

THE UTILITY OF ROLE-PLAYING METHODS IN DESIGN IDEATION

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ABSTRACT

Role-playing methods have been widely used as tools to assist design ideation in research literature. However, there has been little research done to assess their utility and compare them to more traditional ideation methods. This research aims to evaluate the utility of role-playing methods by comparing the outcome scenarios of four role-playing ideation sessions with users with the outcome scenarios of two non-role-playing sessions with users. The findings show that role-playing sessions are more generative of use-situations than non-role-playing session. Also, role-playing scenarios, overall, contained more allusions to communications between actors, more physical activities, more physical interactions with other people and objects, and more explicit description of spatial movements than non-role-playing scenarios. The research findings confirm the utility of role-playing methods as effective tools for design ideation with users. Additionally, the research points to methodological aspects that can potentially improve the results from the conducting of role-playing sessions.

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CHAPTER 1: INTRODUCTION

1.1 Challenges and processes of ideation for interactive technologies and services

Information and computer technologies have had a rapid progress in the past thirty years creating a space for many new possibilities for interactive technologies and services. However, arriving at design ideas that have real utility and value for potential users is not always easy and involves a good understanding of them and their needs. Without this understanding, a seemingly innovative or brilliant technology can easily be shunned by users for lack of real utility, or cause them un-necessary problems and frustrations. That is why efforts toward understanding user's needs and their activities are pivotal for the design process of interactive technologies and have been considered in the process of design in the past two decades. The process of interaction design also involves "developing alternative ideas to fulfil user's needs, building prototypes to assess the ideas and evaluating the prototypes and final product" (Sharp, Rogers & Preece, 2006, p.12). Obviously, designers need methods and approaches that support them in each of these four stages of design. Several approaches to design such as cognitive engineering, user-centred design and participatory design believe the focus on users of systems is pivotal in designing better design solutions. However, the way each of these approaches focus on users is different from each other (Atwood, McCain & Williams, 2002).

User-centred design methods encourage early focus on users and their tasks (Gould & Lewis, 1985). These methods, usually obtain information about users and their tasks by formal or informal interviews and focus groups, ethnography and contextual field studies. Developing alternative ideas in this method, usually takes place among designers or the multidisciplinary design team, using methods such as brainstorming, sketching, storyboarding and developing scenarios (for e.g. Leffingwell & Widrig, 2003). User's active involvement in ideation in user-centred design methods is usually limited and if any, it is constrained to brainstorming along with different stakeholders (for e.g. Leffingwell & Widrig, 2003). On the other hand, users are more frequently invited to evaluate ideas and final prototypes. Potential users are asked to evaluate design concepts, presented in form of storyboards or scenarios. Or, more commonly, they are recruited to evaluate the usability of final prototypes within the setting of a traditional usability testing session which usually takes place in the designer's office or usability lab.

In contrast to user-centred design methods, participatory design methods actively engage users in the design process. Their goal is to access more of the tacit knowledge of users and move beyond static descriptions of their work processes (Bodker, Greenbaum & Kyng, 1991). In a typical participatory design process, users not only express their views and problems by discussions with designers, but also directly contribute to understanding the context of the problem by creating scenarios of their activities; and to the generation and development of ideas by building mock-ups, or testing mock-ups that are made by designers (For

e.g. Kyng, 1994). In participatory methods, users and designers work together as team members. In such a setting, communication between designers and users, who normally come from different backgrounds and have different practice jargons and experiences, is a challenge. To overcome this, participatory design methods focus on designing activities and planning workshops that organize the participation between the designers and users and enhance the communication between them. These activities are understood as “design language games” (Ehn & Sjorgen, 1991.p. 253), which are not games for competition, but rather engaging activities to build a common ground among designers and users and help users and designers to envision and experience a future (Ehn & Sjorgen, 1991).

Both user-centred design methods and participatory design methods develop and utilize scenarios of use in their design process. Although they use and develop scenarios in slightly different ways, they both see them as tools for contextualizing the design ideas and communicating ideas (for e.g. Carroll, 2000; Kyng, 1995; Nardi, 1992). In user centred design methods, scenarios are either developed after fieldwork and interviews (Rosson and Carroll, 2002), or are developed based on the design teams imagination (Campbell, 1992). In both cases, it is the designers or developers who craft the original scenarios. These original scenarios, are edited and expanded ,based on the needs of the designers in different phases on design to help rationalize the ideas, gather requirements, design information and interaction and perform usability evaluations.(Rosson and Carroll, 2002) .In participatory design, users of the

technology frequently craft and create scenarios in collaboration with designers. These scenarios, called *use-scenarios*, are used as a base to contextualize simulating future work and testing preliminary mock-ups of design with potential users (Kyng, 1995). Use-scenarios are not the only type of scenarios developed in participatory design, but other kinds of scenarios such as *requirements scenarios* and *explanation scenarios* are usually developed by designers alone, in order to discuss technical details and design rationale as a follow up to participatory workshops where use-scenarios were deployed (Kyng, 1995).

1.2 The use of role-playing in the design process

Macaulay, Iacucci, O'Neill, Kankainen and Simpson (2006) believe that role-playing methods were developed and used in design motivated by three different research programs: user experience, participatory design and embodied interaction. Almost all three of these programs explore role-playing based on a need to move beyond the static descriptions of scenarios. While the user experience programme looks for methods that support designing for user experience and considering pleasure, enjoyment, emotional and cultural aspects; participatory design programme is concerned with techniques that would facilitate the participation of users in the design process and bring in the lived experience of users instead of scripted representations of work (Macaulay et al. 2006). The embodied interaction research programme, according to Macaulay et al., has a different agenda from the other two programmes since it is not only concerned with techniques to improve the design process, but rather a perspective that

embraces the physical environment, and “the role of body, beyond ergonomics, for its’ increased relevance as a presentational, representational, and experimental medium” (ibid. p.946).

Macaulay et al. (2006) Also cite examples of research projects that have used role-playing in different stages of the design process, these include early explorations of the design space by Iacucci et al., requirements generation by Newell et al. and evaluations of crafted product by Mehto et al. Of course, these examples are representative and not inclusive. Iacucci G., Iacucci C., and Kuutti (2002) explain and cite three different roles for role-playing in the design process: exploration of contexts and ideas, communication and testing. It is worth mentioning that many role-playing methods are deployed in a process that results in developing or refining scenarios of use (for e.g. Binder, 1999; Brandt & Grunnet, 2000; Iacucci et al, 2000).

According to Boess, Saakes and Hummel (2007), role-playing has been used in design for the following reasons: “communication within the design process, the increase of technological complexity, the experience and empathy of designers, the tangibility of interaction, and attentiveness to social change”. Seland (2006) contends that the reasons for using role-playing are described as the need for “understanding users and contexts, exploring, testing and communicating ideas, the involvement of users, enhancing the design process and other reasons that include the design of mobile technology.” Those who have developed or used role-playing techniques and methods in design report several benefits for the use of these methods; however, many of these benefits remain

unverified by other researchers. The reason may be partly that the techniques are not often repeated before being modified by another researcher and that only a few researchers have developed guidelines that may enable others to conduct their role-playing workshop. On the other hand, most of the developed workshops do not have detailed guidelines for facilitating enactments and organizing participation of the people who are involved. What is left is a vast array of techniques and arrangements that are not detailed enough to be repeated, or tested thoroughly enough to be used with confidence in non-experimental design situations.

This research is a step toward verifying the utility of role-playing methods, and understanding their specific contributions to the ideation and exploration of contexts of use. It is also expected, that the results of the research will both shed light on the important issues that need to be considered when performing role-playing workshops and be a step toward developing the methods and the guidelines for conducting role-playing based design ideation.

1.3 Research questions and research design

This research more specifically aims to answer the following questions:

- 1. What is the contribution of role-playing methods to the discovery and exploration of contexts of use in design ideation?**
- 2. What is the contribution of role-playing methods to understanding user's activities and their mobile and embodied aspects in design ideation?**

There are claims, in the literature, that role-playing methods enhance discovery and exploration of use contexts, especially in situations where the physical and mobile aspects play a role in use of technology (Iacucci & Kuutti, 2002; Strömberg, Pirttilä, & Ikonen, 2004). In order to verify these claims, and better understand the general utility of role-playing methods in ideation, I attempted to study the outcome of two types of role-playing methods for evidence of shared patterns and contrast them with outcome of a more traditional method, which did not involve role-playing. One of the role-playing methods that I chose is described by Simsarian (2003) as a method that is already used in the IDEO and the other is a method developed by Iacucci, Kuutti and Ranta (2000) in the process of *GO research project* in Europe. Both methods actively involve the users in ideating, role-playing and creating scenarios of use. Additionally, in both methods, participants create and use mock ups of the envisioned technology and enact physical interaction with them. However, they have some difference with this respect: In Iacucci et al.'s method, participants enact the scenarios using a toy character and a small mock up of the environment and are not entirely involved in physical enactment. While in contrast, in Simsarian's workshop, participants enact the scenarios, with their whole body, in a simulated representation of the target environment. The non-role-playing method, which I used as a contrasting baseline, was a workshop that consisted of brainstorming for problems and design solutions and round-table discussions for developing scenarios of use. Brainstorming in this fashion is the norm in ideation processes in the industry (Leffingwell & Widrig, 2003). Also creating scenarios of use, with

or without the collaboration of potential users, based on field data or interviews is a routine practice in both commercial and research settings (Carroll, 2000; Kelley and Littman, 2005; Nardi, 1992).

Each type of method was run two times, with a different set of participants, the outcome of each being user-generated written scenarios. I analyzed these scenarios along a framework of *elements of user interaction scenarios* developed by Rosson and Carroll (2002), with the aim of understanding the common patterns of role-playing workshop scenarios and comparing those with patterns seen in brainstorming scenarios.

1.4 The structure of this thesis

This document has been divided in seven chapters. The second chapter provides an overview of the history of use of role-playing in the design, and explains how the method has played different roles in aiding of ideation and exploration of contexts, communicating design ideas and situations of use, and testing design ideas. It concludes with a summary of the rationale for using the method and the reported gains of the method.

Chapter 3 describes the research design, and the methodology followed for running the workshops with potential users of a technology.

Chapter 4 initially focuses on the framework that was selected and modified to analyze the outcome scenarios of role-playing workshops, and continues on to report the results of the analysis based on this framework.

Chapter 5 attempts to answer the research questions by interpreting and summarizing the results.

Chapter 6 discusses the findings and their alignment with other research and attempts to explain the discrepancies.

Chapter 7 draws the conclusions of the research and provides suggestions for future research.

CHAPTER 2: LITERATURE REVIEW

A look at design and computing science literature reveals a trend toward interests in exploring and experimenting with role-playing methods in design, by researchers who have delved in this field since the 1970's. Since 1990, the topic of role-playing in design has been continually addressed in accredited HCI conferences. Some researchers see the potential of role-playing in enabling enriched design exploration by taking user experience and embodied interaction into account, and helping in the organization of user and designer participation (Macaulay et al., 2006).

In this section, I will provide a broad view of how role-playing or using a more correct term, performative activity or performance is used in design. In doing so, I will point to the rationale of using this method, as well as the reported gains and benefits of it. I will then draw attention to the gap of knowledge in this area of research, which has motivated my research.

2.1 Performance based methods in design;

Role-playing was first used in design in the 1970's and early 1980's, in the pioneering work of Ehn and Sjorgren (1991). Ehn used role-play under the concept of *design games* or *design-by-playing*. Design games were games played not for competition but for supporting the participants' common understanding, expression of ideas and involved dialogue, and engaged and

pleasurable participation. Not all design games were role-playing games, however many of them did indeed incorporate an element of role-playing. For example *Carpentrypoly* that was similar to monopoly was played with a group of carpenters; the carpenters would play different roles ranging from factory owners to factory workers around a board, *desktop publishing game* involved employees of the publishing department of *Konsumentverket* and was played around a table and a board named *playground*. Neither of these games involved physical and bodily enactment. Ehn and Sjorgen (1991) state that the main goal of these games was to give the participants an opportunity to envision and experience work organization and technology alternatives. In 1995, Kyng (1995) systematized the use of mock- ups, which was already established in co-operative design, into workshops where potential users would interact with a physical mock up in the context of scenarios of their workplace. This experience provided a common ground for designers and potential users to discuss the evolving design idea, and to experience and discover situations where break downs might occur. In this way, both designers and users would enhance their understanding of the design concepts, the design requirements, and situations of use.

In 1994, Burns, Dishman, Verplank, and Lassiter, who came from the user- centred design school approach to design, used role-playing in their work to improvise a technology which could be used in a hair salon. Later, they enacted the detailed scenario in front of their peers to communicate their design concept and the context of use and, thereby, named the technique *Informance*. Since

then, researchers in different parts of the world have tried role-playing methods in many various ways. Apart from the difference in the rationale and ideology that motivates the different attempts and techniques, these methods also formally differ based on who enacts, what performance or theatrical techniques are used, and what role the performance actually plays within the design process. Seland (2006) mentions two other factors that differ across various methods: where the role-playing is carried out and where the prototypes come from (designed through the process or created beforehand).

2.1.1 Who acts in design role-plays?

In many projects the main actors of the performance, or improvisation, are the designers themselves. This is the case in *bodystorming* (Oulasvirta, Kurvinen, & Kankainen, 2003), *experience prototyping* (Buchenau & Suri, 2000) and *Informance* (Burns et al., 1994). In some other projects, only the potential users are involved in the enactment of roles. These projects include Svanaes and Seland's workshop (2004) with healthcare providers, and Urnes, Weltzien, Zanussi, Engbakk, and Rafn's (2002) workshop that explored a universal interface for smart homes with people with different backgrounds. Finally, some methods use a combination of the approaches described above, and encourage both designers and users, to act along with each other. Both Iacucci et al.'s (2000) *Situated and participative enactment of scenarios* method and Simsarian's (2003) role-playing workshops that are carried out in IDEO are examples of this. In contrast, methods such as *endowment with props* (Howard, Carroll, Murphy, &

Peck, 2002a) and *focus troupe* (Salvador & Howells, 1998) simply employ professional actors to perform for a group of designers and other stakeholders. It has been reported, on occasion, that enacting roles may be very hard for people with no experience in theatrical expression. However, the power of enactment in creating a subjective and embodied experience, and illustrating a multimodal picture of an event or experience, has inspired many designers to try enacting themselves or explore methods for empowering potential users in enactment.

2.1.2 Different forms of enactment and performance in design:

While not many of the performative techniques and methods used in design are clearly based on dramatic concepts or techniques. It is good to situate these efforts in the concepts developed and used in theatre.

2.1.2.1 Improvisations:

Pure improvisation, or the simplest description of it as an art form, can be defined as the “simultaneous conception and performance of a work” (Smith & Dean, 1997, p.26). Frost and Yarrow, as cited in Smith and Dean (1997), define dramatic improvisation as:

the skill of using bodies, space, all human resources, to generate a coherent physical expression of an idea, a situation, a character (even perhaps, a text); to do this spontaneously, in response to the immediate stimuli of one’s environment, and to do it *à l'improviste*: as though taken by surprise, with out preconceptions (ibid. p. 25) .

In professional theatre, improvisational performance usually includes interaction with the audience and using their input as one of the sources of improvisation. The above definitions define improvisation strictly as an effort that

happens in the moment and is not based on any previous decisions or scripts; however, Smith and Dean (1997) point to a “gradient of creative endeavour from pure improvisation to composition” which does not have absolute borders (p.26). Lying somewhere along this gradient are performances that can be considered “applied improvisations” or “workshopping in private” (ibid. p.28). These, according to Smith and Dean (1997), can be part of the creative process for creating a composed work or performance. Here, the improvisations are an essential tool for evolving the play and “resituate the role of the playwright” (ibid. p.29).

Using the definitions above we can conclude that many role-playing workshops, in design, use “applied improvisations” in order to build a story or scenario of use that can be later performed or recorded for an audience of team members or users. Throughout the process of these improvisations, the people involved in the enactments evolve ideas of a technology and the details of the contexts of its use, and in some cases the characters of the potential end users as well. Examples of these kinds of improvisations can be seen in the work of Burns and colleagues (1994) who improvised scenarios for the use of a technology in a hair salon, and later enacted the fixed and refined scenario in front of their peers; Svanaes and Seland’s (2004) workshop with healthcare providers who applied improvisations to the creating and performance of scenarios of their workplace; and Binder’s (1999) work with plant technicians that improvised the uses of a mobile technology at their workplaces, and later enacted the scenario for recording on video. On the other hand, Strömberg and

colleague's interactive scenario workshops (2004), where researchers and users used drama improvisation techniques, such as writing ideas on pieces of paper, are an example of interactive improvisations, where the audience affects the course of the improvisation, as it is unfolding. In their technique, the actors had to pick up the pieces of paper, read them and incorporate them into their on-going performance.

Most improvisations for design occur in closed spaces where the attempt is made to simulate the original space by using simple décor and props. However some methods as Iacucci et al.'s (2000) *SPES* (Situating and Participative Enactment of Scenarios) method, and the *act it out in context* method of Howard et al. (2002b), run the improvisations in real contexts, without a script, and sometimes follow the everyday life of the user-participants. These contextual enactments are considered role-play, despite the fact that the actors do not play imaginary roles, because they interact with a prop or mock up and imagine it to be a real device that can fulfil their needs in different contexts.

2.1.2.2 Scripted performances:

Scripted enactments can be based on scripts that have previously evolved by using applied improvisations such as Svanaes and Seland's (2004) workshop with healthcare providers. Here, the healthcare providers created a script and enriched it through improvisations. In other cases the scripts can be written by users, or be based on user's stories that are narrated in a workshop, as is the case in Kankainen, Kantola, Mehto and Tiitta's (2005) experience with retired people using a playback theatre method. Finally, scripts can be written by the

design team based on their observations in field studies. An example of the latter is the backbone scenarios provided by the design team for the actors in endowed props workshops (Howard et al., 2002a).

The actors of scripted enactments can be the users themselves (Svanaes & Seland, 2004), the designers (Burns et al., 1994), or actors (Marquis-Faulkes, McKenna, Gregor, & Newell, 2003; Salvador & Howells, 1998). These enactments usually take place in simulated closed spaces in front of an audience, or can be video taped and shown to the audience later. For example in Marquis – Faulkes et al.'s work (2003) , professional actors acted out scenarios of using a home monitoring system which was videotaped and later shown to the elderly users.

2.2 The role of performances and enactments in design

Performances can play three main roles in design: exploration, communication and evaluation (Iacucci et al., 2002). I have further expanded these concepts below:

2.2.1 Exploration:

Role-playing has been used to explore different issues in the initial phases of the design process: from understanding the user and his or her practices or life routines, to exploring different design ideas and contexts of use.

2.2.1.1 Understanding the users' characters, lifestyles, values and social roles:

The literature reveals that different drama techniques have been used with the goal of understanding the potential users of a technology. For instance, Burns et al. (1994) improvised the actions and dialogues of a hairstylist and his clients to explore their characters, interactions and values. Brandt and Grunnet (2000) explored refrigerator technicians' characters and lifestyles using the *frozen images* technique based on Gustav Boal's interactive drama, while Howard et al. (2002a) used professional actors to personalize a potential user's character, with the help of a theatre director.

2.2.1.2 Understanding existing practices and routines and their social, emotional, cognitive and cultural contexts:

Researchers have used improvisation, and the enactment of the sequences of a user's work and practice, for various reasons. One reason is to arrive at a uniform understanding of the physical details of the user's activities and to acquire the tacit knowledge involved in their work (Brandt and Grunnet, 2000). Another reason is to gain a subjective understanding of the emotional, cognitive and physical experience of the users, such as in Buchenau and Fulton Suri's (2000) *experience prototyping* efforts. Here, the design team enacted the role of patients who had fibrillator pacemakers. The patients would receive sudden calls from other members of the team, in different contexts of everyday life, telling them to imagine that they were having a stroke in that context. Other researches have asked users to enact scenarios of their daily lives to facilitate

the researchers and developers understanding of their practices or life routines (for e.g. Svanaes & Seland, 2004; Urnes et al., 2002).

2.2.1.3 Exploring new use-scenarios and design concepts (ideation):

A large part of the literature in role-play and drama-based activities in design fall within this category, or have this category as their focus. In many of these instances, role-play rides shoulder to shoulder with ideation, or in other words, drama enactments are the main tool for ideational creativity. Although there are several examples given in the literature, the following examples are sufficient to demonstrate the significance of this category:

Simsarian (2003), reports using role-playing for idea generation and for building scenarios in teams comprised of designers, users and other stakeholders at IDEO. He shares a workshop agenda that incorporates the brainstorming of ideas, and body-storming, to refine the details of the ideas and build scenarios of use. Svanaes and Seland (2004) also describe using role-playing for ideation with users. In their experiments, which are finalized toward a structured workshop, they have asked different types of users to enact scenarios from their daily life and generate technological ideas that would fit those situations with simple material: the users are asked, as well, to enact them in front of designers and developers. Howard and colleagues (2002b) have worked on developing workshops where actors enact scenarios comprised of using a technology, and where designers and users suggest features and form factors and contexts to be incorporated into the enactment. They state that this approach “facilitates the co-evolution of the artefact and situation of use” (ibid. p.175).

Iacucci et al (2000) have developed a method where a designer and a user collaboratively come up with new design ideas as the user goes through the contexts of his everyday life. This contextual approach has also been explored by Carroll, Kjeldskov, Tobin and Vetere (2003) to build a context-aware mobile system which supports users in public transportation.

2.2.2 Communication:

In some methods, role-playing is used particularly for communicating a design idea to an audience that may consist of other designers, users or other stakeholders. These enactments are either delivered live on stage by the designers, actors or users; or are documented in videos to be delivered to the audience at a later time. Examples of live enactments can be seen in the work of Salvador and Sato (1998), Burns et al (1994), Brandt and Grunnet (2000), Marquis–Faulkes, and Colleagues (2003). Examples of using video enactments can be seen in the work of Binder (1999), Buchenau and Fulton Suri (2000), and Iacucci and colleagues (2002). We have described some of these examples in the section where we discussed scripted enactments (section 2.1.2.2).

2.2.3 Testing ideas and concepts

Testing design concepts by using mock ups and scenario scripts has been used for a long while in participatory design tradition and more systematically, in the work of Kyng, termed *co-operative design* (Kyng, 1994). In participatory design sessions described by Kyng, the design ideas are more or less defined, yet not as defined or concretely shaped as in a prototype. Use–scenarios are

written based on the users' work descriptions, the users are then asked to perform the use-scenario on a concept, which is in the shape of a low resolution mock up, such as a paper or cardboard mock up, or any other *wizard of oz* open-ended type mock up. The aim of this type of performance is to uncover breakdowns in the situations of use, to better clarify contexts of use, and to get feedback and ideas for the concept from the users themselves. A more recent example of the use of this approach can be seen in the work of Binder and Brandt (2000), which gave problem situations and/or tasks to groups of plant workers and asked them to demonstrate, and video, how they would use their concepts in context. Other examples are observed in the experiments of Iacucci et al. (2002), where they have the customers of a café explore a cardboard mock-up of an electronic tray.

2.3 What role-play offers

Both Seland (2006) and Boess et al. (2007) have summarized the rationale of using role-playing in design based on their review of the literature. Seland summarizes the reasons for using role-play in five categories: "to understand users and context of use; to explore, test and communicate ideas; to involve users; to enhance the design process; and to work with mobile technology" (ibid. p.2). Likewise, while Boess et al. also categorizes the rationales in using role-playing in design into 5 categories, theirs seem to be of a more interpretive nature, consisting of communication within the design process,

the increase of technological complexity, the experience and empathy of designers, the tangibility of interaction, and attentiveness to social change.

In this research, the literature review reveals that researchers tend to report the benefits of using role-play in several areas: creativity and ideation, exploration of contexts of use, communication, empathy with users, organizing participation, and team dynamics.

2.3.1 Creativity and ideation

Some researchers state that role-playing enhances creativity in certain areas, such as “new to the world technologies” (Simsarian, 2003, p.1012), and where user’s physical interaction with futuristic pervasive technologies and mobility come into play (Iacucci et al., 2000; Strömberg et al., 2004). Brandt and Grunnet(2000) report that role-playing, prior to brainstorming with stakeholders, resulted in a greater amount of idea generation, and enactment of use of new design concepts in front of users allowed them to realize that nothing was too wild, which encouraged them to express their own ideas. Burns et al. (1994) and Simsarian (2003) claim that enacting the use of an envisioned technology enhanced the designer’s imagination and creativity. Finally, the ideas or scenarios created by the users’ improvisations have served as a good medium to enhance designers’ creativity in expanding and refining their scenarios and prototypes (Binder, 1999; Buur et al., 2000; Iacucci et al., 2002).

2.3.2 Exploration of contexts of use

Role-playing has been reported to provide designers with insight about users and contexts of use by “simulating whole or part of the relationship between people places and objects,” (p.2) and helping the designers to obtain a subjective experience that allows for a deeper understanding of the issues involved (Buchenau & Suri, 2000). Researchers, who have tried to gain insight about users’ personality and life-style by enacting their behaviour and dialogues, report that their experiment made them aware of user’s preferences and needs (Brandt, 2000; Burns et al., 1994).

Iacucci et al. (2000) claim that role-playing supports the creation of scenarios and ideas that are context-aware. In the same line, Carroll, J., Kjeldskov, J., Tobin, D., & Vetere, F (2003) report that role-playing “provided specific information relating to technology use in context and the emergent requirements that arise from the interaction of the user with the prop in context”(p.690). Brandt & Grunnet (2000) contend that role-playing fosters a bodily understanding of user tasks, and make the testing of ideas and assumptions about the tasks easier because “bodily expression of arguments seems to be much more revealing”(p.19). Moreover, Svanaes & Seland (2004) state that role-playing takes users and developers “out of the chair and into the in the social, physical and embodied reality of mobile computing” (p.479). Additionally, researchers have reported that role-playing has aided them to understand socio-cultural contexts of use (Iacucci et al., 2000), and the emotional and cognitive needs of users in different situations (Buchenau & Suri, 2000).

2.3.3 Communication

Many researchers have reported the benefits of role-playing in the enhancement of communication between team members, designers and peers, and designers with end users. For example, Brandt and Grunnet (2000) contend that the illustration of situations and use, by role-playing, “appeals to more senses and creates a common platform for users and designers that makes the communication and understanding easier among them” (p.9). Simsarian (2003), and Buchenau and Suri (2000) report that role-playing creates a shared experience and solves the problem of different mental models. In addition, some researchers believe that acting out the scenarios enhances later recall of situations and details (Simsarian, 2003; Oulasvirta et al., 2003). Binder’s research with plant technicians (1999) demonstrates that role-playing using props makes users efficient in expressing design moves (Binder, 1999). Finally, in the realm of pervasive environments and mobile situations, Strömberg (2004) reports that role-playing is helpful, to end users, in communicating usage situations for “everyday life systems related to spaces” (p.205).

2.3.4 Empathy with users

Empathy is one of the reported results of using role-playing in design (Binder, 1999; Brandt & Grunnet, 2000; Buchenau & Suri, 2000; Burns et al., 1994; Simsarian, 2003). Researchers report that role-playing allows designers to “enter the user’s world with both body and mind” (Brandt & Grunnet, 2000, p.9),

and get a subjective understanding of the user's lives and the issues involved (Buchenau & Suri, 2000).

2.3.5 Team dynamics and organizing participation

Research claims that role-playing is successful in actively involving the users in idea generation (Buur et al., 2000; Iacucci et al., 2000; Svanaes & Seland, 2004; Urnes et al., 2002), the exploration of contexts (Brandt and Grunnet, 2000; Brandt, 2006; Buur et al., 2000; Howard et al., 2002a), and providing feedback for design ideas (Burns et al., 1994; Iacucci et al., 2002; Kankainen et al., 2005; Marquis-Faulkes et al., 2003; Salvador & Howells, 1998).

Binder (1999) reports that role-playing with plant-workers changed their role from audience to directors, while Iacucci et al (2002) claim that role-playing supports collaborative creativity. Brandt and Grunnet (2000), Marquis-Faulkes (2003) and Binder (1999) claim that role-playing, in front of users, either live or through video scenarios, has focused users and encouraged them to express their ideas and issues.

Burns et al.(1994) , Brandt and Messeter (2004) and Urnes et al.(2002) point to the similarity of role-playing and game-playing, and claim that this similarity both breaks the hierarchies between participants supporting fruitful dialogue.

Other contributions of role-playing to team dynamics have been attributed to its' potential to create a common vision and shared understanding of the

problem and ideas (Burns et al., 1994; Simsarian, 2003; Svanaes & Seland, 2004).

While claims about the use of role-playing in the design process sound very promising, the disparity and variety in the ways that role-playing has been utilized in the design process as a tool, or method makes it difficult for designers to decide which technique or method to use in practice. On the other hand, there is very limited research available that is directed at assessing and verifying the claims made about the benefits of either using role-playing techniques or following role-playing methods. In the next section, I will describe the design and methodology of my research, which attempts to fill this gap of knowledge regarding role-playing methods and techniques.

CHAPTER 3: METHODOLOGY

Few examples of research have been completed in the area of Human-Computer Interaction (HCI) or Interaction design, that specifically aim to validate or compare design methods. Those that do exist either attempt to assess the method by asking the view and experience of researchers or practitioners through questionnaires (Vredenburg, Mao, Smith, & Carey, 2002), or interviews (Seland, 2006), or by analyzing assessments that are based on how the experts, such as product designers rate or approve the artefact that is the process outcome (Oulasvirta et al., 2003)

In this research, my aim has been to understand what role-playing, as a method in general, might contribute to the exploratory and ideation phase of design by looking at the outcome of role-playing methods in the form of scenarios of use. Traditionally, in the preliminary phases of the design process, scenarios are used as a vehicle for problem space inquiry, exploring the interactions of the solution with the context, and discussing the future outcomes. My rationale for analyzing scenarios is based on the premise that the contribution of role-playing methods to design space inquiry, will crystallize in the final scenarios. Therefore, the analysis of the scenarios should illuminate these contributions. Considering this goal, a qualitative approach in analyzing the outcome scenarios from a small sample of workshops seemed sufficient to support this research.

3.1 Research Design

Aiming to see the common patterns among role-playing methods and making a general assessment about the use of role-playing in ideation, I chose to two different types of “performative or drama based” methods. These were *role-play in a mis-en-scene of toys* created by Iacucci et al. (2000), and the role-playing workshop suggested by Simsarian (2003) as a method used in IDEO Company’s ideation processes. Both methods actively involve users in ideation, enactment and scenario-making, and are suggested for exploratory ideation and scenario making in the initial phase of the design process, before the prototyping stage.

In order to see the specific contribution of role-playing methods to design ideation, I clearly needed a baseline to compare these methods with non-performance based methods. A method consisting of brainstorming and discussion based scenario writing seemed suitable for this goal. Brainstorming and non-role-playing scenario writing are both methods frequently used in the industry for ideation and contextualization and communication of design ideas. For this research, I used an ordinary scenario-brainstorming workshop structure where the ideas for a future technology, as well as scenarios of use, are brainstormed with potential users and then recorded. The brainstorming activity was conducted following the guidelines suggested by Kelley & Littman (2005). Since I could not find any particular guidelines for conducting a scenario-writing activity with users in the literature, although this technique has been frequently used in the industry or research, I developed my own general guideline for this

part of the activity, which can be seen in the handouts of all three types of workshops. (See appendix 1.A, 1.B and 1.C)

I ran six workshops in total: four used role-playing techniques for idea generation or exploration, while two used brainstorming only. Each type of workshop was run two times with different users, following the guidelines published in the literature for the selected role-playing methods (Iacucci et al., 2002; Simsarian, 2003) and a brainstorming method (Kelley & Littman, 2005), as strictly as possible. The workshops were recorded with audio and video and the final scenarios were documented in text by the user participants based on a guideline given to them in handouts (see appendix 1.A to 1.C).

In order to understand the contribution of the methods, the outcome of each workshop was seen through the lens of scenarios of use that were documented in text at the end of each workshop. I created a framework for analyzing the scenarios, based on Carroll and Rosson's (2002) framework of *elements of user interaction scenarios*. And looked for patterns of similarity and difference in the scenarios in the lines of the framework categories and, when needed, revised the framework for more detailed analysis of the data. In the following sections, I will describe the sampling strategy, the structure of the workshops, data collection, and analysis method in more detail.

3.2 Sample

Participants were recruited from university students, as well as local members of a global online camping/travelling club in Vancouver, Canada. They

were aged between 19 and 36, with the majority of them being between 19 and 26.

I chose a criterion-based sampling strategy for recruiting the participants: novice to expert experience in hiking. The participants were distributed into teams of 3 three according to their gender and expertise in the area of inquiry (for instance hiking). I made an attempt to rule out the effect of gender, age and expertise by distributing these factors evenly. For instance, in a workshop which aimed to explore and create ideas for a support tool for hiking, I strived for an even distribution of both genders, along with experts, intermediates and beginners in hiking across the teams; however, the scheduling of the participants conflicted, which resulted in having to settle for one team comprised only of women (see table 3.1).

The setting for all role-playing workshops was in closed theatre-like studios and the brainstorming-scenario writing sessions were held in regular classrooms on the university campus.

Table 3-1 Distribution of participants in experiment workshops

Type of workshop	Workshop 1	Workshop2
Role-playing in a simulated environment using Simsarian's workshop agenda	2 men , 1 woman: 1 expert , 1 intermediate, 1 beginner	2 women, 1 man : 1 expert , 1 intermediate , one beginner
Role-playing in a mis en scene of toys	2 men, 1 woman: 1 expert, 1 intermediate , 1 beginner	2 woman, 1 man 1, expert, 1 intermediate, 1 beginner
Brainstorming scenario-making workshop	2 men, 1 woman: 1 expert, 1 intermediate, 1 beginner	3 women: 1 expert, 1 intermediate, 1 beginner

The detailed structure of each of the three types of workshops used in the research is outlined below. There is also a description of the limitations faced, and modifications considered when repeating these structures.

3.2.1 Workshop 1: Role-playing following Simsarian's sample agenda:

Simsarian (2003) offers a sample workshop agenda, which incorporates ideation and exploration of design details. This workshop sample agenda is outlined in table 3.2:

Table 3-2 Simsarian's workshop sample agenda

Time	Sample agenda
0:00	Field observation (or "what we know" session) to ground the group in understanding of the design problem and opportunities.
1:30	Brainstorm using the opportunities to generate as many ideas as possible by creating a space where anything is possible
2:30	Post it vote on brainstorm ideas, e.g. "easiest" and "greatest impact" creating a set of selected ideas
3:00	Break into teams, where each group takes one of the selected ideas. These groups detail the ideas by exploring it through bodystorming and use the best elements and ideas to develop a scenario
4:00	Re-convene groups for Informance- each team presents their scenario – which is videoed. The videos may be reviewed to capture issues.

I found it necessary to change the timing of the sections above in order to allocate some time for an introduction to the research, writing final scenarios, and the final interviewing and questionnaires. Therefore, the session structure as defined in the hand- out given to the participants was as follows:

Table 3-3 The research workshop structure based on Simsarian's agenda

Time length	Our workshop structure
0:20	Introduction to the workshop: giving participants information about the research and its interests , introducing the workshop structure and the problem we are investigating , giving instructions about the issues we are interested to inquire about and write in our final scenario
00:20	“What we know” session : Telling personal stories about cases relevant to the subject of our inquiry
00:50	Brainstorm for a smart technology: Brainstorming with sticky notes to solve the problem that was introduced by coming up with ideas, and chose one or two ideas to detail through role-playing
00:60	Body storming (Role-playing and improvisations): developing mock ups for the technology idea that was chosen. Defining a plot and role-playing it to discover details of the solution and context.
00:10	Break
00:40	Writing scenarios: the participants write down the scenarios of the role-playings that had unfolded based on the guidelines given to them.
00:20	“ Informance” or acting out : final acting out of one or two of the refined scenarios
00:20	Final discussion and questionnaires
Total: 4 hrs	

During the actual workshops, some teams were able to complete some sections faster than expected. And the final timing of the workshops turned out to be 4:45 and 4 in workshop 1 and 2 respectively.

3.2.1.1 Participants

As mentioned before, in each workshop there were three user-participants working together as a team. The number of participants was based on the minimum number of user-participants in a team suggested by both Simsarian and Iacucci et al. for their respective methods. However, Simsarian's method proposed that two teams compete with each other in each workshop. In this research, there could not be more than three users in each session, due to the limitations of recruiting and timing, therefore, only one team could be formed per workshop and the competing component was omitted. One researcher and one designer facilitated each Simsarian method session. The designer who was usually a fourth grade student in interaction design, joined the activities by playing side roles, and provoked discussion and inquiry without contributing to the ideas directly. The facilitator, who was the researcher, kept the timing of different sections and helped the flow of the sessions.

3.2.1.2 Introduction

Before introduction to the research, the participants signed the ethics approval for the research. Then they received a handout that explained the overall research goals as well as the workshop goals and structure, and provided a guideline for the activities in each stage of the workshop. The facilitator read aloud from the handouts, provided a brief description to clarify the content of the handouts, and provided further explanations for issues that that was confusing for the participants.

The handouts described an imagined problem area that the design team (consisting of the participants) was to investigate. For both of the workshops that followed Simsarian's agenda, the problem given was *"situations in hiking where you need to sustain or create awareness and connection with someone, someplace or something"*. The participants were told that the research goal was to elicit their expertise in the area of inquiry in order to gain understanding in the following areas:

1. The setting that the technology will be used.
2. The behaviour of potential users and the possible patterns.
3. Social and cultural norms in the context of the activities that the potential users will be involved.
4. The problems that they encounter.
5. Their goals, motivations, and emotions in the setting and in using the technology.
6. Their interaction, ergonomics and cognition as it relates to the idea

The participants were informed that these details would be explored through the role-plays and documented in scenarios to demonstrate the design idea and the contextual issues that were explored.

3.2.1.3 "What we know" session

In Simsarian's method, this is the stage to share understanding of the problem domain, and uncover and discuss the issues that were learned through

observation. Since the participants were well experienced in the domain investigated, I opted for a discount method, incorporating a storytelling session where they told of experiences related to being lost while hiking or in occasions that they needed to be in contact or keep connection with others. The facilitators asked questions from time-to-time to help the flow of the session and to make sure that everyone could contribute.

3.2.1.4 Brainstorming and voting on an idea

In this stage, the facilitator led a brainstorming session using post-it notes to get ideas for technologies that could help in *situations in hiking where we need to sustain or create awareness and connection with someone, someplace or something*. The participants were also provided with handouts that explained rules for brainstorming based on the rules defined by Kelley and Litterman (2005) (see appendix 2).

After the brainstorming, the participants tagged their two most favourite ideas with colour stickies, and voted on one or two ideas for further development. Finally, they merged and combined some of their ideas into one final idea.

3.2.1.5 Role-playing and improvisation (Bodystorming)

This was the most challenging part of the workshop to design and conduct because of a lack of consistent guidelines for conducting this method in the literature. Burn's et al. (1994) and Simsarian (2003) describe bodystorming as an activity that involves the whole body and is performed in a simulated environment created by props. In contrast, Oulisvirta et al. (2004) describe bodystorming as a

brainstorming activity while being physically present in context or a context similar to the context under inquiry, and bodily involvement is not a component of the method.

With regards to the procedure of the method, Burns et al. (1994) start their bodystorming activity, with development of a backbone script or plot and proceed to improvisations based on the plot to find the details. However, Simsarian (2003) does not explicitly mention the use of plots and leaves the procedure unclear. With regards to props and representations of the envisioned technology, both Burns et al. and Simsarian mention interaction with props, including mock-ups or prototypes of an envisioned technology. However, in Simsarian's workshop agenda, bodystorming immediately follows brainstorming, and a stage where the props for the technology are developed is missing. The other unclear detail about the method is how and by whom the simulated environment and props are created.

This research introduced a stage for creating mock-ups for the envisioned technology at the beginning of the bodystorming stage, and followed Burns et al.'s (1994) procedure and started the bodystorming activity by defining a plot. Furthermore, the participants were allowed to personalize other props, which were available on stage, and reconfigure them to represent the environment or some artefacts, prior to and throughout the improvisations. Figure 3.1 shows the environment used in role-playing workshops following Simsarian's method. The environment had some pre-shaped props that could represent trees and foliage, as well as some boxes, ropes, fabric, bags, and other personal items that the

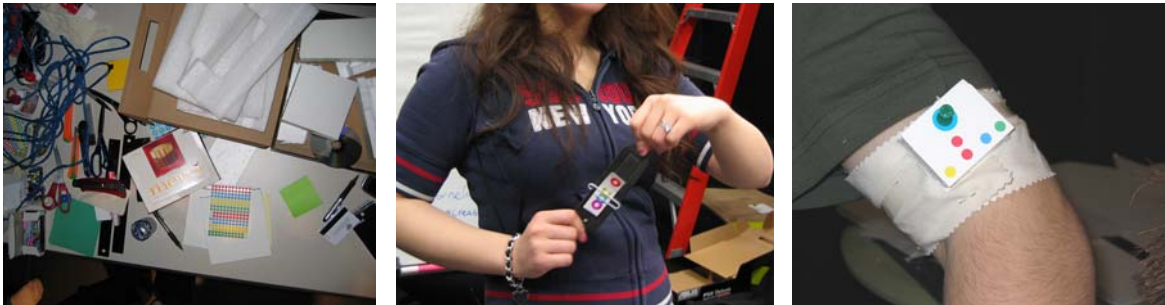
participants could personalize or use to re-shape the environment and define places or environmental elements.

Figure 3-1 The environment in Simsarian method workshops



To create mock-ups, the participants were led to a desk, which had basic material such as stickies, labels, foam, wire, straps and pins, etc, and were advised to create a mock up that could represent the technology they had brainstormed and agreed on. They also received a brief overview of the possible technologies and formats such as wireless technologies, wearable, different formats of notebooks etc. following Svanaes and Seland (2004) (figure 3-2 shows the mock up material and the examples of mock ups developed by the participants). The participants were advised that the form of the mock-ups can change as they proceed with their improvisations based as new ideas and needs arise.

Figure 3-2 Mock up material and examples from Simsarian workshops



After creating their mock-ups, the participants proceeded to develop a plot or sequence of events for a situation where the technology, which they had ideated, could potentially be used. The facilitator aided the participants in defining the actors of their plots, their relationship between the actors, the location of their setting, and a general sequence of events. Then the participants improvised and role-played based on the plot, filling the gaps with improvised actions, dialogues, events and interactions with each other and their device mock-ups.

3.2.1.6 Discussions

After each improvisation, the designer led a discussion on the unfolded improvisation and scenario. The researcher and designer would probe the users to think of alternative outcomes and problems for the scenario and asked them to detail or explain their actions, or interactions with their imagined device. These discussions sometimes inspired further inquiry of the same problem with a variant in its setting or details, or introduced a new problem. This would start a new cycle of plot making and improvisations.

3.2.1.7 Scenario-writing

At the end of each session, the participants created a textual record of the enacted scenarios by writing them down. The workshop handout had guidelines

for developing a scenario, describing the scenario as a story with specific actors, living in a specific setting, and using/interacting with a technology. The participants were asked for a scenario description detailed enough to allow another group of people to re-enact the scenario with all the details that were enacted. The participants were free to add details and improve their ideas while they were writing the enacted scenarios. The handout re-emphasized the topics that were important and expected to be seen in the scenarios, namely: 'settings, behaviours, problems, social and cultural norms, goals, motivations and emotions, and interaction, ergonomics and cognition'. The details of the instructions given to the participants for scenario writing can be seen in appendix 1.A. Example of scenarios written following Simsarian's method can be seen in appendix 3.A.

3.2.2 Role-playing in a mis-en-scene of toys:

This workshop was originally created by Iacucci et al. (2000) to explore ideas and use-scenarios for new mobile technologies for future nomadic users in a campus setting. Urnes et al. (2002) followed this method, with some modifications, in their research investigating a universal interface for a smart home.

Iacucci's (2000) method is comprised of five main elements: toy characters, environment representations, event list, incident cards and game rules. The details of these elements are described below:

Toy characters: These are miniature toy representations of humans that the users will use and move around as their avatar on the game board.

Environment: This is a representation of the environment that the researchers aim to explore and study. For their research, Iacucci and colleagues (2000) created a small physical model of a campus, using simple elements spread on tables and shelves, in their studio. They represented different places with labels carrying the name of each place, a graphical symbol that was closely related to each of them, and small artefacts or a graphical image related to each context.

Event list: this has been described as a list “to help players be aware of passing of time and planning of game moves” (Iacucci et al., 2000, p.197).

Incident cards: These are cards that have a description of an event or incident that can possibly occur in the context of the game environment or scenarios. The designers/ game masters ask the players to pick the cards at random times throughout the game and incorporate them in their improvisation.

Game rules: The game rules are as follows:

- Always use the toy character
- Act out the use of the device/service
- Use the dice to decide about non predefined aspects.
- Everyone chooses a toy character and picks a *mobic*, a mock up representing a magic mobile device.
- Now and then a player is asked to pick an incident card.

Iacucci et al. (2000) suggest the game involve five participants comprised of three users and two designers. The users are the main players and the designers only act in side-roles to help the game flow. It is suggested that one designer act as the game master, monitoring the game and making sure that rules are followed. The game master, according to Iacucci et al, is “the interface to the environment representing the worlds and its constraints and opportunities” (p.196), the game master also guides the unfolding of the game introducing incidents and deciding who plays. The method description, however, does not offer more details on how the interaction between the designers and the users is structured. For instance, there are no details for determining how far and when the game master will direct the inquiry or ask questions, how she will initiate or get cues for starting a side-role act, and to what degree, if any, she will frame the inquiry through side-role improvisations. The other detail that Iacucci et al. leave open is the use of plots or scenarios. They mention that their team explored both a situation where there was a fixed initial scenario, yet users were allowed to improvise; and a situation where the information was pre-defined and users mainly enacted them. However, they do not specify how to run each of these versions, or what the specific role of the game master or designer will be in each version.

Given the limitations above, I ran the workshop trying to fill in these knowledge gaps about the methods, with the following modifications or interpretations:

Designer–user interactions: Three user-participants acted as main game characters in both workshops. One workshop had one facilitator/game master and one designer who acted side-roles by the participants' request, the other workshop had only one person acting as both the side role player and the game master. The game master monitored the following of rules, introduced incidents. She did not control the unfolding of the game play, only facilitated it, thereby allowing the players to improvise based on plots that they had initially planned. As well, she did not interrupt the game play for questions while the game was in motion but rather facilitated discussions in breaks after each role-play.

Environment: The environment created for the study was a representation of a wild nature setting with areas of flat grass, mountains, trees, smaller foliage and rocks. I used miniature mock ups of trees and foliage from commercial environment modelling kits and added small artefacts that could act as representation of paths, rocks, mountains, snow, rivers and lakes using different material such as legos, wooden blocks, sand-paper, wrapping paper, cotton and fabric. The representations of the environmental elements and locations, as can be seen in figure 3-3, were clear enough so I did not label them the same way as Iacucci et al. had labelled their locations. I also used graphical images of animals, ground and foliage texture, human habitats (village, house, camps), and artefacts, to provide reminders for the contextual details of different environments.

Figure 3-3 The game environment in role-play in a mis-en-scene of toys



Event list: At the beginning of each role-play, I asked the players to think of a plot and write a sequence of events that would comprise the backbone of that plot.

Rules: The rules we followed were the same as those suggested by Iacucci, with the exception of the *use the dice* rule: because this rule was not clear to me, I had to omit it.

3.2.2.1 The workshop structure used in this research

The research workshop agenda can be seen in table 3.4:

Table 3-4 The research workshop agenda based on Iacucci et al's (2000) role-playing in a mis en scene of toys

Time length	Our workshop structure
0:20	Introduction to the workshop: giving participants information about the research and its interests , introducing the workshop structure and the problem we are investigating , giving instructions about the issues we are interested to inquire about and write in our final scenario
00:5	Introduction to method: introducing the “magic thing” or <i>mobic</i> , reviewing the game rules and participant roles, introducing the environment and demonstrating how to enact with the doll figures, writing plots

00:60	Role-play and discussions: Improvisations in the environment using the doll characters and the <i>mobic</i> . Discussions followed each role-play.
00:40	Writing scenarios: the participants write down the scenarios of the role-playings that had unfolded based on the guidelines given to them.
00:15	Filling Questionnaires and interviews
total : 2.5 hrs	

In these workshops, as in the Simsarian workshops of this research, the participants received a handout that clarified the research goals and workshop structure and provided instructions for the activities of each workshop section. (See appendix 1.B for this workshop's handout.) The details of activities and handout content for "introduction" section were the same as those in the Simsarian workshop session of this research. In role-playing in mis-en-scene of toys workshop, the ideas for technology were not pre-defined in a brainstorming phase; but were detailed, or in other words, improvised in the course of the performance. For the *mobic*, the participants created a form factor using the basic material the research either provided for them, or chose the basic mock-up the research team offered them. The offered mock-up was a square foam block that had a sticky note and few pin buttons that represented a screen and buttons. The players were permitted to change the form of this mock-up, or to imagine a different form for it if found necessary throughout their performance. The scenario writing section of the workshop had the similar structure and instructions as that in Simsarian method's workshops. Example of two scenarios written following mis-en-scene of toys role-play method can be seen in appendix 3.B.

3.2.3 Brainstorming and scenario writing workshops

These workshops were different from the other workshops, in that they lacked a role-playing phase or element. Like role-playing workshops, these workshops too began with an introduction phase where the goals of the research and the workshop structure were explained. After being introduced to the topic for brainstorming, the participants read the instructions for brainstorming from the handout and brainstormed for technology ideas and problem areas using sticky notes. They then voted on some ideas and proceeded to write a scenario(s) that would illustrate the use of their brainstormed idea(s) in context. The instructions given for brainstorming were the same as those given in the handouts used in Simsarian method. And the scenario writing instructions were the same across all types of workshops (The handout used for this workshop can be seen in appendix 1.C, and the scenarios developed by this method can be seen in appendix 3.C). The workshop agenda for the brainstorming-scenario writing workshops can be seen in table 3.5.

**Table 3-5 Brainstorming and scenario writing workshop agenda
used in the research workshops**

Time length	Brainstorming workshop structure
0:20	Introduction to the workshop: giving participants information about the research and its interests , introducing the workshop structure and the problem we are investigating , giving instructions about the issues we are interested to inquire about and write in our final scenario
00:50	Brainstorm for a smart technology: Brainstorming with sticky notes to solve the problem that was introduced by coming up with ideas, and chose one or two ideas to detail in scenarios
00:60	Writing scenarios: the participants write down scenario/s that illustrate the use of the technology or features that they have brainstormed in context based on the instructions provided for them in hand outs
00:20	Filling Questionnaires and interviews
total : 2.5 hrs	

3.3 Data Collection

The role-playing workshops were all video recorded with two cameras to show different angles of the space within which the participants acted. In addition, the mock ups, which the participants had built in the process, were photographed at the end of each session. The brainstorming workshops were audio-recorded to provide us with a back up for conversations that happened throughout the session, and especially for the scenario that was developed. The audio and video records, however, were used only for backups in case confusions arose. Our main data consisted of the scenarios that the participants had documented in text near the end of each workshop. We suggested to participants that they take turns in writing the scenario. Because of time constraints, in the case of three scenarios in different sessions, to speed up the process, one of the facilitators

asked the participants to tell the story sentence by sentence and repeated each sentence, after the participants, in a voice-recorder for later transcription.

3.4 Data Analysis

This research analyzed the scenarios that were the outcome of the different kinds of workshops using the framework proposed by Rosson and Carroll (2002) as the *elements of user interaction scenarios*. Since Carroll and Rosson's description for scenario elements was more or less general and somewhat confined to scenarios for desktop systems, this research attempted to expand these descriptions to embrace mobile, tangible and ubiquitous solutions as well. The scenarios were then coded under the categories of Carroll and Rosson's scenario elements and their relevant subcategories for comparative analysis of the results across different workshops.

In the next chapter, I will describe the details of the framework and the results of the analysis.

CHAPTER 4: ANALYSIS AND RESULTS

4.1 The rationale for using scenarios for measuring outcome

As mentioned before, my analysis of role-playing and brainstorming workshops has been based on the outcome of these workshops, in the form of scenarios of use. The rationale for using scenarios as the main data, apart from the practicality of dealing with text data rather than the rich video data of the workshops, is the fact that scenarios of use are the desired outcome of many role-playing methods in the literature (Iacucci et al., 2002). This is because scenarios bring users and use into focus, and are a good medium for exploring both the issues that play a role in the use of a technology and the possible outcomes of use before the technologies are actually built (Carroll, 2000). Scenarios also have a comprehensible narrative structure that makes them a good vehicle for communicating both across different stakeholders of the final product (Carroll, 2000), and with different experts working on the project (Nardi, 1992).

John Carroll, a scholar with a considerable body of work contributed to the topic of scenarios in design, states five advantages for using scenarios in the design process. Four of these are:

1. Providing reflection in the process of doing design.

2. Helping to control the fluidity and uncertainty of design situations, by being both flexible and concrete.
3. Promoting work and use orientation and keeping the external constraining factors in check.
4. Supporting reflection on the consequences of each design move from different perspectives, and therefore recognizing and addressing trade-offs.

Scenarios embody a unified vision of the system and its use that can stay with designers throughout the design process and help them reflect on the design situation (Carroll, 2000; Nardi, 1992). The use of a scenario encourages reflection on both the motivational and cognitive issues that underlie people's actions and the understanding of the dynamics of the problem domain, including the social dynamics (Carroll, 2000). In Nardi's words, one of the important features of the scenario is that it provides a big picture of the situation because it "depicts activities in full context, describing the social setting, resources and goals of users" (Nardi, 1992).

As a unified vision, the scenario provides a common language for discussion among different experts, working on different parts and aspects of a system (Carroll, 2000; Nardi, 1992). Its narrative and story-like format enables communication across other stakeholders and users, who may have no technical knowledge and, therefore, both fosters participatory design and empowers focus on users and use (Rosson & Carroll, 2002).

The concrete nature of scenarios allows designers to test assumptions and design moves without having to commit to a solution. This is because the scenario is an editable object and can be easily revised in a matter of minutes. The concrete nature and flexibility of scenarios also makes them a perfect tool for sketching solutions, and studying their outcome before a system is developed: in this way, the scenario acts as a vivid design representation that both supports reasoning and the discussion of trade off's (Rosson & Carroll, 2002).

Another positive potential of using scenarios lies in the fact that they can be written from different perspectives and with different resolutions, allowing the designers to change a couple of variables and observe their joint impact (Carroll, 2000). Wright (1992) sees the potential for analysis from different perspectives as a function of the fact that scenarios describe contextual entities and events. Different professionals, including a psychologist, a usability analyst, or a system engineer can each either write or see the scenario from a different perspective, and argue about the pros and cons of the design moves from that perspective, while basing their discussion on the same backbone of events and entities (Wright, 1992), or basically, the basic plot, actors and settings.

4.2 Building blocks of scenarios

Scenarios have a setting, or a starting state, which are the “details in the environment that affect the user's motivations and actions” (Rosson & Carroll, 2002, p. 18). Scenarios have actors or agents, a single goal or objective, or several goals and sub goals. Although some scenarios have more than one goal,

it is usually one goal that is the defining goal of the scenario and that explains why the scenario happened (Carroll, 2000). Like all stories, scenarios have a plot. Carroll defines the plot as “sequences of actions and events, things that actors do, things that happen to them, changes in the circumstances of the setting, and so forth” (Carroll, 2000, p.47).

In their book *Usability Engineering: Scenario-Based Development of Human-Computer Interaction*, Carroll and Rosson (2002) describe a design process that is completely based on creating scenarios in different phases of design, up to, and including the prototyping. In this system, the design process starts with an analysis of the problem domain. After field studies the result of the analysis is crystallized into “problem scenarios” (Rosson and Carroll, 2002, pp.26-27). Problem scenarios are stories that highlight aspects about the potential users and their activities that may have an implication for the design. In the next phase, the design phase, the design team creates three more types of scenarios: *activity scenarios*, “information scenarios” and finally “interaction scenarios” (Rosson and Carroll, 2002, pp.26-27). Activity scenarios illustrate the system’s functionality, without providing too much detail about the system form or interaction. Information scenarios elaborate activity scenarios and describe the information the users need to carry on their tasks, and as to how the system provides that to them. Finally, interaction scenarios envision the system fully, by containing the details from the previous scenarios, including the tasks that are supported by the system, the information needed to carry out the task, and by defining how users will interact with the system to achieve their goals. Carroll and

Rosson state the elements of a user interaction scenario as setting, actors, task goals, plans, evaluations and events. These elements will be described in the following section.

4.3 A framework for analyzing scenarios:

The framework I used for analyzing scenarios is based on Carroll and Rosson's elements of user interaction scenarios, and consists of seven categories corresponding to the seven elements of user interaction scenarios: "setting, actors, task goals, plans, actions, evaluations and events" (Rosson & Carroll, 2002, p.18).

I coded the scenarios based on Carroll and Rosson's definitions of these elements; however, in several cases, I needed to re-define the boundaries of the definitions while coding. At the end of the first round of coding, the definitions were revised, and the data was recoded accordingly. I have described, below, the definition of each of the elements of this framework as based on Rosson and Carroll's view, and have included the modifications and boundaries of these definitions used in my coding schema.

4.3.1 Setting:

Carroll and Rosson (2002) define setting as "situational details that motivate or explain goals, actions, and reactions of the actor(s)" (p.18). This definition leaves us with a broad range of situational details, from physical details of the environment such as the details of the location or place, to social and

cultural details that may affect the actors. In my analysis of setting, I considered the following as details of the setting: place, time, objects, elements of the environment, and activities. I did not analyze social settings, under this category, as they were observable after analyzing different types of actions that had social implications.

"Place," in this study, corresponds with specific places such as "a mall," "a park," and "a wood"; specific locations within places such as "a stand," "a trail," and "a river"; possessive locations such as "Cindy's place," or "the area that Adam is in"; and relative locations such as "closer to the lake," "nearest to Susan's place," or "before others in the line."

The element, "time," includes time span, which might be described as the period "for three days," timestamp, which might refer to "at 4 o'clock," or "on Wednesday," and relative expressions of time that usually express sequence or concurrency such as "meanwhile," "while," "after," or "before."

"Objects" relates to all objects in the environment that are of an artificial or fabricated nature: for example "bottle," "car," or "device."

"Elements of the environment" entail the natural objects in the environment such as "a tree," "a rock," "clouds," or "a bear," physical details of the environment including "weather," "temperature," "light," or "wind," or surface details such as "rain," "shine," "darkness," "15 degrees Celsius," "windy," or "foggy."

Finally, I considered a sub-category for time, named “concurrency of activities.” Some activities act as a setting to another action: for example, a person may be getting money from an ATM while her child is pulling her skirt. Alternatively, when two actors are acting concurrently, the action of each can be considered as a setting for the other. An example situation may include one such as “Susan was giving Tom directions on phone, while he was walking in the woods.”

4.3.2 Actors

Actors are “human(s) interacting with the computer or other setting elements,” (Rosson & Carroll, 2002 p.18) as well as “personal characteristics relevant to the scenario” (ibid. p.18). Scenarios can have more than one actor; however, either one alone, or a few of the actors at the same time will be the main protagonist(s) of each scenario. The specifics of who the actors are, as well as their personal characteristics, limitations, and capabilities are factors that define the setting as well (Rosson & Carroll, 2002). I analyzed actors from two different perspectives: static personal characteristics and changing characteristics as well as characteristics that are mentioned in the context of the scenarios. The static characteristics are those that the actors bring with them from the beginning and do not easily change. These characteristics include age, sex, status or occupation, possessions, and physical or mental capabilities or limitations at the starting state of the scenario. Changing characteristics include those that can change according to the setting. Emotions such as anger,

sadness, or feeling happy; and mental or physical states such as becoming tired, or injured fall within this category. If a rather static characteristic was mentioned for the first time in the body of the scenario, I considered that under the dynamic characteristics.

4.3.3 Task Goals

Carroll and Rosson (2002) define task goals as “changes that the actor wishes to achieve in the circumstances of the setting” (p.17). This definition does not necessarily tie task goals specifically to goals fulfilled entirely, or partially, by the system. Goals fulfilled separately from the system, however, may be relevant to the scenario and help to illustrate the context within which the use of the system becomes necessary.

4.3.4 Plans

In order to fulfil goals, and “convert a goal to a behaviour” (Rosson & Carroll, 2002, p.18), actors may plan a sequence of actions. Plans are mental activities manifested through actions that the actors take, or that can at least be re-stated and assumed from the course of observable actions. Actors may not necessarily plan the course of their actions, but rather act in the embodied situations based on the resources they have at hand (Suchman, 1987). In other words, plans are not completely pre-structured, but are shaped in the course of action: changes in the setting affect actors and force them to change or re-structure their plans.

In my analysis, I considered any course of action that was directed toward a specific task goal as a plan. There are cases where actors decide on a course of plan, and the decisions are clearly stated in the scenario. In some other cases, there are no stated goals, although the goals are clearly distinguishable. Finally, courses of actions without a very clear definitive goal are routines that are carried out at certain times or locations. For instance, a person who washes his face and teeth, turns off the lights and sets the alarm does each action for a different goal; however, if this course of action is carried out before bed, it can be considered as a routine.

4.3.5 Evaluations

Like plans, evaluations are mental activities; however, they are directed toward “interpreting features of a situation.” This interpretation may arise from the response or status of the system: for instance, a user may interpret dark blue links as active links in a document. The interpretation may be of a situation in the setting where, for example, someone may interpret the coldness of the weather as a sign of snow coming soon. Certain cognitive actions are evaluative by nature: the act of looking for something involves evaluating the presence of something in different locations. In my analysis, I have considered these acts as evaluations as well.

4.3.6 Actions

Rosson and Carroll (2002) define actions as observable behaviour. This definition strictly excludes cognitive activities that do not have an observable

component. For example, cognitive exercises such as decision-making, seeing, realizing, and recognizing are excluded from this category. In my analysis, I considered these mental activities as actions as well. On the other hand, there are actions that are done to the actors, such as an instance where an actor may be injured after an attack by an animal; I coded these under actor's mental or physical state, rather than under the category of actions. The main reason is that in these cases, the actor is subjected to another actor's action, or the effect of an environmental element.

4.3.7 Events

Carroll and Rosson (2002) define events as "External actions or reactions produced by the computer or other features of the setting" (p.18). According to this definition, events have an external source, although the reaction of an actor to external stimuli can be considered an event as well. For instance, an actor may encounter a wild animal - which is an external event by itself - and feel terrified. Feeling terrified is the actor's reaction to the external event and is an event of its own. Events are an important part of most scenarios as they can explain the actor's problems, or clarify the dynamics of the setting that can affect the actors indirectly. Understanding common events, and the routines or reactions surrounding them, is one of the important aspects of understanding the context of activities and practices, and plays a role in making design decisions that can accommodate the events and their characteristics.

Because of the direction of my inquiry toward understanding the contribution of methods to contextual details in scenarios, with the exception of few cases that envisioned the system as a starter of automated events (such as sending signals to others based on a user's blood pressure or brain wave profile), my analysis of events has focused more on external events that have a source in the setting, rather than in the computer.

4.4 Results:

Below I have described the results of the analysis of the scenarios that came from 6 different workshops. Before going through the analysis, which aims to see how the scenarios differ from each other, I need to point to the difference in productivity of the sessions.

Table 1-4 shows the number of scenarios that were obtained from each different type of workshop.

Table 4-1 Number of outcome scenarios per workshops

Workshop type and number	Number of scenarios
Simsarian workshop 1	4
Simsarian workshop 2	3
Mis-en-scene of toys workshop 1	3
Mis-en-scene of toys workshop 2	1
Brainstorming workshop1	1
Brainstorming workshop 2	1

It should be noted that even though one workshop from mis-en-scene of toys workshop has resulted in only one scenario, this sole scenario itself contains 4-5 different situations of use.

One of the differences between Simsarian and mis-en-scene of toys workshops is the fact that Simsarian workshop includes a brainstorming activity (in this research the time given to this activity was 50 minutes) which is separate from the bodystorming activity (in this research bodystorming was allotted 60 minutes). In contrast, in mis-en-scene of toys method, ideation and role-playing happen simultaneously (in this research, 60 minutes was allotted to this activity), and there is no section dedicated solely to brainstorming. The time spent for writing down the scenarios is the same in role-playing workshops: 40 minutes, and slightly longer in the non-role-playing workshop: 60 minutes. The non role-playing workshop has been given a slightly longer time to write the scenarios to compensate for the fact that the Mis-scene workshops spend some of the time of their ideation, 60 minutes, for creating scenarios by improvisation; and the Simsarian workshops have an additional 60 minutes allotted to creating and detailing a scenario by improvisation.

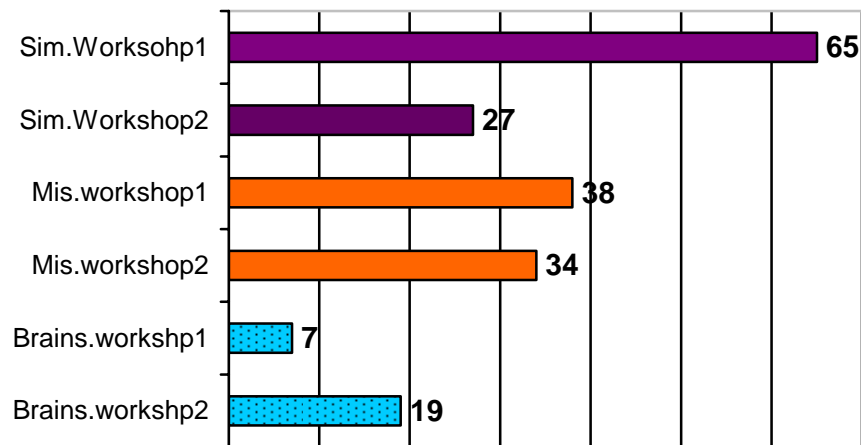
Given the facts above, the number of scenarios resulted from each type of workshop suggest that the role-playing workshops are generally more productive than brainstorming workshops. Among role-playing workshops, mis-en-scene of toys workshop proves to be more productive, as it provides almost the same amount of scenarios, or situations of use, as the Simsarian Workshop but in a less time. Scenarios are good tools for reflecting on the problem space and

sketching the dynamics of the solution with the contexts. The higher number of scenarios resulted from role-playing methods, therefore, can lead us to infer that role-playing workshops provide more chances for reflection. However to support reflection, a scenario needs to be of good quality as well. The analysis of the scenarios using the elements of user interaction scenarios, which follows, aims to shed a light on the quality of the scenarios obtained from each method. This analysis looks at the outcome scenarios of different methods through the lens of the basic elements of user interaction scenarios including setting, actors, plans, actions, evaluations and events.

4.4.1 Settings results

Figure 4-1 illustrates the analysis of setting elements across different workshops. In this figure, each bar represents the sum of instances of setting in all scenarios of a workshop. The instances, however, are themselves categorized in five different categories of time and place as shown in Figure 4-3, objects and environmental elements as illustrated in Figure 4-5 and concurrent activities as shown in Figure 4-4.

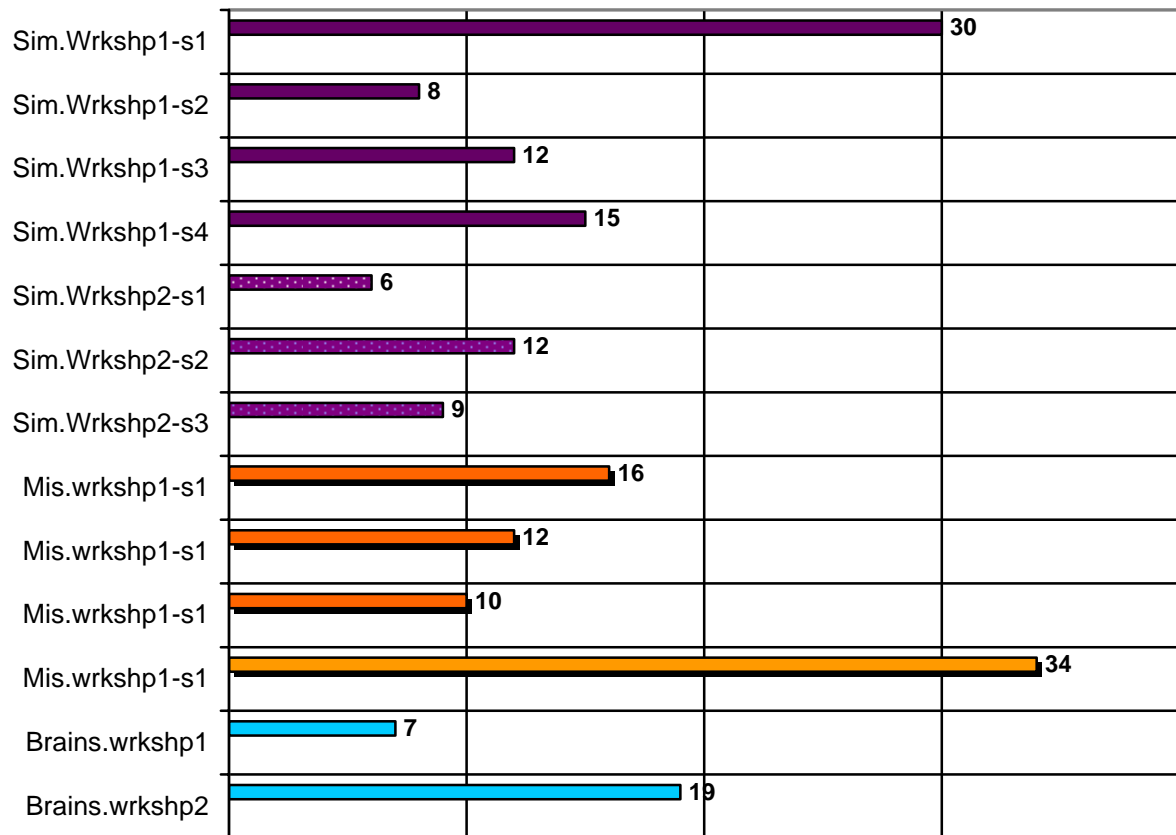
Figure 4-1 Sum of Setting instances across workshops



Setting is one of the important factors of a scenario and holds a considerable amount of information about the context of use. The space of contextual details needs to be wide enough at the initial stages of the design process, where vision scenarios are created, to enable the users of the scenarios to expand the ideas, and explore the solution-problem space interaction in different domains.

Figure 4-1 shows that role-playing workshops consistently provide more contextual details than brainstorming workshops.

Figure 4-2 Sum of setting instances across scenarios

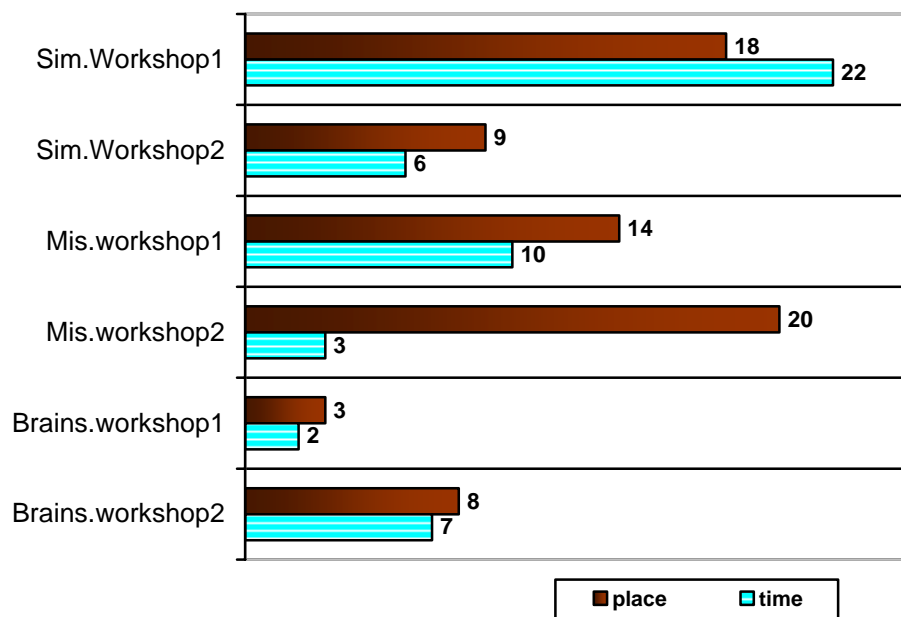


As it can be seen in Figure 4-1, not all role-playing scenarios have a higher rate of contextual details relating to the scenario setting than non-role-playing scenarios; however the count of contextual details in two of the most detailed scenarios of role-playing methods is considerably higher than any of the non-role-playing scenarios. Among role-playing workshops themselves however, the mis-en-scene of toys method has consistently high rates of contextual detail, while Simsarian workshops are not consistent. This inconsistency across Simsarian may be explainable by the factors affecting the performance of participants in the second workshop. I will point to these factors in the discussion section.

4.4.1.1 Place and time

Figure 4-3 shows the count of instances of place and time across different workshops.

Figure 4-3 Count of instances of Place and Time across different workshops



The results again show that the mis-en-scene of toys method consistently provide more contextual instances of places than other methods. While they do not exhibit the same consistency with regards to time instances.

Scenarios from Simsarian method usually have a spatial construct that does not allow the imagination of a full terrain. This construct can be clearer when it is consisted of both the location of the event and the relative positioning of one actor to that location, or it can be vague and consist of only one general location such as a camp, or mountain. The event location may be described by one or two environmental details if they, themselves, have contributed to the

event: for example, the actor may have slipped on the steep section of the trail, or a branch may have fallen on him while walking on the hill.

On the other hand, scenarios that come from Iacucci et al.'s mis-en-scene method have at least two locations and, therefore in some cases, allow for a better imagination of the full terrain. While many of the locations in these scenarios are event locations as well, in some scenarios, the area between two locations may be filled by actors in various position points. In other words, the space is more finely grained, or traversed. In one scenario, for instance, the actors are depicted as all being in the area of a lake, but unable to find each other. In another instance, the actors come across a hole on the way to the bridge, and use their device to find an alternate route (see appendix 3.B : workshop2 scenario). Among the different scenarios that came out of the workshops, following the Iacucci method, the scenario from the workshop where the participants spent all their time following the trails and terrains of the environment model has the best spatial construct, in terms of variety of places and the level of detail of locations.

The two scenarios, from the brainstorming session, vary widely in their sense of spatial construct. One scenario almost lacks a sense of place: It is constrained to one location, a mall, and more specifically to just one location inside the mall that is visited, with no other positioning. The reader of the scenario is left in a state of ambiguity over where the main actors are throughout the story, other than the fact that they are inside a mall. On the other hand, the scenario from the second brainstorming workshop offers a very good sense of terrain,

consisting of three different locations, with no less environmental details than the scenarios that came from role-playing sessions.

Time is a construct that is hard to assess, qualitatively, across scenarios. In some cases, the sequencing of sentences that may lack a time description can, themselves, indicate that the authors are communicating the sequencing of time. In other cases the scenario writers may have adopted a writing style that specifically clarifies the sequences of actions by using adverbs such as then, after, or while. In the quantitative analysis of instances of time, I have counted those instances that have been explicitly expressed in the text. As figure 4-3 demonstrates, role-playing workshops on average provide more instances of time compared to brainstorming workshops. Among themselves, role-playing workshops that follow Simsarian's method have a higher average of time instances than those that follow Iacucci et al.'s method.

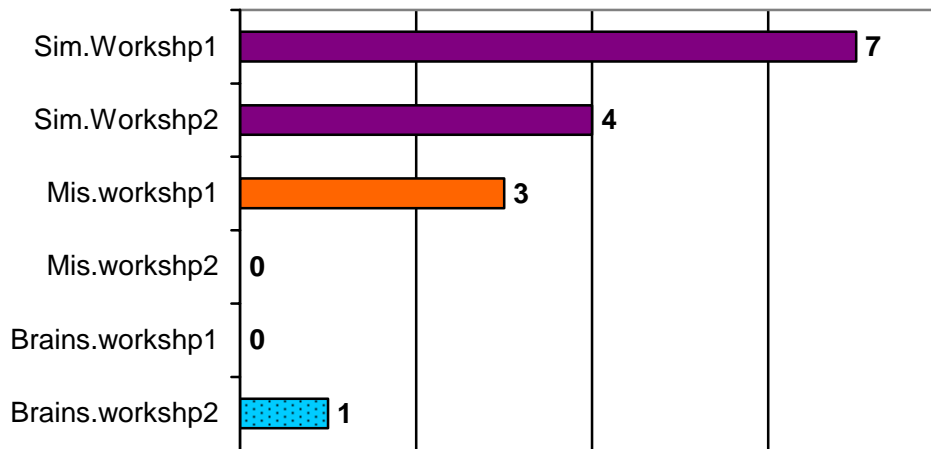
In the qualitative analysis, I looked at the sense of time in scenarios in terms of variations that are reported in the length of events and time stamps, and are an expressed or implicit concurrence of events. I also looked at the structure of the timeline with regard to episodes of events. The qualitative analysis of time instances, and the time construct of the scenarios, did not show a specific pattern across role-playing scenarios that was distinct enough from the brainstorming scenarios. Scenarios that came from role-playing on a mis-en-scene of toys, however, proved to contain more than five episodes of events, and more sequences of activities on the story timeline. On the other hand, if in these particular scenarios there was an event, it was usually positioned either in the

middle, or throughout the timeline. In contrast, in most Simsarian scenarios, the main event started close to the beginning of the story and, with the exception of one scenario, all other scenarios were made from less than five episodes.

The brainstorming scenarios do not share a similar pattern. The first scenario has few episodes, but many sequences of actions across its timeline. Because most of these actions are spent in interaction with the device and are not interrupted by events, these sequences can be imagined to be both short and close to each other. The second brainstorming scenario has approximately five episodes and its timeline resembles some of the scenarios of the mis-en-scene workshops. The only similarity between these brainstorming scenarios is the fact that both provide an exact and detailed time for the beginning of the story, which contains details of the hour, week or month.

The concurrence of actor's activities was mostly described in scenarios from role-playing workshops (see Figure 4-4): many of the scenarios from Simsarian's workshops describe situations where actors are involved in activities concurrently. This is observable in scenarios from Iacucci's method as well, however, linear scenarios are seen more often among these scenarios, and if the concurrence of activities is present, they have been vaguely described.

Figure 4-4 Total count of concurrent activities per workshop

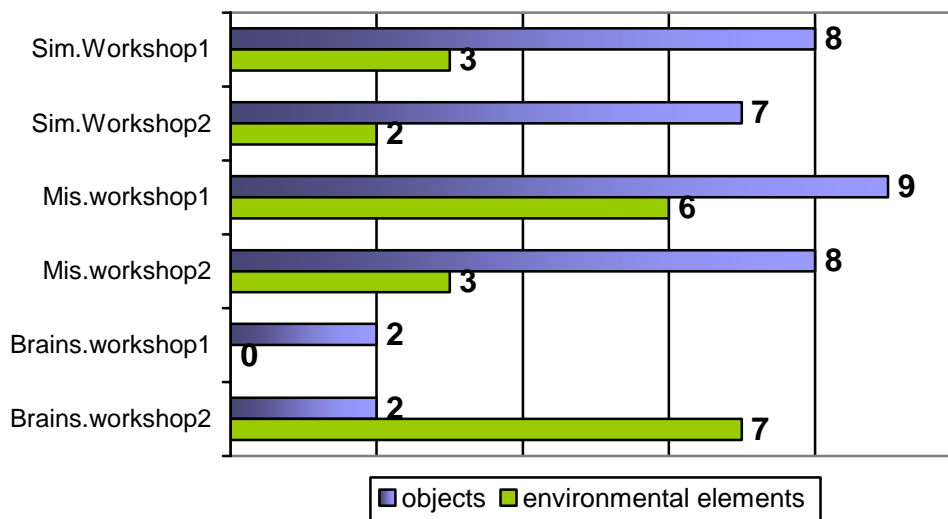


4.4.1.2 Objects and environmental elements

Figure 4-5 claims that role-playing workshops, in general, have a higher count of instances of objects in the setting than brainstorming workshops. On the other hand, role-playing in a mis-en-scene of toys workshops have a higher rate of instances of objects than role-playing workshops that followed Simsarian's method.

In general, object types mentioned across scenarios include devices, device components, vehicles, and some equipment related to the activity within which the actors are involved. A very clear pattern is not observable across role-playing workshops versus brainstorming workshops, with regard to the type of objects they register: the count of object instances in brainstorming workshops are generally low so such a comparison is difficult. Among scenarios from role-playing workshops, those from Iacucci et al.'s method contain more unique objects and object types, such as equipment, happens in them more frequently.

Figure 4-5 Count of instances of 'Objects' and 'Environmental elements' across different workshops



Environmental elements are not consistently high in role-playing workshops. In fact, one of the brainstorming scenarios alone has the highest count of environmental elements among all workshops. However, this pattern is not consistent across all brainstorming scenarios. In general, regardless of the type of workshops that they come from, most scenarios mention or detail environmental elements only when they are the main cause of an event in the story. For instance a rocky hill may be the cause of the actor falling down, an animal may attack an actor, or snow and cold weather may affect actor's plans and activities (See appendices 3.A to 3C for examples within scenarios).

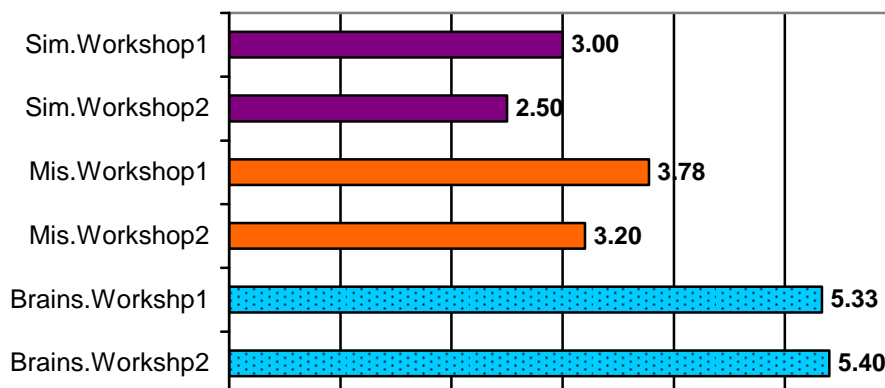
4.4.2 Actor's Results

Scenarios may have more than one actor and each can bring characteristics along with them, such as their job, status, experience, belongings, health, or feelings that can act as factors of the setting. While many of these

characteristics are static and do not change, at least in the short time frame of the scenario, there are characteristics that may change dynamically as the events of the scenario unfold: actors may be injured, they may become either present, or absent from events or places, and their psychological or mental status may change.

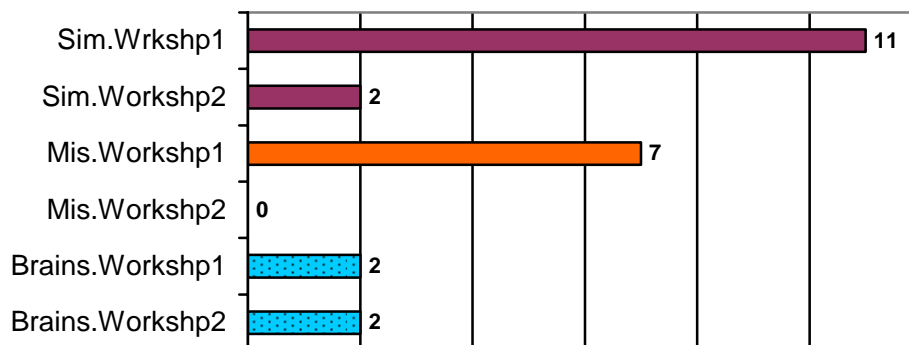
In this research, the static characteristics of actors of scenarios were usually determined by the participants in the beginning of each enactment, when they decided on the plot of the story. The details that they decided on were, in many instances prompted or directed by the facilitators, however, assuming that these directions were comparatively similar across workshops the scenarios show that participants detailed actor's characteristics more often in brainstorming workshops (see figure 4-6). A closer look also reveals that actors are described with details of job status and personality type, in greater detail, in brainstorming workshops. In one of the brainstorming scenarios, the main actor's motivation for the activity she undertakes in the scenario is elaborated in detail.

Figure 4-6 Average static characteristics per actor of a scenario



The analysis of dynamic characteristics and characteristics that are mentioned during the course of the scenario rather than at the beginning does not show a consistent pattern in the count of these types of characters across workshop types (see Figure 4-6). Scenarios from one of each role-playing workshop types have high counts of characteristics mentioned in the body of the scenario. Dynamic characteristics and the characteristics mentioned in the context and body of the scenarios include actor's knowledge or experience about an activity, actor's knowledge of another actor's situation, actor's knowledge about objects they carry, actor's physical and medical state, and actor's psychological state.

Figure 4-7 Dynamic characteristics of actor's and characteristics mentioned in the body of scenario



Brainstorming workshops scenarios display instances of actor's psychological state and their status limitations. Scenarios from mis-en-scene of toys method contain instances of actor's psychological state, instances of their presence or lack of presence at places and locations for example, Adam was at the lake, and few instances that describe the actors experience and medical condition. Simsarian's method scenarios also contain instances of the actor's presence and psychological condition, and instances that describe actors knowledge about their devices, as well as the history of how they came to possess them. There are also few instances where the actor's knowledge about the state of other actors is described, as well as instances that describe actor's physical and medical situation. Scenarios from Simsarian's method explain the latter type with slightly more detail than scenarios from Iacucci et al.'s method.

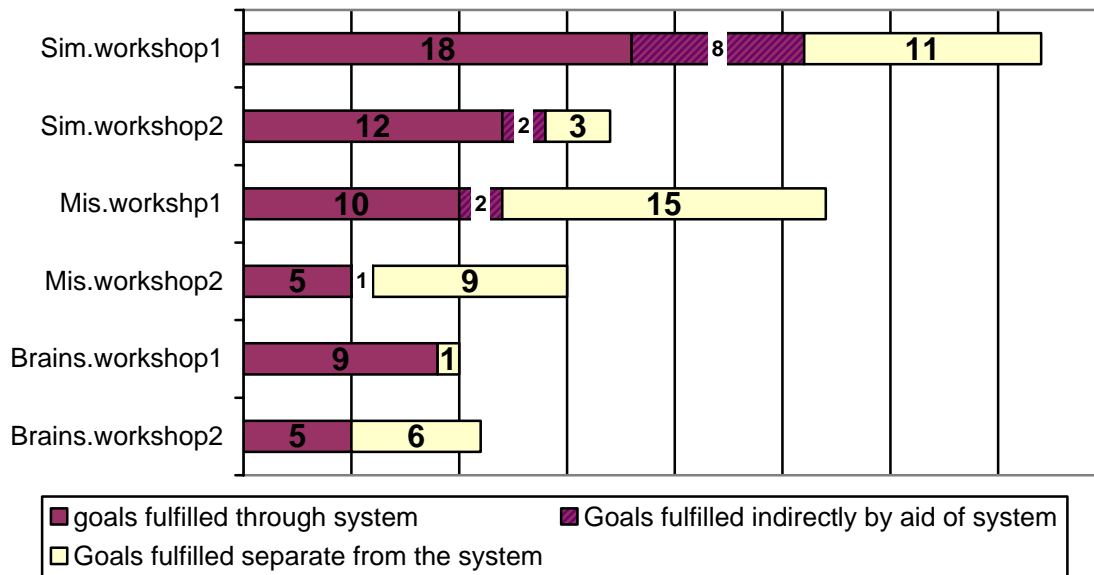
4.4.3 Task Goal results

As I mentioned before in the beginning of this chapter, task goals, or the goal of actions or activities seen in the scenario, may either be fulfilled through

the system or separately. When task goals are fulfilled by the system they, in fact, represent the required functionality of the system. If the tasks are detailed to the level of interaction within the system, then they can explain the structural features of the system as well. Goals that are not fulfilled through the system can instead be goals set for the whole activity of the scenario, such as, Bob is going hiking to bond with his son, or goals that the actors pursue in the moment that are based on changes in the setting or a change of plans, such as, Grandma assured Kally that they will be okay when she got terrified because of warning about bear, or Adam decided to go the other way and climb the peak (see appendix 3.B for the scenario containing this instance). In some cases, however, while the goals may not be fulfilled completely by the system itself, the system has a role in fulfilling them. For example, a signal from the system may prompt an actor to pursue the goal of checking another hiker's status (see appendix 3.A, scenario 1; and appendix 3B scenario 1 for examples).

Figure 4-8 represents the ratio of system task goals to non-system task goals, as well as the total count of task goals in different workshops.

Figure 4-8 Count of different types of goals across workshops

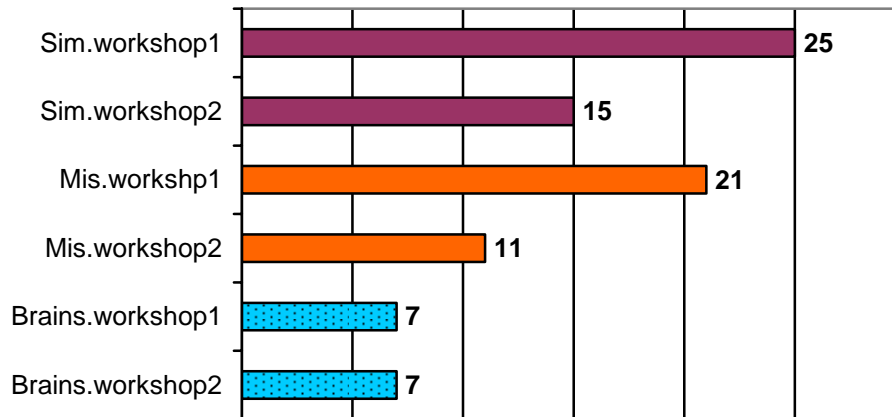


As is evident from the diagram, role-playing scenarios contained more task goals than brainstorming scenarios. Simsarian workshop scenarios, on average, contained slightly more task goals than mis en scene workshop scenarios. On the other hand, while the Simsarian role-playing scenarios demonstrated that the majority of goals have been fulfilled or aided by the system; Iacucci et al.'s role-playing scenarios contain more non-system related goals.

4.4.4 Plans results

Figure 4-9 displays the sum of plans in different workshops: It is quite evident that role-playing workshops have a higher overall count of plans or courses of action.

Figure 4-9 Total count of plans in different workshops



This figure also shows that on average, role-playing workshops that follow Simsarian's method have a higher rate of plans and courses of actions, than those that follow Iacucci et al.'s method.

Following the main goals or sub-goals of the scenario, the plans are clustered around 1- 5 clusters in different scenarios. Thus, scenarios coming from mis-en-scene of toys method have more plan clusters than those of Simsarian method and brainstorming scenarios do not demonstrate a pattern with this respect with one of them containing only two main sub goals, and the other showing four main sub-goals and clusters of plans around each of them.

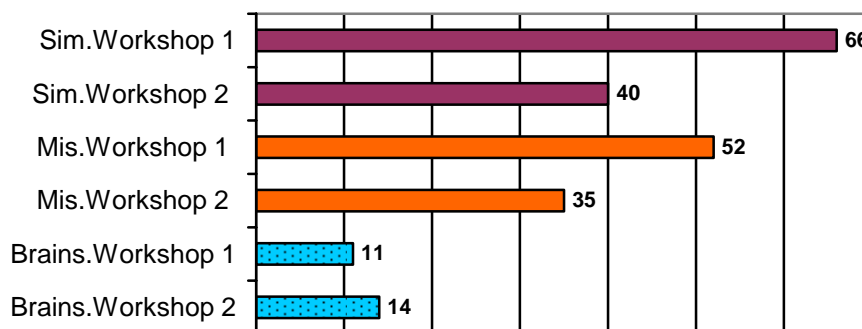
The quality of the plans can be assessed based on number of actions that detail them. The scenarios of different workshops do not have a clear distinguishing pattern with respect to the quality of the plans within them. Each type of workshop contains two - in the case of brainstorming workshop one - scenarios that demonstrate plans containing at least three sequences of actions.

4.4.5 Actions results

Actions are the basic backbone of each scenario: without actions, actors and task goals, a scenario would not exist at all. Identifying the nature of actions can show the nature of activities that the actors are engaged with in the scenario and will both illuminate the resolution within which the activities have been illustrated, as well as the perspective of the scenario. As an example, a scenario that does not contain any actions that show how the actors interact with the design at the level of hands, or eye contacts with the screen has a macro resolution and sheds little light on how the solution will fit at a detailed interaction and cognitive level. As we explained before, however, scenarios differ in terms of the level of resolution and perspective that they offer, based on where they were created or detailed within the design process. Vision scenarios normally have a lower resolution and a more functional perspective than the rest.

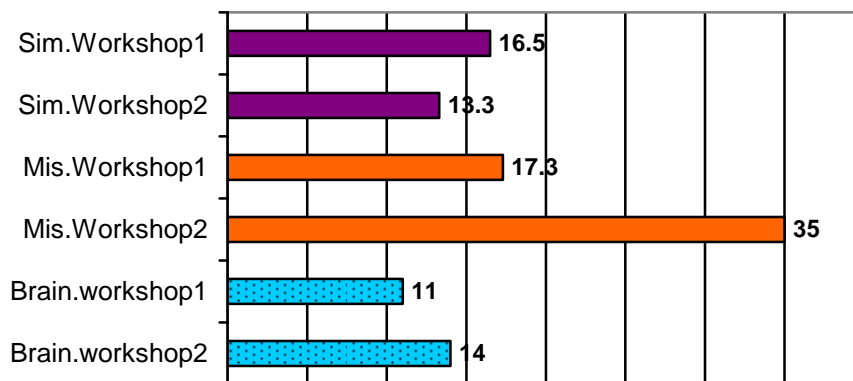
Figure 4-10 illustrates how various workshops differed in the total count of actions they reported within their scenarios. Figure 4-11 provides an almost opposite view by showing the average amount of actions per scenario.

Figure 4-10 Count of actions in different workshops



The first view postulates role-playing workshops as superior to brainstorming workshops in providing information about actions. But the second diagram shows that one role-playing workshop has in fact not been as successful as brainstorming workshops.

Figure 4-11 Actions average counts per scenario in each workshop



Actions, separated from scenarios can be meaningless; therefore, I believe that diagram 4.11 provides a more accurate picture.

In qualitative analysis of scenarios it was important to see how the scenarios represent spatial actions, social actions, and embodied actions because embodied, mobile and social contexts are quite often mentioned as areas within which role-playing seems to offer great potential as a tool for exploration in the literature.

4.4.5.1 Spatial Actions:

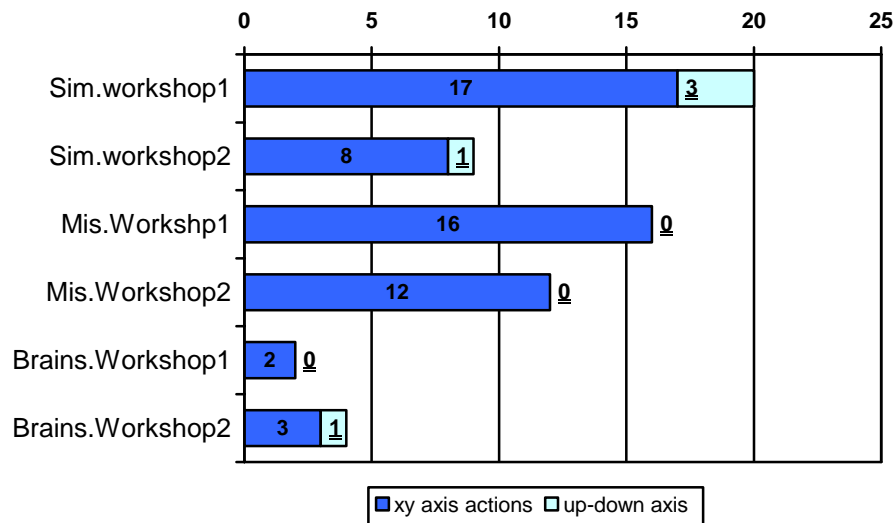
Figure 4-12 shows the total count of spatial actions across workshops, and defines the portion of those actions that have been on the z-axis as well. In counting spatial actions, I considered all actions or verbs that indicate a change

of the location of actors along the x, y, and z axis. For example, sit, fall, and walk are all spatial actions: the first two happen mainly on the z-axis, while walk happens on the xy-plane. There are, however, mixed spatial movements such as a climb that happens on all axes. In these cases, I let the context define whether the action is on the axis of xy or z: “climbing a mountain” was considered a xy-plane movement, while “falling down” or “being lifted up” is comparatively a z-axis movement.

The analysis revealed that brainstorming workshop scenarios had less spatial actions than the role-playing workshops, as is evident in figure 4-12. On the other hand, scenarios from mis-en-scene workshops (16 and 12), overall, had more spatial actions when compared to other types of workshops, while Simsarian scenarios did not show a consistent pattern (20-9).

Overall, the scenarios demonstrate a range of spatial actions that include movement to places and people, arrivals and departures, the start and end of spatial actions such as finishing a trail, or setting off hunting, moving along and across, moving up as in climbing or airlifting, and moving down as in climbing down and sitting down.

Figure 4-12 Count of spatial movements across workshops



The variety of spatial actions seen across scenarios was present in one of the brainstorming scenarios, while the other contained only spatial movements to a place. Spatial actions of arrival to places had a consistent presence across role-playing workshops, while one of the workshops from Simsarian method, and one from Iacucci's method contained a higher number of spatial actions of "movement to places" than the rest.

Figure 4-12 also reveals that exclusively up-down spatial actions were registered only from scenarios that came from either the Simsarian role-playing workshops, or one of the brainstorming sessions. The total count of these actions, however, in all of the sessions was comparatively low (maximum= 3),

and the actions were limited to actions such as falling, sitting down, running up a tree, and airlifting.

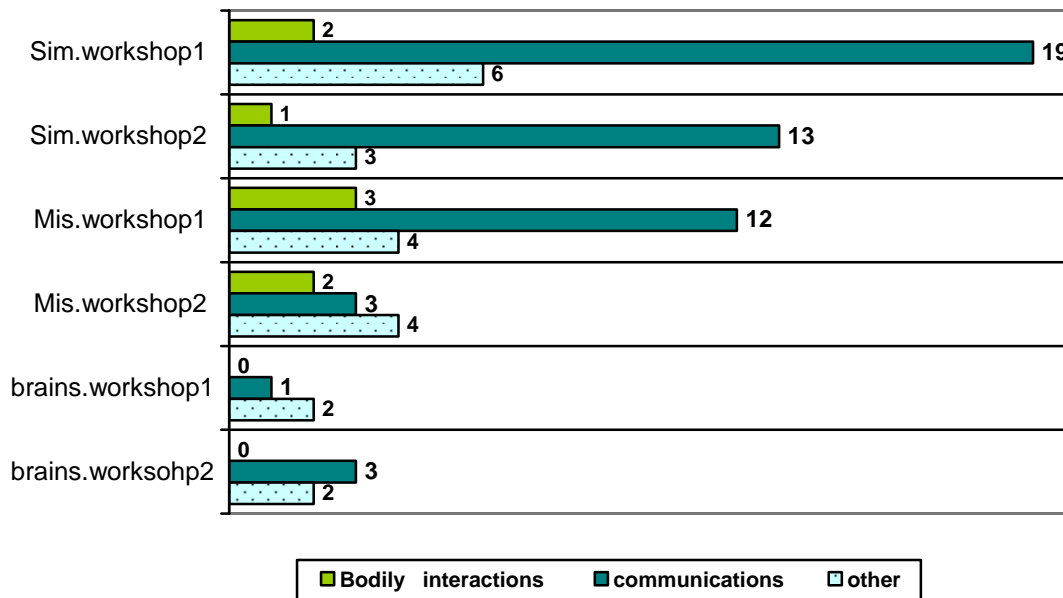
4.4.5.2 Social Actions:

I coded social actions in three categories: communications, bodily interactions and other social actions. Communications correspond with all actions in which there is either a conversation factor, or a give and take of symbolic codes of information. As an example, talking and saying are clearly conversational modes of communication, while signalling and messaging or waving hands are symbolic forms of communication. Bodily interactions include all social acts that explicitly involve bodily interactions, such as giving an object to, carrying someone, and administering a splint. This category excludes communication acts that involve the body movements as a signal. All other social actions that did not fall in the above two categories were considered under the category of *other social actions*. Examples are registering a person or deciding together.

Figure 4-13 displays the count of social actions in scenarios across different workshops. As can be seen role-playing sessions, in general, generate more social actions in all categories. Communication actions have the highest count and consistency in role-playing sessions following Simsarian's method, although they do not show a consistent presence in mis-en-scene scenarios. The type of communication seen in all scenarios includes contacting, calling, telling, the sending and receiving of information, informing, signalling, warning, commanding, and assuring. In most scenarios, the communicating acts are

accompanied by content, with the only exceptions being scenarios from the second Simsarian role-playing workshop and those from the second workshop using Iacucci et al.'s method.

Figure 4-13 Count of social actions across workshops

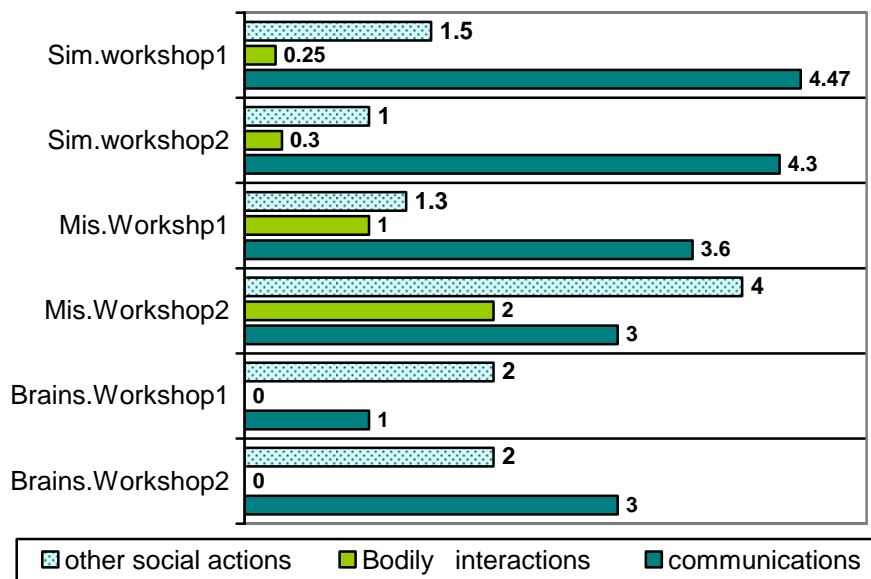


Bodily interactions generally do not have a high count in any of the scenarios, and are totally absent from bodystorming scenarios. They were registered more often in scenarios that come from role-playing sessions in a mis-en-scene of toys, while only 2 scenarios from the 6 Simsarian method scenarios contain any bodily interactions and the count is generally low in each of them. Most of the social, bodily interactions that I encountered in the scenarios were those related to helping other actors, in instances such as applying first aid, applying a splint, carrying another person, or helping a person to pass or move. None of these actions, however, were detailed enough to understand the courses of actions needed for these activities to take place.

Other types of social actions do not have a consistent appearance in Simsarian workshops. It is hard to say, then, which role-playing workshop can potentially create higher counts of these other types of social actions.

The average number of social actions, per scenario, confirms the results of the total counts, except for the conclusions regarding other social actions (see figure 4-14). Based on the averages, brainstorming scenarios do not appear to have fewer social interactions, other than communications and bodily interactions, per scenario than the role-playing workshops.

Figure 4-14 Average of social actions per scenario



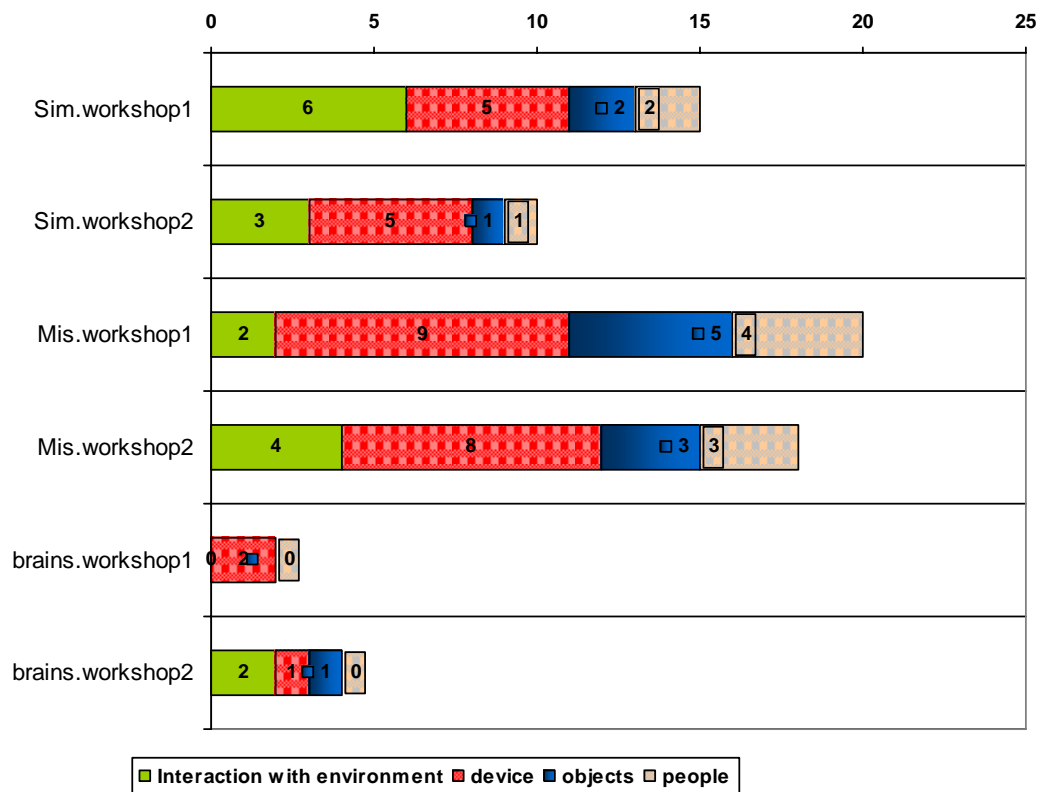
4.4.5.3 Embodied actions

These actions involve bodily interaction of the actors with objects, people, or elements in the environment. Objects, in this coding schema, include individual objects that are separable from the environment, such as a bottle, a car, or a bag, while elements of the environment include objects that are not separable,

including a tree, or a lake or a column are considered. Part of the bodily actions in the outcome scenarios was related to interactions with the design object or the design concept. Such cases are coded under the category of “interaction with device” only when the physicality of the design object is explicitly mentioned.

Figure 4-15 illustrates how embodied actions were distributed in different scenarios across the workshops.

Figure 4-15 Sum of embodied actions across workshops



This illustration clearly claims that scenarios from role-playing workshops have a higher rate of embodied actions than brainstorming sessions, while it affirms that scenarios that come from brainstorming sessions do not include instances of embodied actions with people, or the environment. Besides, the

instances of embodied interactions with objects in these scenarios is not consistent across workshops, and is lower than those seen in scenarios that come from role-playing in a mis-en-scene of toys.

Among role-playing workshops, those following the mis-en-scene of toys method have higher instances of interaction with people and objects, while those that follow Simsarian's method have a higher rate of instances of interaction with devices. Although one of the workshops following Iacucci's method reveals the highest rate of interaction with the environment among all of the other workshops, this pattern is not seen in the scenarios from the other workshops following this same method.

The qualitative analysis of embodied actions reveals that, overall, these actions are not explained in great detail in many of the outcome scenarios. They can be considered embodied actions rather by virtue of the nature of the activity, such as driving a car, or running up a tree than by the physical details that may explain the embodied aspects. The only scenarios that somewhat break this general pattern are a few of the scenarios from the role-playing in a mis-en-scene of toys, where the actors have been described to rotate a device sensor, pull it out of their bag, or cast it in the water.

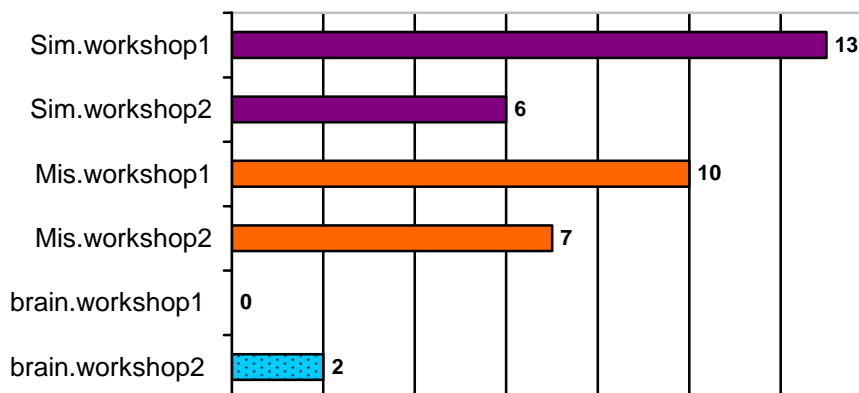
4.4.6 Events results

I encountered different types of events in the scenarios; events that originate from an interaction with the environment, such as falling down a cliff or being attacked by a bear; events that originate from the environment, like a

change of weather; events that originate from objects, such as low batteries; social events which include meeting other people who are not the main actors of the scenario, and events that originate from the system. System events that I considered in coding were events from the system that were not consciously initiated by any of the actors, and yet interrupted the actor's activity through an external factor.

Role-playing scenarios proved to contain more events than brainstorming scenarios (see figure 4-16).

Figure 4-16 Sum of events across workshops



The various types of role-playing scenarios do not seem to be too different in this respect; however, the scenarios from mis-en-scene of toys method contained more unique instances of events. These workshops also seem to be more successful in creating different types of events including environmental events, social events, events that originate from objects, and system events as well. The scenarios from Simsarian workshops, however, do not show any instances of social events, and the events that originate from the state of objects

within them was usually limited by the state of devices, such as the malfunction of batteries.

System events were evident in some of the scenarios from Simsarian's workshops, and in one of the scenarios from the mis-en-scene of toys workshop. The system events in Simsarian's workshop were triggered after body injuries based on biofeedback, while those from Iacucci's workshop were triggered by weather.

Brainstorming workshops, as the diagram displays, did not result in many events, and the only event that was registered was of an environmental nature; this event - change of weather- was described in much detail in the scenario. This level of detail was infrequent in the scenarios I analyzed.

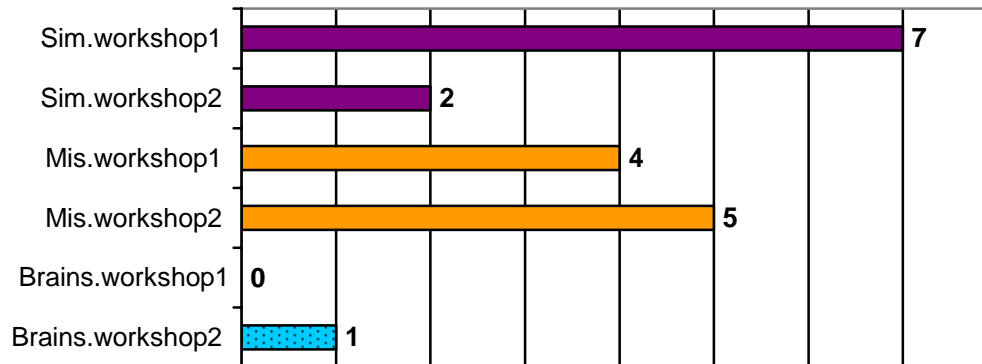
4.4.7 Evaluations results

Evaluations, as depicted in Rosson and Carroll's term, are mental activities directed toward interpreting the features of the situation or the system. Features of the system are not described in detail, in the scenarios that came from most workshops, because most do not go into interface details, or the exact form of data display. The interpretation of the system features, therefore, is not often encountered in these scenarios, although there are instances where we can infer that evaluation has taken place. One instance includes the case where the result of the actor's evaluation of the system response has been mentioned in the form of the information that the actor receives from her or his device. An example of this would include a situation where the actor immerses her device in the river

with the displays reading that chlorination is needed. Another example would be a case when we can infer an actor's evaluation from the re-action he has to the system's output: for example, "Grayden got a signal on his device and hurried to JF's place" (see appendix 3.A scenario 1 for this example).

Examples of where we can infer that the evaluation of a situation has taken place based on what is reported as either the user's observation, or realizations of a situation include "Kali gets to the area that Shannon is and sees that snake has bitten her"(see appendix 3.B), or "Mona realizes that Nancy is missing." Likewise, examples of inference based on the user's re-action to a situation include "Sharon got terrified and ran up the tree." This can imply that Sharon evaluated the situation as terrifying. Figure 4-17 demonstrates that scenarios which came from role-playing workshops contained more instances of evaluations. It is hard to say which of the role-playing workshops has resulted in higher number of evaluations because the results from Simsarian's workshops are not consistent; however, scenarios from mis-en-scene of toys show a consistently higher than average count of evaluations.

Figure 4-17 Sum of evaluations across workshops



A look at the nature of evaluations across scenarios reveals that psychological evaluations, in the form of reactions or feelings about a situation, are not often encountered in the scenarios, but can be seen in scenarios from all three types of workshop. Evaluations of a situation through the system can be seen in scenarios that depict a system that communicates through metaphors and signals, and such a system is imagined only in role-playing workshops. This makes the comparative analysis of this aspect with brainstorming-scenario-writing workshops difficult. The evaluations that come from role-playing on a mis-en-scene of toys contain instances of evaluation of the state of objects more often than those coming from Simsarian's method do. Evaluations that come from brainstorming workshops do not contain instances of this kind.

The results described so far in this chapter, show both conclusive patterns and some patterns that leave room for interpretation. In the next Chapter, I will describe the implication of these results.

CHAPTER 5: FINDINGS

5.1 Contribution of role-playing methods to understanding and exploration of contexts of use

5.1.1 Situations of use

One of the main goals of this research is to answer the question concerning the contribution of role-playing methods towards understanding and exploring the contexts of use of technologies that are to be envisioned and developed. One of the first things a designer or design team needs to know prior to designing a system or service are the different situations where both the use of a technology makes sense and the system is needed either typically or under critical circumstances. The more situations that a design team is made aware of, the more coverage it will have concerning the contexts of use, and the more it will be able to align the design specifications and requirements to fit all possible situations.

5.1.1.1 Role-playing methods generate several situations of use

This research demonstrates that role-playing methods can efficiently generate several situations of use within a 2-4 hour session. The four role-playing sessions that I facilitated each created between 3 and 6 different situations of use, which had their own unique settings, plots, events, and, in general, circumstances. The majority of role-playing workshops yielded 3-4 scenarios, with each scenario depicting one situation of use. In one mis-en-scene of toys

workshop, the result was only one scenario; however, that scenario contained 4-5 different situations of use, as well as diverse functionalities for the envisioned technology.

5.1.1.2 Some role-playing scenarios provide a full scope of situations of use

Another finding of this research regarding situations of use is that role-playing workshops can generate scenarios with a full or partial scope of situations. The scope of situations includes situations that existed before and after the situation of use. The situation of use itself includes all circumstances that combine to necessitate or inspire the use of the technology. 3 of the 11 outcome-scenarios of the role-playing methods provided a full view of pre- and post-use situational contexts and activities. It is interesting that these 3 are actually the first scenarios that were developed within each workshop; they include the first scenario from the first Simsarian method workshop, the first scenario for the first mis-en-scene of toys workshop, and the sole scenario from the second workshop of the same method. These 3 scenarios provide the most detailed accounts of the activities of the actors within one, or several, initial settings before the event that drives the use of the technology; they also provide insight into the activities that follow the event of use, as the actors return to their normal, or typical, routines. Other than the 3 full-scope scenarios mentioned above, of the 8 other scenarios that came out of role-playing sessions, 6 provide some details about the initial, or final, activities that precede, or follow, the situation of use. 3 of these 6 scenarios, which come from both Simsarian and

Iacucci et al.'s methods, illustrate the outcome of use and activities or events that follow it in a very general manner that does not exceed a sentence or, sometimes, just a verb. The other 3 scenarios, which all belong to Iacucci et al.'s methods, briefly describe the initial situations before the event of use, leaving out the activities that follow it.

5.1.2 Detailed contexts of situations

Finally, the most focused or detailed way of looking at the context of use is to look at the details that illustrate each situation. Every situation happens in dimensions of place and time, and involves actors that always contribute to the situation by virtue of their motivations, emotional or physical state, intentions, and the activities they are involved with. In addition, a situation usually has a social context, which is made up of the actors involved, along with others who affect the situation whether they are present or absent. In the analysis of the results and the synthesis of findings, the dimensions of place and time and the environmental details that they encapsulate relate to the 'settings' category, as defined in the previous chapter. Actors' states, motivations, and intentions roughly relate to the 'actors' category of analysis and with some aspects from the 'settings' category, such as environmental factors or objects, or both, that draw the actors into the scene. Finally the social context can be synthesized from the mental state and positions of actors registered in the 'actors' category, the actor's goals and plans as coded under the 'task goal' category, and the social activities that were analyzed in the 'actions' category of the analysis.

5.1.2.1 Space, time and environmental details

5.1.2.1.1 The role-playing methods that were investigated had different potentials in exploring and depicting space and the whole story terrain

Overall, role-playing scenarios in this research define the space of the story by means of places and locations that they mention or describe. Places refer to known geographical locations that have broad boundaries, such parks or wooded areas, or more localized geographical features, such as rivers, mountains, or bridges. Locations refer to areas that exist by virtue of containing actors or objects such as “where Shannon is”. These locations exist by virtue of being the origin or destination of the actors’ movements; they are described in terms of the positions of the actors in relation to each other, such as “close to Adam” or “behind Mona and Mike”.

The results demonstrate that the 2 role-playing methods have different potentials in exploring and depicting space. Scenarios from role-playing in the mis-en-scene of toys methods generally contain at least two defined places, for instance both a lake and a river, or a peak and a camp. The higher number of locations provided in these scenarios allow for a greater conception of the whole terrain whereby the story takes place. In contrast, all but one scenario from the Simsarian method usually describe only one place, which is generally the location where the main event of the story takes place. The one exception generated by the Simsarian method has a greater number of places than all other scenarios. This may be partly because this scenario is a full-scope scenario, which describes the events both before and after the situation of use. 4 out of 7 scenarios that resulted from the Simsarian method also contain details about the

positioning of actors in relation to each other or the place of the event. This type of positioning information is less visible in scenarios generated from the mis-en-scene of toys method. It is worth mentioning that in some cases, particularly in the case of the scenarios from the mis-en-scene of toys workshops, the higher number of places and locations correlates to the number of story episodes, which, in turn, correlates to the number of events that happen throughout the story. This means that stories that contain more events usually contain more places and locations.

5.1.2.1.2 Environmental details of places were not fully explored in the role-playing scenarios

One of the strange findings about role-playing scenarios is that environmental details of places (such as foliage, weather, physical surfaces, temperature, light, and animals) are generally not described, except when these very elements are the cause of an event in the story; for example, a “steep hill” causes an actor to fall down or a “branch from a tree” knocks an actor down or the “downpour of rain” causes actors to run for shelter.

5.1.2.1.3 Role-playing scenarios illustrate different time-spans

As described in the results, role-playing scenarios have been shown to explore and define time-spans ranging from an hour to a day as per the entire timeline of the stories. The length of a story timeline correlates with what I previously mentioned under the subject of scope and can include the time *before* the central event of the story, the time *of* the central event of the story, and the time *after* the event. On average, role-playing scenarios have proven to contain

3-10 episodes within their timeline; however, scenarios from the mis-en-scene of toys method have the longest average of timeline length and the highest count of episodes. The only exception to this is the first scenario from the first workshop of the Simsarian method, which has the largest scope and timeline, as well as the highest count of episodes of events and activities among all role-playing scenarios (see appendix 3.A, scenario 1).

Not all role-playing scenarios have a defined time-span, indicated by the general timetable or time-plan of actors at the beginning of the stories. On the other hand, only a few scenarios have indicated an exact time for when the main event of the story happens. Finally, there are no more than 2 instances where the length of time that an actor or actors are involved with a situation or activity is mentioned. However, most scenarios provide a rather clear picture of the sequence of events and activities, even if the sequencing is not described with time stamps or adverbs such as then, after or before.

5.1.2.1.4 Arrival at places is a time-stamp in several role-playing scenarios

One interesting feature seen in several role-playing scenarios is the fact that there are instances where the time-stamp of an event or activity has been described in terms of the time when the actors arrive at a place, for example: *once the helicopter reaches one hiker's place*, the ranger goes back to her daily routine (see appendix 3A:scenario 1, for this example).

5.1.2.1.5 Concurrency of activities of actors is often described in role-playing scenarios

Many role-playing scenarios contain instances where concurrency of events or activity of actors has been explicitly described; especially, scenarios derived from the Simsarian role-playing workshops that usually contain such instances. Concurrency of events or activities of actors have been described with words such as ‘meanwhile’ and ‘while’, indicating that two actors are or have been involved in separate activities at the same time. Other scenarios may contain non-explicit concurrent events.

5.1.2.2 Actor’s motivations, emotions, mental or physical state, and objects as context

Most role-playing scenarios are preceded with a short user profile that explains the actor’s age and experience and, sometimes, personality, fitness and level of experience with the activity that will follow in the scenario. Other contributions made by actors to the settings and situations have usually been explained within the body of the scenario, while others are merely inferred from the other scenario details.

5.1.2.2.1 Actor’s motivations are clear in most role-playing scenarios

The motivation of actors in using technology that has been envisioned in the scenarios, as well as the activities that they get involved with, is clear and reasonable in most role-playing scenarios; however, a few cases do exist where the motivation of actors for specific actions, or ways of planning courses of activity, is not clarified. For instance, in one workshop there are several cases where one of the hikers responds to a signal that he receives from another hiker by proceeding toward the area of this other hiker. The motivation of the hiker, in

this case, can be inferred to be either curiosity or the desire to help the other person or both. Whatever the case may be, the scenario is left to the reader to interpret. In an alternative circumstance, a hiker that is stuck in the middle of a mountainous, narrow path calls the hiker below in order to ask for help from the hiker above her; the motivation of the actor, in following this arrangement, is not clear or interpretable from other details of the scenario.

5.1.2.2.2 Actor's emotions are generally not conveyed in detail

Most role-playing scenarios of this research have instances where the emotional reactions of actors to events and situations are very briefly described, but this is limited to a few instances and, in general, the scenarios do not contain much information about the emotional state of the actors while involved with an activity. The examples that explain their emotional reaction to events are few as well.

5.1.2.2.3 Actor's state in terms of presence, position, and mental or physical situation has been mentioned briefly in some scenarios

Several role-playing scenarios explore the state of actors in terms of their presence or absence in contexts, or their positioning with respect to the location of events or other actors. These instances can be seen in scenarios from all the workshops, with the exception of the second mis-en-scene of toys role-playing workshop. In this case, however, all actors move along with each other, and instead of stating their presence or positioning in terms of location, their arrival to different places is described with action verbs. The actors' mental and physical bodily states and their affect on the situation are explored in a few of the role-

playing scenarios of the Simsarian workshops, as well as being touched upon by some of the other scenarios of both types of methods. In most of these, however, the actors are faced with injuries or critical physical or mental situations such as a shock. Other than these examples, the actors' knowledge, or lack of knowledge, of a situation or device can be seen as the contributing factor to the situations of a few scenarios.

5.1.2.2.4 Actor's possess different objects in the scenarios; however, the methods differ in the diversity of objects the actors are explained to possess

The object types that actors bring with them to the setting are comprised of vehicles, personal items, activity equipment, and devices. All scenarios have instances of different objects; however, the mis-en-scene scenarios display a larger diversity of objects. The state of the objects contributes to situations in 3 role-playing scenarios: 1 in a situation where a car is stuck, and the other 2 in situations where a device loses power. Devices and device components, such as armbands, handles, sensors, and details of their interface have been mentioned in a few scenarios and are particularly more present in the scenarios of the first Simsarian workshop and the second mis-en-scene workshop.

5.1.2.2.5 Except for few instances, the physical details of objects and devices are not described in role-playing scenarios

Despite the fact that participants used self-made mock-ups to improvise interaction with their devices in the ideation phase, the details of their interaction and of the objects themselves, and how they alter or define the situation, remains vague.

5.1.2.3 Social Context:

The social context of scenarios or situations can be described as the matrix of people, or actors, that are in some way related or contributing to a situation, which may or may not be co-located, and whose intentions, motivations, emotions and state may affect the situation and the actors involved within it.

5.1.2.3.1 All role-playing scenarios are social scenarios

All role-playing scenarios of this research are, by nature, social scenarios as they have 3-4 actors playing a role per scenario. In most scenarios, however, 1 actor is less active and acts in the role of the accompanying actor or the injured person. In some other cases, 2 actors join at a certain point in the story and from there on their actions are described collectively. Most actors are defined in user profiles that are introduced at the beginning of the stories; however, in 4 mis-en-scene scenarios, actors meet with new people who appear in the story as part of an event or in response to an event. This is because of the event cards that are used in the method, which may introduce unknown social events into the story.

5.1.2.3.2 All role-playing scenarios contain communications, bodily interactions, and other types of social interactions

The analysis of social actions reveals that all role-playing scenarios contain instances of social situations where communications, bodily interactions, and other social interactions, such as collective agreements and decision-making, have taken place. All scenarios have at least one situation where all or some of the actors are not co-located yet are allowed to be aware of or connected to each other through the active or passive use of the system. The

number of social communications is higher in scenarios that have more instances of situations where the actors are not in the same location. The first workshop of Simsarian's method, where none of the actors are initially co-located, therefore has the highest count of social communications.

5.1.2.3.3 Face-to face communications or direct speech are not frequently registered in the scenarios

It can be said that, overall, the scenarios do not register much of the face-to-face communicative actions of the actors. On the other hand, the content of the communications that happen through the system are either abstract, because the system functions based on signals, or the content has been described abstractly with indirect speech.

5.1.2.3.4 Embodied social interactions are not detailed to the level of physical actions involved

With regards to social interactions that have an embodied aspect, such as saving someone or helping someone pass a bridge, the results indicate that the Simsarian workshops, which actually involve physical role-playing, strangely enough register fewer bodily interactions. However, regardless of the type of workshop, none of the embodied social interactions of actors are elaborated enough to show the details of their physical interactions.

5.1.2.4 Events within the context

5.1.2.4.1 Role-playing scenarios contain a large number of external events, caused by the environment, objects, social meetings, and physical accidents

Role-playing workshop scenarios have proven to contain a large number and variety of possible external events in situations-of-use. Many of these events

occurred as physical accidents caused by the interaction of the actors with the environment, such as falling down, being attacked by animals, or falling into the river. Events such as these were the main drivers for the need of technology. Some others included events that were a result of the state of objects in the setting, such as the malfunction of device batteries or difficulties with vehicles, or alternatively as a result of the obstructions of objects, such as bridges. In addition, environmental events, like the change of weather, were seen in several scenarios. Finally, many scenarios from the mis-en-scene of toys workshops contained social events, such as meeting strangers and park rangers on the way to places. While most role-playing workshops contained an external event, the mis-en-scene of toys workshops had a higher-than-usual number of external events per scenario and contained more social events.

5.1.2.5 Summary of findings regarding contextual details

The contribution of role-playing in the exploration of contexts-of-use and contextual details can be summarized as follows:

1. Role-playing workshops generated a very good range and number of situation of use.
2. Overall, role-playing workshops generated diverse information regarding the different arrangements of space and locations and time frames, which can be the bedrock of situations that require a new technology.

3. Role-playing scenarios demonstrated that the participants have explored timelines ranging from a few hours to a whole day within role-playing workshops, as well as the full scope of situations that happen before and after situations of use.
4. Although role-playing scenarios explored the spatial, temporal, and environmental contexts of situations, they did not clarify the details of these contexts. The mis-en-scene of toys scenarios, on the other hand, were more successful in defining locations and could provide a better sense of the terrain.
5. Most role-playing scenarios were successful in exploring meaningful motivations for using new technology, as well as functionalities that are demanded from a system in contexts.
6. Some role-playing scenarios described the actor's state, in terms of their presence and absence at locations, as well as their mental and physical health status. The exploration of actors' emotional states exist, but it is generally limited to emotional reactions to some critical situations.
7. Role-playing workshop scenarios had different social arrangements that depended on particular scenarios and the actors' mobility and connectedness with others; that being said, because the intentions and emotions related to certain social situations of actors were sometimes unclear, details of the social context often remained vague. In addition, the social context, in terms of other non-actors who may be related to the

situations or social events, was only explored in role-playing scenarios following the mis-en-scene of toys method.

5.1.3 The exclusive contribution of role-playing methods to the understanding of contexts

Although role-playing scenarios have proven to be successful in exploring numerous aspects of contexts-of-use, the results have shown that many of these aspects have also been explored in brainstorming-scenario-writing scenarios, to a greater or lesser degree. I should emphasize here, however, that of the two brainstorming-scenario-writing workshops in this research, each yielded only one complete scenario, leaving only two outcome-scenarios to be compared with eleven role-playing outcome-scenarios. This small number does not allow general patterns to be distinguished or generalizations about the brainstorming-scenarios to be made; therefore, this limitation should be taken into consideration when reviewing the findings. Moreover, the two scenarios from the brainstorming-scenario-writing sessions are vastly different from each other. The results from one scenario have demonstrated that it is the weakest among all others with regard to the development of space, the environment, and the social context, including communicative actions and embodied social interactions between actors and people. Moreover, this scenario does not make clear the motivations of some of the people who interacted with the main actor of the story. The other brainstorming scenario is very different from the first scenario with regard to the above aspects. Keeping these irregularities in mind, the summary of the

contribution of role-playing workshops to the understanding of contexts is as follows:

1. On average, role-playing methods generated a higher number of diverse situations of use within a workshop period, more so than the non-role-playing method. While the average number of scenarios per workshop of the Simsarian method may be closer to the average of non-role-playing scenarios, the mis-en-scene of toys workshops, which have the same time-length as the non-role-playing methods, generated a considerably higher number of scenarios.
2. Since role-playing workshops generate more situations of use, the variety of instances-of-place from each role-playing workshop is greater than those from brainstorming workshops. It is noteworthy that the more elaborate scenarios of role-playing workshops have a larger number of instances-of-place and diversity of places than the most elaborate non-role-playing scenarios. For instance, the sole scenario of the second role-playing workshop, following Iacucci et al.'s method, had a larger number of places, higher diversity of locations and places, and more environmental and geographical features than that of any of the non-role-playing scenarios.
3. Role-playing scenarios contained more instances and variety of objects than brainstorming scenarios and, in some cases, the state of the objects were the source of scenario events.

4. The design solutions, or devices depicted in role-playing workshops, were sometimes more structurally detailed and, more importantly, were described in the context of the narrative of their use. While one brainstorming scenario describes the details of the device features, it does not describe them while in use.
5. Some role-playing workshops depicted complex collaborative systems and services. Non-role-playing scenarios, on the other hand, did not depict collaborative systems.
6. Some role-playing scenarios had longer timelines and more episodes of events along their timelines than any of the non-role-playing scenarios. Several role-playing scenarios described time of start of events or activities in terms of the time of arrival of the actors to their places. Several role-playing scenarios described the concurrence of activities of actors more explicitly than brainstorming scenarios.
7. Role-playing scenarios provided more social context, in terms of communications and embodied social interactions, than non-role-playing scenarios. None of the brainstorming-scenario-writing scenarios contained instances of embodied social interactions, and the count of communication acts in them was generally low.
8. Role-playing scenarios had a higher count of external events than brainstorming-scenario-writing scenarios; however, they did not necessarily explain the events in more detail.

5.2 Understanding users' activities and their mobile and embodied aspects

The details of users' activities in the situation of use, or situations surrounding use and their embodied and mobile aspects, are other important aspects in understanding the contexts of use of a technology. The second goal of this research is to assess the contribution of role-playing methods to these aspects.

5.2.1 Understanding users' activities

Understanding users' activities involves understanding the sequence and details of the actions they are comprised of and the physical, cognitive, and sometimes-emotional demands of each action. For instance, helping a person cross a river, while jumping from rock to rock, imposes certain physical and cognitive requirements on both parties. Coordinating actions for rescuing an injured, lonely hiker that is trapped in a dangerous area at night will demand cognitive and emotional capabilities for decision-making and social communication in the face of the emotional stress that the situation imposes on all people involved in the situation. The findings of this research with regards to understanding user's activities using the outcome scenarios of role-playing methods has been defined and described below.

5.2.1.1 Role-playing scenarios each contained at least 3 activities and 4 plans or routines

The results indicate that role-playing scenarios each show actors involved in at least 3 activities and overall, the mis-en-scene of toys scenarios had the highest number of activities and actions when compared to Simsarian scenarios.

Each role-playing scenario contained at least 4 plans or courses of action. Only 3 scenarios from the 11 role-playing scenarios depicted actors following more than 6 plans. These were scenarios that have a larger scope, or contain more use situations. However, the number of plans and the number of activities or actions described in the scenario are not co-related, which suggests that some scenarios may contain more plans, but not many details about the courses of actions taken to fulfil those plans.

5.2.1.2 The number of detailed courses of actions was less than those that were not detailed, however half of the scenarios contained a plan fulfilled with more than 3 sequences of actions

Overall, across all scenarios, the number of detailed courses of actions is less than courses of actions that are fulfilled with only 1 or 2 actions. Yet, half of the role-playing scenarios contain at least 1 plan or course of action with more than 3 sequences of actions. The majority of these detailed plans or routines came from the mis-en-scene of toys scenarios. These scenarios detailed the course of actions in 2 cases of using the system for way finding, 2 cases of detailed sequences of actions taken with a device and 1 case of routine activities at arrival to a place. The other 3 detailed plans came from the Simsarian method scenarios and described a case of complex co-ordinating of collaborative activity,

a case of detailed communication of actors over the system, and a routine of activities at arrival to a place.

5.2.2 Embodied actions and contexts

Understanding the activities of the users and their contexts would also entail an understanding of how they are bodily performed and the tacit knowledge used in performing them. The following defines and describes the findings of this research with respect to embodied contexts.

5.2.2.1 Embodied actions were mentioned but not detailed

The results of the analysis revealed that role-playing scenarios exhibit embodied interactions with objects, devices, people, and the environment. They also contain spatial actions that are embodied by nature; however, the specific embodied detail of these actions, in terms of the sequences of bodily physical actions, is not described in most of the cases. An exception to this exists in a few cases from the mis-en-scene of toys scenarios, which describe the way the actors reach out for their devices, handle them or interact with their physical components to make them work.

5.2.2.2 Embodied contexts were not very detailed

The contexts of the embodied actions in terms of place and environmental details, such as surface, foliage, temperature and light, which affect the performance of the embodied actions or interactions are generally left very unclear in most scenarios and are illustrated only in general terms. Likewise, most of spatial actions of the actors are generally described as moving or going

from one place to another, with few details about their speed, gait, and interaction with the physical elements of the setting, or the effects of weather, light, wind or any other environmental factor that can affect their movement from one location to other.

5.2.3 Mobile contexts

Some activities occur while users are changing locations and therefore span over changing contexts. These mobile situations and contexts have their own specific demands on the user and, therefore, the technology developed for them. The findings of this research with regards to mobile contexts displayed in outcome scenarios of role-playing method can be seen below.

5.2.3.1 Role-playing scenarios contained many spatial actions

The analysis of spatial actions has demonstrated that all of the role-playing scenarios involved mobility, and the movement of at least one actor from one location within the setting to another. Spatial actions comprised a considerable portion of actions in most role-playing scenarios; however, role-playing scenarios from the mis-en-scene of toys sessions had a higher count of spatial actions. This may have occurred because all of the actors were involved in spatial actions in these scenarios, compared to Simsarian scenarios where usually only 1 or 2 actors have been described in movement.

5.2.3.2 Role-playing scenarios described different forms of movements along the x-y plane but not many up and down movements

Spatial actions in role-playing scenarios included several forms of movement including movement to places, such as a ranger's office or a lake,

people running to one's child, movement of objects like a car, as well as movements comprised of arrivals and departures and movements across, along, and into places. Overall, very few up and down movements, such as airlifting, climbing up a tree or mountain, or sitting down were mentioned in scenarios, and most of these were registered in the Simsarian method scenarios.

5.2.3.3 Role-playing scenarios demonstrated different aspects of mobility

According to Bellotti and Bly (1996), mobility can have different appearances: it can have a remote appearance, such as when people are moving between places far from each other by car, train or other vehicles; or it can have a local appearance such as when people move between locations that are close to each other, such as different rooms in a building. Luff and Heath (1998) have also suggested a third appearance for mobility, namely micro-mobility, which is the way an artefact is used and manipulated at the level of hands for different purposes.

All of the role-playing scenarios demonstrated instances of remote mobility, and 5 from 11 scenarios, which include all scenarios from Iacucci's method, contained local mobility such as moving from one side of a lake to another, getting out of a vehicle, or running up a tree. Examples of micro-mobility, in terms of the details of the treatment of objects and, in particular, devices, are rare in the scenarios, being described only in 3 cases and strongly implied, although not explained, in a few others. There are at least 20 more instances, however, where actors must have interacted with and handled devices and objects, but no details exist to imply or explain these embodied actions. For

instance, although a scenario describes that 1 of the actors was in contact with the other all the way from his location to the location of an event, it does not describe how this connection was carried out, what the device looked like, and how it was held along the way.

5.2.3.4 Details of mobile contexts

Mobile situations usually involve many changes of context because the changing of locations themselves lead to constant changes of environmental settings. Additionally, social settings may change along the path, and the mobile person may enter into new social circumstances. These may impose new demands on her activities; for example, entering into a quiet room may demand that the mobile user change the mode of her communication from voice to text. Besides, people may be multitasking while mobile; therefore, the mobile situation of use may have to coincide with several other activities of the users.

5.2.3.4.1 The scenarios depict use of technologies when mobile and illustrate actors involved with a variety of activities while mobile; Mis-en-Scene scenarios contained more activities

The mis-en-scene of toys scenarios show actors involved with a greater variety of activities while mobile. The actors also face a change of social circumstances more often than the Simsarian role-playing scenarios, by virtue of the events that were introduced by the event cards during the improvisation of scenarios. The outcome scenarios depict situations where the actors use the technology, when mobile, to find locations and people and navigate to them, to communicate critical contextual information, to be connected and aware of each

others' wellbeing, to passively report their health, to search and rescue in the face of critical situations, and to co-ordinate activities.

5.2.3.4.2 Depending on the method, role-playing scenarios depict the mobile terrain differently

While many scenarios imply movements of actors between locations, except for the first scenario of the first Simsarian workshop, most Simsarian scenarios only define one location with a specific name or environmental characteristic, and describe the other locations only relative to that sole location. Mis-en-scene of toys scenarios specify more locations; therefore, it is easier to imagine a path of movement between the locations in these scenarios. This is especially true with the sole scenario of the second mis-en-scene workshop, which defines more than 3 locations and, additionally, some description of the path between them.

5.2.3.4.3 Environmental details of mobile contexts are usually not described in most scenarios

The results from the analysis of settings suggest that most role-playing scenarios do not specify the physical and environmental contexts that actors pass through, or arrive and leave, except when these details are the cause of an event, such as falling down, slipping, and being delayed.

5.2.3.5 Summary of findings about activities and embodied and mobile contexts

In summary, the role-playing methods that this study investigates contribute to an understanding of activities, and embodied and mobile contexts, in the following way:

1. Role-playing workshops generated a good amount of information about the different activities and courses of actions that actors may undertake in the problem domain. All scenarios mentioned actors involved with more than 3 activities, or courses of actions; however, the sequence of actions that build an activity were not detailed in many cases.
2. Role-playing workshops generated a considerable amount of actions that were embodied by nature; however, most scenarios did not describe the physical, bodily details and sequences of these embodied actions. Generally, the tacit knowledge of the actors, in performing embodied actions was not conveyed through the scenarios. On the other hand, in many cases, the environmental details that may affect the performance of actions are mentioned very briefly and only in cases that they have caused critical problems, such as breaking off of a branch on an actor. Therefore, overall, many environmental factors, such as light, temperature, and density of environment that may affect embodied interaction with people, environment and objects, have been left unexplored.
3. Role-playing scenarios depicted different aspects of mobility. All scenarios contained instances of remote mobility and half of the scenarios contained instances of local mobility. Micro-mobility was explored in a small number of scenarios and cases. In comparison, scenarios from the mis-en-scene of toys method had more instances of local mobility, and a higher number of defined locations.

4. The environmental and embodied contexts of mobile activities have been explored in few scenarios. Most scenarios, however, only describe a few environmental details about locations, particularly paths, and routes that actors take in transit.
5. The mis-en-scene of toys scenarios have proven to reveal actors involved in a greater variety of activities when on the move and a change of social context, as result of meeting new people, is registered more often in them.

5.2.4 The exclusive contribution of role-playing methods to understanding activities and embodied and mobile contexts

It is difficult to generalize about the exclusive contribution of role-playing methods because the brainstorming-scenario-writing scenarios do not show a consistent pattern with regard to their description of activities and mobile contexts. Both, however, share a low count of embodied social interactions, as well as embodied interactions with objects and devices.

The scenario from the first brainstorming workshop depicts the main actor of the scenario inside a building, mainly engaged with queries from her device. The scenario contains 2 instances of social interaction, with undefined physical, temporal, and social contexts. The only mobile action of the whole scenario occurs at the start of the story and is not embedded in contextual environmental details. The scenario from the second workshop, in contrast, shows the actors engaged in several activities and describes the actors in movement throughout

the story, incorporating both remote and local mobility. The environment of the story contains more than 3 locations and provides the reader with some sense of the terrain.

Keeping the inconsistency of data in mind, the following statements can be made when comparing role-playing and brainstorming scenarios with regard to activities, and embodied and mobile contexts:

1. Each role-playing workshop provided more information about the diverse activities that people may be involved with in the contexts of situation of use, than any of the brainstorming-scenario-writing workshops.
2. Some role-playing scenarios contained more instances of activities within one scenario, than any of the non-role-playing scenarios.
3. Role-playing scenarios contained activities with a greater number of sequences of action more often than non-role-playing scenarios.
4. Role-playing scenarios contained more instances of embodied interactions with people, objects and devices than non-role-playing scenarios; in fact, each role-playing workshop provided more instances of embodied interactions of all kinds.
5. Role-playing scenarios contained more spatial actions than brainstorming sessions where some mobile activities were described in terms of the actor's decisions and plans, rather than actions.

6. While on the move, actors met with more social situations in role-playing scenarios from the mis-en-scene workshops than any of the non-role-playing scenarios.

CHAPTER 6: DISCUSSION

6.1 Limitations of the study:

As I explained in the methodology chapter, there were several shortcomings in conducting the role-playing methods for this research, some of which were due to a lack of precise descriptions of the methods in the literature. Others were related to a lack of access to professional designers and facilitators who could participate in the method. It is noteworthy that if anyone had accepted the position of the facilitator, they also would have had to necessarily invest time to be trained in conducting each workshop based on the protocols of each, and to practice it to ensure they would conduct them consistently. As a result, I had no success in recruiting people with the interest and time to facilitate the sessions and so I had to facilitate all workshops myself. Recruiting designers who would interact with the participants in role-playing sessions was not easy either. Therefore, only 3 of the 4 role-playing workshops had designers present. To limit the bias caused by this situation, I had to ask the designers to limit their contribution to the design ideas and situations. Of course, the lack of solid descriptive guidelines was another contributing factor that shaped my decision to downplay the interaction between designers and users. I have described the limitations of this research in conducting each of the methods below in more detail:

6.1.1 Limitations in conducting Simsarian role-playing workshops

Simsarian's (2003) paper on the use of role-playing in the design process provides a useful workshop agenda for running a role-playing session with designers and users; however, it does not describe how the participation of users and designers should be facilitated, and only provides little guidance for conducting bodystorming activities. Additionally, Simsarian's method is based on a premise that users and designers will enact interactions with a mock-up of the envisioned technology and carry out their performances in a simulated place equipped with props. However, the method description does not clarify or describe the stage of creating the mock-ups or setting the environment, leaving the details of the participation of designers and users unclear.

To overcome the above limitations in Simsarian's method, I drew on similar methods, such as Burns et al.'s method (1994) to instruct and plan the bodystorming phase, and on Svanaes and Seland's (2004) approach to introducing users with possibilities of technology before their prototyping activity. The users were also instructed to use the objects and props in the environment to build a representation of the target environment of their plots. Although I provided participants with modified guidelines, or in some cases guidelines that I created myself, the modifications brought to the original method, and the fact that the modified guidelines were not tested in research before, may have contributed to the way the participants imagined and constructed their desired technology and inquired about the details of the technology and the situation through their enactments. For instance, the way they constructed the environment initially and

the level of detail that they brought into the initial set up may have affected their success in imagining the situational details of the environment and therefore in grounding their designs in the details of the situation. Likewise, the way they imagined and constructed their mock-ups may have affected their success in carrying out the enactment and in envisioning their functional needs or their interaction with the technology.

Finally, it is conceivable that the improvisations could have had better results if the participation of designers and users was organized differently. Due to the lack of clear guidelines about the interaction of designers and users throughout the role-play, I decided to decrease the contribution of the designer to the creation of ideas in this study. This was to ensure that the participants would have enough room to explore and express their ideas without getting bogged down by the designer's ideas. Furthermore, the designer was not permitted to interrupt the user's role-plays to ask questions and was permitted to discuss and inquire about the details that the users had brought up only after the performances were over. The method would possibly have yielded better results if there were guidelines under which the designer could have had an optimal interaction with the users, and have been more involved in the co-creation of the technologies or situations.

The Simsarian method study was also faced with an unpredicted limitation in conducting the method. In fact, it was not possible to conduct the last phase of the workshop, informance, completely. Based on the workshop agenda, in the informance phase, the participants should once again enact the scenario or

scenarios that they had developed and fleshed out through improvisations in front of the camera. However, in this study, the participants were too tired to re-enact the plots and they did not have a clear memory of the details they explored in the improvisations to re-enact them in the final Informance.

Other limitations that complicated the conduct of the method were due to uncontrollable factors, such as: a lack of compatibility and co-operation of team members due to differences in personality or background; differences of energy level and mood of users, designer and facilitator in different workshops; and differences in the level of comfort of participants in enacting in front of others.

6.1.2 Limitations in conducting mis-en-scene of toys workshops

Similar to the Simsarian method, although less so, the mis-en-scene method is also vague in describing details of the interaction between the designer and the facilitator, who is the game master, with the participants. However, compared to the Simsarian method, it does clarify the roles of the designer and the facilitator, and mentions that they do not contribute to the idea but instead organize the flow of the game, introduce incidents, decide who plays, and act out side-roles. Still, the level of participation of the designer to the improvisational enactment is not clarified. For instance, we do not know whether the designer can initiate a situation or action, or if she is restricted to following others and reacting to their actions. Also, it is not clear how far the facilitator goes in shaping situations when enforcing incidents, or deciding who should play. Furthermore,

the structure of the mis-en-scene of toys method incorporates the use of dice without clarifying the rationale or method of using them in the game.

To overcome the limitations above, I had to limit the interaction between designer and facilitator with the participants to ensure that the participants were not driven by their ideas, nor were overwhelmed by their control over the situations or their questions. This approach may have affected the final results of the inquiry; however, since it was used consistently in all types of methods, the limitations are at least distributed evenly.

Other limitations faced in conducting this method are similar to Simsarian's method and include the same uncontrollable factors mentioned before.

6.1.3 Limitations in conducting brainstorming-scenario-writing workshops

The instructions for conducting these methods were adapted from those mentioned in the literature for conducting brainstorming. The only limitations faced in conducting this method were the uncontrollable factors that were mentioned in the other methods.

6.1.4 Limitation in data capture for all methods

As I mentioned before in the methodology section, the main data of the study was the scenarios that the participants wrote at the end of each session. This approach allowed me to have a more manageable format of data than the rich multi-layered data that was available in the footage of the sessions. However, the fact that the users where not professional scenario-writers or

designers affected the quality of the scenarios both in the narrative and the details they chose to mention or exclude from the written scenarios. Furthermore, in the role-playing workshops, the fact that the scenario writing activity was the last activity of the session caused the users to write the scenarios when they were most tired, and while they had forgotten details of the enactments that were carried out at the beginning of the session.

6.1.5 Limitation in data analysis:

Although I conducted each type of method two times based on the protocols described in the literature for each, the number of scenarios that each occasion generated was different. The brainstorming-scenario-writing methods consistently yielded the least number of scenarios (altogether two scenarios), which made drawing generalizations about them very difficult. On the other hand, restriction in time and funds and difficulties in recruiting a new set of users for conducting more brainstorming sessions made it impossible to gather more data. Therefore, this study was restricted in terms of level of generalizations and comparisons it could make based on the data available.

6.2 Role-playing methods and creativity in the design process

Several researchers have noted the potential of role-playing methods in aiding creativity in the design process (e.g. I Burns et al., 1994; Iacucci et al., 2000), by either fostering creativity in stakeholders including users participating in the process, or designers. The findings of this research confirm that participants were more successful in generating several use situations and scenarios in role-

playing workshops than in corresponding non-role-playing workshops. This contrast of productivity is even more visible when comparing the number of the outcome use-situations from the mis-en-scene of toys method with that of non-role-playing methods, because both of these methods took equivalent durations of time.

In creativity research, several factors and processes are considered important in creating unique ideas or solutions to problems. One of these processes is divergent thinking. People use divergent thinking when faced with an open-ended task such as “name anything that is circle and red”, to arrive at “numerous and varied responses” (Runco, 2006, p.9). Runco (2006) asserts that divergent thinking is not equal to creative thinking “but it does tell us something about the cognitive processes that may lead to original ideas and solutions” (ibid. p.10). Individuals differ based on variables of “fluency” (number of ideas), “originality” (the number of unusual or unique ideas), and “flexibility” (the number of different categories implied by ideas) in different tests of divergent thinking (Runco, 2006, p.9). This study shows that role-playing sessions support divergent thinking of the group of participants resulting in a high fluency and flexibility of ideas. Role-playing sessions resulted in a higher number of ideas in terms of situations of use and technologies or services than non-role-playing sessions. On the other hand, the different situations that were ideated in each session scored high on flexibility as well, since the situations differed from each other in terms of: type and personality of actors; type and source of problem; and problem settings such as location, time and timeline, and environmental details.

The fact that participants can come up with more ideas, more quickly in role-playing sessions helps them to arrive at unique ideas as well. An associative theory of creativity suggests that more original ideas arrive later in the process of ideation, when the most obvious ideas are depleted (Runco, 2006). In associative thinking, ideas arise based on associations that the mind makes between ideas themselves and concepts that are in some way related to them. Another process that assists creative thinking is combinatorial thinking, in this type of thinking “two or more concepts” are “merged” to build a new idea (Welling, cited by Runco, 2006, p.13). A higher number of ideas, therefore, assists both associative and combinatorial thinking, and supports the process to arrive at more unique and remote ideas. It might be based on practical understanding of this fact that brainstorming protocols commonly advise participants to create as many ideas as possible, and build on ideas of each other (e.g. Kelley and Littman, 2005).

Finally, role-playing sessions support the creativity of designers who later access the scenarios. In offering a higher number of diverse situations of use, role-playing sessions provide designers with a larger inventory of instances of events, activities, settings, actors, and problems to draw on for expanding the given scenarios or creating new scenarios, and support the designer’s combinatorial and analogous creative thinking. In analogous thinking, a “conceptual structure” from “one habitual context” is “transposed” to “another innovative context” (Welling, cited by Runco, 2006, P.12). This happens based on the fact that “abstract relationship between the elements of one situation is similar to those found in the innovative context” (Welling, quoted by Runco, 2006, P.12).

Creativity in role-playing sessions can be attributed to several factors. Iacucci et al. (2002) draw on the concept of *interactional creativity* to explain the creative process of participants engaged in enactments for design. The group performances in design are a collaborative effort consisting of cycles of offering and responding (Iacucci et al. 2002; Kuutti & Iacucci, 2002). Every participant in the enactment makes an interpretation of the environment, props and situations and offers his interpretations by her expressions or actions. Other participants interpret these actions or symbolic interpretations of props and environment “in the light of the unfolding action” and respond to it. This process results in constructing and maintaining a fictional space. This space is not the result of the “imaginative creativity of a single participant” but is created by the imagination of all and maintained by offering these imaginations to others through actions and expressions and by responding and building on the offering of others (Iacucci et al., 2002). In this process “every contribution or reaction can potentially constitute an imaginative or creative achievement of some sort” (Iacucci et al., 2002, p.174); however, everything that comes to the mind of the participants needs to be represented in order to be fruitful in the performance. Furthermore, everything that is represented needs to be interpreted and reacted to by other participants in order to create an observable change in the fictional space (Iacucci et al., 2002). These dynamics makes performances a process that is intensely dependent on the continual contribution of all participants, and the fictional space that results is constructed by the creative offerings of all people involved.

In contrast, creating scenarios through discussion and talk is a more fragmented process and in nature is based on the voluntarily contribution of members to the creation of the fictional space of the story. In fact, what I observed in both brainstorming-scenario-writing workshops was that usually one person took the role and responsibility of being the writer and creator of the story, and others sat back and confirmed her offerings or added to it only sporadically. In comparison, an improvisational performance is more collaborative, and hence it moves faster and is more vibrant and productive than a process where participants are less involved in the collective creative endeavour, in which one or two individuals take on the responsibility for the majority of the imaginative thinking and creativity.

The other factor contributing to creativity in role-playing sessions is the environmental cues provided by the set-up of the environment and props. Research in creativity suggests that environmental cues can both foster divergent thinking and inhibit original thinking (Runco & Chand, 1995). For instance when people are asked to name everything round, they will first scan the environment for cues, an environment that has many cues can therefore help them in coming up with more ideas. However, being restricted to the knowledge scanned from the environment, rather than accessing internal experiences and ideas, can have an inhibiting effect on the ideas that are created in this way. Nevertheless, tests of divergent thinking are somehow different from role-playing situations, where the participants need to use the cues from the environment to construct and maintain the imagination of a fictional environment, which is representative of

their previous experiments. Here, participants need the cues not only to imagine similar or remote details, but also to experience being in a detailed environment and to react to it through their expressions and actions. Oulasvirta et al. (2003) performed brainstorming activities in situ based on the belief that the external cues decrease the cognitive load of imaging details internally and “help retrieving of relevant personal memories” (ibid., p.126), as well as “facilitate recognizing analogies in personal knowledge” (ibid., p.126). However, they report that they did not find significant difference in the contextual information that later showed up in the scenarios written in situ from those written in an office environment. In contrast, Iacucci et al. (2002) enacted in situ using a method named Situated and Participative Enacted Scenarios and report that the physical and social constraints of the real world provided a fruitful situation for developing ideas of products and services with participants. Other researchers, such as Simsarian (2003), Burns et al. (1994), and Svanaes et al. (2004), who used enactments in simulated environments, ranging from abstracted environments using basic props, to naturalistic representation of the environment, mention the effectiveness of environmental representations using real or artificial artefacts and environments. However, they do not offer much detail about the effect of abstractness or the level of detail of the artefacts and environment on the creative process of the group.

The results of this study and especially the comparison between the results from the two types of role-playing methods suggest that the richness of the simulated environment have a direct affect on the way participants explore

space and represent them in their scenarios. Most of the scenarios coming from the Simsarian method have less pronounced and defined locations than those coming from the mis-en-scene of toys method. This can be attributed to the fact that the environment was too simple and abstract and the props and artefacts were not concrete or numerous enough in Simsarian's method to allow participants to create and maintain a clear imagination of space. In contrast, the more detailed and rich environment in the mis-en-scene method allowed for a more detailed and clear sense of space and environmental detail.

Urnes et al. (2002), who use a microenvironment following Iacucci et al.'s (2000) mis-en-scene of toys method, believe that "the use of a miniature model as a pivot will enable the test subjects to enter imagined worlds connected to the design object and develop the complexity of such worlds through structured play" (ibid. p.193). They see the microenvironment as a pivot, an anchor to the participant's cognitive schemas, as well as an object that will enable sharing of imagined worlds and cognitive schema and exchange of contexts among participants. They state that participants will depend on the pivots initially but later "break free from the pivot form as their expertise with the imagined world increases, allowing for a display of creativity that can be used as a basis for the development or refinement of concepts and designs" (ibid. p. 193). This study confirms the above statements about the function of the microenvironment. However, while the representations of the microenvironment are powerful in allowing participants to experience being in different contexts and sharing their experiences, the structure of the environment may itself pose some difficulties in

their imagining and bringing in their personal memory. This is because the environment will nevertheless be only an abstracted and deducted form compared to the real environments the participants have experienced. For instance, a microenvironment that represents a park in the wilderness may represent an abstraction of rivers, mountains and routes yet can never embody all the different possible configurations and shapes of these elements in nature that the participants may have experienced or may face. Therefore, restricting the imagination of participants to this micro-representation may force them to omit details that are accessible in their personal memory. A solution to this may be to maintain a balance between symbolic and abstract versus natural and realistic representations of the environment as well as providing the participants with the means to expand and change the environment based on their personal memories.

6.3 Role-playing methods and generation of contextual details

While the findings of this research suggest that role-playing sessions support participants' creativity in generation of ideas and use-situations, it is worthwhile to ask if they also contribute to the generation of scenarios that are contextually rich; furthermore, whether they are any stronger than non-role-playing sessions in exploring and revealing contextual details of activities and their mobile and embodied details.

Context is a concept, which has been a subject of much debate in HCI. Dourish (2004), coming from a social science and anthropology background,

emphasizes the centrality of activity and practice in the understanding of context. In his words “context isn’t just ‘there’, but is actively produced, maintained and enacted in the course of activity at hand” (ibid. p.4). Dourish describes context as “an occasional property, relevant to particular settings, particular instances of action, and particular parties to that action” (ibid.p.4). From this perspective, details of the setting in terms of location, physical and environmental properties, time and artefacts can form the context if they have a bearing on the unfolding activity or problem of the actors. Likewise, the emotions and intentions of each of the actors that are engaged with the activity or have a bearing on it can be considered as a relevant aspect of the context (Suchman, 1987). Therefore, in studying the contextual details represented in the outcome scenarios of this study, it is meaningful to narrow down our attention to the activities that are described in each scenario, and ask if the relevant contextual details to those activities are reasonably described and represented in the scenario.

To illustrate this approach, let us look at an example from one of the scenarios from role-playing using the mis-en-scene of toys method (see appendix 3.B, scenario1). In this scenario, one of the main actors, who is separated from other actors on an individual hiking exploration, encounters a snake and is attacked by it. She reaches for her device and sends alerting signals to other members of her hiking team in order to get help. This is already a complex situation; an actor is engaged with an activity, hiking, when an event forces her to switch to another activity, to seek help. The contextual details relevant to this situation are: the injured actor’s state of health and mental alertness; her

knowledge and experience about snakes and first aid; her cognitive abilities under stress and symptoms of her injury; her location and its physical details such as the amount of movement flexibility she has; and the degree of darkness or light and further, her proximity to the other actors; her knowledge of other actors' location; the social relationship and closeness she has to other actors; etc. In addition to these, the activities that other actors are engaged with at the time she seeks help and the contexts that are relevant to their receiving and responding to her situation, add to the complexity of the context of the injured actor's act of seeking help. From all these details, the outcome scenario only mentions the activity and location one of the actors is engaged in when he receives the alert message, and the emotional re-action of another one in reaction to the alert. The other contextual details mentioned above are not detailed in the scenario. However, the scenario is successful in describing a story that is realistic, a problem situation that is complex, and in providing a rationale for using the technology. It also provides a reasonable scope for events and routines preceding and following the critical event of the story. As a problem scenario the scenario is successful in defining the problem and defining the general dynamics of the situation. However, it does not have enough contextual details to allow designers to detail out an information scenario or an interaction scenario as described by Rosson and Carroll (2002). Most scenarios coming from role-playing scenarios more or less show the same amount of treatment of contextual details; of course, some of these scenarios tend to be more detailed than others and differ depending on the role-playing method that they belong to. However, in

general, role-playing scenarios do not provide the contextual details relevant to all activities mentioned in the scenarios, and if they do, the details are not complete. Most of the time, what is missing is the relevant environmental details of activities, in terms of physical details of locations, and environmental elements that affect the way an activity is carried out. On the other hand, while the motivations of actors in their activities are most of the time clear in the scenarios, their emotional and mental circumstances are not detailed in all of the cases. When they are, it is usually when the reaction of one of the actors to a significant accident is detailed, and in most of these cases still, it is only the reaction of only one actor that is clarified. For instance, in one scenario we get to know that an actor is terrified after seeing a bear and that she reports the situation to a ranger, but we are not provided with information about how the ranger reacts to the news emotionally and mentally and how that affects the first actor.

In any case, with all their shortcomings, role-playing scenarios are overall not weaker than brainstorming-scenario-writing scenarios. In fact, they generally contain more allusions to physical activities, embodied interactions, spatial actions and communications than brainstorming-scenario-writing scenarios. Besides, the fact that they illustrate the spatial movements of actors with action verbs, along with the fact that arrival at places is the time-stamp for the start of an event or activity in several scenarios shows that mobility and movement of actors from place to place has been a vivid experience for the participants throughout role-plays. On the other hand, the strongest scenarios from the role-playing sessions illustrate more activities in the problem space, detail the component

actions of some activities better, provide a better sense of the scope of the situation, and illustrate more complex or diverse social situations and collaborations than non-role-playing scenarios of this study. Yet, as I mentioned before, this study is limited in its ability to make generalizations about what can be considered the particular contribution of role-playing sessions against non-role-playing sessions because of the low count of scenarios that resulted after non-role-playing sessions.

The lack of sufficient contextual details in the outcome scenarios may be for two reasons: either the exploration of the details through role-playing did not take place sufficiently, or at all, or that the explorations did take place, but the participants either did not register the details in scenarios because they were not aware of their significance, or they simply did not have the time. A general review of the video footage of role-playing sessions reveals that improvised scenarios contain details that are not reflected in scenarios. For instance, the mis-en-scene workshop improvisations contain more details about the physical context of activities, including the path and space of spatial actions. Also, direct communications between the actors, and the actor's mental and physical state and emotions, is enacted and expressed more often, and interactions with devices are more detailed than that reflected in the scenarios. On the other hand, given that the miniature environment used in the mis-en-scene method contained many physical and elemental details and locations, it is surprising that not all of the relevant details and locations are mentioned in the outcome scenarios. This may point to a gap between participants' and designers' notion of what is relevant

and necessary to mention in scenarios. Another reason may be that after enacting on the environment, the mock up environment is treated as shared knowledge between designers and participants, and the participants do not see a need to write down details that are already there.

The Simsarian method improvisations also contained more direct communications between the actors, and more expressions of actors' mental and physical state and emotions. More importantly, in most of them, the actors are more frequently and more elaborately involved with the physical interactions with other people, objects and devices, than what is conveyed within the written scenarios. The lack of these details in the scenarios may again be because the participants have left details out because of tiredness, lack of time, forgetfulness or misunderstandings about the relevance of details to designers. However, the reason may also be the fact that the details were not explored enough to value their mention. For instance, the footage from one session shows an actor helping another actor, who is stuck in the middle of a mountainous path, by pulling her two hands from above the arms (see figure 6-1). It is not clear if this physical interaction has any resemblance or relation to what may have happened in the real environment, and it may well be the reason why it is not mentioned and detailed in the scenario.

Figure 6-1 Two participants enacting an embodied interaction



Limitations of contextual details in the written scenarios, either because of loss of details in the process of documenting the scenarios , or because of a lack of exploration of relevant contexts within the role-play is an issue which needs to be investigated and overcome by developing better documentation or facilitation methods for role-playing sessions.

6.4 Final notes on individual role-playing methods

So far, the findings and results of this study have shown that the Simsarian and mis-en-scene of toys method have different potentials in exploring contexts of use and revealing them through scenarios of use. The results of this study suggest that mis-en-scene of toys method is generative of results in a shorter time than the Simsarian method. In addition, with the exception of the first scenario of the Simsarian method's first workshop, other scenarios coming from this method overall contained less variety of activities, defined locations, objects and social events than most scenarios from the mis-en-scene of toys method. Several factors may be responsible for the results of the mis-en-scene of toys

method. First, the micro-environment in this method was a more well-defined representation of the environment; due to its smaller size, it was able to incorporate a variety of settings and geographical locations such as rivers, mountains, lakes, etc, and represent a variety of environmental features such as rocks, trees, and animals, using artefacts and graphical symbols. In comparison, the representation of the environment in the Simsarian method was more abstract, contained less variety of environmental features, and was not able to stretch to embrace different locations. The more defined environment may have stimulated the imagination of the participants and helped them ground their stories better and with more ease by lowering their cognitive load. While on the other hand, participants of Simsarian method had to struggle with both retrieving personal memories with regards to environmental contextual details and maintaining that imagination throughout the enactment using very simple and abstract props.

Secondly, the mis-en-scene method had a more defined protocol for facilitating and organizing the participation of users and designers, the overall flow of the story, and the inquiry. Participation and collaboration of people participating in an enactment has unique qualities that must be attended by the participants and the facilitators. Kuutti et al. (2002) offer an interesting explanation of the dynamics of performances in the design by contrasting them with the dynamics of performance in theatre. They argue that performances for design are more fragmentary and shorter than improvisations in theatre. They believe this is a necessary feature of exploratory performances in design

because in drama improvisations the actors are not as much concerned about “observing, understanding and accessing” (ibid, p.100) what other actors are signifying or saying, as much as they are with maintaining the flow of the improvisation, by being spontaneous and not blocking the performance of their partners. In contrast, in design improvisations, exact observing, understanding and accessing of what each participant is saying or signifying is important, and reflection, inquiry and critical thinking are as important for the process as the imagination and flow of the ideas and stories (Kuutti et al., 2002). To accommodate these needs, in their experience with the SPES method which was carried on in the context of real life, Kuutti et al. “intertwine performances with discussion and continuation of normal activities” (P.100). My observation of the role-plays that took place in both the Simsarian and mis-en-scene of toys method concurs with the above. In the Simsarian method, the participants were totally immersed in the enactment, maintaining the fictional space by continually offering and responding to actions. On the other hand, when two participants were busy enacting two parallel yet separate activities, they were necessarily disconnected from each other. In contrast, in the mis-en-scene of toys method, the facilitator as webmaster or voice over narrator had the control to stop one activity, and ask for another one to proceed. The other observation is that the micro-environment, as Urnes et al. (2002) explain, acted as a fictional space that the actors could enter into and leave. In their enactments, participants of the mis-en-scene method sometimes acted in the role, and sometimes narrated what their avatar was doing, along with the displaying of the action on the board. Giving participants a

means to freely enter and leave the performance space, in sequences of action and reflection, will definitely improve the process of performance for design, and the slightly more clear guidelines for organizing this process in the mis-en-scene of toys method may have contributed to the results of these workshops.

Thirdly, the use of events cards introduced randomness and creative stimulation for the participants in mis-en-scene of toys method. In this study, the participants reported enjoying the bend and surprise that the event cards introduced, and were successful in creatively incorporating the incidents mentioned in each cards into their stories. In the same line, many participants from the Simsarian workshops expressed that more intervention from the designers or facilitator in terms of events or actions would have helped the flow of the story. The unpredicted incidents announced by the event cards, seemed to infuse the improvisation with fresh ideas and intensity. Since they were unpredicted, they were like problems introduced in midst of actions, forcing all participants to join forces to solve the problem. They made the enactments more real, and improvisatory, and created situations more similar to real life where people plan and act based on unpredicted situated events. Although the event cards may have had indirect impact on the whole process, their more evident impact on the scenarios coming from the mis-en-scene method are a higher number events and especially social events.

Finally, in mis-en-scene of toys method, participants did not always enact a problem or solution, which was envisioned beforehand, but frequently, they improvised the problems and solutions within the enactments and on the fly.

Svanaes and Seland (2004) report that users could come up with ideas of a new technology much easier when they were “*designing-in-action*” than when they tried to make a pre-defined idea fit inside a scenario (ibid, p.482). Designing while in action creates a situation where the function of the system arises from the need that is tangibly experienced within the enactment. The results of this study show that the fact that participants brainstormed the ideas for a technology in advance of enacting their function did not make these sessions necessarily more productive. Besides, many times, ideas for functionality that came up in brainstorming scenarios were abandoned in the term of the enactment, since the need for them could not be grounded once their actual use-situations were enacted. This may suggest that brainstorming prior to the enactments may not be necessary and, in fact, a condensed session where ideation and enactment are merged in design-in-action, may serve both the purpose of ideating functionality as well as illustrating the use.

Aside from the issues above, the overall quality of contextual details revealed through role-playing methods point to the need for facilitation techniques to assist participants in incorporating their personal memory into the simulated environments and expressing details of activities and interactions with more physical detail. Some researchers have already taken steps in this direction, and found some solutions by incorporating drama warm up exercises into the workshops (Svanaes and Seland, 2004). Others have raised the pressure of enactments off users and shifted their role into audiences who guide professional actors’ enactments by providing them with feedback and information (Howard et

al, 2002a; Marquis-Faulkes et al., 2003). Another solution may be to facilitate co-enactment of users and professional actors.

On the other hand, the disparity between the emotional, communicational and physical details seen in the enactments of participants in the video footage of workshops and those details reflected in the written scenarios highlights the need for better methods for documenting enacted scenarios. One solution may be to facilitate co-writing of scenarios by designers and users, or writing the scenarios along with participants in retrospective, after watching the footage of each enactment. Other methods could be documenting the scenarios in video, as Binder (1999) suggests, or enriching written scenarios with fragments of enactments in video or still images.

CHAPTER 7: CONCLUSIONS

This research aimed to understand the contribution of role-playing in design ideation. The study tried to understand the contribution of role-playing to design ideation by comparing outcome scenarios of two different types of role-playing methods with those of a non-role-playing method.

The findings demonstrated that role-playing methods are more generative of use-scenarios than non-role-playing methods. In other words, user-participants of role-playing workshops were able to create more scenarios of use of an envisioned technology than those who participated in non-role-playing workshops. On the other hand, the findings showed that role-playing outcome-scenarios are in general as strong as non-role-playing scenarios with regards to providing the readers with details about potential users of a technology and their motivations and characteristics, as well as their activities that need support or surround situations of use. In addition, role-playing scenarios, overall, proved to contain more allusions to communications between actors, more physical activities, more physical interactions with other people and objects, and more explicit description of spatial movements than their non-role-playing counterparts. The results also demonstrated that the best outcome scenarios from role-playing workshops contain more activities, more detailed description of activities, a larger

scope of the situation of use, and more contextual detail and diversity of objects than the best scenarios from non-role-playing methods.

This study demonstrated that the two role-playing methods that were used in this study, role-playing in a game toy environment (Iacucci et al., 2002), and role-playing following Simsarian's (2003) published agenda for a role-playing workshop, have different potentials in exploring contexts of use and productivity. Overall, with a few exceptions, the outcome scenarios of role-playing in a toy environment were more successful in conveying a sense of space, and contained more activities, objects and social events. I suggest that these differences point to the importance and effect of the physical simulated environment and props, facilitation techniques that allow an intertwining between periods of action and reflection (Iacucci et al., 2002), and game structures that allow unpredicted improvisatory activities. The findings of this research confirm previous claims that role-playing workshops can aid in the discovery of use situations and create scenarios of use that illustrate contexts of use. The role-playing scenarios that were developed through the methods explored in this research had sufficient details to explain users' motivations and functional needs in the setting and created a good vision of the problem space and design idea. These scenarios can act as preliminary activity scenarios in the design process. The contextual details illustrated in the scenarios (in terms of a detailed view of the locations and the environmental elements that affect the users' activities, as well as the physical details of their actions, and their emotional and mental states while in activities and in response to each other), however, are not enough to allow

designers to understand the exact limitations or offerings of the situations and the details of the social context. Video footage of the role-playing sessions, however, revealed that the enacted scenarios contained more communications, detailed physical interactions and actions and expression of emotions and mental states. This points to the important issue of accessing and documenting what is experienced within an enactment, which is an issue already raised by Iacucci and Kuutti (2002) and demands further research.

Overall, further research is needed to find strategies that can assist users to enrich the simulated environment with their personal memory of relevant contexts, and maintain that imagination throughout the enactment. Another area that also deserves more research are methods for facilitating role-playing workshops so that they can support the participants' physical and emotional expression of activities and events, as well as techniques and strategies that can support reflection and critical thinking of both designers and users parallel to improvisatory enactments. Such need has already been posed by Iacucci et al. (2002) and research has already been undertaken by some researchers (e.g. Howard et al., 2002a; Svanaes & Seland, 2004); however, this research is only in its initial stages and given the variety and disparity of role-playing techniques and research experiments in this area, a great deal of work is needed to find the best ways and configurations and to combine them for best results.

REFERENCE LIST

Atwood, M. E., McCain, K. W., & Williams, J. C. (2002). How does the design community think about design? *Proceedings of the 4th Conference on Designing Interactive Systems*, London, England, 125-132.

Bellotti, V., & Bly, S. (1996). Walking away from the desktop computer: Distributed collaboration and mobility in a product design team. *Proceedings of the 1996 ACM Conference on Computer Supported Cooperative Work*, Boston, Massachusetts, USA, 209-218. DOI: <http://doi.acm.org/10.1145/240080.240256>

Binder, T. (1999). Setting the stage for improvised video scenarios. *CHI '99 extended abstracts on Human factors in computing systems*, Pittsburgh, Pennsylvania, 230-231.

Bodker, S., Greenbaum, J., Kyng, M. (1991) Setting the Stage for Design as Action. In J. Greenbaum & M. Kyng (Eds.), *Design at Work: Cooperative Design of Computer Systems* (pp.139-154). Hillsdale, NJ:Erlbaum.

Boess, S. (2006). Making role playing work in design. *Proceedings of Desform 2006 Conference: Design and Semantics of Movement*, L. Feijs, S. Kyffin, B. Young (Eds.), Eindhoven, The Netherlands, 117-121.

Boess, S., Saakes, D., & Hummels, C. (2007). When is role playing really experiential?: Case studies. *Proceedings of the 1st International*

Conference on Tangible and Embedded Interaction, Louisiana, USA, 279-282.

Brandt, E. & Grunnet, G. (2000). Evoking the future: Drama and props in user centered design. *The Proceedings of the Participatory Design Conference*, Cherkasky, T., Greenbaum, J., Mambrey, P. (Eds.), New York, USA, 28-31.

Brandt, E. (2006). Designing exploratory design games: A framework for participation in participatory design? *Proceedings of the Ninth Conference on Participatory Design: Expanding Boundaries in Design-Volume 1*, Trento, Italy, 57-66.

Brandt, E., & Messeter, J. (2004). Facilitating collaboration through design games. *Proceedings of the Eighth Conference on Participatory Design: Artful Integration: Interweaving Media, Materials and Practices-Volume 1*, Toronto, Canada, 121-131.

Buchenu, M., & Suri, J. F. (2000). Experience prototyping. *Proceedings of the 3rd Conference on Designing Interactive Systems: Processes, Practices, Methods, and Techniques*, New York, USA, 424-433.

Burns, C., Dishman, E., Verplank, W., & Lassiter, B. (1994). Actors, hairdos & videotape—informance design. *Conference on Human Factors in Computing Systems*, Boston, USA, 119-120.

- Buur, J., Binder, T., & Brandt, E. (2000). Taking video beyond 'Hard Data' in user centered design. *Participatory Design Conference*, New York, USA, 21–29.
- Campbell, R. L. (1992). WILL THE REAL SCENARIO PLEASE STAND UP? *SIGCHI Bull.*, 24(2), 6-8. DOI: <http://doi.acm.org/10.1145/142386.1054872>
- Carroll, J., Kjeldskov, J., Tobin, D., & Vetere, F. (2003). A user-centred process for determining requirements for mobile technologies: The TramMate project. *Proceedings of the 7 th. Pacific Asia Conference on Information Systems (PACIS)*, University of South Australia, Adelaide, Australia, 683-694.
- Carroll, J. M. (2000). *Making use: Scenario-based design of human-computer interactions*. Cambridge, MA, USA: MIT Press.
- Dourish, P. (2004). What we talk about when we talk about context. *Personal Ubiquitous Computing*, 8(1), 19-30.
- Ehn, P., & Sjogren, D. (1991). From system descriptions to scripts for action. In J. Greenbaum & M. Kyng (Eds.) *Design at Work: Cooperative Design of Computer Systems* (pp 241-268). Hillsdale, NJ, USA: Erlbaum.
- Gould, J D., & Lewis, C. (1985). Designing for usability: Key principles and what designers think. *Commun.ACM*, 28(3), 300-311. Doi: <http://doi.acm.org/10.1145/3166.3170>

- Howard, S., Carroll, J., Murphy, J., & Peck, J. (2002a). Using 'endowed props' in scenario-based design. *Proceedings of the Second Nordic Conference on Human-Computer Interaction*, Aarhus, Denmark, 1-10.
- Howard, S., Carroll, J., Murphy, J., Peck, J., & Vetere, F. (2002b). Provoking innovation: Acting-out in contextual scenarios. In X. Faulkner, J. Finlay, F. D  tienne (Eds.), *People and Computers XVI: Memorable Yet Invisible*, Springer, London. pp. 175-191.
- Iacucci, G., Iacucci, C., & Kuutti, K. (2002). Imagining and experiencing in design, the role of performances. *Proceedings of the Second Nordic Conference on Human-Computer Interaction*, Aarhus, Denmark, 167-176.
- Iacucci, G., & Kuutti, K. (2002). Everyday life as a stage in creating and performing scenarios for wireless devices. *Personal and Ubiquitous Computing*, 6(4), 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. *Proceedings of the 3rd Conference on Designing Interactive Systems: Processes, Practices, Methods, and Techniques*, New York, USA, 193-202.
- Kankainen, T., Kantola, V., Mehto, K., & Tiitta, S. (2005). Interactive drama and user centered product concept design. Paper presented at *Dux 2005: Proceedings of the 2005 conference on Designing for User eXperience*, AIGA: American Institute of Graphic Arts, San Francisco, USA, 1-8.

- Kelley, T., & Littman, J. (2005). *The ten faces of innovation: Strategies from IDEO for beating the devil's advocate and driving creativity throughout your organization*. New York, USA: Currency/Doubleday.
- Kuutti, K., Iacucci, G., & Iacucci, C. (2002). Acting to know: Improving creativity in the design of mobile services by using performances. *Proceedings of the 4th Conference on Creativity & Cognition*, Loughborough, UK, 95-102.
- Kyng, M. (1994). Scandinavian design: Users in product development. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems: Celebrating Interdependence*, Boston, USA, 3-9.
- Kyng, M. (1995). Creating contexts for design, In J., Carroll (Ed.), *Scenario-based design: Envisioning work and technology in system development*, New York, NY, USA: John Wiley & Sons, Inc.
- Luff, P., Heath, C. (1998) Mobility in collaboration. *Proceedings of the 1998 ACM conference on Computer supported cooperative work*, Seattle, Washington, United States, 305-314.
- Macaulay, C., Iacucci, G., O'Neill, S., Kankainen, T., & Simpson, M. (2006). The emerging roles of performance within HCI and interaction design. *Interacting with Computers*, 18(5), 942-955.
- Marquis-Faulkes, F., McKenna, S., Gregor, P., & Newell, A. (2003). Scenario-based drama as a tool for investigating user requirements with application to home monitoring for elderly people. *HCI International*, Crete, Greece, pp. 512-516.

Nardi, B. A. (1992). The use of scenarios in design. *SIGCHI Bull.*, 24, 13-14.

Retrieved from Retrieved on October 22, 2008, from the ACM online database

Oulasvirta, A., Kurvinen, E., & Kankainen, T. (2003). Understanding contexts by being there: Case studies in bodystorming. *Personal and Ubiquitous Computing*, 7, 125-134.

Rosson, M. B., & Carroll, J. M. (2002). *Usability engineering: Scenario-based development of human-computer interaction*, San Francisco, CA, USA: Morgan Kaufmann.

Runco, Mark A. *Creativity: Theories and Themes, Research, Development and Practice*. Burlington, MA, USA: Academic Press.

Runco, M.A., & Chand, I., (1995). Cognition and creativity. *Educational Psychology Review*, 7(3), 243-267

Salvador, T., & Howells, K. (1998). Focus troupe: Using drama to create common context for new product concept end-user evaluations. *CHI 98 Conference Summary on Human Factors in Computing Systems*, 251-252. DOI: <http://doi.acm.org/10.1145/286498.286734>.

Seland, G. (2006). System designer assessments of role play as a design method: A qualitative study. *Proceedings of the 4th Nordic Conference on Human-Computer Interaction: Changing Roles*, Oslo, Norway, 222-231.

- Simsarian, K. T. (2003). Take it to the next stage: The roles of role-playing in the design process. *Conference on Human Factors in Computing Systems*, FL, USA, 1012-1013.
- Smith, H., & Dean, R. T. (1997). *Improvisation, hypermedia and the arts since 1945*. Amsterdam, The Netherlands: Harwood Academic Publishers.
- Strömberg, H., Pirttilä, V., & Ikonen, V. (2004). Interactive scenarios-building ubiquitous computing concepts in the spirit of participatory design. *Personal and Ubiquitous Computing*, 8, 200-207.
- Suchman, L. A. (1987). *Plans and situated actions: The problem of human-machine communication*. New York, NY, USA: Cambridge University Press.
- Svanaes, D., & Seland, G. (2004). Putting the users center stage: Role playing and low-fi prototyping enable end users to design mobile systems. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, Vienna, Austria, 479-486.
- Urnes, T., Weltzien, Å., Zanussi, A., Engbakk, S., & Rafn, J. K. (2002). Pivots and structured play: Stimulating creative user input in concept development. *Proceedings of the second Nordic conference on Human-computer interaction*, Aarhus, Denmark, 187-196.
- Vredenburg, K., Mao, J., Smith, P. W., & Carey, T. (2002). A survey of user-centred design practice. *Proceedings of the SIGCHI conference on*

Human factors in computing systems: Changing our world, changing ourselves, Minneapolis, USA, 471-478.

Wright, P. (1992). What's in a scenario? *SIGCHI Bull.*, 24, 11-12. Retrieved on October 22, 2008, from the ACM online database.

APPENDICES:

Appendix 1.A: Handout for Simsarian Workshops:

Intro:

Welcome to our Workshop!

The Goal of the workshop:

In this workshop we want to investigate how a ' role-playing ' method can help us (designers and users) envision new technologies and understand situations and details around the use of those technologies. The outcome of our workshop will be a scenario in which you will explain one story or case where the technology that we innovate will be used.

The technology we want to innovate is something that can help us in finding, tracking and keeping aware of people or places or things. One of our goals is to come up with ideas that correspond with the life-style, tastes and preferences of hikers and fit their expectations of what hiking and camping experiences should be like. For this reason we hold sessions with potential users, like you, and look to them to provide us with ideas and details of their experience as they would like it to be.

However as we said, the main goal of this workshop is investigating the “role-playing method”. We are using the case of innovating technologies for hiking, as a case study or example in order to see how useful the role-playing method is in helping us in innovation and understanding situations of use, and details of hiking experience.

We expect this role-playing workshop to help us understand and explore several issues: These issues are : setting; Behavior and routines; social and cultural norms; problems; and goals, motivations and emotions of the potential users of the technology; We will elaborate these issues below:

Setting :

We are interested to know the physical details of the setting where the technology will be used

Behavior :

We are interested to know the patterns of behavior and normal events that

happen in the user's life in hiking situations , especially in situations that the technology may be needed or used

Social and cultural norms

We are interested to know the social norms and behavior of people at hiking situations and settings and understand the elements and factors that affect it.

Problems:

We are interested to know what problems the users (hikers or people related to them) face in the situations we investigate, and what the details of their problems are; we want to know how the technology that we innovate can solve those problems.

Goals, Motivations and emotions:

We are interested to know the user's goals, and motivations that inspire the use of the innovated technology. We want to know the emotions they face in different circumstances and how the use of the innovated technology will change their emotions and experience.

Interaction, Ergonomics and Cognition:

We want to know how the potential users will interact with the innovated technology (how they will hold or carry it, how they will be aware of it, how they will communicate with it, and how they will keep it) and how they will do all these in different settings and circumstances.

Our workshop will be in 4 stages. At the beginning of each stage, the instructions for it will be given to you.

The break down of the procedure is as follows:

1. Intro:
2. What we know (storytelling) :
3. Brainstorming ideas for smart technology
4. Role-playing and improvisation :
5. *Break : 10 minutes*
6. Writing scenarios of our improvisation :
7. acting out the refined demo of one or two scenarios :
8. *Final discussion questionnaire :*

Total 4 hours.

Stage one: what we know

Let us talk about the different experiences you have had in camping or hiking when **you needed to sustain or create awareness and connection with someone, somewhere or something**. You can think of times that you were **lost**, or **lost someone or something**; or you **needed to keep track and connection of/to someone or something**. You can think of the experiences of others' that you know, and mention them.

Stage 2: Brainstorming:

Ok, now that we have re-loaded our memories with cases relevant to the issue we are investigating; So lets have a brainstorming session in order to come up with some innovative and exciting ideas for technologies that can help us in situations that we need to **sustain or create awareness and connection with someone**, something, or someplace. You will write your ideas on stickies and stick them to the board. Feel free to look at other people's ideas. **You can write an idea, a function, or a situation that is related to this discussion. Think of ideas that can be smart, but other ideas are welcome too as they may inspire you or others.**

We will give you the rules of brainstorming in a separate piece of paper.

After you have put all your ideas down, we will cluster ideas that seem related, and chose an idea for a smart technology. Then we will brainstorm it a bit more. And go for finding its details by role-playing.

Stage 3: Body storming/role-playing:

At this stage we will use role-playing theatre improvisations in order to innovate details of the idea we have chosen.

To make our work easier we will do the following:

- *First:* we will **choose a setting** and different roles: for example imagine that our device is a handheld device for registering our shopping, in that case, the setting can be a supermarket ... or the roles are a mother and a daughter that are going to shopping.

- *Second:* we will **decide on a plot**, or **sequence of events** that may happen in the supermarket: for example, we enter, then we go to one of the aisle and start looking for cornflakes, then we will buy the cornflakes, and put it in our basket and leave the shop.
- *Third:* **Make a mock up** of our system with the material we have on the prototype desk. You may chose to have similarly shaped devices or different models ...
- *Fourth:* we will start to **improvise the plot**. (We will act in space and show our interaction with objects and people.) . We will try to imagine the details of the setting, improvise events, dialogues with each other, and interactions with our device,

For instance,

“In front of the imagined isle, we pick up the imagined cornflakes box and for example scan it with our prop. We might stick some of these little stickies on the prop for buttons. Then we will push one of these buttons and for instance say," hm... 9 dollars that's expensive let me put it in 'remind me' for now" and push another button. Then we will put the cornflakes back on the shelf and tell our partner, let's go and check the prices at London drugs? And we will both pass the imagined door and get out of the store.”

- **Rules:** once you decided on the setting and plot, and started improvising; do not come out of your roles. Finish the plot. After that, there will be a discussion.

After each discussion; you will act out the improv again and incorporate ideas and issues you came up with. (Another 10 minutes maximum). Once you are satisfied with one setting and plot, we will write up another setting and plot with you and explore that one.

Overall we will have 1.30 minutes for this exercise. One of the moderators will make quick notes about your decisions and some of the details you incorporate on the fly, so you can have access to them later. The facilitator will join you in the act and act as side-role if you wish. She/he will also take part in the discussion and ask questions. But he will not initiate new ideas ...

Break: 10 minutes

Stage 4: Writing the Scenario

At this stage, you will write down the scenario/s for the technology that you have innovated. A scenario is like a story that has specific actors, living in a specific situation within a setting, and using /interacting with a technology.

Remember the things we discussed as our interests at the beginning of the workshop. **(Setting, behavior, problem, social and cultural norms, goals motivations and emotions, interaction, ergonomics and cognition)** The scenario that you write shall be rich in a way that will give us a picture of all these areas and issues. It should be detailed enough to act as a script for some other people who may act out your scenario.

How? :

First: Define who the actors of this scenario are, and give us a snapshot of their lifestyle and character.

Second: Write down the story as it happened in your acting. If new ideas come up during this, you can write them down. If some new details are explored or clarified, incorporate them.

We suggest that you chose one person among you to write things down while you all contribute.

Stage 5: Acting out :

Break the roles within the scenario among yourselves and get ready to act it out in front of the camera. You can work on your prop in order to make it proper for your act-out. Do not explain things, act out as if you are making a small commercial that will picture your innovation and show how useful or pleasure-able it is. Make your demo it persuasive enough to persuade management to invest on your idea.

Final Questionnaire and discussion: 15 minutes.

Appendix 1.B: Handout for mis-en-scene of toys workshops:

Workshop 2: Role-playing at the game board

Welcome to our Workshop!

My name is Malahat and I am the main investigator of this thesis project. This is Kawi and she will be acting as the co-researcher in this session. Below, I will explain the goal of our workshop and briefly tell you about the structure of our workshop. If you have any questions, after I read these details, or any time within the workshop feel free to ask us.

The Goal of the workshop:

In this workshop we want to investigate how a 'role-playing' method can help us (designers and users) envision new technologies and understand situations and details around using those technologies. The outcome of our workshop will be a scenario in which you will explain one story or case where the technology that we innovate will be used.

The technology we want to innovate is something that can help us in finding, tracking and keeping awareness of people or places or things. (We want innovative and exciting ideas for technologies that can help us in situations that we need to sustain or create awareness and connection with someone, something, or somewhere.)

One of our goals is also to come up with ideas that correspond with the life-style, tastes and preferences of hikers and fit their expectations of what hiking and camping experiences should be like. For this reason we hold sessions with potential users, like you, and ask them to provide us with ideas and details of their experience as they would wish it be.

However as we said, the main goal of this workshop is investigating the “role-playing method”. We are using the case of innovating technologies for hiking, as a case study or example in order to see how useful the role-playing method is in helping us in innovation and understanding situations of use, and details of hiking experience.

We expect this role-playing workshop to help us understand and explore several issues: These issues are setting; Behaviour and routines; social and cultural norms; problems; and goals, motivations and emotions of the potential users of the technology; we will elaborate these issues below:

Setting:

What are the physical details of the setting where the technology will be used?

Behaviour:

We are interested to know the patterns of behavior and normal events that happen in the user's life in hiking situations, especially in situations that the technology may be needed or used.

Social and cultural norms

We want to understand the social norms and behavior of people at hiking situations and settings and understand the elements and factors that affect it.

Problems:

We are interested to know what problems the users (hikers or people related to them) face in the situations we investigate, and what the details of their problems are; we want to know how the technology that we innovate can solve those problems.

Goals, Motivations and emotions:

What are the user's (a hiker's) goals, and motivations in different situations that inspire his decisions and actions and the use of the innovated technology. We want to know the emotions they face in different circumstances and how the use of the innovated technology will change their emotions and experience.

Interaction, Ergonomics and Cognition:

We want to know how the potential users will interact with the innovated technology (how they will hold or carry it, how they will be aware of it, how they will communicate with it, and how they will keep it) and how they will do all these in different settings and circumstances.

What we have, and what we will do:

To make our work easier we will do the following:

First: we will choose a setting and different roles: for example imagine that our device is a handheld device for registering our shopping, in that case, the setting can be a supermarket ... or the roles are a mother and a daughter that are going to shopping.

Our setting: In our case the board is our setting. However, the board is not complete, it may show some general aspects of places you visit in hikes; but it doesn't show effects of light, and wind and cold and wetness; Neither does it show particularities in nature than you might face or have faced. > Use your imagination to add to this setting or subtract from it as you see fit. If you decide to demonstrate a particular experience and the shape of the setting doesn't allow you, feel free to use your imagination and anything around here; to create that for you. If you wish to ignore some details of the setting, feel free to do so. **MOST OF ALL USE YOUR IMAGINATION.**

Define Profiles and roles: you will play your own selves, or decide on other roles... there are 3 poster papers on the wall in front of you. Go ahead and write your name, your age or age group, and tell us about yourself/ or your role : where you come from, how often you hike, where you have been to and hiked, something about your lifestyle and 2 sentences that define you.

for example imagine that our device is a handheld device for registering our shopping , in that case the setting can be a supermarket ... or the roles can be a mother and a daughter that are going to shopping.

Use the doll characters as your self: These small characters are representations of you. Move them around, show pace and position with them. If there are emotions or movements /gestures that you need to show but can't do it with these small characters; then show it with your own body.

Second: we will decide on a plot, or sequence of events that may happen.

For the supermarket example the plot can be : 1.we enter , 2.we go to one of the aisles and start looking for cornflakes, 3.then we will find the cornflakes we want, 4.we will put in our basket 5. We will pay six. We will leave the shop.

This plot is too general and as you can see a lot of little events, communications, actions, goals and emotions can be improvised in between these stages. Likewise, our plots will be general and we will improvise the details.

Third: Once you know the plot you will choose or Make a mock up of your system with the material we have on the prototype desk. You may chose to have similarly shaped devices or different models ...we call these mock-ups or props, mobics.

There, are different shapes of a mobic you may want to take along with you. Choose one for your trip. The parts of the act that are related to the mobic will be totally acted out by you. Show how you hold it, point it, punch it, throw it, hide it, put it away and etc..."Show, don't say." You can decide to add details to the mobic along the way, or change its form...

Fourth: we will start to improvise the plot. (We will act in the board space and show our interaction with objects and people.). We will try to imagine the details of the setting, improvise events, dialogues with each other, and interactions with our device,

For instance, "In front of the imagined isle, we pick up the imagined cornflakes box and for example scan it with our prop. We might stick some of these little stickies on the prop for buttons. Then we will push one of these buttons and for instance say, hm... 9 dollars that's expensive let me put it in 'remind me' for now and push another button. Then we will put the cornflakes back on the shelf and tell our partner, let's go and check the prices at London drugs? And we will both pass the imagined door and get out of the store."

Fifth: After acting out each plot, we will have a discussion where the situations and services are discussed, worse case scenarios are thought of or alternative situations are reflected on. The researchers may ask you questions at this stage to inspire your reflection. Based on this discussion you may want to re-play the plot and explore the new conditions, situations or cases that you discussed.

Rules: Once you decided on the setting and plot, and started improvising; do not come out of your roles. Finish the plot. After that, there will be a discussion.

After each discussion; you will act out the improv again and incorporate ideas and issues you came up with. (Another 10 minutes maximum). Once you are satisfied with one setting and plot, we will write up another setting and plot with you and explore that one.

When you are acting/improvising services and devices, let your imagination rule rather than your rational reasoning. Express the mobic and service that can really satisfy you. Do NOT think about the possibilities of technology as of today; or necessarily follow the trends. If your mobic ended up being too fictional or did something that the stage of our technologies can't support; we will let you know ourselves. Leave us to worry about giving technological reality to your ideas.

One of the moderators will make quick notes about your decisions and some of the details you incorporate on the fly, so you can have access to them later. The facilitator will join you in the act and act as side-role if you wish. She/he will also take part in the discussion and ask questions. But he will not initiate new ideas ...

Sixth: Writing the Scenario: At this stage, you will write down the scenario/s for the technology that you have innovated. A scenario is like a story that has specific actors, living in a specific situation within a setting, and using /interacting with a technology.

Remember the things we discussed as our interests at the beginning of the workshop. (Setting, behavior, problem, social and cultural norms, goals motivations and emotions, interaction, ergonomics and cognition) The scenario that you write shall be rich in a way that will give us a picture of all these areas and issues. It should be detailed enough to act as a script for some other people who may act out your scenario...

How:

First: Define who the actors of this scenario are, and give us a snapshot of their lifestyle and character.

Second: Write down the story as it happened in your acting. If new ideas come up during this, you can write them down. If some new details are explored or clarified, incorporate them.

We suggest that you chose one person among you to write things down while you all contribute.

Appendix 1.C:Handout for Brainstorming-Scenario writing workshops

Intro: 10 minutes

Welcome to our Workshop!

The Goal of the workshop:

In this workshop we want to investigate how a ' role-playing ' method can help us (designers and users) envision new technologies and understand situations and details around the use of those technologies. The outcome of our workshop will be a scenario in which you will explain one story or case where the technology that we innovate will be used.

The technology we want to innovate is something that can help an alone hiker in finding, tracking and keeping awareness of people or places or things. One of our goals is to come up with ideas that correspond with the life-style, tastes and preferences of hikers and fit their expectations of what hiking and camping experiences should be like. For this reason we hold sessions with potential users, like you, and look to them to provide us with ideas and details of their experience as they would like it to be.

However as we said, the main goal of this workshop is investigating the “role-playing method” . We are using the case of innovating technologies for hiking, as a case study or example in order to see how useful the role-playing method is in helping us in innovation and understanding situations of use, and details of hiking experience.

We expect this role-playing workshop to help us understand and explore several issues: These issues are : setting; Behaviour and routines; social and cultural norms; problems; and goals, motivations and emotions of the potential users of the technology. We will elaborate these issues below:

Setting :

We are interested to know the physical details of the setting where the technology will be used

Behaviour :

We are interested to know the patterns of behaviour and normal events that happen in the user's life in hiking situations , especially in situations that the technology may be needed or used.

Social and cultural norms

We are interested to know the social norms and behaviour of people at hiking situations and settings and understand the elements and factors that affect it.

Problems:

We are interested to know what problems the users (hikers or people related to them) face in the situations we investigate, and what the details of their problems are; we want to know how the technology that we innovate can solve those problems.

Goals, Motivations and emotions:

We are interested to know the user's goals, and motivations that inspire the use of the innovated technology. We want to know the emotions they face in different circumstances and how the use of the innovated technology will change their emotions and experience.

Interaction, Ergonomics and Cognition:

We want to know how the potential users will interact with the innovated technology (how they will hold or carry it , how they will be aware of it , how they will communicate with it, and how they will keep it) and how they will do all these in different settings and circumstances.

Our workshop will be in 2 stages. At the beginning of each stage, the instructions for it will be given to you.

The break down of the procedure is as follows:

Intro:15 minutes

Brainstorming ideas for smart technology : 80 minutes

Writing scenarios for the use of the technology in different situations: 40 minutes

Final discussion questionnaire : 15 minutes

Total 2.5 hours.

Stage 1 : Brainstorming :

Let's have a brainstorming session in order to come up with some innovative and exciting ideas for technologies that can help us in situations related to shopping in malls. You will write your ideas on stickies and stick them to the board or leave them on the table. Feel free to look at other people's ideas. **You can write an idea, a function, or a situation that is related to this discussion. Think of ideas that can be smart.**

We will give you the rules of brainstorming in a separate piece of paper. After you have put all your ideas down, we will cluster ideas that seem related, and chose an idea for a smart technology. Then we will brainstorm it a bit more. And go for incorporating it in a story (scenario) .

Stage 2 : Writing the Scenario

At this stage, you will write down the scenario/s for the technology that you have innovated. A scenario is like a story that has specific actors, living in a specific situation within a setting, and using /interacting with a technology.

Remember the things we discussed as our interests at the beginning of the workshop. **(Setting, behavior, problem, social and cultural norms, goals motivations and emotions, interaction, ergonomics and cognition)** The scenario that you write shall be rich in a way that will give us a picture of all these areas and issues. It should be detailed enough to act as a script for some other people who may act out your scenario..

How? :

First: Define who the actors of this scenario are, and give us a snapshot of their lifestyle and character.

Second: Write down a story That show situations where your technology will be used .

We suggest that you chose one person among you to write things down while you all contribute.

Final Questionnaire and discussion: 15 minutes

Appendix 2: Brainstorming rules

Rule 1: Postpone and withhold your judgment of ideas

Do not pass judgment on ideas until the completion of the brainstorming session. Do not suggest that an idea won't work or that it has negative side-effects. All ideas are potentially good so don't judge them until afterwards. At this stage, avoid discussing the ideas at all, as this will inevitably involve either criticizing or complimenting them. Ideas should be put forward both as solutions and also as a basis to spark off solutions. Even seemingly foolish ideas can spark off better ones. Therefore, do not judge the ideas until after the brainstorming process. Note down all ideas. There is no such thing as a bad idea.

Rule 2: the Wilder the Better

The 'wilder' the idea the better! Shout out bizarre and unworkable ideas to see what they spark off. No idea is too ridiculous. State any outlandish ideas. Exaggerate ideas to the extreme.

Rule 3: Quantity counts at this stage, not quality

Go for quantity of ideas at this point; narrow down the list later. All activities should be geared towards extracting as many ideas as possible in a given period.

Rule 4: Build on the ideas put forward by others

Build and expand on the ideas of others. Try to add extra thoughts to each idea. Use other people's ideas as inspiration for your own. Creative people are also good listeners.
Combine several of the suggested ideas to explore new possibilities.

Rule 5: Every person and every idea has equal worth

Every person has a valid viewpoint and a unique perspective on the situation and solution.

We want to know yours. In a brainstorming session you can always put forward ideas purely to spark off other people and not just as a final solution. Please participate, even if you need to write your ideas on a piece of paper and hand it out. Encourage participation from everyone.

Each idea presented belongs to the group, not to the person who said it. It is the group's responsibility and an indication of its ability to brainstorm if all participants feel able to contribute freely and confidently.

Appendix 3.A: Sample scenarios from Simsarian Role-playing method:

Simsarian role-playing Workshop1:

Scenario 1: Falling down

Profiles:

JF: hiker going through a seven day trip. 25 year old, experienced camper, you can take off time like this, you need to have good stuff already and be enough well off (,

If he is not affluent then he has been in it for a few years...fairly wealthy , cause it is a expensive thing to do (especially with all the new technology) , where I am going is not accessible (so maybe you live in Yale town) ... definitely wealthy but experienced as well, cause anyone who hasn't camped before would love ??) (hum))

Grayden: hiker number 2: early 30's in the middle of a 5 day camping trip, just going a long weekend kind of trip. Just taking a few days off work. Probably as if not as experienced as Hiker 1. Same technology, because it is safe, maybe cause wife said...yeah, (because I don't want you to get caught).

Kaitlyn: Park ranger: I said forty but I think she will probably be closer to 50 but not quite 60 because at that point you know sometimes health starts deteriorating. She is more experienced easily from both of them, which is why she wanted to do this (Grayden confirms). She understands that they probably want to be solitary, there's probably if this is new technology since she is in tune with the solitude (that's nature , not wireless internet) (yeah exactly) , there might be resistance to new technology maybe some resistance to it maybe some confusion about using it , so she might need some help.

Jf is going to Yale town, he signs up for the device, leasing it for a week. He hasn't used the device before. So he receives half hour info session training. Grayden has his own device, his wife got it for him for him as a Christmas gift.

Grayden goes to the rangers station to report his entrance. Each hiker goes to the ranger station so If I notice if they are a couple of miles off their planned route it will set an alarm that he is off by X kilometers (in danger) so The ranger can check with them (yeah , that would be good : G) . Grayden registers with Kaitlyn informing of his planned

route and trip duration (uhum) then heads out . Now Kaitlyn can observe when he goes off route so he can check in with him.

Two days later, When Grayden is on his 3rd day of his trip and routing back, JF arrives at the ranger station informing Kaitlyn of his route and plans. She registers him, and bids him farewell.

Simsarian role-playing method workshop 2:

Scenario 3:

Actors: Mona, Mike, Nancy: act as themselves, friends.

Setting : light hiking , mountains and rocks , people get hurt , , very narrow trail that they can pass one at a time, goes up to high mountain,

Plot: Mike is up, Mike has already reached up and is eating. Mona is in the middle. . Nancy is down and waiting for Mona's signal to go up.

- Climbing on a narrow path on a mountain...
- mike reaches the top
- Mona is stuck in the middle and is hurt
- Nancy is below and waiting for instructions
- Mona contacts Nancy to call for help from Mike. Meanwhile, Mike is eating and waiting at the peak. Mona calls Nancy or sends voice messages.
- Nancy receives the message and contacts Mike; communication reception is terrible, so she texts mike.
- Mike receives the message and saves Mona. Then he notifies Nancy about the situation and tells her to stay there.

Appendix 3.B: Sample Scenarios from role-playing on mis-en-scene of toys:

Mis-en-scene of toys workshop 1:

Scenario 1: snake attack

Characters:

-Adam 20, experienced in Alpine, reserved, is used to hiking with a buddy

-Shannon: 21 Experienced in mountainous terrains/trees, adventurous and outgoing

-Kally: 35 adventurous hikes with friends + strangers

Adam, Kally and Shannon are all acquaintances. They have been hiking all day. They set up a camp and decide to explore in separate directions.

They agree to be back at camp at 3 o'clock. So they set the co-ordinates of the camp site on their devices and sync the devices with each other so they can get back. Then each goes off on their own, and has lunch separately. Then Shannon gets attacked by a snake and sends signals to others. Kally gets the signal and she hurries to go to where she is and sees that the snake has bitten her and applies first aid procedure on her and after that. Since Adam is not there yet, they both send signals at the same time to really catch his attention.

Meanwhile, Adam decides to take a hike toward the peak. When he stops for lunch, he sees a signal on his watch so he reaches out to his back pack and pulls out the device, and uses it to see where the signal is coming from. And he uses the map on his device to find the fastest route to get to the place where the signal comes from.

He finds the way, shows up at the place, and does the rest of the first aid. They use the co-ordinates they had previously set on their devices they go back to where the camp site was.

Mis-en-scene of toys workshop 2

Scenario:

Arrive at trailhead

Sort, put Lanz's gear – leaves some things in car

Head off on marked trail

1st break : lend water to Lanz

arrive at large hole – obstruction in trail >> Ed used his T to find an alternate route to bridge :

display shows current position on map buttons allow to scroll to other place find bridge and river Suggest follow shoreline At approach to river, Heike immerses T in river for a few seconds, gets water quickly > rotating telescoping sensor requires chlorination (on display)

We get to the bridge it's broken. How deep is the water? Lanz uses T to detect depth (retracts spring-loaded rope, casts device into center of the river, waits until he thinks it is at the bottom. When it's brought back in, read out depth >> says too deep cannot cross.

They use Ed's T to find part of the river that is shallower (broader), they hike along to the wider part of the river and cross. Ed helped Lanz cross, gave his hand. Heike helped him cross by offering him her pole.

Lanz T tells them its break for lunch time.

Ed's T tells storm is coming (needs a menu selection button , menu or on demand mode to get out of map mode)

Hit by torrential downpour , they decide to find shelter ... they run for the big rocks , and hide in a cave.

Lanz went to river for water (took out bottles); Heike's T detected a distress signal from Lanz >> some discussion about trigger) Heike and Ed run to rescue >> to shallow part of river ... Set up a fire to warm Lanz . Heike goes to fetch water for Lanz. Heike meets ranger >> conversation about our condition with the ranger. (Cultural situation >> doing ok ?)

>> festival , short cut , ridge

>> contact ranger in case of trouble

>>>>>provides contact details

>>>>>can get info at trail head , sign and website>> heike goes back to cave , they prepare to start hiking again.

APPENDIX 3.C: Non-role-playing scenarios

Brainstorming workshop 1

Scenario:

Actor : Sally ... 19 year old- doesn't own vehicle- has a boyfriend- indecisive-no sense of direction-shy- first year university student- works part-time- owns a cell-phone- goes to malls twice a week – caring personality

Boyfriend : John : 23 years old, grad student at SIAT , likes technology , owns a cell phone (iphone), owns a car (bmw) , has rich parents (lives in Richmond) , No job, spoiled kid, sweet and self centered.

Sally has a hard time finding a perfect present for John, because she doesn't have enough money to buy an expensive gift for her boyfriend who has almost everything.

>>time after 3-4 pm (Wednesday – a day before his B-day)

>>needs a present in rush, but she is happy to find something for her Boyfriend

>> Her price range is 50- 80 \$

>> Buses to mall from school

>> She is tired, she had to walk in the mall (minimize walking)

>>First visit to men's clothing store

>> Mall is closing in an hour; she has to find something within the period of time. (1hr)

>>Takes a device (to search for technology store)

(Searches for price range > asks the advisor

The advisor gives sally a list of technology items with in her price range. Sally sorts out the items, with good ratings from the reviews that mall provides. She then compares the remaining items by using the price-compiling machine. Sally cannot decide between three items that she likes, so she communicates with local costumers. She's persuaded by the costumers on one of the items. So sally decides to get the item. Now she has to find the store where the specific item is located by using Google-map on her device.

Brainstorming workshop 2

Scenario:

They were 5 people out working for the day, 45 minutes north of whistler. The trail was marked as beginner /moderate /5 hr loop. The forecast was sunny and dry with 30% chance of showers. It was the beginning of June. We started at the trailhead at 10 am.

2 out of 5 decide to take off on a side route to check out another peak, because they are faster and they would have been waiting a lot for the other three otherwise.

Person 1: Joe , 28 year old , male smokes yet is fit ,arrogant , Poli sci student

Person 2: Bernard, 28 years old male, head strong, exchange student from the east coast, fit, engineer student

Person3: Dai, 21 year old female, non-smoker, anthropology student, fit, Technophobe

Person 4 : Naomi , physiotherapist , non smoker , fit

Person 5 : Christine, 25 year old , non smoker , International studies student, fit

All 5 are experienced hikers and know each other through the hiker's club. (Before the other 2 breaking from the group) it was determined that we would meet and have lunch at the merging of the side trail and the main trail , approximately an hour from the end...

(but) the weather changed. It got colder, cloud coverage increased and it started to snow lightly. Due to the snow Jo and Bernard are delayed, they are making slower progress due to the slippery rocks. Dai , Naomi and Christiane are vaguely concerned about the men's progress but are optimistic that they will meet them at the rendez vous point.

The girls arrive at the determined point, sit down under a tree and proceed to have lunch.

Luckily, the group had brought a prototype of a communication device that Bernard had been working on. This device could be connected with one or more devices exclusively and uses some technology to transfer messages that have been created and uploaded prior to departure (for example: are you ok?). The girls sent the boys a message saying "we're here, are you ok?", after a short delay , the guys responded with " delayed (by weather . ETA 60 mins . Doing ok." To which the girls responded, "Rendezvous at pub". The girls finished the trail within the hour and went to the pub in their own car... (the boys had their own)...