's attention on these to the exclusion of everything else, but in the *knowing* of these secondary 'as-ifs' (, p. 94). In this context a person-in-role will fit into the definition of an object.

As an example of lack of particularization, she strongly criticizes the well known role-play experiment of the Stanford Prison (Haney et al., 1973, discussed in Yardley-Matwiejczuk, 1997, pp. 39 - 42). In this experiment the subjects who volunteered to participate in the experiment were randomly assigned to be prisoners or guards in a simulated prison at the Stanford University. Because of violent behaviour among the guards, the experiment had to be stopped before schedule. Haney et al. interpreted the result as an indication that the role a person is given, such as prisoner or guard, shapes the behaviour. However, Yardley-Matwiejczuk offers another explanation, saying that the experiment participants showed highly stereotypic behaviour because neither the subjects given the roles of prisoners nor guards were given particularized reasons for why they were in the prison. "The prisoners" were given no particularized information about their own biographical background and reasons for being under arrest. They had no choice but to behave in the way they thought the experimenters expected them to behave. The "guards" were acting even more stereotypically than "the prisoners", and Yardley-Matwiejczuk claimed that their behaviour was a result of factors not related to the assignment of a role. All the guards-in-role came to the "prison" at the same time without any particularized instructions on how to perform their job, something that would have been very unlikely in a regular prison. Prison culture was ignored entirely in the experiment, but would have had a large impact on the guards' behaviour in reality. In summary, Yardley-Matwiejczuk attributed the stereotypic behaviour of the participants in the Stanford Prison experiment to a lack of particularized information, not to the fulfilment of general roles.

Presencing is the second key role-play induction principle proposed by Yardley-Matwiejczuk. This term is strongly related to and can be considered as an extension of the concept of particularization. In Yardley-Matwiejczuk view the particularized objects must be made present and actual in the role-plays: "so that they are perceived as 'out-there' (part of the situation or 'other person') or 'within-here' (part of the 'self')" (p. 95). For the facilitator this means that he or she must use the language to emphasize that what happens in the role-play happens in present time. Instead of saying "imagine that this is the waiting room and act as if you are waiting for the physician", the scene is made actual by saying "this *is* a waiting room, and you *are* waiting for the physician". With particularization an object is identified, and by presencing it is made familiar and actual to the participants.

Personalization is the final key role-play induction principle of importance for the perception of secondary "as-if"-ness. This term is related to the degree to which the particularized objects are drawn from the subjects themselves or from the role-play facilitators. By asking the participants themselves to create the physical configuration for a role-play scene, the quality of the participants' engagement in the role-play improves. Role-play used for research purposes, as in the Stanford Prison experiment, does not open up for personalization. The role-play participants in that experiment were not allowed to configure their environment. According to Yardley-Matwiejczuk, the concept of personalization is closely related to Konstantin Stanislavsky's belief that an actor must relate to his or her own experiences to create life to a text. The actor must work on paying attention to details and make the role character his/her own to be able to act naturally and spontaneously (K. Stanislavski, 1948, cited by Yardley-Matwiejczuk, 1997, p. 97). Yardley-Matwiejczuk also relates the concept of personalization to Jacob L. Moreno, who made his psychodrama participants to use the first person "I am" when rehearsing role-plays or role-play details (Moreno, 1946 [1972], as cited by Yardley-Matwiejczuk, pp. 97-98).

To summarize Yardley-Matwiejczuk principles, particularization makes objects known to the participants, presencing is the process of making the objects actual to everyone involved in a role-play, and personalization implies that each participant configures the environment and the role description, so he or she feels and acts as if he or she is the person-in-role.

However, it can be questioned whether these induction principles are equally important in all types of role-plays and for all types of role characters. Yardley-Matwiejczuk varied the degree of particularization,

presencing and personalization in a number of experiments on role-play, and concluded that the detailing of knowledge was most important for people in roles leading the play and of less significance those who were mainly responding to the others' acting (Yardley-Matwiejczuk, 1997, p. 163). In other words, a person who can act by responding to other people's moves may be able to role-play a situation without paying attention to particularization, presencing and personalization. But for a person who has to take initiatives in the play, lack of information will result in a situation where the person feels that he/she makes a fool of oneself.

Do these principles apply to our role-play design workshops, where the participants primarily act themselves to create and explore ideas about technology? To answer these questions we did a detailed video analysis of workshop 2 – 7.

6.3 Analysis of Role-Play Facilitation

In the workshops video was used to record both the process and the ideas. The first workshop was regarded as an initial internal tryout of the method and consequently was summarized in writing and not on video. The video material from the rest of the workshops was transcribed. The scenes with facilitator-participant interaction were reviewed in details for the purpose of this chapter, categorized and sorted with the application atlas.ti. In total, about 40 hours of transcribed video were analysed in this process, and all illustrative scenarios given in this chapter are direct transcripts from this video material.

When sorting the video material, I started to look for strategies that we as facilitators used to a) enhance user brainstorming on everyday situations, b) to help the participants select ideas as a basis for the role-play and to elaborate on the chosen ideas, and c) to assist the participants in improvisation. The result of this sorting procedure was then seen through Yardley-Matwiejczuk's concepts of particularization, presencing and personalization.

The analysis of the second part of the workshops, developing technological ideas, is described in section 6.5.

6.4 Results on Role-Play Facilitation

6.4.1 Strategies Used for Helping the Participants Evolve the Role-Plays

After the first examination of the video material and the transcriptions, it emerged that we as facilitators used four main strategies to help the participants to define realistic scenarios and develop and rehearse the role-plays:

1. Ask details about the participants´ work practice to ensure realism of the play
2. Ask questions about all aspects of the role-play scenarios to make sure that all details were thought through by the participants
3. Repeat the participants' suggestions to encourage further development of the role-play
4. Make summaries about the role-play plot before a new rehearsal, to ensure that all participants were aware of the total course in the play

Asking details about work practice included questions like "how do you do this today?" and "do you work in this way in your ward?" To ensure the realism of the plays, we only allowed requisites and props at the stage area that the participants envisioned could be part of a related situation in the real world. We did not aim at mirroring the reality in the workshop, but we neither wanted to introduce props in the plays that could not have been possible objects in reality. Questions about the role-play scenarios and the role-play characters were concerned with issues like "who are you?", "where are you?", "what time is it?" and "why are you here?" The classes of questions were inspired by general theatre instruction practice. Repeating the participants' suggestions involved formulating their ideas as a question, or stating their thought with slightly different wording. If a participant would say "I will choose the little device", then we would reply "so you would use this one?" and hand over a small model. Repeating the participants' idea with other words was done for several reasons: to signify that we understood the suggestions, to ensure that the other participants had heard the idea, and to encourage elaboration of the ideas in a participant-facilitator dialogue. Before each new rehearsal we as facilitators always summarized the setting and the main plot to help everyone remember the agreed details about the role-play.

Figure 47 illustrates a typical workshop situation where the different strategies were mixed to enhance the scenario development. The dialogue is a direct transcript from workshop 4. In this example, the facilitator (DS) noticed that the nurse carried a sheet of paper in the role-play. To ensure that the paper was part of the drama, he asked what the paper was (strategy

2), and then asked if she would usually carry a sheet of paper in her ordinary work (strategy 1). The facilitator learned that the nurse usually has a Report Paper in her hand when she talks to the patients, but in the role-play she used the paper as a memo to remember the work routines at the department where the role-play was set. He repeated her explanation with a question to make her tell more (strategy 3). The dialogue ended with a decision to define the paper note as the Report Paper in the role-play.

Figure 47 Facilitator-user dialogue about current work practice (reconstruction of workshop situation)

In addition to the four general strategies, we gave the participants fundamental instructions on how to work with their topic, such as "sort the brain-storming ideas into groups" and "discuss and find one idea or group of ideas you would like to start creating a scenario from". Besides, we gave concrete advice about how to perform their role-play. After having experienced stereotypic behaviour in our first workshop with health care personnel, we regularly reminded the participants that their play should be realistic to avoid overacting. To retain focus on problems to be addressed, we asked the participants to elaborate on some parts of the role-plays in more detail and spend less time on some other.

6.4.2 Linking our Strategies to the Conceptual Framework

Of the four strategies we as facilitators used to lead the process of developing and rehearsing the role-plays, the first two strategies can be related to Yardley-Matwiejczuk's theoretical concepts of particularization, presencing and personalization, while the last two cannot. Strategy 3) and 4) are concerned with helping the participants to role-play or continue playing, which cannot be explained with the principles of particularization, presencing and personalization.

When we asked details about the participants' scenarios we asked questions as "who are you?", "where are you?", "what time is it?" and "why are you here?" which can be considered as the use of particularization, presencing and personalization at a general level. By asking "who are you?" we implicitly used presencing and personalization by asking the participant as-if she or he was another person. We signalled that we were not interested in a general role description but in his or her interpretation. We used present language to state that what happens in the role-play takes place here-and-now, actualizing the plot. Asking questions about current work practice (strategy 1) can be seen as a way to gather background information for particularization, since we wanted our role-plays to be grounded in real work practice. However, it is important to understand that this linkage was made retrospectively, and did not use the concepts as guidelines. Our leadership strategies were a result of a learning process with organizing a number of workshops. Anyway, the linkage indicates that the general framework can be applied to the conduction of role-play workshops for design, and not only to psychological role-plays in research, education and therapy.

6.4.3 Lack of Particularization, Presencing and Personalization in our Role-Plays

Perhaps more interestingly than presenting evidence for the use of particularization, presencing and personalization in our role-plays is to investigate the consequences when they were lacking.

In the first two workshops several problems occurred due to a lack of attention to these principles, resulting in role-plays that the participants, the observers, and the organizers felt problematic. The problems in the first workshop included difficulties with acting, and the trouble with the second was related to strong overacting and stereotypic behaviour.

In the first workshop, a professional drama instructor was engaged to lead the role-play process. She was giving some freedom in how to work with the workshop theme, because I had little experience as a role-play facilitator. The main PhD supervisor (DS) was not present in the workshop. The workshop theme was "to explore ideas for the use of PDAs in hospitals" and the participants were mostly academics with an interest in health informatics. Neither the participants nor the drama instructor had any experience with clinical hospital work, and the theatre instructor relied on her pervious experience on leading groups in theatre sport and improvisation when planning the workshop. In the main part of the workshop the participants were asked to improvise short scenes involving system developers and health care personnel. As described in chapter 4, a participant was for example asked to take the role of a system developer, and demonstrate a mobile EPR system to the head nurse at a hospital ward. Nurses are usually considered to be very busy in the hospital, and to signify this, the drama instructor asked the person given the role as the nurse to fold some sheets of paper while talking to the system developer. However, the drama exercise turned out to be a superficial performance where the little was learnt about work practice or technology.

There were several problematic aspects with this short improvisation act, which can be related to the lack of attention to Yardley-Matwiejczuk's three role-play induction principles. First of all, no details were particularized on what the mobile device could do, and in which way it could be helpful for the nurses at the hospital. Thus the person role-playing the system developer had to be creative, and become responsible for improvising the features of the mobile device. This created a pressure for performing. Similarly, the person role-playing the nurse was given the folding exercise to signify that she was busy, but it was not particularized what the folding signified. The act of busyness resulted in a situation where the person role-playing the system developer had to use all his energy on getting the attention of the person acting the nurse to convince her about the usefulness of the mobile device. The nurse-in-role was given no instructions on why she had agreed to discuss the mobile device with the system developer, and this lack of motivation resulted in a quite ignorant behaviour. Because of insufficient details on both the hospital work and the purpose of the meeting, the nurse had no choice but to take a stereotypical role of busy nurse, sceptical to new technology, and not interested in listening to the developer. The dialogue we had hoped for about possible technological solutions did not occur, and the short role-play became intimating for both the role-players and the other participants who were observing the scene.

In the second workshop the main participants had background knowledge for their role-play, but the performance nevertheless resulted in overacting and stereotypic behaviour in one of the groups. The goal in this workshop was to investigate whether health care personnel could participate and develop ideas about technology in a role-play workshop. One of the two groups in this workshop consisted of three nurses, who chose to role-play a pre-round meeting. Two of the nurses took the role of physicians, and the third nurse role-played herself in her ordinary job. All three nurses were experienced and knowledgeable about their own work, the pre-round meeting situation, and the physicians' work. However, due to a lack of particular instructions on who they were to act and how they should act, the two nurses who role-played physicians acted very arrogantly. They were talking to each other, came with irrelevant comments, and seemed not to be particularly interested in listening to what the nurse had to say (Figure 48). Instead of creating an arena for exploring information needs the role-play became a stereotypic demonstration of power relationship between nurses and physicians. This overacting could probably have been avoided by requiring the nurses to play average physicians, and by making their roles particularized and personalized.

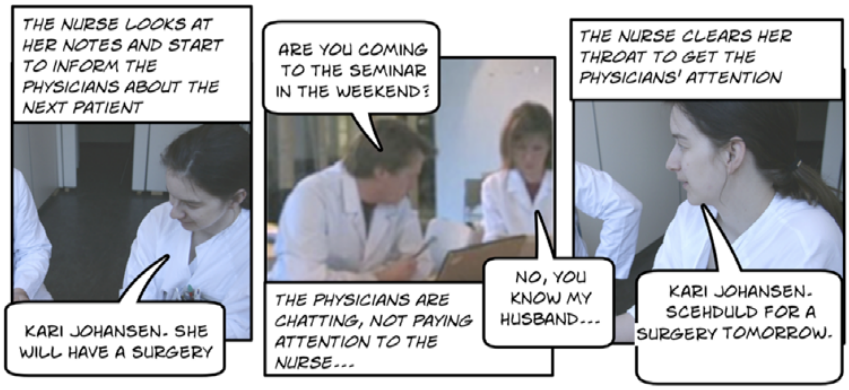

Figure 48 Stereotypic acting due to lack of paricularization (reconstruction of workshop situation)

6.4.4 Using Yardley-Matwiejczuk's Approach to Guide Role-Play Workshops for Design?

According to Yardley-Matwiejczuk "each new role-play situation – whether for education, training, therapy or research purposes – must be individually tailored, and requires adapted techniques of induction, based on a thorough understanding of the principles outlined within this book" (Yardley-

Matwiejczuk, 1997, p. 100). The principles are here defined as particularization, presencing and personalization.

However, is this true for all types of role-play sessions, including role-play workshops with end users? Our experiences with the use of role-play as illustrated in the previous two sections indicate that the concepts of particularization, presencing and personalization are important for such role-play workshops. Though we did not explicitly have the concepts in our mind, we implicitly used them when we gained experience with organizing and leading the role-play workshops. However, these concepts seem to be limited to the scenario building part of a role-play sessions. When we facilitated the role-play events, we used strategies beyond Yardley-Matwiejczuk's principles to help the participants continue their play or to start acting again after a little break. In conclusion, these principles are fundamental for role-play sessions, but thorough use of particularization, presencing and personalization do not ensure role-play success. The participants must still be directed through the rehearsals to guarantee progress in the acting and a continued focus on the workshop theme.

For the second part of our workshops, development of system requirements, Yardley-Matwiejczuk's general framework is of limited value. In its simplest form it is possible to view development of ideas as particularization, but when analysing the videos we observed that the process of developing ideas was more complex than the detailing of artefacts. By studying how the ideas came into being in our own workshops, we learnt that they came from different sources, from spontaneous acting and idea creation in the performances through participant-facilitator interaction, and participant-participant discussions.

6.5 Analysis of the Idea Generation Process

After analysing the video material concerning the development of role-plays in the workshops, the transcribed text was searched for strategies we as facilitators unconsciously or consciously employed to help the users develop ideas about the system requirements. The search started with a look for the origin of the ideas of the proposed solutions. Did all the thoughts about the solutions have their source in the participants, or did our input as facilitators influence the users' contributions? After the first analysis iteration for the idea generation processes in the workshops, it became obvious that the process of idea generation appeared to be quite complex. I therefore divided my attention between 1) ideas for *information needs* and software functionality, and 2) ideas for *technical devices and infrastructure*

6.6 Results Concerning Facilitating of the Idea Generation Process

The ideas about *information needs* evolved mainly through the process of design-in-action and from discussions between the workshop participants. These results were in line with our goal of developing role-play as a method to engage users in the process of exploring needs for information in mobile situations.

A typical example of design-in-action from one of the workshops is a situation where a nurse is about to leave a patient room to find the physician-on-call because he must examine the patient. Another nurse stays in the room to watch the patient, who has fainted. The physician in the play stops the scene and says ”Well, when she wanted to call me…. When I started working this morning, I registered in my PDA that I am working at the Cardiology Department. Then I automatically receive the on-duty-calls.” The facilitator hand over a PDA foam model, and the physician continues: ”She has a similar device. When she uses it, she sees who is the physician-on-call. If she presses this button at the screen, then we can talk”.

However, the choice of technological devices and infrastructure was more complex. Similarly to development of ideas about information needs, ideas about technical solutions were developed through design-in-action and participant discussions. However, these ideas were also a result of input from the facilitators and the observing system developers. This last fact surprised us when reviewing the videos, as we had initiated the line of role-play workshops as a means to involve and empower users. I therefore decided to go into details in the dialogues to see in how we as facilitators influenced the idea generation process.

In the following sections I present four examples of different routes to idea generation in our workshop. The illustrations are selected to demonstrate the complexity of the idea generation processes, and are concerned with choice of technical devices and interaction style. The goal of this presentation is not to show a representative sample of idea generation routes, but to reveal some of the diversity and enhance discussion.

The first two examples are concerned with different routes to deciding the device sizes. The first is with explicit facilitator influence (figure 49), and the second is without (figure 50). The third example shows how the

facilitator fails to follow up on the user's idea, because he unconsciously accepts the observing developer's input (figure 51). The last example shows how a nurse's ideas about an electronic system are overruled by a physician's decision to keep the current paper version (figure 52). All examples are gathered from group 1 in workshop 5, which was organized around the hospital pre-round meeting. The main participants in the group were a nurse and a physician. Besides, a facilitator, a student as system developer, and a cameraperson were present. The examples are presented in the same order as they appeared in the workshop.

6.6.1 Deciding Device Size through User-Facilitator Discussion

As in most of our workshops, the second part of the day in workshop 5 started with a focus on future technology. Being one of the two facilitators I presented capabilities and limitations of available technical devices to the participants. The participants were then divided into two groups to work on their specific cases. In group 1, the facilitator (DS) started by telling that we had forgotten to say that it was possible to use a projector in addition to mobile devices (figure 49). The participants were then asked to pick the device size they wanted to have. The physician said that it was a good idea to use the projector to view documents that are difficult to read, but selected the PDA for use in the role-play. The nurse picked the same size. DS suggested that they maybe could have one in the pocket and one on the desk. And as a reply to the advice the physician selected a Tablet-PC sized model in addition to the one he had already.

Looking at this scenario in details, it is obvious that there is a very thin borderline between enlightening the participants about possible technical solutions and giving advice on what to select. One of the facilitator's tasks is clearly to make the participants aware of the different technological possibilities and to avoid unnecessary limiting solutions. Reminding the participant of available technology is clearly part of the job. However, when we as facilitators start to give examples of use like "you could have this in your pocket" we go into the workshop as direct participants and have extended our roles from informing to contributing. This extension would be appropriate for many collaborative design approaches, but in this particular case I wanted to give the users a voice. In this way non-reflected influence becomes problematic.

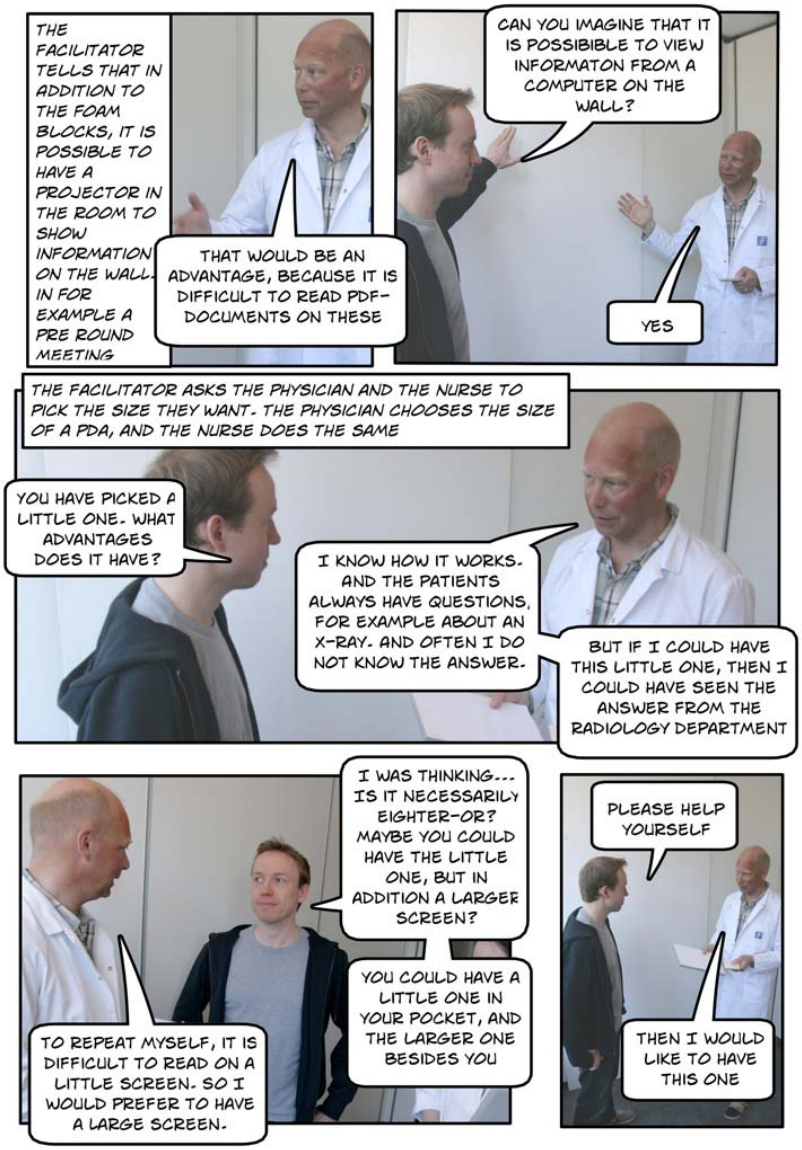

Figure 49 Participant-facilitator dialogue on device sizes (reconstruction of workshop situation)

6.6.2 Choice of Device Size through Design-in-Action

After the initial discussion and choice of devices presented in the previous section, the participants started to role-play the pre-round meeting as it appears today. The nurse and the physician were told to imagine that the information they needed in the pre-round meeting was available on the technical devices, and they should improvise the use of the devices in the role-play.

The two participants sat down by a table. Each of them had a little PDA sized foam block in their hands. However, when he started to act the physician spontaneously started to use the Tablet sized foam block instead of the PDA sized. In the role-play situation he discovered that the device in his hands was not large enough to display the information he wanted to see (figure 50). The foam block of the Tablet PC was readily available at the table for the physician and made the change easy. It was literally in front of him, because the DS had suggested that he could pick more than one device before they started to work on the future scenario (see previous section and figure 49).

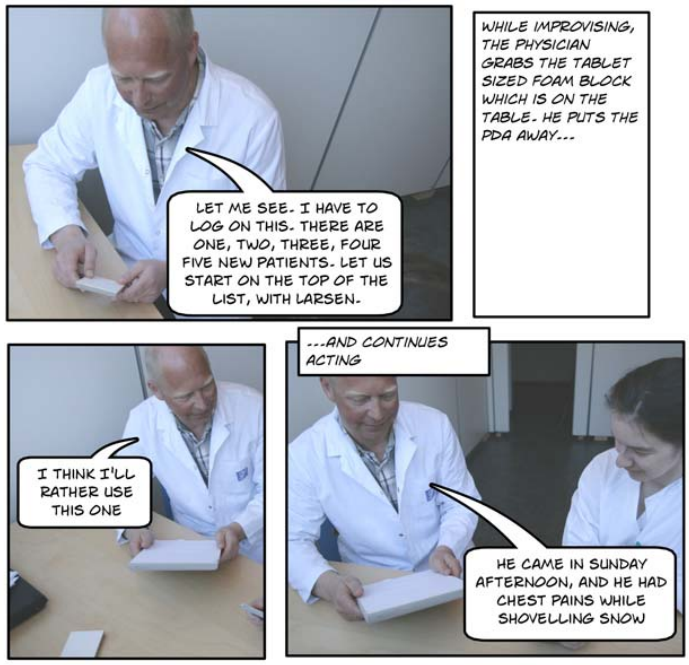

Figure 50 Choice of device size through improvisation (reconstruction of workshop situation)

6.6.3 Selecting Technical Solution through Facilitator - System Developer Discussion

After the first improvisation act with the use of the foam blocks representing PDAs and Tablet PCs the facilitator asked how the two devices interacted. The physician answered that the screens were mirrored, and the facilitator confirmed the physician's reply to encourage sharing of more details. However, the graduate student holding the role as system developer continued the talk. The student exclaimed that it seemed to him as if the physician used the small device as a menu for the large one. The facilitator was satisfied with this answer, and accepted the system developer's suggestion by telling the participants to continue their improvisation (figure 51). In other words the facilitator and the student overruled the physician's idea.

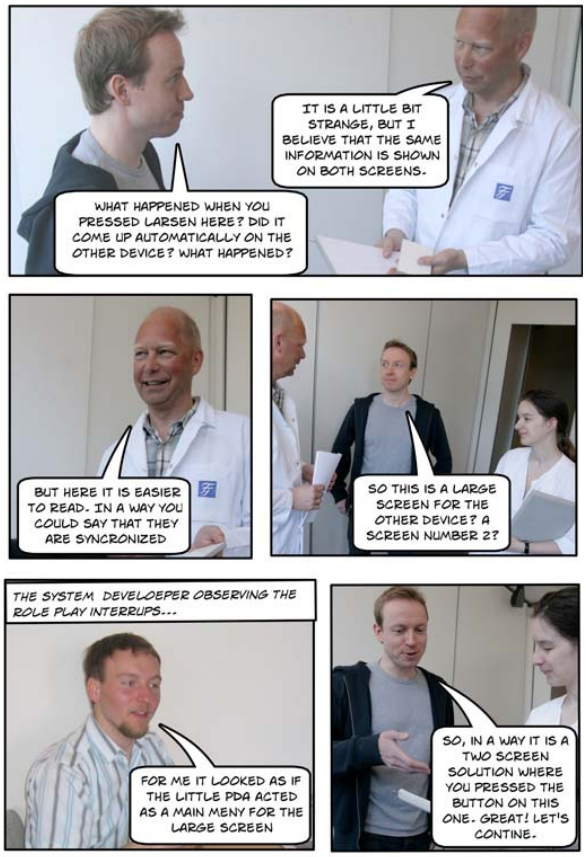

Figure 51 Choice of interaction style (reconstruction of workshop situation)

Even thought we had instructed the student not to participate actively but observe the actors, he was able to contribute with an idea that was accepted into the process without further discussion

6.6.4 Negotiating Functionality

The last example is similar to the scenario in the previous section, where a participant's idea about technology was overruled by the system developer's suggestion. However, in this last case the physician exercised authority over the nurse in a discussion about which solution to choose for the medical chart. As a result for his input, the nurse's ideas about the electronic medical chart were neglected. In the situation described the nurse explained how she imagined the use of an electronic device to view vital patient data (figure 52). The facilitator posed a question on what time they usually utilize the chart, which was answered by the physician. Then he continues by telling that he would like to have the chart on paper instead of using an electronic version. The facilitator questions if this is what they would like to have, and as a response to his question she said "yes" without further argument.

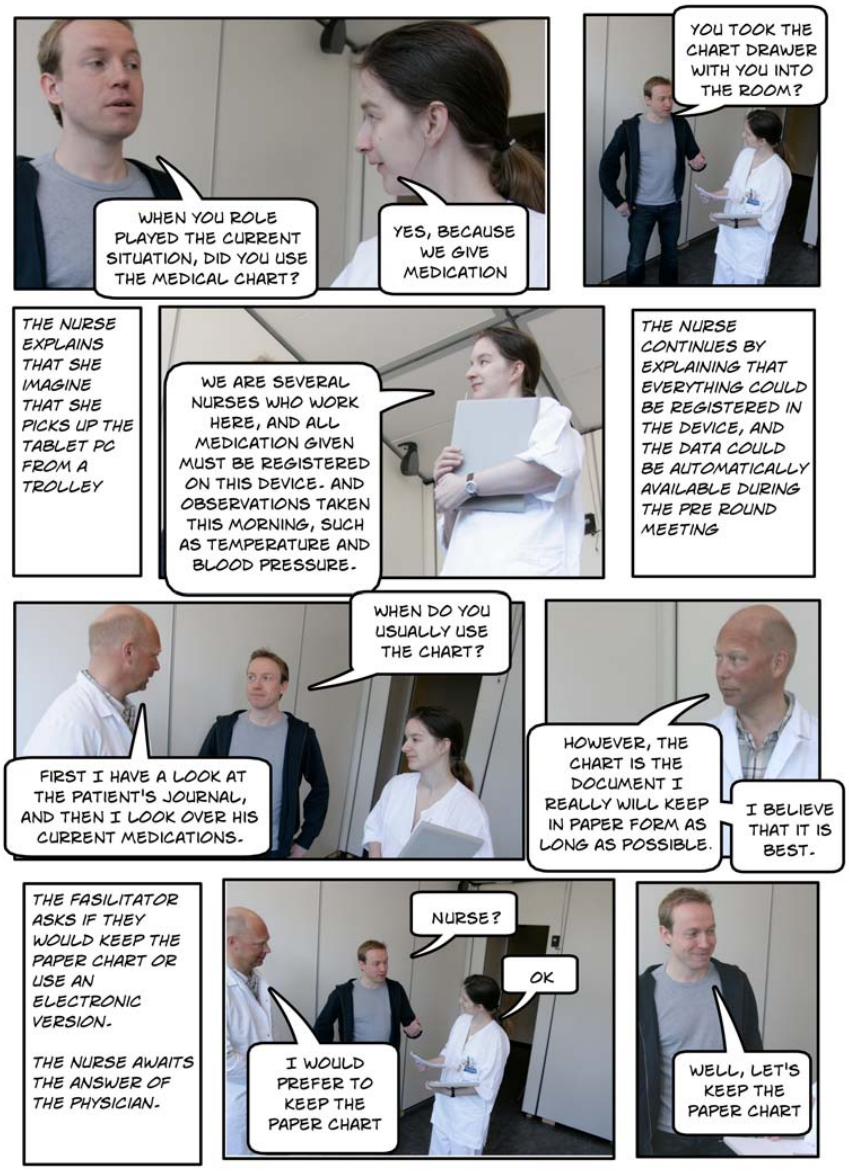

Figure 52 Negotiating functionality (reconstruction of workshop situation)

6.7 Reflections on Idea Generation Process

As exemplified in the previous section the idea generation process is complex. Although we aimed at giving the decision power to the users and support active user participation, we learnt for example that both we as facilitators, and the observing system developer, had an impact on the choice of technological solution in the workshop (table 16). In the first example, the facilitator suggested that the participants could use more than one size on their devices, which resulted in a choice of using both a PDA sized device and a Tablet sized one. However, when the participants started to act, they initially had a PDA sized foam block each. It was not before the physician had started the role-play that he started to role-play using the Tablet sized foam material. He did not use it because the facilitator's suggestion, but because he discovered the need for it in the play. When discussing the integration between the two systems, the system developer suggested that the PDA sized device should act as a main menu for the Tablet sized device, and the participants accepted this without further discussion. Further, the nurse wanted to use the medical chart on a tablet PC. However, the physician, who did not want an electronic version of the chart, overruled her ideas.

The observation of the complexity of the technological idea generation process can be viewed in at least three ways, giving highly different implications for the participants' status as "actively involved" in the workshop. These are a) workshop facilitators are in control and not users, b) the prototyping material and the specific situations helped the participants understand the facilitator and the system developers' ideas, and c) the role-play opened for a division of labour between experts.

Table 10 Overview of idea generation process for device sizes and interaction between devices in workshop 5

Figure	Idea	Source	Situation	Decision
49	Projector in meeting room	Facilitator	Information	No
49	PDA as mobile EPR	Physician	Discussion	Yes
49	Tablet PC as mobile EPR	Facilitator	Discussion	Yes
50	Tablet PC as mobile EPR	Physician	Role-play impro.	Yes
51	PDA and Tablet show same info.	Physician	Role-play impro.	No
55	PDA act as main menu for Tablet	System dev.	Observation disc.	Yes
52	Medical chart on Tablet PC	Nurse	Discussion	No
52	Medical chart on paper	Physician	Discussion	Yes

6.7.1 Workshop Organizers in Control of Ideas, or Users?

First of all, the most obvious way to view the scenario descriptions is that the main participants believed that they were leading the process, while in fact the system developer and the facilitator intentionally or unintentionally gave input that had a big impact on the choice of technological solutions. Viewing the workshop in this way reduces the participants from "actively involved" to the status of being representative users, whose task is to be present to ensure a user-centred process, but not to have a real impact on the process.

Secondly, the results can be seen in a way which puts the system developer and the facilitator in a more positive light, by saying that the role-play and the concretization of the ideas in the form of low-fidelity foam models enabled the participants to understand and evaluate the system developers' and the facilitators' ideas. Support from this explanation comes from the fact that the facilitator came up with two ideas about what devices the participants could use in their role-play. He first reminded the participants that they could use a projector, and then suggested that they could have a Tablet sized device in addition to the small PDA. Initially, the physician was positive to the use of the projector, but in the role-play he only used the Tablet sized foam block. And he did not use the Tablet PC block before it felt natural in the role-play. This indicates that the role-play created a context, which helped the participants to see what type of technology would be appropriate or not. Active user involvement may not mean that all ideas should originate from the users, but it can also mean that the users are able to understand and share their opinions and technologists' suggestions.

Finally, the results can be seen as a division of labour among experts. The facilitator and the system developer are clearly more knowledgeable about technological solutions than the health care personnel, who have extensive knowledge about their everyday information needs. Support for this view can be found in the fact that neither the system developer nor the facilitator interrupted the physician and the nurse while they were developing the ideas in the role-play for software functionality, but only shared their opinions when there was a need for clarification about the underlying technological solutions. From this viewpoint, active participation means to contribute with expert knowledge from one's own domain.

When using role-play as a means to understand needs and develop requirements for new technology it can be questioned whether it is desirable

that the facilitator should not have any impact on the idea generation work. If the workshop goal is to create a cooperative environment where users, facilitators and developers contribute equally this is not a problem. However, when one is not aware of one's own influence in the idea generation process, the validity of the resulting ideas decreases.

Without drawing any conclusions about which perspective is correct in this particular instance, the results from this workshop clearly show two things: 1) the importance of using video to document the idea generation process, both to document from whom its idea has its origin, but also to capture ideas which otherwise might be forgotten (such as the idea of the electronic chart); 2) the concept of *active involvement of users,* as for example stated in ISO 13407 (ISO13407, 1999) may not be straightforward when it comes to practical work. In every project it has to be determined if active user participation means that all ideas should originate from the users, that a context is created where users and technologists understand each other's ideas, or whether users and technologists should contribute with their expertise on different aspects of the idea generation process. The video data further indicate that the facilitator may unconsciously influences the process. It is therefore crucial to be reflective and aware of one's own role, and to take and explicit choice of user involvement model.

6.7.2 Validity of the Requirement Ideas

After reviewing the videos from our role-play workshops we recognize that the process of idea generation is complex and that the facilitator's role in the idea generation phases is far from straightforward. However, the story does not end there. An important role of the facilitator is to manage all the user roles, and to help everyone contribute with their voice. Managing group dynamics is not an activity exclusive to role-play workshop, but becomes obvious and clear when one person's opinions are overruled by another as show in the examples illustrated in figure 51 and 52. If the voices of some participants are not listened to, the results from the workshop are probably not very valid in the real world.

However, one can question whether the nurse in the example illustrated in figure 52 would have tolerated that her perspective on the electronic chart could be rejected without discussion if the workshop had been part of an ongoing system development project. When we organized our health informatics workshops to gain knowledge on drama as a system development method the participants knew that the ideas generated did not have any immediate personal or practical consequences. Everyone involved knew that

the workshop was organized to study role-play as a method, with no goal whatsoever on creating real systems. If the workshops had been part of an ongoing project it is not certain that the nurse would have been satisfied with letting the physician decide how the system should be. And it is not sure that the physician would have allowed the system developer to decide how the two screens should interact (figure 51). The only conclusion we can draw on validity is that we observed these situations of overruling in our workshops, and as facilitators it is important to understand that management of group dynamics to avoid such situations in real projects.

6.7.3 Validity of the Research Approach

This chapter is the result of a video analysis of our roles as facilitators in the workshops. We planned the workshops, organized them, and analysed our own behaviour. The chapter gives insight into problematic aspects of leading role-play workshops. It points at some concepts that are useful for leading role-plays, and provides reflections on how one should behave when working with end users. However, how valid is this type of research? And is it research?

Obviously, as the role-play facilitator's tasks are given little attention in the literature on role-play in design, it is necessary to start the discussion somewhere. Schön differentiates on "reflecting-in-action" and "reflection-on-action" as different ways to become a reflective practitioner (Schön, 1991). To "reflect-in-action" means to reflect on and adjust ones own behaviour, while in action, in the form of "reflective conversation with the situation". According to Schön, "when someone reflects-in-action, he becomes a researcher of practice" (p. 68). However, Schön notices that there are situations where it is not suitable or practical to "reflect-in-action", because the reflection might interfere with the action. In these circumstances, video can for example be used retrospectively to "reflect-on-action". In this chapter video from the workshops has been used as a starting point for "reflecting-on-action". The chapter provides new ideas on role-play facilitation based on these reflections, and can be considered as a starting point for research on yet another aspect of role-play as a design method.

6.8 Conclusions

In this chapter I reflected on drama and idea generation facilitation in role-play workshops for design. The answer to **RQ 3** "What is the role of the

workshop facilitator's in such role plays"?, is from our experiences, to lead both the role-playing and the idea generation.

For the role-play part the conceptual framework of the psychologist Yardley-Matwiejczuk proved useful for understanding how we should help our participants develop and rehearse their role-plays. The terms particularization, presencing and particularization are useful for assisting participants in acting out realistic scenarios. The role-play participants need sufficient information to play their roles, which is ensured through the application of the concepts. Insufficient information about the purpose of the role-play, the setting, and the characters leads to a meaningless activity of stereotypic behaviour.

However, Yardley-Matwiejczuk's concepts were inadequate for guiding the idea generation process. For this part of the workshops we found that it is important to be aware of and reflect on how one as facilitator has an impact on the idea generation process, and on group dynamics. The chapter does not give an exact answer to how this should be done. However, it provides reflections on the dynamics between the users and the facilitator in the idea generation process. The facilitator can obviously help users to develop requirement by arranging for design-in-action, but in some situations ideas develop outside the activity, and in these situations the facilitator must be aware of and take into consideration his or her influence on the participants.

The use of video was important as it enabled us to reflect on our role as facilitator. A detailed analysis of the videos from the workshops revealed that our understanding of the ways in which we influenced the users was misguided. In the spirit of experiential learning as described in chapter 3, this kind of "reflection-on-action" is important to be able to improve one's skill as facilitator.

Chapter 7: Conclusions

This chapter concludes the thesis with a summary of the findings, some considerations about the research methodology, as well as reflections about the implications of the knowledge on role-play workshops for user-centred design. Section 7.1 presents the main findings, section 7.2 is a reflection on the overall research approach, section 7.3 provides some reflections on further work on role-play, and section 7.4 discusses the value of knowledge on role-play for usability testing of mobile devices.

7.1 Summary of Findings

In this thesis seven role-play workshops with end users have been described. The purpose of the conducted workshops was primarily to develop understanding of important aspects of role-play workshops with end users. The current work differs from other explorations of role-play in design, as presented in chapter 2, by taking an iterative approach to exploring different variations of role-play workshops, and by reflecting on factors that emerged through these.

The overall research subject of the thesis was to develop understanding of key premises for using role-play with low-fidelity prototyping to involve end-users in exploring user needs and requirements for mobile IT.

Three different aspects of this research subject are explored in the thesis, RQ 1, RQ 2 and RQ 3.

RQ 1 was defined as: "What are the important issues related to planning and running of role-play design workshops with end-users?"

From the seven workshops described in the thesis, five categories of important issues were identified through an analysis of lessons learnt.

The categories identified were:

1. **Practicalities**, which refers to practical issues that should be considered in the planning process of role-play workshops, such as recruitment of participants, preparation of prototyping material and video recording.
2. **User role-playing**, which refers to challenges related to making the end-users act out scenarios.
3. **Idea generation process**, which refers to issues related to developing ideas during acting versus a separate process.

4. **Workshop resources**, which refers to issues that may influence the idea generation process, such as choice of prototyping material, physical room configuration and field material.
5. **Roles in the workshop**, which refers to different roles identified in our workshops, such as participant, facilitator and developer.

The issues are described in detail in chapter 4.5., and can be viewed as a first step to understand the necessary requirements for using role-play workshops with users.

RQ 2 was defined as: "What do system developers perceive as the strengths and limitations of such role-play workshops as a system development method?"

This research question was answered through an analysis of interviews with system developers that had taken part in the workshops, or had participation in an evaluation meeting on role-play as a method. The developers identified a number of benefits and limitations of role-play workshops as a system development method. These are described in chapter 5.4, and discussed in chapter 5.5. The developers perceived role-playing to be particularly useful for developing ideas, which would otherwise be difficult to capture, for enhancing active user involvement, and for helping developers understand the context of use. The approach was perceived as useful in early development phases, for fast idea creation, for creating a focus in a project, and for establishing a good group process. Further, the developers pointed out that role-play workshops must be supplemented with other methods, because of the lack of a system perspective. Similarly, the developers felt that the workshops were not suited for creating an overview of a system in a system development context, as they only provide the users´ perspective, without taking system development premises into account. Finally, one of the organizational developers thought it was a danger of thinking that the role-play is the reality, and not an idealized reality. The system developers´ view of role-play was a result of first impressions of the approach, and should be validated and expanded with the use of role-play in long-term projects.

RQ 3 was defined as "What is the role of the workshop facilitators in such role-play workshops?"

This question was explored through an analysis of video material from the workshops. Two aspects of the facilitator's role were reflected upon: (1) leading the role-play scenario building and (2) leading the idea generation process. The actual analysis of the role-play scenario building facilitation is

described in chapter 6.4, and the results from the analysis of the idea generation processes are given in chapter 6.6.

For the role-play scenario building part, the conceptual framework of the psychologist Yardley-Matwiejczuk proved useful for understanding how we should help our participants develop and rehearse their role-plays. The terms particularization, presencing and personalization are useful for assisting participants in acting out realistic scenarios.

However, Yardley-Matwiejczuk's concepts were inadequate for guiding the idea generation process. For this part of the workshops we found that it is important to be aware of and reflect on how one as facilitator has an impact on the idea generation process, and the group dynamics. The use of video was important as it enabled us to become aware of and reflect on our role as facilitator. The video allows a kind of "reflection-on-action", which is important to be able to improve one's skill as facilitator.

7.2 Reflections on Methodology

As described in chapter 3, Klein and Myers´ principles for conducting and evaluating field studies in information systems was found useful for reflecting on the overall research process in this study (Klein & Myers, 1999).

This section describes Klein and Myers´ principles, and my reflections drawn. The quotes in italics, which describe the principles, are from Klein and Myers, p. 72. As recalled from chapter 3, Klein and Myers wrote that every principle is not relevant for all projects. For the discussion of the principles, I have strived to consider each of them in relation to the thesis work, but have found that it is valuable to discuss the principles as a whole, and not as individual parts as they are highly related.

1. The fundamental principle of the hermeneutic circle

The principle suggests that all human understanding is achieved by iterating between considering the interdependent meaning of the parts and the whole that they form. The principle of human understanding is fundamental to all the other principles.

2. The principle of contextualization

Requires critical reflection of the social and historical background of the research setting, so that the intended audience can see how the current situation under investigation emerged.

3. The principle of interaction between researchers and the subjects

Requires critical reflection on how the research materials (or ´data´) were socially constructed through the interaction between the researchers and the participants.

4. The principle of abstraction and generalization

Requires relating the idiographic details revealed by the data interpretation through the application of principles one and two to theoretical, general concepts that describe the nature of human understanding and social action.

5. The principle of dialogical reasoning

Requires sensitivity to possible contradictions between the theoretical preconceptions guiding the research design and actual findings (´the story which the data tell´) with subsequent cycles of revision.

6. The principle of multiple interpretations

Requires sensitivity to possible differences in interpretations among the participants as is typically expressed in multiple narratives or stories of the same sequence of event under study. Similar to multiple witness accounts even if all tell it as they saw it.

7. The principle of suspicion

Requires sensitivity to possible ´biases´ or systematic ´distortions´ in the narratives collected from the participants.

7.2.1 Reflections on Klein and Myers´ Principles

The principle of the *hermeneutic circle* is considered to be fundamental to the other principles, and the discussion will start by reflecting on this. The overall research approach in this study has been iterative and experiential, and has several similarities with a hermeneutical circle with a continuous shift between the parts and the wholeness. As described in chapter 3, we planned to carry out a number of role-play workshops. However, as we did

not know the outcome of the workshops we were not able to plan the process in full details from the beginning of the project. Instead the process commenced with the planning of an initial workshop, which then was carried out, and resulted in valuable experiences. These experiences were reflected upon and summarized as lessons learnt. The lessons learnt were used as input into the subsequent workshop in the iterative cycle. This iterative process shifted the focus from role-play workshops as a whole, to parts of the process (i.e. lessons learnt). After each iteration, the understanding of role-play workshops as theme grew, as we continued to learn learnt more about important factors for successfully organizing such workshops. The lessons learnt were then analysed across the workshops to identify issues of relevance for planning and conducting role-play workshops with end-users. The basis for this analysis was all knowledge developed about role-play workshops as a whole.

In addition to the hermeneutical nature of the overall research approach, the study of the three research questions can be considered as individual parts that contribute to the understanding of a complete picture of role-play with end users. Three perspectives existed in this work: An experiential perspective through the iterative process of running the workshops, a system developer perspective on role-play as a system development method, and an analytical perspective on our own workshop processes. Central concepts, such as *design-in-action* were analysed through all these perspectives. This did contribute to an understanding of role-play workshops as wholeness, in accordance with Klein and Myers´ principle of *multiple interpretations.*

Further, the principle of *interaction between researchers and the subjects*, the principle of *dialogical reasoning*, and the principle of *contextualization* are considered as highly related. The understanding of role-play workshops, as expressed in the thesis, is a result of the interaction between those who participated in the workshops (subjects) and the researchers/facilitators, and the changing view of role-play as a method. In addition, the motivation and rationales for studying role-play formed the approach, and is part of the context for the interaction between researchers and the subjects.

In this study, the workshops, surveys and interviews were carefully planned and conducted, and appropriate questions about role-play were defined. The results were thoroughly discussed and reflected upon. The same persons filled the role of both workshop facilitators and researchers. In such a study, it becomes evident that the data that evolves is tightly connected to the way the study is conducted and the persons who carry it out.

To clarify the *context* for the work, the background and motivation for the thesis were described in the introductory chapter. The motivation for studying role-play was a direct consequence of the observations made in the process that lead to the role-play performance in the MOBEL project (Sørby, et al., 2009), combined with earlier experience with drama. The work was further motivated by a desire to work with a method that would enhance user participation. This was justified by the focus on user participation in the traditions of participatory design and user-centred design, and the health informatics context constituting the main case. If another perspective had been made, e.g. one of a product designer, other choices regarding the focus of the workshops would most likely have been taken. For example, the form factor of the prototypes would probably have been given more attention, than as used here to exploring information needs.

This study was motivated by at desire to understand a user-centred design method for mobile IT. Role-play was thought to be a democratic means of user involvement in design process, not requiring users to understand specific technical notations or technical terms to take part in the process.

Initially, there was a desire develop a method which could be placed on the "top of the Ladder of Participation" (section 1.4), to give users a tool for discovering and sharing information needs. It was inspired by Kutti et al.´s statement that "engaging in theatre performances for design has not been developed as a proper *design methodology"* (Kuutti, et al., 2002, p. 101). The reference for the work was established methods such as usability testing and heuristic evaluation, which have their place in HCI textbooks with agreed norms about how they should be used. The idea was that it should be possible to understand the necessary requirements for using role-play in such a way one would be able to know how to use the approach, and for which purposes.

However, when reflecting on the role-play workshops carried out in this study, the processes were found to be much more complex than first anticipated. Methods such as usability testing and heuristic evaluation are restricted as they are suited to evaluate systems or prototypes, while role-play is a much more versatile methodology when used for idea generation. Even though the use of role-play workshops was restricted to user involvement here, it became impossible to clearly define how such role-play workshops should be conducted. As a result of the reflection on the process itself, the view on "design method" changed. From having a perspective on role-play workshops with end user as a method that could be defined, the view of role-play was changed to an outer framework, through which one

must improvise. Whilst using role-play, one gains experiences and skills on how to adapt the usage "the method" to different projects and purposes.

One of the main experiences from the process of conducting the role-play workshops was that the task of leading such workshops involves a set of skills that must be learnt. I.e. it became evident that the facilitator's role is very important in such work. In relation to our defined roles as role-play facilitators and researchers a general framework on role-play conduction developed by Yardley-Matwiejczuk was applied to understand our actions (Yardley-Matwiejczuk, 1997). In addition to the analysis of the role-play development the participant-facilitator interaction in the idea generation process was critically reflected upon in one of the workshops. By analysing the video of the participant-facilitator interaction, a clear impact by the facilitator on the idea generation was revealed, and it is therefore important to be aware of one's own impact in such processes. Even though we aimed at being at the top of the "Ladder of Participation" we learnt by studying the video material that we were situated more in the middle.

The use of Yardley-Matwiejzuk´s concepts on role-play conduction is one of several examples on how details from the data material is interpreted by the use of theoretical concepts as described in the principle of *abstraction and generalization*. Although it was not possible to find one theory that was applicable for all aspects of role-play workshops, relevant theories are discussed in relation to the data.

The *principle of suspicion* refers to sensitivity to possible biases in the narratives from the participants. In this work an attempt to set the system developers´ comments in an appropriate context was done in chapter 5, and to analyse the reasons for the choice of ideas among the participants was done in chapter 6.

7.3 Further Work on Role-Play as a Method

When this study was undertaken, there was little structured knowledge about role-play as a method in system development. By reviewing the literature on role-play retroactively, it is evident that some of the knowledge described in the thesis has been presented (e.g. some aspects on acting and role-play facilitation), but rather widespread in selected papers and never systemized. As a consequence the decision was made to carry out a set of role-play workshops in an iterative, experiential learning process, and later conduct a qualitative assessment of the approach seen from a system developer perspective. As the role of the workshop facilitator emerged as an

important topic in the workshops, the necessity of reflecting upon the given role of the workshop facilitator became obvious.

The result of the work establishes a foundation, or a starting point, for the use of role-play with end users, but there is still a need to understand more about which role it can have in real system development projects, and how role-play can be combined with other HCI methods.

It would have been useful to use role-play in an action research study, where one would experiment with different variations of role-play workshops in a project. In an action research approach, it would be possible to validate the groups of issues identified in chapter 4, to study to which degree these would be valuable as a checklist for planning and running such workshops. Such an approach would be useful to study to which degree the benefits and limitations identified in chapter 5 were the most relevant, or if other factors would emerge, and to explore to which degree the concepts of particularization, personalization and presencing discussed in chapter 6 were meaningful. Using action research would add a long-term dimension, which would enhance our understanding of role-play workshops with end users.

In our workshops we involved prospective end users as participants, but the approach should be explored with an addition of other system stakeholders in addition to end users, to see how different concerns about the purpose of a system can be explored in a collaborative setting.

7.4 The Future of Role-Play in User-Centred Design

This thesis contributes to an improved understanding of different aspects of role-play workshops with end users. What does this mean for user-centred design? Should every system developer invite users to role-play sessions?

On the one hand, the obvious answer is “no”. The knowledge of role-play will not result in a revolutionary new way of working with users in system development. However, the work described here should enable system developers to include role-play in their toolbox of methods, and use it when they feel it will add value to a project.

On the other hand, knowledge on role-playing will probably be more important in the future due to continuous development of technological and computer-based devices. In Norway, laptops and handheld electronic

devices are used on a daily basis both privately and at work with almost unlimited access to wireless networks. Imagining future hospitals, it is likely that the nurse will carry a bar code reader and laptop when administering medication, or some new technology, which is still not fully developed. The technology is becoming a larger part of our physical world. The devices are mobile and wireless, and contribute significantly to way of living.

When such technology is developed and tested it is necessary to take the physical context into account. If a device is intended for carrying and wearing, the body and the surroundings become a part of the interface. To take usability testing as an example, in the future it will not be sufficient to test mobile devices in a traditional sense with one user completing a set of predetermined tasks in front of a computer. Testing mobile systems in the traditional way may overlook important aspects of the system in use. Since the IT systems become more and more integrated, commonly accepted and mobile, it is necessary to test the systems through simulations, where users role-play entire scenarios instead of carrying out specific tasks. Usability testing such systems is likely to become more or less transformed to scenario role-playing in the future, and in this setting it is very important to have an understanding of key aspects for organizing role-play simulations. This implies that interaction designers must learn a set of new skills on how to lead these types of simulations, and the basic training must be part of the educational curriculum in user-centred design. It must be recognized that such skills must be learnt through repeated experience with this type of working.

Epilogue

When I started working on the PhD project in 2001 I knew little about for hospital work. I was convinced that mobile devices have their place in the ward, and therefore chose "mobile EPR systems in hospitals" as the main case for the thesis. Since the initiation of the work I have gained more knowledge about actual the work in hospitals, and understand more about what is required from IT systems in the domain. In 2006 I was employed in a research project called Point-Of-Care Multi-Aware clinical Pilot (POCMAP), which opened my eyes for new visions about EPR systems. Central concepts in the POCMAP project are sessions and plans. A session is a view of the patient's EPR, in the form of a referable object, which can easily be opened on different devices and shared among different people. The plan is thought to be a central organizational unit in the EPR system, which support clinical processes to a larger degree than current journal systems. Today, most systems can only be used to document completed care acts and interventions. When a person arrives to the hospital with a known diagnosis, there is a set of logical examinations and tests the patient must take during the stay. Since the tests are predetermined in best practices guidelines, they could become the basis for the patient's plan for the stay, and the documentation of the care acts could be directly linked to the patient's plan.

Returning to the thesis and the original ideas developed by the participants in the workshops, I see different things now than in the early in the PhD work. In 2003 I interpreted an idea created by the participants in one of the workshops, as "he would like to send the most important data to the emergency department". Today I would rather say, "he wants to hand over the patient's session to the emergency department". Similarly, in 2003 I could have said "the nurses believe that the ward has a special program independent of the patient's EPR, which can be used to inform the patients about preparation for knee operations". Today, I would rephrase this to something like say "she envisions that the patient's plan for the knee operation is created based on a best practices ward template, which informs the patient about preparations before the operation and the recovery process".

My years in this field have resulted in a changed view on the potential of IT systems in hospital, and this has resulted in new interpretations of the workshop participants´ ideas. In other words, the person using a method is of most importance for the result. This does not mean that methods are useless and superfluous; however it means that a method can never ensure good solutions. It indicates that a method can never be better than its user, and the knowledge the person using the method encompasses.

References

Administration, M. o. L. a. (1977). *Lov om arbeidervern og arbeidsmiljø [Law of Workers' Protection and Working Environment]*: Norway.
Anastas, J. W. (1999). *Research design for social work and the human services* (2 ed.). New York: Columbia University Press.
Barba, E., & Savarese, N. (1991). *A dictionary of theatre anthropology : The secret art of the performer* (R. Fowler, Trans.). London: Routledge.
Bardram, J. E., & Bossen, C. (2005). Mobility work: The spatial dimension of collaboration at a hospital. *Computer Supported Coop Work, 14*, 131-160.
Baroudi, J. J., Olson, M. H., & Ives, B. (1986). An empirical study of the impact of user involvement on system usage and information satisfaction. *Communications of the ACM, 29*(3), 232-238.
Berg, M. (1996). Practices of reading and writing: The constitutive role of the patient record in medical work. *Sociology of Health and Illness*.
Berg, M., Langenberg, C., Berg, I. v. d., & Kwakkernaat, J. (1998). Considerations for sociotechnical design: Experiences with an electronic patient record in a clinical context. *International Journal of Medical Informatics*(52), 243 - 251.
Binder, T. (1999). *Setting the stage for improvised video scenarios.* Paper presented at the Conference on Human Factors in Computing Systems (CHI 1999), Pittsburgh, Pennsylvania.
Bjerknes, G., & Bratteteig, T. (1987). Florence in Wonderland: System development with nurses. In G. Bjerknes, P. Ehn & M. Kyng (Eds.), *Computers and democracy*. Aldershot: Avebury.
Bjerknes, G., & Bratteteig, T. (1995). User participation and democracy: A discussion of Scandinavian research on system development. *Scandinavian Journal of Information Systems, 7*(1), 73-98.
Bloor, M., & Wood, F. (2006). *Keywords in qualitative methods: A vocabulary of research concepts*. London: Sage.
Boal, A. (1995). *The rainbow of desire: The boal method of theatre and theraphy* (A. Jackson, Trans.). London: Routledge.
Boal, A. (2002). *Games of actors and non-actors* (A. Jackson, Trans. 2 ed.). London: Routledge.
Boess, S. (2006). *Rationales for role playing in design.* Paper presented at the Design Research Society International Conference in Lisbon, Lisbon.
Boess, S., Saakes, D., & Hummels, C. (2007). *When is role playing really experiential? Case studies.* Paper presented at the Conference on Tangible and Embedded Interaction (TEI 2007), Baton Rouge, Louisiana, USA.
Borning, A., Friedman, B., Davis, J., & Lin, P. (2005). *Informing public deliberation: Value sensitive design of indicators for a large-scale urban simulation.* Paper presented at the ECSCW 2005, Paris.
Boud, D., Keogh, R., & Walker, D. (2005). What is reflection in learning. In D. Boud, R. Keogh & D. Walker (Eds.), *Reflection: Turning experience into learning*. London: Routledge Falmer.
Brandt, E., & Grunnet, C. (2000). *Evoking the future: Drama and props in user centered design.* Paper presented at the Participatory Design Conferance (PDC 2000), Palo Alto.

Buchauer, A., Pohl, U., Kurzel, N., & Haux, R. (1999). Mobilizing a health professional´s workstation: Results from an evaluation study. *International Journal of Medical Informatics, 54*(2), 105 - 114.

Buchenau, M., & Suri, J. F. (2000). *Experience prototyping.* Paper presented at the Conference on Designing Interactive Systems (DIS 2000), New York.

Burns, C., Dishman, E., Verplank, W., & Lassiter, B. (1994). *Actors, haridos & videotape - informance design.* Paper presented at the Conference of Human Factors in Computing Systems (CHI 1994), Boston, Massachusetts, United States

Buxton, B. (2007). *Sketching the user experiences: Getting the design right and the right design*. Canada: Morgan Kaufman Publishers.

Bødker, Ehn, P., Kyng, M., Kammersgaard, J., & Sundblad, Y. (1987). An utopian experience: On design of powerful computer-based tools for skilled graphic workers. In G. Bjerknes, P. Ehn & M. Kyng (Eds.), *Computers and democracy: A Scandinavian challenge* (pp. 251 - 279). Aldershot: Avebury.

Bødker, Nielsen, & Petersen (2000). *Creativity, cooperation and interactive design.* Paper presented at the Conferance on Designing Interactive Systems (DIS 2000), New York.

Bødker, S., & Buur, J. (2002). The design collaboratorium - a place for usability design. *ACM Transactions om Computer-Human Interaction, 9*(2), 152 - 169.

Bødker, S., Ehn, P., Kyng, M., Kammersgaard, J., & Sundblad, Y. (1997). An utopian experience: On design of powerful computer-based tools for skilled graphic workers. In G. Bjerknes, P. Ehn, M. Kyng & K. Nygaard (Eds.), *Computers and democracy: A Scandinavian challenge* (pp. 251 - 279). Aldershot: Avebury.

Carroll, J. M. (1995). *Scenario-based design : Envisioning work and technology in systems development* New York: Wiley.

Chaudhry, B., Wang, J., Wu, S., Maglione, M., Mojica, W., Roth, E., et al. (2006). Systematic review: Impact of health information technology on quality, efficiency, and cost of medical care. *Annals of Internal Medicine*(144), 742 - 752.

Dunlop, M., & Brewster, S. (2002). The challenge of mobile devices for Human Computer Interaction. *Personal and Ubiqutious Computing, 6*(235-236).

Ehn, P. (1988). *Playing the language-games of design and use: On skill and participation.* Paper presented at the Conference Sponsored by ACM SIGOIS and IEEECS TC-OA on Office information systems, Palo Alto, California, United States.

Ehn, P. (1993). Scandinavian design: On participation and skill. In D. Schuler & A. Namioka (Eds.), *Participatory design: Principles and practices.* (pp. 41-78). Hillsdale, NY: Lawerence Erlbaum Associates.

Esbjörnsson, M., Juhlin, O., & Östergren, M. (2004). Traffic encounters and Hocman: Associating motorcycle ethnography with design. *Personal Ubiquitous Computing*(8), 92 - 99.

Fiske, S. T. (2005). Social cognition and the nature of prejudgment fifty years after Allport. In J. F. Davido, P. Glick & L. A. Budman (Eds.), *On the nature of prejudice*. Gospons, India: Blackwell Publishing.

Friedman, B., Kahn., P. H., & Borning, A. (2006). Value sensitive design and information systems. In D. Galletta & P. Zhang (Eds.), *Human-computer interaction and management of information systems: Applications* (Vol. 6, pp. 348 - 372): M. E. Sharpe.

Godden, D. R., & Baddeley, A. D. (1975). Context-dependent memory of two natural environments: On land and under water. *British Journal of Psychology, 66*, 90 - 104.

Goles, T., & Hirschheim, R. (2000). The paradigm is dead, the paradigm is dead... long live the paradigm: The legacy of Burrell and Morgan. *The International Journal of Management Science, 28*, 249 - 268.

Grudin, J. (1991). Interactive systems: Bridging the gaps between developers and users. *Computer, 24*(4), 59 - 69.

Gulliksen, J., Boivie, I., & Persson, J. (2004). *Making a difference: A survey of the usability profession in Sweden.* Paper presented at the Nordic Conference on Human-Computer Interaction (NordiCHI 2004), Tampere, Finland.

Hagen, P., Robertson, T., Kan, M., & Sadler, K. (2005). *Emerging research methods for understanding mobile technology use (OZCHI 2005).* Paper presented at the Australia Conference on Human-Computer Interaction, Canberra, Australia.

Herbig, B., Büssing, A., & Ewert, T. (2001). The role of tacit knowledge in the work context of nursing. *Journal of Advanced Nursing, 34*(5), 687 - 695.

Houde, S., & Hill, C. (1997). What do prototypes prototype? . In M. Helander, T. Landauer & P. Prabhu (Eds.), *Handbook of human-computer interaction*. Amsterdam: Elsevier

Howard, S., Carroll, J., Murphy, J., & Peck, J. (2002). *Using "endowed props" in scenario-based design.* Paper presented at the Nordic Conference on Human-Computer Interaction (NordiCHI 2002), Århus, Denmark.

Howard, S., Carroll, J., Murphy, J., Peck, J., & Vetere, F. (2002). *Provoking innovation: Acting-out in contextual scenarios.* Paper presented at the HCI 02, London.

Iachello, G., & Terrenghi, L. (2005). Mobile HCI 2004: Experience and reflection. *Pervasive Computing, 4*(1), 88 - 91.

Iacucci, G., Iacucci, C., & Kuutti, K. (2002). *Imagening and experiencing in design, the role of performances.* Paper presented at the Nordic Conference on Human-Computer Interaction (NordiCHI 2002), Århus, Denmark.

Iacucci, G., & Kuutti, K. (2002). Everyday life as a stage in creating and performing scenarios for wireless devices. *Personal and Ubiquitous Computing, 6*, 299 - 306.

Iacucci, G., Kuutti, K., & Ranta, M. (2000). *On the move with a magic thing: role playing in concept design of mobile services and devices.* Paper presented at the Conference on Designing Interactive Systems (DIS 2000), New York.

ISO13407 (1999). *ISO 13407 Human-centred design processes for interactive systems*. London: British Standards Institution.

Johnstone, K. (1979). *Impro: Improvisation and the theatre*. New York: Routledge.
Jones, M. R. (2003). Computers can land people on Mars, why can't they get them to work in a hospital? Implementation of an Electronic Patient Record system in a UK hospital *Methods of Information in Medicine*(4), 410 - 415.
Kjeldskov, J., & Graham, C. (2003). A review of mobile HCI resarch methods *Lecture notes in computer science*. Berlin: Springer.
Kjeldskov, J., & Stage, J. (2004). New techniques for usability evaluation of mobile systems. *International Journal of Human-Computer Studies, 60*, 599 - 620.
Klein, H. K., & Myers, M. D. (1999). A set of principles for conducting and evaluation interpretive field studies in information systems. *MIS Quarterly, 23*(1), 67 - 93.
Koppel, R., Metlay, J. P., Cohen, A., Abaluck, B., Localio, A. R., Kimmel, S. E., et al. (2005). Role of computerized physician order entry systems in facilitating medication errors. *JAMA, 293*(10), 1197 - 1203.
Kushniruk, A., Triola, M., Stein, B., Borycki, E., & Kannry, J. (2004). *The relationship of usability to medical error: An evaluation of errors associated with usability problems in the use of a handheld application for prescribing medications.* Paper presented at the MEDINFO 2004.
Kuutti, K., Iacucci, G., & Iacucci, C. (2002). *Acting to know: Improving creativity in the design of mobile services by using performances.* Paper presented at the Creativity & Cognition (C&C 2002), Loughborough, UK.
Law, L.-C., & Hvannberg, E. T. (2002). *Complementary and convergence of heuristic evaluation and usability test: A case study of UNIVERSAL Brokerage Platform.* Paper presented at the NordiCHI 2002, Århus, Denmark.
Lærum, H. (2004). *Evaluation of electronic medical records systems: A clinical task perspective.* Unpublished Doctoral Thesis, Norwegian university of science and technology, Trondheim.
Macaulay, C., Jacucci, G., O´Neill, S., Kankaineen, T., & Simpson, M. (2006). The emerging roles of performances within HCI and interaction design. *Interacting with computers, 18*(5), 942 - 955.
Mackay, W. E., & Fayard, A.-L. (1997). *HCI, natural science and design: A framework for triangulation across disciplines.* Paper presented at the Designing Interactive Systems (DIS´97), Amsterdam.
Mahmood, A., Mo, Burn, J. M., Geomets, L. A., & Jacques, C. (2000). Variables affecting information technology end-user satisfaction: a meta-analysis of the empirical literature. *International Journal of Human-Computer Studies, 52*(4), 751-771.
Mao, J.-Y., & Vredenburg, K. (2001). *User-centered design methods in practice: A survey of the state of the art.* Paper presented at the 2001 conference of the Centre for Advanced Studies on Collaborative research, Toronto.
Mayer, R. E. (1999). Fifty years of creativity research In R. J. Sternberg (Ed.), *Handbook of creativity*. New York: Cambridge University Press.
McKeen, J. D., & Guimaraes, T. (1997). Successful strategies for user participation in systems development. *Journal of Management Information Science, 14*(2), 133-150.

McKeen, J. D., Guimaraes, T., & Wetherbe, J. (1994). Contingency factors affecting user participation and user satisfaction: Task complexity, system complecity, user influence, and user-developer communication. *MIS Quarterly, 18*(4), 427-451.

Metho, K., Kantola, V., Tiitta, S., & Kankainen, T. (2006). Interacting with user data - Theory and examples of drama and dramaturgy as methods of exploration and evaluation of user-centered design. *Interacting with Computers, 18*(5), 977 - 995.

Moreno, J. L. (1946 [1972]). *Psychodrama* (Vol. 1). New York: Beacon House.

Muller, M. J. (2003). Participatory design: The third space in HCI. In J. A. Jacko & A. Search (Eds.), *The human-computer interaction handbook: Fundamantals, evolving technologies and emerging applications*: Lawrence Erlbaum Associates.

Mumford, E. (1984). Participation from Aristotle to today. In T. Bemelmans (Ed.), *Beyond productivity: Informations systems development for organizational effectiveness* (pp. 95 - 104). Elsevier: North-Holland.

Myers, M. D. (1997). Qualitative research in information systems. *MIS Quarterly, 21*(2), 241 - 242.

Mørch, A. I., Engen, B. K., & Åsand, H.-R. H. (2004). *Cases and experiences: The workplace as a learning laboratory: the winding road to E-learning in a Norwegian service company.* Paper presented at the Conference on Participatory Design (PD 2004), Toronto, Canada.

NCVHS, N. C. o. V. a. H. S. (2007). *Enhancing protections for uses of health data: A stewardship framework for "secondary uses" of electronically collected and transmitted health data*. Hyattsvill, Maryland: US Department of Health and Human Services.

Nelson, H. G., & Stolterman, E. (2003). *The design way*. New Jersey: Educational Technology Publications.

Newell, A., Chamichael, A., Morgan, M., & Dickinson, A. (2006). The use of theatre in requirements gathering and usability studies. *Interacting with computers*(18), 996 - 1011.

Nielsen, C. M., Overgaard, M., Pedersen, M. B., Stage, J., & Stenild, S. (2006). *It´s worth the hassle! The added value of evaluating usability of mobile systems in the field.* Paper presented at the NordiCHI 2006, Oslo.

Oulasvirta, A., Kurvinen, E., & Kankainen, T. (2003). Understanding context by being there: case studies in bodystorming. *Personal and Ubiquitous Computing, 7*(2), 125 - 134.

Paulus, P. B., & Nijstad, B. A. (2003). Group creativity: An introduction. In P. B. Paulus & B. A. Nijstad (Eds.), *Group creativity: Innovation through collaboration*. Oxford: Oxford University Press.

Po, S., Howard, S., Vetere, F., & Skov, M. B. (2004). *Heuristic evaluation of mobile usability: Bridging the realism gap.* Paper presented at the Mobile Human-Computer Interaction, Glasgow, Scotland.

Preece, J., Sharp, H., Benyon, D., Holland, D., & Carey, T. (1994). *Human-computer interaction*. Harlow: Addison-Wesley.

Rettig, M. (1994). Prototyping for tiny fingers. *Communcations of the ACM, 37*(4), 21 - 27.

Rice, M., Newell, A., & Morgan, M. (2007). Forum theatre as a requirements gathering methodology in the design of a home telecommucation system for older adults. *Behaviour & Information Technology, 26*(4).
Riksdag, T. (1977). *Arbeidsmilölagen [Joint Regulation Act]*. Sweden.
Robson, C. (2002). *Real world research* (2 ed.): Blackwell Publishing.
Rodriguez, J., Diehl, J. C., & Christiaans, H. (2006). Gaining insight into unfamiliar contexts: A design toolbox as input for using role-play techniques. *Interacting with Computers, 18*(5), 956.
Rossiter, J. R., & Lilien, G. L. (1994). New "brainstorming" principles. *Australian Journal of Management*(19).
Røhme, K., & Kjekshus, L. E. (2001). Når tiden telles: Sykehuslegers tidsforbruk og arbeidsoppgaver. *Tidskrift for Norske Lægeforening, 121*, 1458 - 1461.
Sa, M. d., & Carrico, L. (2008). *Lessons learnt from early stages design of mobile applications.* Paper presented at the MobileHCI 2008, Amsterdam.
Salvador, T., & Howells, K. (1998). *Focus troupe: using drama to create common context for new product concept end-user evaluations.* Paper presented at the Conference of Human Factors in Computing Systems (CHI 1998), Los Angeles, California, United States.
Sato, S., & Salvador, T. (1999). Playacting and focus troupes: Teather techniques for creating quick, intense, immersived, and engaging focus group sessions. *Interactions, 6*(5), 35-41.
Schön, D. A. (1991). *The reflective practitioner: How professionals think in action* Aldershot, England: Asgate
Seland, G. (2006). *System designer assessments of role play as a design method: A qualititive study.* Paper presented at the Nordic Conference on Human-Computer Interaction (NordiCHi 2006), Oslo.
Seland, G. (2009). *Empowering end users in design of mobile technology using role play as a method.* Paper presented at the HCI International, San Diego, USA.
Simsarian, K. T. (2003). *Take it to the next stage:The roles of role playing in the design process.* Paper presented at the Conference of Human Factors in Computing Systems (CHI 2003), Ft. Lauderdale, Florida, USA.
Smith, A., Goodwin, D., Mort, M., & Pope, C. (2003). Expertice in practice: An ethnographic study exploring acquisition and use of knowledge in anaesthesia. *Britsh Journal of Anaesthesia, 91*(3), 319 - 328.
Stangor, C., & Schaller, M. (1996). Stereotypes as individual and collective representations. In C. N. Macrae, C. Stangor & M. Hewstone (Eds.), *Stereotypes and stereotyping*. New York: The Guilford Press.
Stanislavski, C. (1940). *En skuespillers arbejde med sig selv* (E. Rovsing, Trans.). København: Nyt Nordisk forlag.
Stanislavski, K. (1948). *An actor prepares*. New York: Theatre Art Books.
Strauss, A. L., Fagerhaugh, S., Suczek, B., & Wiener, C. (1997). *Social organization of medical work*. New Brunswick, NJ: Transaction Publishers.
Strömberg, H., Pirttilä, V., & Ikonen, V. (2004). Interactive scenarios - building computing concepts in the spirit of participatory design. *Personal and Ubiquitous Computing, 8*, 200-207.

Suchman, L. A. (2007). *Human - machine reconfigurations: Plans and situated actions* (2 ed.). Cambridge: Cambridge University Press.

Svanæs, D., Alsos, O. A., & Dahl, Y. (2008). Usability testing of mobile ICT for clinical setting: Methodological and practical challenges. *International Journal of Medical Informatics*.

Svanæs, D., & Gulliksen, J. (2008). *Understanding the context of design: Towards a tactical user centered design.* Paper presented at the NordiCHI 2008, Lund, Sweden.

Svanæs, D., & Seland, G. (2004). *Putting the users center stage: Role playing and low-fi prototyping enable end users to design mobile systems.* Paper presented at the Conference on Human Factors in Computing Systems (CHI´04), Vienna, Austria.

Sørby, I. D., Melby, L., Dahl, Y., Seland, G., Toussaint, P., Nytrø, Ø., et al. (2009). The MOBEL project: Experiences from applying user-centred methods for designing mobile ICT for hospitals In K. Khoumbati, Y. K. Dwidedi, A. Srivastava & B. Lal (Eds.), *Handbook of research on advances in health informatics and electronic healthcare applications: Global Adoption and Impact of Information Communication Technologies*. Hershey, USA.: IGI Publishing.

Sørby, I. D., Melby, L., & Seland, G. (2005). Using scenarios and drama improvisation for identifying and analysing requirements for mobile electronic patient records. In J. L. Maté & A. Silva (Eds.), *Requirement engineering for socio-technical systems*. Hersley: Information Science Publishing.

Toulmin, S. (2001). *Return to reason*. Cambridge: Harvard University Press.

Urnes, T., Weltzien, Å., Zanussi, A., Engbakk, S., & Rafn, J. K. (2002). *Pivots and structured play: Stimulating creative user input in concept development.* Paper presented at the Nordic Conference on Human-Computer Interaction (NordiCHI 2002), Århus, Denmark.

Vavoula, G. N., & Sharples, M. (2007). Future technology workshop: A collaborative method for the design of new learning technologies and activities. *Computer-Supported Collaborative Learning, 2*, 393 - 419

Vogiazou, Y., Freeman, J., & Lessiter, J. (2007). *The use of improvisational role play in user centered design processes.* Paper presented at the HCI International, Beijing, China.

Yardley-Matwiejczuk, K. M. (1997). *Role play: Theory and practice*. London: SAGE Publications.