User-Designer Collaboration during the Early Stage of the Product Development Process

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ABSTRACT

As an understanding of users' tacit knowledge and latent needs embedded in user experience has played a critical role in product development, users’ direct involvement in design has become a necessary part of the design process. Various ways of accessing users' tacit knowledge and latent needs have been explored in the field of user-centred design, participatory design, and design for experiencing. User-designer collaboration has been used unconsciously by traditional designers to facilitate the transfer of users' tacit knowledge and to elicit new knowledge. However, what makes user-designer collaboration an effective strategy has rarely been reported on or explored. Therefore, interaction patterns between the users and the designers in three industry-supported user involvement cases were studied. In order to develop a coding system, collaboration was defined as a set of coordinated and joint problem solving activities, measured by the elicitation of new knowledge from collaboration. The analysis of interaction patterns in the user involvement cases revealed that allowing users to challenge or modify their contextual experiences facilitates the transfer of knowledge and new knowledge generation. It was concluded that users can be more effectively integrated into the product development process by employing collaboration strategies to intensify the depth of user involvement.
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STATEMENT OF ORIGINAL AUTHORSHIP

The work contained in this thesis has not been previously submitted to meet requirements for an award at this or any other higher education institution. To the best of my knowledge and belief, this thesis contains no material previously published or written by another person, except where due reference is made.

Signature

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Chapter 1: Introduction

1.0 INTRODUCTION

Direct contact with users at the early stage of the product development process has been understood to be an important initiator for product improvement and innovation (Kaulio, 1998; Nonaka and Takeuchi, 1995; O'Connor, 2004; Pine and Gilmore, 1999; Zaltman, 2003). Nonaka and Takeuchi (1995) argued that the main benefit of involving users in the design process was an increase in opportunities to access to users’ tacit knowledge and latent needs. Various tools and techniques in user involvement have been studied and investigated in an attempt to increase the level of accessibility to users’ latent needs and tacit knowledge. However, not many studies have addressed the issues of user-designer collaboration as a strategy. This thesis will address user-designer collaboration as a strategy and will identify effective ways of implementing user-designer collaboration as design competences.

1.1 RESEARCH PROBLEM

Designers have employed user involvement sessions to better understand users’ tacit knowledge and latent needs during the early stage of the product development process. However, direct contact with users does not always guarantee the successful outcomes. Quite often, user involvement session resulted in a long list of users’ physical and cognitive limitations, dissatisfaction of the product, or wish lists for future technology. None of these seemed to have a direct implication to the development of a new concept. In order to assist practicing designers to work with users, various design tools and
guidelines were published (Holtzblatt, Wendell, and Wood, 2005; Preece, Rogers, and Sharp, 2002), yet practicing designers (especially industrial designers) still have a difficulty in implementing successful user involvement sessions for their projects. Successful user involvement needs more than just employing design tools or guidelines: it requires better understanding of how users and designers can work together in the design process to get better design outcomes.

Several researchers have studied ways of better integrating users in the design process (Carlile, 2002; Huxham and Hibbert, 2005; Nonaka and Takeuchi, 1995; Sanders, 2000, 2001a; Sanders and Dandavate, 1999; Wright, 2006). Sanders and Stappers (2008) criticised the way in which traditional user research has been mediated by social science specialists and argued that practicing designers should work directly with users as early as the knowledge development, idea generation and concept development stages. Nonaka et al. (1995) also stressed the direct contact with users as designers’ new competences, mentioning that users’ latent needs and tacit knowledge need to be understood, shared, and sympathised by practicing designers in order to be explored, and then transformed into innovative design ideas. Huxham and Vangen (2005) from the field of inter-organisational knowledge management and creation suggested that interaction with customers is a part of the creative knowledge generation process and that successful product developers should practice a continuous process of sharing users’ tacit knowledge and of creating ideas for improvement at the early stage of the development process. Huxham (1991; 1993) argued that collaboration has been practiced naturally as a way of acquiring users’ latent needs and tacit knowledge, but, the full potential of collaboration, which goes beyond mere communication and cooperation, has not been successfully implemented. Dillenbourg (1999) also argued that tacit knowledge transfer and new knowledge elicitation could be facilitated through collaboration.

Wright (2006, p.195) stated that collaboration was an effective strategy in finding unique solutions to complex problems. Carlile (2002) argued that productivity increased when two different set of knowledge collide. This could be interpreted as showing that problem restructuring activities can also be supported through user-designer collaboration (Dorst and Cross, 2001). These authors indicated that user-designer collaboration can be implemented more effectively if the mechanisms of user-designer collaboration are better understood.
User-designer collaboration, in this thesis, is defined as a set of coordinated and joint problem solving activities where two parties can learn about each other through an iterative process of constructing and rebuilding mutual identities (Chrislip, 2002; Dillenbourg, 1999; Hardy, Phillips, and Lawrence, 2003; Huxham, 1993; Martinez-Moyano, 2006; Roschelle and Teasley, 1995). User-designer collaboration in product development has been considered a useful strategy for learning about users’ latent needs and requirements, and therefore to be a way to assure success in commercial product development (Mackay, Carne, Beynon-Davies, and Tudhope, 2000). The user-centred design community has long argued for the inclusion of field studies, user observations, contextual analyses and procedures to identify true user needs before a project’s launch (Norman, 2006) and for the involvement of users as much as possible (Buurman, 1997). To some extent, user involvement is now accepted as an automatic procedure by most designers (Norman, 2005).

However, the effectiveness of implementing user–designer collaboration as a strategy in product development has also been contested. For instance; “The best way to satisfy users is sometimes to ignore them” (Norman, 2005, p.17). “The user is not a designer and studies have shown that users’ designs are generally inferior to those of interface professionals” (Scaif, Rogers, Aldrich, and Davies, 1997, p.82). “This is because often users cannot properly articulate their needs.” (Pekkola, Kaarilahti, and Pohjola, 2006, p.21). “All too often the actual contribution made by users is too little, too late” (Scaif et al., 1997, p.343).

These pessimistic views partially stem from a misunderstanding of the nature of users’ knowledge and the user-designer relationship in user involvement sessions. Users’ knowledge is usually localised, embedded and invested in their daily experiences (Carlile, 2002). It cannot easily be articulated as words, numbers, and procedures (Sanchez, 2005), and is therefore hard to communicate. Through the process of collaborative experiencing, users’ tacit knowledge can be transferred to product developers (Nonaka and Takeuchi, 1995). Nonaka et al. (1995) reviewed successful product development cases and reported that transferred users’ tacit knowledge should remain within the design team throughout the process, transforming users’ tacit knowledge into innovative design concepts.
The problem is that most designers are aware of the importance of user-designer collaboration and have used user-designer collaboration as a strategy to access users’ latent needs, and facilitate the transfer of users’ tacit knowledge and the creation of new knowledge. However, they have not developed ways to integrate user-designer collaboration as an effective strategy into the product development process.

In order to understand the problem better, for this investigation, a theoretical framework was employed from the fields of inter-organisational collaboration research (Huxham and Hibbert, 2005), knowledge management (Nonaka and Takeuchi, 1995) and collaborative learning (Dillenbourg, Baker, Blaye, and O'Malley, 1996). In the theoretical framework, collaboration among participants was suggested as a way to facilitate tacit knowledge transfer and new knowledge elicitation.

This investigation of user-designer collaboration and user involvement at the early stage of the product development process will help to identify ways of integrating users into the design process for the purpose of facilitating the transfer of users’ tacit knowledge and new knowledge elicitation. As discussed above, collaboration has the potential to enable users and designers to explore new territories and thereby to increase the possibilities of generating new knowledge and ideas. However, in order to realise the full potential of user-designer collaboration, the mechanism of the collaboration needs to be understood.

Once the mechanism can be described and understood, the value of collaboration and how its effect can improve the process of identifying users’ latent needs and generating new knowledge can also be better understood. This thesis aims to extend the knowledge of user-designer collaboration as a strategy, which could improve the efficiency of identifying users’ latent needs and generating new knowledge. This thesis will then explore ways in which user-designer collaboration strategies can be incorporated as one of the designers’ competences. The scope of the study, the significance of the study and its contribution to the existing body of knowledge will be covered in Sections 1.3 and 1.4.
1.2 RESEARCH QUESTION

User involvement has been widely accepted and practiced in current product development processes. However, how users can be integrated at the early stage of the process has not yet been thoroughly studied. User-designer collaboration in user involvement needs to be further investigated in real settings.

Therefore, the research question is

“How can users be integrated during the early stage of the product development process?”

This research question will be further investigated by looking at the following relevant sub questions:

- What is the user-designer collaborative mechanism observed in user involvement sessions?
- What are the factors that influence the generation of collaborative outcomes?
- How can these factors be integrated into the current product development process?

1.3 AIMS AND OBJECTIVES

The aim of this thesis is to increase the level of understanding of the user-designer collaboration in the product development process. User involvement has been practised in various forms including guidelines, tools, and techniques, yet the characteristics of user-designer collaboration in the product development process has rarely been understood as an effective strategy for facilitating the transfer of users’ tacit knowledge and new knowledge generation. The full benefits of user involvement could be achieved by proper implementation of user-designer collaboration as an effective strategy in the product development process. As suggested in management, organisation and innovation literature, accessing users’ tacit knowledge and elicitation of new knowledge...
(users’ latent needs) could be facilitated through the proper implementation of user-designer collaboration in the design process. Once the mechanisms of user-designer collaboration are clarified, research can inform designers of more effective ways of integrating user-designer collaboration in the product development process. The aims of this research are to:

- identify user-designer collaboration as a strategy for facilitating transfer of knowledge and new knowledge generation.
- identify the mechanisms of user-designer collaboration during the early stage of the product development process.
- observe how practicing designers implement user-designer collaboration as a strategy in a practical design environment.
- suggest ways of improving the effectiveness of user-designer collaboration in user involvement cases.

1.4 OVERVIEW OF THESIS

This section describes an overview of the structure of the thesis, its scope and the contributions to knowledge.

1.4.1 Contents

Chapters 2, 3 and 4 review the literature on the nature of user involvement, collaboration and user-designer collaboration in order to develop an understanding of user-designer collaboration. Chapter 5 describes the research plan including the research problems, data collection, and analysis. Chapter 6 explains the procedure of three industry-supported case studies carried out during the two different phases: need finding and concept clarification phases. Chapters 7 and 8 cover the coding and analysis of the case studies. Comparison between the need finding and the concept clarification cases is addressed. Chapter 9 describes and discusses overall findings and their contributions. Chapter 10 draws conclusions and makes recommendations.


1.4.2 Scope of the study

Given that user involvement occurs in various stages: strategic planning, idea generation, idea screening, business analysis, formation of the cross-functional team, service and process design, personnel training, service testing and pilot run, test marketing, and commercialisation (Alam, 2002), this user-designer collaboration study will be limited to the early stage of product development. The study environment is set in commercial product/service development projects.

A prescription for better user-designer collaboration will not be generated as collaboration will work differently in each individual case. Instead, guidelines for conducting better user-designer collaboration will be generated.

1.4.3 Contribution to knowledge

This study tries to externalise how the mechanisms of user-designer collaboration can be used as an effective strategy for facilitating the transfer of users’ tacit knowledge and new knowledge elicitation. Investigation of the collaboration mechanisms will clearly help designers to understand (identify) ways to improve the quality of outcomes in any user involvement session.

The outcome of the study will suggest various ways of developing user-designer collaboration as a strategy, including tools and guidelines within a new product development environment. The study findings will add to the current knowledge of user involvement in new product development processes. In addition, a clarification of the limitations and possibilities of user-designer collaboration as an effective strategy for facilitating user participation will help designers and design educators to implement user-designer collaboration as design competences.

1.5 SUMMARY

Designers today are required to work more closely with users in order to understand how users interact with artefacts in their everyday lives. Various user involvement tools
and approaches have been studied and reported on as ways of bringing real users into the design process. However, user-designer collaboration has rarely been studied as a strategy for facilitating the transfer of users’ tacit knowledge transfer and new knowledge elicitation.

The research question was developed as: ‘How can users be integrated during the early stage of the product development process?’ Sub questions were also developed as 1) ‘What is the collaborative mechanism observed in user involvement sessions?’, 2) ‘What are the factors that influence the generation of collaborative outcomes?’ and 3) ‘How can these factors be integrated into the current product development process?’

To tackle the research questions, various user-designer collaboration strategies which aim to improve the effectiveness of user involvement in the product development process will be reviewed and discussed in Chapters 2, 3, and 4.
Chapter 2: USER INVOLVEMENT

2.0 INTRODUCTION

Literature indicates that the motives for employing users at the early stage of the development were 1) empowerment of the participants, 2) efficiency and 3) improved user acceptance (Damodaran, 1996; Kujala, 2003, 2007; Kumar and Whitney, 2003; Muller and Kuhn, 1993; Nardi, 1996). The first benefit - empowerment of the participants - was realised and practiced by the Scandinavian participatory design approach (Kyng, 1994). The goal of the Scandinavian participatory design approach was to democratise workplaces by evenly distributing decision-making processes among participants. The second type of benefit - efficiency - has evolved from North American practices (Spinuzzi, 2002). Acquiring users’ latent needs, wants and requirements was regarded as the major rationale for involving users in North American practices. The third benefit - improved user acceptance - has been realised through educating users even before manufacturing the product (Kujala, 2007). This chapter will introduce various types of user involvement approaches including user-centred design, participatory design and design for experiencing. Finally, how these approaches have utilised user-designer collaboration as a strategy for facilitating knowledge transfer and exchange will be explored.
2.1 UNDERSTANDING USER INVOLVEMENT IN GENERAL

User involvement has provided widely accepted principles in the development of usable and useful systems (Alam, 2002; Gould and Lewis, 1985; Kaulio, 1998; Kristensson, Gustafsson, and Archer, 2004). However, vague definitions of the term ‘user involvement’ and different usages have made it difficult for researchers to generate a shared understanding of the concept (Kujala, 2003). The term ‘user involvement’ has been used as a synonym for participatory design (Damodaran, 1996; Kyng, 1994) or for usability testing (Spinuzzi, 2002). In general though, user involvement has been regarded as a general term to describe direct contact with users (Kujala, 2003, 2007). The term ‘user involvement’ has been variably described as ‘focus on users’ (Wilson et al., 1997 in Kujala, 2003), ‘consulting end-users’ (Noyes et al. 1996 in Kujala, 2003), ‘contacting with system users’ (Grudin 1991 in Kujala, 2003) and ‘participation of users’ (Heinbokel et al. 1996 in Kujala, 2003).

Another obstacle to define the term ‘user involvement’ in general, was the fact that there have been too many approaches and tools available, and therefore it has been almost impossible to describe the concept taking into account all the considerations. Only the categorisation of the various types of user involvement can help to define the concept of the user involvement in general. In an attempt to define user involvement by categorisation, Kaulio (1998) suggested three types of user involvement: ‘design for customers’, ‘design with customers’, and ‘design by customers’. He proposed these three categories through the analysis of seven existing user involvement approaches, which were 1) quality function deployment (QFD), 2) user-oriented product development, 3) concept testing, 4) beta testing, 5) lead user method, 6) consumer idealised design and 7) participatory ergonomics (Kaulio, 1998 p.143).

The rationale for grouping them into these three categories was described as follows (Kaulio, 1998, p.143):

- Design for users denotes a product development approach where products are designed on behalf of the customers. Data on users, general theories and models of customer behaviour are used as a knowledge base for the design. This approach often also includes specific studies of customers, such as interviews or focus groups.
• Designs with users denotes a product development approach, focusing on the customer, using data on customer preferences, needs and requirements, as in a ‘design for’ approach, but, in addition, includes the display of different solutions/concepts to the customers, so the customers can react to different proposed design solutions

• Design by users denotes a product development approach where customers are actively involved and partake in the design of their own product.

The above approach which groups user involvement into three categories (Kaulio, 1998) was useful, but the usage of the terms was confusing. For example, user-centred design could fall into the category of ‘design for users’ among ergonomics researchers (Pheasant, 1996; Preece et al., 2002), instead of ‘design with users’ (Kaulio, 1998). For some researchers (Westerlund, Lindqvist, Mackay, and Yngve, 2003), participatory design was defined as a part of the ‘design with users’ approach.

Kaulio’s (1998) suggestion, even if it was confusing, could be used as a basic guideline for understanding the spectrum of user involvement, which varies from passive user involvement to active participation. Kujala (2007) again suggested a user involvement spectrum, which began with informative involvement, through consultative to participative involvement. The informative involvement approach denoted an approach where users provide and / or receive information. The consultative involvement approach denoted an approach where users comment on a predefined service or range of facilities. The participatory involvement approach denoted an approach where users influence decisions relating to the whole system (Damodaran, 1996, p.365).

The expected benefits of user involvement were both equivocal and contradictory. Rockwell (1999) reported the benefits of employing contextual techniques for user involvement as 1) a better-targeted product, 2) higher customer satisfaction, 3) reduced development time, and 4) better team synergy and focus for delivery. However, the pitfalls of user involvement such as the costs and labour involved in collecting and analysing collected user data were not mentioned. Cases which failed to deliver the expected overall benefits of user involvement were also reported (Damodaran, 1996). Difficulties in gaining direct access to users, difficulties in finding users willing to share their work experiences with researchers, and inadequate user participation were argued to be major factors contributing to generating gaps (Butler, 1996).
Proper attitudes to user involvement (Gould and Lewis, 1985) and empowering the users’ role in the design process (Damodaran, 1996) were stressed as factors successfully realising the benefits of user involvement. Damodaran (1996 p.365) mentioned that “for user involvement to be successful from the users’ perspective requires the users to be identified closely with both the process and the outcomes.” The participatory approach was recommended (Muller, Blomberg, Carter, Dykstra, Madsen, and Greenbaum, 1991; Muller, Haslwanter, and Dayton, 1997) as a success factor for user involvement, however additional care in the treatment of the users’ role was also stressed even within the user participatory approach (Damodaran, 1996). This implied that proper collaboration with users is as important as the implementation of the participatory approaches.

The following section will review various user involvement approaches and discuss how these approaches developed user-designer collaboration as a strategy for improving the quality of the design outcomes.

2.2 USER-CENTRED DESIGN

The user-centred design approach has been popularised and practiced among industrial product developers, Human-Computer Interaction specialists, and usability experts since the early 1990s (Sanders, 2006a). The nature of the user-centred design approach was said to have originated from applied social and behavioural sciences and/or from engineering, therefore the procedures were developed with research-oriented and expert mindsets (Sanders, 2006a). Ker and Buur (2002) pointed out that in traditional user-centred design approaches, the researchers were kept at a distance in order for them not to engage in interaction with the users. Passive objectivity, therefore, has been widely accepted among user-centred design practitioners (Buur and Bagger, 1999). Buur and Bagger (1999) argued that a passive attitude toward direct dialog with users impeded better understanding of the users’ context.

Even though Human-Computer Interaction gets much more exposure in the literature, the design of commercial products was argued to be more demanding than the design of human-computer interaction(1997). From the perspective of the industrial designer, Buurman (1997) proposed a user-centred design model, which was structured in five
stages, with the cumulative user testing modules acting as the key criteria.

Figure 1 shows the iterative process of user involvement, with the addition of user observation/testing modules superimposed on the generic design process. The user-centred design process has proven to be useful, particularly when applied to the design of control and display panels of modern information appliances, such as microwave ovens, video-recorders, facsimile equipment, automatic teller machines, MP3 players, DVD players and mobile phones. These modern electronic products can require significant cognitive effort by the new user in order to successfully master the fundamental operational tasks. Testing the usability with casual users, before developing the overall form, ensures design teams will develop a product, the efficacy of which should benefit from earlier user studies (Buurman, 1997).

The Buurman (1997) model provides lists of design activities and deliverables using available techniques and methods, which might appeal to design educators and
practitioners. The model however, was criticised for being focused only on the rational aspects of human-product interaction, neglecting perceptual – motor and emotional aspects of human experiences (Overbeeke, Djajadiningrat, Wensveen, and Hummels, 2000). Green and Bonollo (2001) argued that it was not Buurman’s intention to extend the design process to include further phases associated with product development. They perceived the Buurman model (1997) as merely an extension of the existing design process (Green and Bonollo, 2001). Later, distinctions were made (Veryzer and Mozota, 2005) between user-centred design and the traditional approach in terms of user experiences (Table 1).

Table 1. Comparison of traditional and user-centred design approaches (Veryzer and Mozota, 2005 p.132)

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<thead>
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<tr>
<td>Technology driven</td>
<td>User driven</td>
</tr>
<tr>
<td>Component focused</td>
<td>Specialty in UX</td>
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<tr>
<td>Limited multidisciplinary cooperation</td>
<td>Multidisciplinary team work focused</td>
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Table 1 shows the differences between the traditional and user-centred design approach. For example, the user-centred design approach was characterised as user driven, specialty in user experience, and multidisciplinary team work focused; whereas the traditional design approach was thought of as technology driven, component focused, and limited multidisciplinary cooperation. Through this comparison (Table 1), Veryzer et al. (2005) stressed the total customer experiences as an important characteristic in user-centred design approach.

Simple design principles were suggested for better understanding of user-centred design approach in the product development process (Gould and Lewis, 1985):
• Know the user;

• Incorporate the current knowledge of users in the early information stage of design;

• Confront users repeatedly with early prototypes for evaluation purposes; and

• Re-design as often as necessary.

These principles looked simple; however, the following issues were reported as the common mistakes and difficulties that usual designers experience in practices:

• Designers’ suppressive attitudes which intimidate users;

• Organisational arrangement that prevents direct contact with users;

• Organisational fear of delaying the schedule; and

• Belief that design guidelines should be sufficient.

The user-centred design approach has promoted direct contact with users for improving user-designer collaboration in product development process. However, the designers’ suppressive attitudes, which prevented the users’ active participation was reported as obstacles in the user-centred design approach (Damodaran, 1996; Gould and Lewis, 1985). The participatory design approach was suggested, which allowed better, more frequent and deeper conversation with users at the early stage of the development process. The following section will describe how the participatory design approach has been developed, and discuss how the strategies for user-designer collaboration were implemented in the product development process.

2.3 PARTICIPATORY DESIGN

Participatory design is a set of theories, practices and studies that actively involve the end users in the design process to help ensure that the product meets their needs. It has been used in urban design, architecture, landscape architecture and planning as a way to
create environments that are more responsive and appropriate to their inhabitants and users’ cultural, emotional, spiritual and practical needs (Sanoff, 2000, 2007). The resulting knowledge and philosophy have been transferred into the fields of industrial design and information technology (Sanoff, 2007).

Early participatory design literature emphasised the development of tools and methods of participation; workshops, games and prototypes (Muller and Kuhn, 1993; Sanoff, 2000). Participatory design has branched into diverse trajectories, influenced by political, socio-economic and cultural factors (Spinuzzi, 2002). Europe (especially Scandinavia) and the US (Puri, Byrne, Nahampossa, and Quraishi, 2004) have developed quite different participatory design approaches.

Based on Asaro (2000), who summarised the evolution and adaptation of participatory design in the western design context, the participatory tradition in the West, especially in Scandinavia, was developed with a strong emphasis on democratisation of the workplace. The other trajectory of participatory design approach was developed mostly in the United States and the United Kingdom, drawing on users’ knowledge of work processes to improve the usability of end products. The United States’ participatory approaches were adopted from the systems design approach, with a primary focus on customer-centeredness. The methodology used was to give working prototypes of systems to customers to obtain feedback, in an effort to ‘refine’ the artefact for customer needs (Asaro, 2000).

Recently, clear distinctions have been made between the unique qualities of the participatory design approach and the traditional user-centred design approach (Blomberg and Henderson, 1990; Spinuzzi, 2002). Blomberg and Henderson (1990) reviewed participatory design approaches and suggested the following characteristics of participatory design approaches as opposed to the user-centred design:

- The goal of the participatory design should be the improvement of the quality of the work life of the participants
- The orientation of the participatory design should be toward collaborative development and
- The process of the participatory design should be iterative.
Spinuzzi (2002), however, argued that there are practical difficulties in carrying out the Scandinavian participatory approach in corporate or institutional environments, which are not characterised by high unionisation. Kujala (2007) also agreed that a participatory design approach is better suited to in-house development, where the users are known and are willing to participate in development work. Spinuzzi (2002) warned against the monolithic adaptation of participatory tools and approaches in a new product-service development project, saying that “If we adopt a range of different techniques such as prototyping, we may find that they actually work against each other.” (p.213)

He compared the Scandinavian and US prototyping design projects and illustrated the differences between the Scandinavian and US approaches (Table 2).

Table 2. Comparison between Scandinavian and US participatory design approaches (Spinuzzi, 2002)

Table 2 highlights the different orientation in employing participatory design approaches in the product-service development process both in Scandinavian and US approaches. The role of the users was understood to be as a ‘co-developer’ in the Scandinavian approach, whereas the users were treated as an ‘information provider’ in the US approach. The participatory design approach in the US therefore was mixed with user-centred design, usability testing, observation or in-depth interview. For example, Beyer and Holtzblatt (1998) adopted participatory in-depth interview and observation techniques for developing innovative product development frameworks, which were designed mainly to understand users’ latent needs and tacit knowledge, however the users remained as ‘information providers’ only.
User-designer collaboration in participatory design was argued to be an effective strategy for facilitating user engagement (Asaro, 2000; Bull, 1999; Luck, 2007). Bull (1999) argued that participation is the principal way to empower effective collaboration with users in the field of product development. Asaro (2000) also argued that the central objective of conducting a participatory design is to systematically involve the users in the design of the system. Luck (2007) argued that designers should be trained in conversation skill as an important component of their design competences and explained how conversational manner enabled users to become engaged in participation and collaboration. Luck (2007) stated that the ‘expert in design talk’ introduces and asks questions, gives preferences and suggests alternative approaches after the users have engaged in the workshop.

Sceptical perspectives on the participatory design approach were reported (Grudin, 1993). Grudin (1993) pointed that deeper conversation with users was employed as a strategy for improving user-designer collaboration in the participatory design approach, as a response to the recognition that direct contact with users were often unsatisfactory. However, participatory design was reported to be more difficult in product development where the prospective users are not known in advance (Grudin, 1993). The product developers, aiming for a broad market, have focused on identifying common characteristics shared by most users rather than individual differences. The direct application of Scandinavian participatory approach in industrial design education was reported as rather unsatisfactory (Ward, 2005). Ward (2005), as an University educator, reported that employing an indirect user involvement approach such as ‘asking to sales representative about customers’ was rather satisfactory in industrial design education, which include learning from marketing and sales people, customer service and trading staff, user groups, trade magazines and journals.

As a response to the recognition of the obstacles and limitations of the participatory design approach in product development, different perspectives (approaches) of integrating users into the product development were explored (Sanders, 2005, 2006a, 2006b; Sanders and Dandavate, 1999; Sanders and Stappers, 2008; Stappers and Sanders, 2003). These approaches regarded the users as creative partners who possessed latent creativity, with which the designers could be inspired.

Alongside others, Sanders (1999, 2005, 2006a, 2006b, 2008) gradually introduced various toolkits and frameworks in order to integrate users as creative partners in the design process. She incorporated multiple research approaches with generative tools
such as images collage and scenario building in order to encourage users to reveal their latent creativity (Sanders, 2001a). Section 2.4 will review various ways this design for experiencing has worked for users’ latent needs and creativity; and then report on how these approaches have developed strategies aiming to improve the effectiveness of user-designer collaboration.

2.4 DESIGN FOR EXPERIENCING

Sanders and Dandavate (1999) used their concept of ‘design for experiencing’ as a theoretical framework for empowering users in the design process. Design for experiencing (Sanders and Dandavate, 1999) used various generative tools and participatory prototyping methods for encouraging and challenging the users to express their latent needs, aspirations and dreams to the design teams. Sanders later used the terms ‘co-designing’ (Sanders, 2000) and ‘co-creation’ (Sanders, 2005; Sanders and Stappers, 2008), gradually expanding the concept of ‘design for experiencing.’

In design for experiencing, Sanders (2001b) suggested a theoretical framework for the ‘design for experiencing.’ It was described as a constructive space, where users should collaborate with designers in constructing a mutual goal. In communication, user experience occurs when what the communicator (designer) provides meets what the communicatee (user) brings to the interaction (Figure 2). In this constructive space, the role of designers has shifted from genuine creators to creators of infrastructures or scaffolds.

Figure 2. The mechanism of design for experiencing (Sanders, 2001b)
Figure 2 describes the mechanism of the constructive communication space, in which actual communication occurs only when the communicator and the communicatee participate and exchange their ideas. This theoretical framework resembles the concept of the collaborative design space, which was studied in environmental design cases (Mitchell, 1993). Mitchell (1993) argued for the collaborative design space as being the space “through which designers and non-designers alike participate as partners in the design process, shaping not only the outcomes but the aims of designing as well” (p.73). In this space, Mitchell (1993) argued, the designers’ task was shifted from geometrical shaping (form giving) to the making of a context or a situation, in which users could determine the geometry.

Sanders (1992) reported the necessity of employing multiple research perspectives in solving today’s complex design problems. In her experience of working on the design of office systems, the design team experienced the necessity of employing both observational, participatory and co-design approaches, in order to achieve the project goal (Sanders and Dandavate, 1999). The followings are the lists of their experiences of employing various techniques in the project:

- The participatory and observational approaches complement each other very well in terms of user understanding.
- Observational approach reveals activities or observable facts that the users are not aware of and are not able to articulate if asked.
- The participatory approach delivers higher-level learning about user aspirations that are not accessible through observation alone.
- Co-design approach helps designers to combine the learning from observational research with the learning from the participatory research.

In summary, Sanders (2001a) used the term ‘design for experiencing’ and tried to provide a collaborative space, in which users could act as a creative collaborator in the design process by expressing their latent needs, wishes, dreams and aspirations. However, the concept of opening up the design process to the public (collaborative design, Mitchell, 1993, p.73) seemed to be applicable only to the environmental design cases where only a limited number of people could participate.
User involvement methods developed in information system design between 1950s-1990s were reviewed (Beath and Orlikowski, 1994; Ives and Olson, 1984). Ives and Olson (1984) argued that user involvement was enthusiastically practiced since 1950s, yet, poorly grounded in theory and research, and therefore methodologically flawed. They mentioned that user involvement was rather remained as intuitive, experience-based and unsubstantiated practices until early 1980s, even though some researchers (Mumford, Mercer, Mills, and Weir, 1972) attempted to formulate the basic structure of user involvement. Ives and Olson (1984) developed a theoretical model describing a mechanism of user involvement in system design, applying theories from the field of organisational behavioural studies. Within the model, they proposed factors that might impact the relationship between user involvement and system success, which included 1) role of participants, 2) characteristics of the system, 3) degree of involvement, 4) type of involvement, 5) cognitive factors, and 6) emotional factors.

Following the Ives and Olson’s work (1984), Barki and Jon (1994) investigated the concept of user involvement further, and found that user involvement was a mixture concept of user participation, user involvement and user attitude. Barki and Jon (1994) believed that users’ participatory activities preceded to the users’ subjective involvement toward the system, meaning that through the participative activities, users may develop a better understanding of the new system and are likely to develop beliefs that a new system is good, important and personally relevant (Barki and Jon, 1994, p. 75). However, Winston and Benjamin (2000), after conducting a survey of 32 organisations, empirically showed that user participation, user involvement, and user attitudes are inter-related and they are linked to system success.

The literature review in information system design revealed that user involvement has been practiced since 1950s, yet without a rigor theoretical model. Literature also indicated that several researchers (Barki and Jon, 1994; Ives and Olson, 1984; Muller et al., 1997; Winston and Benjamin, 2000) have developed a model of user involvement, yet have not succeeded in identifying how much each factors contributed to system success, since there were too many factors involved in the model. Literature only agreed that user involvement, user participation, and user attitudes are three key factors that contribute to overall system success in information system design.
In Agile software development (Kent, 2005), collaborative work with the customers were strongly promoted, by asking the customers to work as on-site team members throughout the development process. The customers were required to write user stories, participate in acceptance tests, and provide feedback to the developers (Arie van, 2001). In Agile development environment, training customers and selecting right customers were an issue (Arie van, 2001). Most early stage design activities (such as need finding and concept clarification) were taken place during the development process, through prototyping testing and face-to-face communication between the customers and the developers (Sharp and Robinson, 2008). They claimed small-sized story cards as media for facilitating the collaborative activities between the users and the developers (Sharp and Robinson, 2008), yet, without a rigor theoretical background. Controversial outcomes have been reported and modifications on approaches were made (Kent, 2005; McBreen, 2003). It seemed that Agile software development approach was not quite relevant to the study of user-designer collaborative activities (or user involvement).

2.6 DISCUSSION

User-centred design (Buurman, 1997) was developed by integrating features like recursive feedback and evaluation from usability engineering and the field of human-computer interaction. The basic concept of user-centred design was to consider users as an effective source for informers (Sanders, 2006a). This user-centred design approach has contributed to the improvement of the effectiveness of user-designer collaboration in terms of involving real users in the design process (Sanders and Dandavate, 1999).

Endeavours to expand the user-centred design approach to reflect the emotional and socio-cultural concerns of users gave rise to the development of ‘empathic design’ (Leonard and Rayport, 1997)and ‘participatory design’(Sanoff, 2000). The rationale employed in ‘empathic design’ was that the designer can absorb the emotional and socio-cultural desires of the users by participating in the interviewing or probing process (Kumar and Whitney, 2003). It was argued that by being in close proximity to the users, designers would be more effective in transferring the users’ tacit knowledge (Boutilier and McNaughton, 2006). Designers were strongly encouraged to conduct user research within the empathic and participatory design culture in order to improve their level of understanding of consumer experiences. This gave designers a greater opportunity to identify unmet user needs (Beyer and Holtzblatt, 1997).
In human-computer interaction, the participatory design approach was acknowledged as an obvious way of bringing socio-cultural aspects of user experience into the design team, and participatory design has become the dominant approach within the field (Kensing and Blomberg, 1998). Empathy (Suri, 2001 in McCarthy and Wright, 2008) and improvisation (making together) were considered to be the two most intriguing aspects of the participatory design culture, but they were seldom distinguished in traditional design processes. These two aspects of participatory design have allowed users to bring their own domain knowledge into design deliberation and have facilitated engagement, commitment (Ylirisku, 2004) and better outcomes in terms of creativity (Sawyer, 2003). However some participatory attempts have produced arguable results, as they have put users in situations where they seldom have the power to contribute to the decision making process (Blomberg and Henderson, 1990).

Sanders (2006b) played an important role in the field of participatory product development by suggesting a new design space where the users’ participation actually shaped the final design. In the new design space, the designers’ role shifted to creating scaffolds or infrastructures on which the users were encouraged to express their own creativity to decide their own design (Sanders, 2005).

In information system design, user involvement was also studied. Several researchers (Barki and Jon, 1994; Ives and Olson, 1984; Winston and Benjamin, 2000) have suggested a model of user involvement in system design, yet no researchers have succeeded to show how much of these factors contribute to system success. They only agreed that user participation, user involvement, and user attitudes were the key factors that contribute to system success. Also, not many researchers have investigated actual collaborative activities between the users and the designers during the early stage of the development process, and how these collaborative activities were performed (managed) to enhance the overall outcomes of the user involvement sessions.

2.7 SUMMARY

In this chapter, several design approaches associated with user involvement were reviewed and how each approach has developed strategies for improving user-designer collaboration were discussed. First of all, accessing users’ latent needs and tacit knowledge through direct contact with users was explored in user-centred design. Next,
participatory design and how it employs more effective strategies for collaboration than user-centred design, by including more direct and deeper conversation with users was discussed. In user-centred design, users were mainly employed as a source for information provision, evaluation and testing. The designers provided information to the users in a controlled or limited fashion in exchange for the users’ tacit knowledge and aspiration. The user-designer relationship has not changed drastically from the one seen in the traditional design approaches where users are treated as an effective source for information (Sanders, 2006a).

Participatory design approaches were opening up the design process to the public. However, they are thought to be better suited to in-house development, where the users are known and are willing to participate in development work. More effective user involvement approach was demanded for the mass-produced market. Sanders and her research team (Sanders and Dandavate, 1999) suggested a constructive space for design for experiencing, in which, ordinary people’s latent creativity could be discovered through the process of user-designer collaboration.

Various tools and techniques were developed that enabled users to develop and discover their latent creativity (Hippel and Katz, 2002; Sanders, 2001a; Stappers and Sanders, 2003). These tools and techniques helped to develop further collaborative strategies by allowing ordinary people to express and explore their own identity and experiences.

The following chapter will explore these tools and techniques which have been developed to stimulate users’ latent creativity and it will discuss the strategies that these tools and techniques have employed in order to improve the effectiveness of user-designer collaboration.
Chapter 3:

COLLABORATION

3.0 INTRODUCTION

As discussed in Chapter 2, relevant literature suggested that users can be integrated into the early stage of the design process as informers, consultative partners, and participative co-creators (Kujala, 2007). However, how can the users be integrated into the product development process has rarely been addressed. The nature of collaboration in user involvement has to be better understood. This chapter reviews various definitions of collaboration in the fields of organisational management, computer-supported cooperative learning, Human-Computer Interaction (HCI) and conversational studies, in search of a clear concept of collaboration in design. Various collaboration strategies also were reviewed and summarised as: 1) enabling direct access to the final design, 2) working with ambiguous contexts, and 3) developing shared experiences among participants.

3.1 COLLABORATION

Current literature on collaboration claims that collaboration means, as its Latin roots com and laborare indicate, ‘to work together’. It goes beyond mere communication, cooperation, and coordination (Chrislip, 2002). By this definition (Chrislip, 2002), for genuine collaboration to occur, all participants must be able to learn from and with each other, and to jointly design the process by which they collaborate.
In inter-organisational studies, collaboration was understood as a function of the recursive interaction of knowledge, engagement, results, perceptions of trust, and accumulation of activity over time (Martinez-Moyano, 2006). Collaboration was studied as a factor in influencing 1) the way knowledge is being transformed and then learned, and 2) the overall outcomes of collaborative works (Huxham and Hibbert, 2005).

In the field of computer-supported collaborative learning perspectives, Roschelle and Teasley (1995) defined collaboration as “a coordinated, synchronous activity that is the result of a continued attempt to construct and maintain a shared concept of a problem.” (p.70). Dillenbourg (1999) argued for an understanding of collaboration as having outcomes as well as processes. He defined collaboration as joint problem solving activities, measured by the elicitation of new knowledge.

In the leadership field, collaboration was defined as “a mutually beneficial relationship between two or more individuals, groups or organizations, who work together toward common goals by sharing responsibility, authority, and accountability for achieving results…” (Chrislip, 2002, p.41).

Kleinsmann, Valkenburg and Buijs (2007) focused on analysing a process of knowledge sharing and creation within a multi-disciplinary design team meeting, where collaboration means synchronising diverse perspectives into integrated ones. In Kleinsmann et al.’s definition (2007, p.60), collaborative design is “the process in which actors from different disciplines share their knowledge about both the design process and the design content.”

As such, collaboration has many definitions; but common characteristics can be found. Collaboration is 1) a set of coordinated and joint problem-solving activities, 2) a recursive process of knowledge management activities (clarification, understanding, and modification) and a social management activity (trust building and engagement) and 3) measured by the overall outcomes of the collaborative works.

### 3.2 STRATEGIES FOR IMPROVED COLLABORATION

Dillenbourg (1999) argued that to be successful, collaboration should be interactive enough to influence the participants’ cognitive processes, such as new knowledge
elicitation; synchronous enough to maintain the participants’ subjective feelings of synchronicity of reasoning; and ambiguous and flexible enough for them to justify their standpoints.

In usability testing, due to the conception of objectivity (which stems from the tradition of psychological experiments), it has been a widespread belief that user involvement should be rigidly structured and that users and designers should be kept at a distance from each other so as not to obscure the objectivity of the session (Dumas and Redish, 1993 in Buur and Bagger, 1999, p.63). Buur and Bagger (1999) disliked the concept of objectivity in usability testing, arguing that traditional usability testing restricts the understanding of problems and impedes productive dialogues between designers and users on use, context, and technology.

As a response to the objectivity of usability testing, flexible user involvement techniques which included exposing the users to designers’ subjective and active intervention were suggested as a new strategy for improving the effectiveness of user involvement in the development process (Gaver, Boucher, Pennington, and Walker, 2004; Gaver, Dunne, and Pacenti, 1999; Johansson, 2006; Mattelmaki, 2005). User dialogue (Buur and Bagger, 1999) was one of the strategies employed, in which users were invited to a full-day workshop to not only test products but to also participate in design discussion with the designers. Video footage of usability testing was used as material for discussion. Gaver et al. (1999) introduced ‘cultural probes’ as a tool for design inspiration in which ambiguous wording and suggestive images were used to open a space for discussion, allowing the participants as much room to respond as possible. Provoking questions were given to the participants in the expectation of generating original ideas and subjective interpretations. This approach allowed for imaginative interpretation and open discussion among participants. Ambiguities in collaborative sketching were also reported to work as ‘boundary objects’, which users and designers could share, talk about, and discuss with reference to the design (Johansson, 2006).

Allowing synchronous visualisation and direct modification of the final design was also stressed and practiced as one of the main user-designer collaboration strategies (Al-Kodmany, 2001). For example, King, Conley, Latimer, and Ferrari (1989) used freehand sketches as a medium for allowing synchronous visualisation and direct user access to the final design. They conducted over 190 co-design workshops in urban planning, and in their workshops, professional artists were hired to visualise ideas and concepts while
the participants described their needs and preferences. The participants were able to see, clarify, discuss and modify their ideas in real-time as they were expressed by the artist. Direct and synchronous manipulation of the design allowed the participants to actively participate in the decision-making process.

Developing shared and improvised experiences was the third strategy for improving the level of collaboration. Tools like ‘cultural probes’ (Gaver et al., 1999), ‘generative tools’ (Sanders, 2000), ‘prototypes’ (O’Connor, 2004), ‘video scenarios’ (Ylirisku, 2004), ‘video clips’ (McDonnell, Lloyd, and Valkenburg, 2004) and ‘role-playing’ (Svanaes and Seland, 2004) were suggested as ways of empowering ordinary users with creative potential (Kristensson et al., 2004). The development of shared and improvised experiences among participants was the major role of these tools.

In summary, for a collaborative design session to be successful, the tools must be flexible and ambiguous enough to facilitate imaginative interpretation, to open a space for discussion (Johansson, 2006) and to support direct and synchronous manipulation of the final design (Al-Kodmany, 2001; 1995). For this investigation, various user-designer collaboration tools were categorised into three user-designer collaboration strategies: 1) direct user-access to the final designs, 2) co-exploration of ambiguous contexts and 3) development of shared and improvised experiences.

### 3.3 STRATEGY ONE: ALLOWING DIRECT ACCESS

Direct access to the final design was implemented as a way to improve the level of user-designer collaboration in the fields of urban architect, community planning and product development (Hippel and Katz, 2002; King, Conley, Latimer, and Ferrari, 1989; Nam and Wright, 2001). King et al. (1989), in the fields of urban planning and community design, implemented several design cases, where community members and visualisation artists were working together to externalise the members’ thoughts, ideas, needs and functions. The local community members could instantly access to the final design while the visualisation artists were making drawings based on the members’ descriptions of the design. Public participation was enabled and encouraged in these design cases.
Hippel and Katz (2002), in the field of new product development, suggested a new product development framework, where users could participate in the process of manipulating the final design with design toolkits. Design toolkits have been provided to the users in the high-tech industries such as integrated circuit design and manufacturing and the users could conceptualise the circuit board in a functional level. The manufacturing parts of the production automatically generated the rest of the circuit board for manufacturing. This type of collaboration allowed the users to directly access to the final design in a functional level while the designers could more focus on the manufacturing aspects of the design. Hippel (1988) argued that need-related design tasks should be assigned to users and that solution-related design tasks should be assigned to manufacturers in order to implement more productive and effective production processes. This approach, by separating the design process into two: the users’ parts and the manufacturers’ parts, enabled cooperation between the users and the manufacturers. However, this cooperation approach failed to address the collaborative issues between the users and the designers, which required a set of coordinated problem-solving activities within the design process. King et al.’s practices (1989) also failed to elaborate on the process of collaboration between the community members and the visualisation artists, which resulted in transfer of design freedoms (but nothing else) to the users.

3.4 STRATEGY TWO: WORKING WITH AMBIGUOUS CONTEXTS

The use of collaborative design tools promised to deliver improved collaboration in the new product development process such as an improved understanding of the consumers’ needs (Veryzer and Mozota, 2005) and the consumers’ more active participation in the decision-making process. Cultural probes were used as a collaborative design tool in order to inspire the users’ ambiguous interpretations of their experiences, emotions, potential situations of product use, and social and cultural influences (Stappers and Sanders, 2003).
3.4.1 Cultural probes

Cultural probes are design-oriented toolkits which aim to invite and provoke users to reflect on and verbalise their experiences, feelings and attitudes, and to visualise their actions and contexts (Gaver et al., 2004; Gaver et al., 1999; Mattelmaki, 2005). Cultural probes were first used to provoke inspirational responses from participants in a project aimed at developing new interactive techniques for the elderly in local communities (Gaver et al., 1999). Cultural probes were further developed to facilitate interactions among groups of people, i.e. designers, researchers and users in user involvement projects. Recent studies have revealed various roles that the probes could play in enhancing the quality of outcomes using the participatory approach (Gaver et al., 2004; Gaver et al., 1999).

The cultural probe package used in the Gaver’s approach contained postcards, disposable cameras, maps and photo albums with media diaries. The techniques that were employed to elicit new ideas by using these materials were learnt from projective methods used in psychology and contemporary art philosophies (Mattelmaki, 2005).

In contrast to observation-oriented user research methods, Gaver et al. (1999) wanted to empower co-creative or co-discovery aspects of cultural probe approaches. Mattelmaki (2005) identified four main motives for applying probes in the product development and concept design process after reviewing seven industry-involved probe cases. There were four motives for employing the probes; information gathering, inspiration, participation and dialogue. Each motive was summarised as follows:

**Motive 1: For information gathering**

The goal of information-oriented probes is to find information about users, their experiences and their needs. The tasks given to users to probe for information are primarily descriptive. The probes concern the users’ subjective world. Users are asked to experiment and to make interpretations of their experiences. The users’ individual points of view are used as the basis for improving the design of the product. Disposable cameras combined with diaries have commonly been used for this purpose (Gaver et al., 1999).
**Motive 2: For inspiration**

Inspiration probes aim to provide new insights for designers’ creative thinking. The “making” tasks leave space for interpretation and inspiration both for the users and the designers (Sanders, 2001; Gaver et al., 1999).

**Motive 3: For participation**

In the probes approach, the users are generally given tools and tasks with which to experiment, observe, record their subjective experiences, and express their feelings. The tools invite and provoke the users to actively participate in an imaginative process.

**Motive 4: For dialogue**

Gould et al. (1985) emphasised the necessity of frequently creating a dialogue with users early in the development process. Cultural probes can be used to create a direct interaction between users and designers at the early stage of the process (Gaver et al., 1999). Through the probes process, familiarity grows between participants and designers.

In summary, cultural probes have been used as design tools by practitioners for the following reasons. First of all, they provided effective ways of gathering information from users’ real life environments. Secondly, they can be used as an inspirational source for the designers. Thirdly, they provide a situation where the user can have ownership of the shared workspace. Finally, they could be used to facilitate direct dialogue with users.

**3.5 STRATEGY THREE: DEVELOPING SHARED EXPERIENCES**

Along with Sanders (Ivey and Sanders, 2006; Sanders, 2000; Sanders and Dandavate, 1999) and others (Bodker, Ehn, Sjogren, and Sundblad, 2000), Buur and Bagger (1999) have argued that users are a potential source of ideas, and that they readily come forth with opinions on design, if media through which they can express and explore their ideas are provided. Co-generative tools, low-tech prototypes, future scenario creation, and games are the tools that support the ‘shared experiences’ strategy.
3.5.1 Generative tools

Generative tools were conceived and implemented as tools for improving access to context-rich user information as well as for improving access to user-driven innovative ideas (Sanders, 2000; Sanders and Dandavate, 1999; Visser, Stappers, van der Lugt, and Sanders, 2005). They served as a common ground for connecting the thoughts and ideas of people from different disciplines and perspectives because they were primarily visual (Sanders, 2006a). Generative tools have become the new language for user-designer collaboration (Sanders, 2001b) and are particularly good in the idea generation phase where unknown, undefined, and/or unanticipated user or consumer needs can be discovered.

The generative tools (Sanders and Dandavate, 1999) comprised emotional and cognitive toolkits. Emotional toolkits are a package of artefacts including collages and diaries. With the emotional toolkits, users could express or generate their stories and dreams associated with the product use. The stories associated with the artefacts from the emotional toolkits could be used to relate the feelings with the potential products. Emotional toolkits were also used to evoke negative emotional feelings such as fears or concerns. Cognitive toolkits are composed of a set of artefacts such as maps, mappings, 3D models of functionality, diagrams of relationships, flowcharts of processes and cognitive models. These toolkits were used to elicit how the users understand and misunderstand things, events and places. The cognitive toolkits can be used to reveal the relationships between system components.

The benefits of using these generative tools were claimed to be (Muller, 2002; Sanders, 2000):

- Richer, contextualised communication between end-users and designers.
- Stronger engagement of designs with end-users’ worlds.
- Enhanced sharing of views and needs among end-users, leading to stronger articulation by them as a collective voice.
- Using visual ways of sensing, knowing, remembering, and expressing.
• Giving access and expression to the emotional side of an experience.

• Acknowledging the subjective perspective in people’s experiences with technologies.

• Revealing unique personal histories that contribute to the ways that people shape and respond to technologies.

As such, the implementation of the generative tools in the design process had a positive influence on the collaboration between the users and the designers, and allowed the users and the designers to exchange, share and discuss about the knowledge that the users had brought in. The focus of the generative tools was to expand the shared understanding of the users’ experiences about the product use. They were mostly used to access the users’ latent needs.

3.5.2 Prototypes

The first low-tech prototype used in the design project was the cardboard printer mock-up and the paper prototypes (Kyng, 1994), that were used in the UTOPIA project (1981). The Nordic Graphic Workers Union sponsored a group of researchers to develop state-of-the-art graphics software for skilled graphics workers who happened not to have prior computer skills. Ever since the UTOPIA project, low-tech prototypes have had an impressive impact on the design community as a way of helping people from diverse backgrounds to think about new technologies, office layouts, and new working relations. Suri and Buchenau (2000) used prototypes as a way of engaging users, design team members, and clients to gain a shared understanding of future conditions. They addressed three benefits of employing prototypes in the design process (Suri and Buchenau, 2000): to explore new design ideas, communicate design concepts and understand users’ experiences. The benefits of prototyping were claimed as (Muller et al., 1997);

• Enhanced communication and understanding through grounding discussions in concrete artefacts.
• Enhanced incorporation of new and emergent ideas through the ability of participants to express their ideas directly via the low-tech materials.

• A sense of shared ownership of the resulting design.

• Practical application with measured successes in using low-tech design approaches to solve real product challenges, thus achieving consequential business goals.

Prototyping employed the collaborative nature of user participation in the design process. Users were asked to work with the prototypes and share their experiences of using the prototypes with the design teams. These experiences were used for facilitating the discussion of the features and the elaboration of new ideas. A set of joint problem solving activities could be implemented between the users and the design teams, yet the focuses are more on the final solutions.

3.5.3 Design games

Design games have been used for creating a common language and developing a shared experience among the participants (Brandt and Messeter, 2004). For example, Ehn and Sjogren (1991 in Brandt and Messeter, 2004) reported the use of ‘Layout Kit’ and ‘Organisational Kit” as design game activities in the design process of a computerised newspaper production system. They used the design games for engaging the participants in the design process by creating a common language, which allowed the developers to share and understand the users and their experiences. Brandt and Messeter.(2004) implemented design games as means for staging collaborative design framework, in which various stakeholders could develop a shared understanding of the users. The benefits of employing design games in the design process can be summarised as 1) increased level of understanding about the users and 2) better engagement of the stakeholder to the decision-making process (Brandt and Messeter, 2004).
3.6 SUMMARY

In this Chapter, the user-designer collaboration was defined as a set of coordinated and joint problem solving activities, where knowledge is not only transferred from one participant to another, but where through recursive interaction, new knowledge is generated (Chrislip, 2002; Dillenbourg, 1999; Huxham, 1996; Martinez-Moyano, 2006; Roschelle and Teasley, 1995). Various design tools such as cultural probe, generative tools, prototypes, and design games were reviewed and strategies for improved collaboration in user involvement were discussed. Three strategies were identified: 1) allowing direct and synchronous access to the final design, 2) exploring ambiguous situations with users, and 3) developing shared experiences. And benefits of employing these design tools in the design process were reviewed. The first approach, which enabled the users to access to the final design, seemed to focus more on a cooperative work rather than collaborative work. The second approach, which allowed the users and the designers to explore and challenge the ambiguous contexts together, enabled an open discussion between the users and the design teams. However, the focus was more on the inquisition of the designers’ inspirations rather than solving the design problems. Final approach, which asked the participants to develop shared experiences, encouraged the participants to express, share, exchange and discuss about their experiences about the product use. The focus was on the identification of the users’ latent needs or the elaboration of new design ideas. The following chapter will develop the structure of user-designer collaboration by identifying elements of user-designer collaboration and then generate a theoretical framework for the investigation.
Chapter 4:

USER-DESIGNER COLLABORATION

4.0 INTRODUCTION

In Chapter 3, collaboration was defined as a set of coordinated and joint problem solving activities, measured by the elicitation of new knowledge. Based on the definition, this chapter further develops a theoretical framework to describe the interaction mechanisms of user-designer collaboration. Elements of the theoretical framework will be identified and characteristics of each element will be described.

4.1 STRUCTURE OF USER-DESIGNER COLLABORATION

In order to describe the structure of collaboration between people with different cultural backgrounds, a concept of a shared workspace was introduced (Muller, 2002). Muller adapted Bhabha’s in-between culture concept (Bhabha, 1994) and suggest a shared workspace, where the process of collaboration among participants could be observed. The concept of a shared workspace is similar to the concept of a constructive space in ‘design for experiencing’ (Sanders and Dandavate, 1999) and a collaborative space (Mitchell, 1993). As suggested in Section 2.4, a constructive space in ‘design for experiencing’ was constructed from participants’ own spaces, as well as an overlapping space (Figure 2).

In modelling a structure of user-designer collaboration, it is important to include the individual’s knowledge and culture as input elements of the structure (Carlile, 2002). Carlile (2002) argued that knowledge is localised, embedded, and invested within each
participant’s territories or culture; knowledge should be clarified, understood, and transformed in order to be used as a resource for collaboration.

It is also important to note that individual efforts to coordinate their communication with other collaborators should be included as main elements in the construction of user-designer collaboration model. Roschelle and Teasley (1995) showed that each participant’s conscious and continued efforts to coordinate their language and activity with respect to shared knowledge were essential for collaboration. They examined two students’ interaction with instructional software demonstrating the laws of physics and found that individual efforts to coordinate language and activity affected the outcomes of the collaboration.

In summary, a shared workspace, individual knowledge and individual efforts to coordinate were identified as important elements for the construction of user-designer collaboration model. The following Sections 4.1.2, 4.1.3, and 4.1.4 will describe these elements in more detail.

4.1.1 Grounding: Interactive mechanism

Grounding is basic mechanism to all collaboration (Clark and Brennan, 1991) and it is the process by which all participants maintain and expand a common ground of mutual understanding. Clark and Marshall (1981) were able to conceptualise the concept of ‘grounding’ as a basis for analysing interactions among participants in a collaborative situation. The grounding mechanism is a mechanism for co-constructing a common language, which simply allows participants to develop a mutual understanding - enough to continue performing the task at hand. Clark and Marshall (1981) argued that various forms of linguistic and non-linguistic feedback constitute the basic mechanisms of the interaction and that maintaining some degree of mutual understanding is a necessary condition for proceeding to collaborative interaction.

A common ground of mutual understanding, knowledge, beliefs, assumptions, presuppositions, and so on has been claimed to be essential for the success of communication and collaboration (Clark and Brennan, 1991). The common ground is maintained and expanded through evidence of what participants do or do not understand over the course of a conversation, their knowledge, beliefs, assumptions and
presuppositions (Baker, Hansen, Joiner, and Traum, 1999; Clark and Marshall, 1981). Technically, grounding is a collaborative process by which all participants try to reach a mutual recognition.

Muller (2002) described the shared workspace as a ‘third space’ in which both sides challenge each other, learn reciprocally, and create new ideas, which emerge through negotiation and co-creation of identities across differences. Through continual negotiation and the creation of identities within this overlapping space, a new culture could be generated (Figure 3).

Figure 3. The structure of an overlapping space (adapted from Muller, 2002)

Figure 3 represents the overall structure of an overlapping space in which all participants are interacting. This space does not belong to any participants. The space is a place that all the participants can access and where they can interact with each other to negotiate, construct and discover. The left and right boxes represent participants with their own identities. New culture is generated only when all the participants depart from their own territories and negotiate their identities in the overlapping space. The centre circle represents the overlapping space where each party shares its identities and generates new culture. The model (Figure 3) represents the iterative, recursive interaction of knowledge (Martinez-Moyano, 2006) which aims to develop a beneficial relationship between two or more individuals, groups or organisations (Chrislip, 2002, p.41) in a synchronous manner (Roschelle and Teasley, 1995).
4.2 ELEMENTS OF USER-DESIGNER COLLABORATION

The framework (Figure 3) describes collaboration as a mechanism composed of three elements. Firstly, knowledge, identities and resources that all the participants bring into a shared working space. Secondly, internal mechanisms of the interaction between the users and the designers. Thirdly, the collaborative outcomes.

4.2.1 Users’ tacit knowledge

Knowledge was defined as “a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information.” (Davenport and Prusak, 1998 in Ramesh and Tiwana, 1999). Davenport and Prusak (1998) suggested that knowledge is embedded in documents, repositories, organisational routines, processes, practices and norms. Nonaka and Takeuchi(1995), in the field of organisational knowledge management, suggested that organisational knowledge creation process can be facilitated through conversion of tacit to explicit knowledge. Explicit knowledge refers to knowledge that is codified and thereby directly available to others. By contrast, tacit knowledge is defined as personal, context specific knowledge that is difficult to formalise, record, articulate, or encode (Nonaka and Takeuchi, 1995).

Nonaka and Takeuchi (1995) argued that successful knowledge management depends on how well the organisation can manage to convert the internalised tacit knowledge into explicit codified knowledge. Later, they suggested a knowledge management framework, in which tacit knowledge is clarified, understood, and then shared with another partners and used as a collaborative information source.

Understanding users’ tacit knowledge is critically important in the very early product development stages, where most of the knowledge is still resident in the mind of individuals (Boutilier and McNaughton, 2006). Users’ tacit knowledge is localised, embedded and invested in their own local artefacts (Carlile, 2002); therefore, transferring the knowledge into the design space (explicit knowledge) is very difficult. Furthermore, tacit knowledge is difficult to codify it since it contains more than verbal information (Nonaka and Takeuchi, 1995).
Within the product design domain, the transfer of users’ tacit knowledge into the design space was also explored. Jordan (1999) argued that the traditional HCI approach generated a narrow view of human experiences, and articulated ways to access user experience with a holistic view. As an alternative approach, even though he did not explicitly mention tacit knowledge in his book section, Jordan introduced the concept of ‘pleasure’ as a way of integrating users’ tacit knowledge into the design process.

Zaltman (2003) devised ways to raise emotional, social and cultural issues from consumer’s ordinary stories and named them ‘Zaltman Metaphor Elicitation Techniques (ZMET)’. He argued that users’ latent needs are so deeply subsumed in the consumers’ sub-conscious minds that they cannot easily be accessed and understood through traditional approaches such as interviews and questionnaires. Instead, he suggested using metaphor as a window for accessing consumers’ hidden needs.

Belonging, self-awareness, self-improvement, consumption, and working in preferred environments are examples of socio-cultural experience which go beyond the individual’s personal and private feelings (Power and Tangsantikul, 2005). Schmitt (1999) indicated that these socio-cultural experiences occur when someone associates him/herself with other people, other social groups (occupation, lifestyle, and ethnicity), and with abstract social entities such as a nation, society or culture. This social association is commonly observed in symbolic, hedonic, and aesthetic consumption behaviours (Morris and Elizabeth, 1982).

De Angeli (2002) anticipated the massive social impact of the focus on Human-Computer Interaction (HCI) in the near future, referring to the ‘social artefact’ which maintains meaningful relationships between users, groups of users and interfaces. The inclusion of emotions, attitudes and social intelligence in the development framework was emphasized for the building of lasting and robust social artefacts.

In summary, users’ tacit knowledge is difficult to access, formalise, record, articulate, and encode, since it is deeply embedded in the personal artefacts, processes, individual and socio-cultural experiences. Therefore, successful access to users’ tacit knowledge has been thought of as a way to understand the users’ latent needs. Several designers and researchers (Jordan, 1999; Schmitt, 1999; Zaltman, 2003) have mentioned that users’ experience could be used as the important resource for accessing to the users’ tacit knowledge and therefore understanding the users’ latent needs.
4.2.2 Users’ experience

Difficulties in acquiring users’ tacit knowledge have caused various user experience oriented involvement techniques to be developed (Cain, 1998; Shedroff, 2001; Visser et al., 2005; Wood, Pougy, and Raulik, 2004). User experience has been investigated by designers (Shedroff, 2001), design consultants (Sanders, 2001), market researchers (Schmitt, 1999), interaction designers and e-business providers (Forlizzi and Ford, 2000). Even though their definitions of user experience differ, they all agree that user experience is the driving force for product innovation.

Traditional design research methods, including observation and market research techniques, such as focus groups, questionnaires and interviews have been used for accessing and collecting users’ experiences. Yet, as Sanders defined it (2001b), a user experience only occurs when a customer acquires knowledge as a result of interaction with artefacts or services created by designers (Figure 4). This definition expanded the concept of experience into an iterative and evolving space where the user’s current and past experience can only be elicited through active interactions with proposed artefacts. Generative tools were added on top of traditional design research methods in order to access users’ ever-complex thoughts, feelings and dreams.

![This figure is not available online. Please consult the hardcopy thesis available from the QUT Library](https://example.com/figure4.png)

Figure 4. User experience as a conversation between the user and the designers (Sanders, 2001)

Figure 4 explains user experience as a conversation between the users and the artefacts that the designers have proposed. It describes the role of user-designer collaboration in accessing and acquiring user experience. User experience can be identified, developed, explored and expanded through the process of user-designer collaboration.

Recently, Forlizzi and Ford (2000) have developed a theoretical framework that supports the concept of experience, in which user experience is defined as the consumer
needs that have grown from the interaction with the products. This framework, which borrows much of its perspective from pragmatist philosopher Dewey (1958) and symbolic interactionist Blumer (1969), explains how different consumer experiences are recognised and transformed into other forms during daily activities. The framework suggests an ability of different types of user experiences to transform from hidden (tacit) to observable (explicit) and vice versa (Figure 5).

Figure 5. Types of user experience (after Forlizzi and Ford, 2000)

Figure 5 represents four types of user experience: sub-consciousness, cognition, narrative and storytelling. The following describes the nature of each type and their relations to other types (Forlizzi and Ford, 2000).

- Sub-conscious experiences are ones that do not compete for our attention and thinking process. Experiences in the sub-conscious state are the most automatic or fluent experiences.

- Cognitive experiences are those whereby someone is confronted with confusing or unfamiliar products and environments, or tasks. They require cognitive effort, focus and concentration. When an experience shifts from a sub-conscious to a cognitive one, it means that a user has encountered something unexpected in his/her interactions with a product, and is forced to think about it.
• Narrative experiences are those that have been formalised in the user’s head. Examples of narrative experiences are the product’s set of features and affordances which suggest a narrative of use.

• A sub-conscious experience can turn into a storytelling experience, as someone schematises it, communicates it and adds levels of meaning on top of the existing experiences. Similarly, an experience can move from narrative to storytelling – a formal experience becomes personalised as it is communicated in a relevant way. Shifts from sub-conscious or narrative experiences to storytelling experiences illustrate the human need to communicate, and to share experience as a story.

An important aspect of Forlizzi and Ford (2000)’s experience model is transformability. When communicating and sharing with others, tacit user experiences can be transformed into explicit knowledge, which can later be used as a source for innovative design development.

4.2.3 Designers’ efforts

As indicated in the product innovation literature (Leiponen, 2006; Nonaka and Takeuchi, 1995), the management of user knowledge as well as the construction of social relationships with users were recognised as key factors for successful product innovation. Without a clear understanding of these factors, user involvement can be of limited value for innovation or even misleading (Christensen and Bower, 1996 in Magnusson, Matthing, and Kristensson, 2003). However, managing users’ tacit knowledge and building a social relationship with users are difficult tasks, because of the tacit nature of the knowledge and attitude issues of sharing information within partners.

Magnusson et al. (2003) illustrated the practical difficulties in managing the users’ knowledge in the organisation and reported as follows:

• Consumers’ ability to express and verbalise is limited because they do not know what is technologically feasible.
• Consumers can only express what they have experienced in the market.

• Consumer involvement may deter the exploration of the opportunities provided by new technologies.

As Magnusson et al. (2003) experienced, the most common difficulties were due to the tacit nature of user knowledge. The users’ tacit knowledge was embedded in their emotions and in their own social contexts. Bringing this tacit knowledge into the design space was thought of as more difficult than asking users’ explicit and direct responses.

Designers’ attitude toward collaboration also contributed to the difficulties of user involvement in the product development process. Huxham and Hibbert (2005) stressed ‘attitude’ as one of the designers’ important competences for the successful management of user involvement. Huxham and Hibbert (2005) observed several inter-organisational collaborative cases and identified four types of attitudes toward collaboration: ‘selfish-exploiting’, ‘sharing-exchange’, ‘sharing-exploring’ and ‘sidelined’. The selfish-exploiting attitudes involve the selfish acquisition of knowledge from a partner, exclusively for an organisation’s own use, thus exploiting the partner; this is knowledge acquisition. Secondly, sharing-exchanging involves the sharing of knowledge with partners, in a relatively controlled fashion, thus exchanging with them; this is also knowledge transfer. Sharing-exploring involves the sharing of knowledge in a broad, open manner among participants, thus exploring innovative solutions to problems-at-hand collaboratively; this is knowledge creation. Finally, sidelining relates to situations where none of these forms of collaboration occur (Huxham and Hibbert, 2005; Huxham and Vangen, 2005).

The following Sections 4.2.4 and 4.2.5 explore designers’ activities toward collaboration (knowledge and social management activities), which may influence the process of knowledge transfer and new knowledge elicitation.

### 4.2.4 Knowledge management activities

Individual knowledge can be an elusive asset to manage (Leiponen, 2006). Therefore, knowledge management activities should be carefully designed within the corporation (Leiponen, 2006) in order to be used as resources for product innovation. Leiponen
(2006) developed a conceptual framework of knowledge management with degrees of tacitness and collectiveness, as a ground for the empirical study of 167 business firms. Tacitness referred to the degrees of transferability of knowledge such as automatic to conscious knowledge; whereas collectiveness referred to who in the organisation could access and use knowledge: individual to organisational. Leiponen (2006) found that higher level of tacit and collective knowledge management activities were more closely associated with new service introduction, whereas explicit and collective knowledge management was associated with the improvement of the existing services.

After Leiponen’s framework (2006), knowledge management activities, in this thesis, refer to the designers’ efforts to manage the tacitness of knowledge in the shared workspace. Any designers’ activities related to the management of user knowledge to the shared workspace can fall into the category of knowledge management activities. Through these knowledge management activities, designers could clarify, evaluate, contextualise, negotiate, hypothesise, and develop the user knowledge in the shared workspace.

### 4.2.5 Social management activities

Social management deals with people, for example: trust building (Inkpen and Pien, 2006; Jassawalla and Sashittal, 1998), respect, and friendship. Social management activities, in this thesis, refer to the designers’ efforts to facilitate the process of tacit knowledge transfer from the users to the designers. Any attempts to facilitate the transfer of knowledge can fall into the category of social management activities. For example, if the designers encourage or orient the participants to generate more knowledge in the shared workspace, these activities can be thought of as social management activities. Once the common ground was constructed successfully through the knowledge management activities, the designers usually employ social management activities to further develop a shared understanding of the contexts. The users are encouraged to bring their own knowledge into the shared workspace, but sometimes, they are also expected to create new knowledge for the product development. These users’ contributions are facilitated by the social management activities such as engaging, elaborating, challenging, orienting, and so forth.
4.2.6 Collective activities

An act performed by two or more people together is a collective act (Clark and Schaefer, 1989). Collective activities, as the term is used in this thesis, refer to the signs of understanding and confusion expressed by any of the participants during the conversation. All collective activities are built on common ground and its accumulation (Clark and Brennan, 1991). In turn-taking situation, common in conversation, Clark and Schaefer (1989) explained that the mere presentation of information to other participants is not sufficient for building a mutual understanding among the participants. Additional elements need to be employed to assist the participants to develop a mutual understanding of the common knowledge. Clark and Brennan (1991) have identified contributory factors, such as evidence of continued understanding, signs of confusion and refusal; which constitute important elements in the modelling of the dynamics of collaborative interaction. It is important to identify these types of evidences as indicators of common knowledge being shared and understood by all the participants. Signs of understanding and confusion are summarised as follows (Table 3):

Table 3. Signs of understanding and confusion

<table>
<thead>
<tr>
<th>Signs of understanding</th>
<th>Signs of confusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acknowledgement:</td>
<td>Questions</td>
</tr>
<tr>
<td>• continuers such as ‘uh huh’ and ‘m’</td>
<td>Refusals</td>
</tr>
<tr>
<td>• assessments such as ‘gosh’, ‘really’, ‘good God’</td>
<td>Negative responses</td>
</tr>
<tr>
<td>• gestures such as head nods</td>
<td>Repetitions</td>
</tr>
<tr>
<td>Repetitions</td>
<td></td>
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</tbody>
</table>

In conversation, one participant ordinarily presents information to the partner intended to specify the context of his or her contribution. As a response, all the participants work together to establish the mutual belief that everyone has understood the context well enough for the next turn. Signs of understanding refer to the involuntary sounds or gestures such as ‘uh huh’, ‘m’, or heading nods. Such signs of understanding can work as an initiator for the next relevant turn taking, or a mere sign of continued attention. Repetitions of the words or the phases can be a sign of understanding or a sign of confusion.
Signs of confusion, which are another types of evidences in conversation, help the presenter fix the situation by adjusting the utterance or rephrasing the information that he/she has presented to the shared workspace (Clark and Carlson, 1982). When the presenter perceives signs of confusion coming from the partner, the presenter prefers to conduct a self-repairing action in order to minimise the efforts needed by all the participants (Schegloff, 1997). This is called least collaborative effort. Signs of confusion also represent the participants’ collective activities to clarify any misunderstanding generated by either the users’ or the designers’ imposed knowledge. The users might use signs of confusion in order to clarify questions, situations or the objectives of the tasks given by the designers. Designers on the other hand, might use these signs when user knowledge and experiences have not been properly understood.

In summary, collective activities play a key role in accumulating and expanding shared knowledge through the iterative process in which participants exchange evidence about what they do or do not understand over the course of a conversation (Clark and Marshall, 1981). These collective activities, such as repetition and rephrasing, are grounds for engaging both the designers and the users in a shared understanding of the situation. Any signs (signals or gestures) of continued attention, understanding, confusion, or refusal can fall into the category of collective activities.

### 4.3 THEORETICAL FRAMEWORK

To model a theoretical framework for user-designer collaboration, theories learned from organisational management, collaborative learning, and linguistic research on conversational study were referred to. Dillenbourg (1999) investigated several collaborative learning cases and found parameters and roles of such parameters in mediating interactions among participants. Dillenbourg, Baker, Blaye, and O'Malley (1996) explored various theoretical fields (pedagogy, psychology, and sociology) applied themselves to explaining various ‘collaborative learning cases’ and argued that collaborative learning is about inter-personal activities (explanation, disagreement, and mutual regulation) and such cognitive mechanisms as knowledge elicitation, internalisation, and reduced cognitive load.

Ideas from ‘collaborative learning’, ‘multi-disciplinary collaborative design’ and ‘grounding’ were considered in the development of a theoretical framework for studying
collaborative interaction between users and designers during the design process. Following Clark and Brennan (1991) and Roschelle and Teasley (1995), a shared workspace was constructed at the centre of the theoretical framework (Figure 6).

![Figure 6. Theoretical framework for user-designer collaboration](image)

Figure 6 illustrates a theoretical framework for user-designer collaboration that consisting of 1) the users’ and the designers’ individual contributions to the shared workspace; 2) designers’ knowledge and social management activities; 3) collective activities between the users and the designers, and 4) activities representing transfer of knowledge and new knowledge generation as outcomes of the collaborative activities. The basic premise of the framework is that the designers’ and the users’ individual contributions can be clarified, shared, explored, understood, and used for the construction of a common ground. The designers’ knowledge and social management activities and collective activities support the construction of a common ground. Once the common ground is constructed, new knowledge can be generated as outcomes of the interactions in the shared workspace. User-designer collaboration, in this framework, is defined as the process by which all the participants construct and maintain a common ground, with the understanding and exchange of individual contributions determined by both the users and the designers.
4.4 SUMMARY

This chapter reviewed the nature of user-designer collaboration from various perspectives: organisational knowledge management, collaborative learning, and linguistic research on conversational study. Knowledge taken from theories in these areas was used to generate a theoretical framework for investigating interactions between users and designers during the early stage of the product development process.

Firstly, a shared workspace was constructed at the centre of the framework. Then, the theoretical framework was constructed with the following elements: 1) the types and characteristics of the resources that the users and designers are bringing into the shared workspace; 2) the types of designers’ efforts for facilitating knowledge transfer and elicitation; and 3) the collective activities observed during the session.

In this research, user-designer collaboration can be understood as a set of coordinated and joint problem solving activities, measured by the elicitation of new knowledge, which can be understood as

1) Designers’ activities (knowledge and social management activities)

2) Users’ and designers’ collective activities

The next chapter will describe the overall structure of the research design, which includes the research plan, the data collection methods, the coding scheme, and analysis procedures.
5.0 INTRODUCTION

In this chapter, the research plan, data collection procedures, analysis and coding scheme are presented as parts of the research design. Ways of addressing the research question are discussed and the basic framework of the investigation is outlined.

5.1 RESEARCH PLAN

The research question asked was ‘How can users be integrated during the early stage of the product development process?’ The sub questions were as follows:

- What is the user-designer collaborative mechanism observed in user involvement sessions?

- What are the factors that influence the generation of collaborative outcomes?

- How can these factors be integrated into the current product development process?
Case studies were employed to investigate the research question and sub questions. The primary focus was on identifying user-designer collaboration mechanisms in a shared working space.

In any user involvement, designers generally construct a shared working space with users in order to identify users’ true needs, clarify new product-service concepts, or generate new concepts and ideas. The research focused on identifying the following types of:

- design knowledge that designers bring into the shared workspace.
- user knowledge that users bring into the shared workspace.
- designers’ efforts for managing knowledge in the shared workspace.
- designers’ efforts for managing social interactions among participants in the shared workspace.
- collective activities implemented by both designers and users.
- outcomes from the users-designers collaboration session.

The findings from this analysis led to the identification of the collaborative nature of interactions employed by both the users and the designer. Three industry-supported product development cases were chosen from ‘need finding’ and ‘clarifying concepts’ projects. The types of resources, designers’ efforts, collective activities, and outcomes were compared to answer the research questions.

Figure 7 illustrates the research plan, which is comprised of analysis and findings. Through analysis, the fundamental elements of the theoretical framework (Figure 6) will be investigated in both ‘need finding’ and ‘clarifying concept’ cases. Then, comparison will be made between ‘need finding’ and ‘concept clarification’ cases. Then comparisons were made between ‘need finding’ and ‘concept clarification’ cases in order to address the second research sub question: ‘What are the factors that influence the generation of collaborative outcomes?’
The results of the comparison will answer the third research sub question: ‘How can these factors be integrated into the current product development process in order to enhance the quality of collaborative outcomes?’

5.2 METHODS

The study of collaborative interactions among participants with different backgrounds relies on techniques, mainly developed in the fields of cognitive sciences, conversational studies and linguistics including protocol analysis (Dillenbourg et al., 1996). These techniques are task analysis, protocol analysis and discourse analysis, which can be used to provide a measurable coding system, necessary for developing a model for describing collaborative interactions (Robillard, Astous, Detienne, and Visser, 1998a).

In the 1990s, empirical approaches based on rigorous observations were used to describe individual cognitive behaviours, but, the study of collaborative interactions among participants with different objectives was challenging (Robillard et al., 1998a).
The focus of the challenge has shifted from identifying isolated parameters such as ‘trust’ (Jassawalla and Sashittal, 1998) and ‘leadership’ (Chrislip, 2002) for determining effective collaboration, to trying to understand the role of such variables in mediating interaction (Dillenbourg et al., 1996).

Robillard et al. (1998a) developed a coding scheme for the analysis of a technical review meeting held in an industrial environment. They employed the procedure of protocol analysis, which started with video recording all of the interactions among participants, moving through to the transcription, coding, analysis and modelling of cognitive behaviours. From the study, they identified the following 10 individual activities and four exchange (collective) activities:

Table 4. The types of individual and collective activities

<table>
<thead>
<tr>
<th>Individual activities</th>
<th>Collective activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Management,</td>
<td>• Cognitive synchronisation</td>
</tr>
<tr>
<td>• Introduction</td>
<td>• Review</td>
</tr>
<tr>
<td>• Request</td>
<td>• Conflict resolution</td>
</tr>
<tr>
<td>• Evaluation</td>
<td>• Alternative elaboration.</td>
</tr>
<tr>
<td>• Justification</td>
<td></td>
</tr>
<tr>
<td>• Rejection</td>
<td></td>
</tr>
<tr>
<td>• Acceptation</td>
<td></td>
</tr>
<tr>
<td>• Information</td>
<td></td>
</tr>
<tr>
<td>• Hypothesis</td>
<td></td>
</tr>
<tr>
<td>• Development</td>
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</table>

Table 4 shows various types of individual and collective activities identified in Robillard et al.’s research (1998a). The individual activities were coded from a statement made by a single speaker, whereas exchange activities were coded from the smallest individual dialog unit among different speakers. Exchange activities were coded when at least two speakers were contributing, through conversation. Among exchange activities, cognitive synchronisation was found to be the most common activity (Robillard et al., 1998a). Cognitive synchronisation was coded when participants showed that they shared a common representation of a given task. Pairs of ‘hypothesis – acceptance/ rejection’ and ‘proposal – acceptance/ rejection’ were the cases of cognitive synchronisation.

As part of the coding system for exchange activities, conflict resolution was coded
when participants had an argument and subsequent agreement about a given subject. This exchange was characterised by a pair of ‘reject-agreement’ statements. Alternative elaboration was coded when participants elaborated new solutions that were not originally part of the existing solutions. The alternative elaboration was the outcomes of the collaboration.

Karsenty (1991, in Robillard et. al., 1998a) studied meetings between designers and future users who were validating the conceptual schema of a database. The coding scheme for their collaborative activities was based on evaluation, clarification, negotiation and problem analysis. In design meetings with experienced designers, discussions involving the design objects and individual clarification were found to be the most common activities(Robillard, Astous, Detienne, and Visser, 1998b).

To conclude, Robillard et al. (1998a) have shown that collaborative interaction must be understood in the context of both individual utterance and the social exchange. The study of user-designer collaboration, therefore, needs to be structured in such a way that it includes both individual statements as well as exchange units (pairs of statements). Protocol analysis was chosen as a method for the investigation of the interactions between the users and the designers in this study.

### 5.3 DATA COLLECTION

Because most of the studies of collaboration (Dillenbourg et al., 1996; Grosz and Sidner, 1986; Robillard et al., 1998a) have employed video and audio recording of interactions as a data collection procedure, this study also employed video and audio recording of the interactions as a data collection procedure. The transcription, coding, analysis and modelling of the interactions followed this procedure, which allows the researcher to observe individual-level utterances and collective activities in a more natural setting. Observing and analysing interactions within user involvement sessions was very complex; it involved analysing not only the participants’ intentional utterances, but also social and emotional interactions such as engagement, elaboration, orientation and negotiation(Jung-Joo, 2007). Therefore, it required special attention to the recording of the participants’ utterances and their facial expressions (Schegloff, 1984).

Heath (2004) used video recordings of everyday activities and interactions to examine
ways in which participants accomplish particular goals in collaboration with others. His study identified that speech, bodily conduct, objects and artefacts were critical to the formation of the meanings embodied in social action and activities (Heath, 2004). His intention in these studies was to examine how new technologies have changed the day-to-day working environment and the ways in which people interact with each other. Most of his studies involved recording people working together in a control room, with a Computer Supported Cooperative Work (CSCW) system and an interpersonal communication device.

From a review of the individual utterances and facial expressions in the video clips of the cases, the following can be identified: the types and characteristics of individual utterances; the designers’ efforts to manage; the collective activities (pairs of exchange units) and collaborative outcomes (Figure 8).

Figure 8. Types of data to be collected

Figure 8 represents the data collection method. As the focus is on the way that users and designers interact with each other, the following aspects should be identifiable when recording the complete session:
• Users’ individual contributions (Verbal protocol)

• Designers’ individual contributions (Verbal protocol)

• Designers’ knowledge management activities (Verbal protocol)

• Designers’ social management activities (Verbal protocol)

• Collective activities (Verbal protocol + Facial expressions)

• Collaborative outcomes (Verbal protocol)

5.4 CODING SCHEME

After reviewing the video clips, it appeared that users and designers acted individually: designers introduced a particular task to the users and the users responded to the given task. Collaborative interactions were not seen on the surface level. A detailed coding scheme needed to be developed to see the mechanisms of collaboration within the shared workspace. Signs of understanding, confusion, interruption and repetition assist the accumulation of common knowledge. These individual and collective activities were the core contributors to the construction of a common knowledge in the shared workspace. Once the way in which individual contributions and collective activities combine to move the procedure forward have been understood, it is possible to articulate the factors that influence the way in which collaborative outcomes are generated.

The overall coding scheme (Figure 9) was developed with four categories: 1) resources, 2) designers’ efforts, 3) collaborative activities and 4) outcomes. Each category has been developed according to the theoretical framework explained in Chapter 4.
The objective of the coding scheme is to identify types of 1) individual contributions that users and designers bring into the shared work space; 2) designers’ efforts in facilitating the transfer of knowledge and new knowledge elicitation among the participants; 3) collective activities employed in supporting the construction of a
common ground; and 4) outcomes from collaboration. The use of this coding scheme to analyse the case studies will reveal how designers use their knowledge and social management activities to facilitate the transfer of user knowledge and new knowledge elicitation.

5.4.1 Individual contributions

In the video clips of the cases, two types of individual contributions were identified: user knowledge and designer knowledge. User knowledge can be accessed through the actions and experiences in the everyday practices of individuals. It relates to knowledge contained in the interaction between individuals and products (UPP: Users’ product experience); the routines and practices regularly practiced by individuals (UCP: Users’ contextual experience); and user preferences (UVE: User preference). For example, when the users expressed experience-based operational difficulties, the difficulties were coded as being product experiences (UPP). When the users’ utterances were related to storytelling experiences (Forlizzi and Ford, 2000), then they were coded as contextual experiences (UCP). Suggestions for product functions and features based on the users’ personal preferences were coded as user preferences (UVE).

Table 5. Coding scheme for individual contributions (user knowledge and designer knowledge)

<table>
<thead>
<tr>
<th>Category</th>
<th>Sub categories</th>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>User Knowledge</td>
<td></td>
<td>UK</td>
<td>Knowledge which is contained in the everyday practices of individuals. It is contained in the operational experience of using products, in personal stories, and in user preferences</td>
</tr>
<tr>
<td>Product Experience</td>
<td></td>
<td>UPP</td>
<td>Articulation of the difficulties, problems and solutions associated with the operation of the product</td>
</tr>
<tr>
<td>Contextual Experience</td>
<td></td>
<td>UCP</td>
<td>Articulation of the social and cultural issues</td>
</tr>
<tr>
<td>User Preference</td>
<td></td>
<td>UVE</td>
<td>Articulation of the explicit and implicit personal preferences and wishes</td>
</tr>
<tr>
<td>Designer Knowledge</td>
<td></td>
<td>DK</td>
<td>Knowledge that is provided by the designers during the user involvement session</td>
</tr>
<tr>
<td>Domain Knowledge</td>
<td></td>
<td>DAK</td>
<td>Provision of domain knowledge to users</td>
</tr>
<tr>
<td>Information</td>
<td></td>
<td>DTK</td>
<td>Provision of detailed information about the tasks</td>
</tr>
<tr>
<td>Instruction</td>
<td></td>
<td>DIS</td>
<td>Provision of instruction about the tasks</td>
</tr>
</tbody>
</table>
The designers’ individual contributions either represented the introduction of a new subject or a continuation of the current subject. The introduction of a new subject was mainly expressed through instruction (DIS: Designers’ instruction) and information (DTK: Designers’ information). Domain knowledge (DAK) was expressed through the designers’ utterances about manufacturing processes, organisational and developmental issues which could only be accessible through the designers’ expertise. Two types of individual contributions are summarised in Table 5.

### 5.4.2 Knowledge and social management activities

The objectives of user involvement could vary from ‘identifying the users’ unknown needs’, or ‘clarifying the design concepts’ to ‘evaluating the usability and acceptability of the products.’ The initial review of the video material revealed that the designers used various knowledge and social management activities in order to achieve their objectives.

Knowledge management activity equates to the designer’s effort to facilitate the transfer of knowledge in the shared workspace. Any designers’ activities related to the transfer of user knowledge can fall into the category of knowledge management activities. Knowledge management activities can include clarification, evaluation, contextualisation, negotiation, hypothesis, and development. Knowledge management activities are summarised in Table 6.

Table 6 shows a list of designers’ individual utterances found to be the most relevant to the description of knowledge management activities. In the case of analysing the meetings between future users and designers, Karsenty (1991, Robillard et. al., 1998a) had already developed a coding system with clarification, evaluation, negotiation and problem analysis. In this investigation, categories such as contextualisation, hypothesis, and development were added for a better understanding of the designers’ knowledge management activities.
Table 6. Coding scheme for knowledge management activities (KM)

<table>
<thead>
<tr>
<th>Sub categories</th>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clarification</td>
<td>CLA</td>
<td>The designers’ efforts to make sure all the participants share a common ground</td>
</tr>
<tr>
<td>Evaluation</td>
<td>EVA</td>
<td>The designers’ efforts to evaluate the users’ knowledge</td>
</tr>
<tr>
<td>Contextualisation</td>
<td>CTN</td>
<td>The designers’ efforts to provide a context for the task</td>
</tr>
<tr>
<td>Negotiation</td>
<td>NGO</td>
<td>The designers’ efforts to negotiate the situation, problems, and partial solutions</td>
</tr>
<tr>
<td>Hypothesis</td>
<td>HYP</td>
<td>The designers’ efforts to hypothesise about problems, situations or functions</td>
</tr>
<tr>
<td>Development</td>
<td>DEV</td>
<td>The designers’ efforts to make progress based on the users’ knowledge</td>
</tr>
</tbody>
</table>

Social management activities deal with people. The users’ individual contributions (knowledge transfer) are facilitated by the social management activities such as engaging, elaborating, challenging, orienting, and so forth. The social management activities are summarised in Table 7.

Table 7. Coding scheme for social management activities (SM)

<table>
<thead>
<tr>
<th>Sub categories</th>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>To introduce</td>
<td>INT</td>
<td>Occurs when the designers ask for the users’ attention in order to provide information about a new subject</td>
</tr>
<tr>
<td>To orient</td>
<td>ORI</td>
<td>Occurs when the designers ask for the users’ attention in order to orient users to new problems or situations</td>
</tr>
<tr>
<td>To request</td>
<td>REQ</td>
<td>Occurs when the designers ask for the users’ attention in order to request users to perform new design tasks</td>
</tr>
<tr>
<td>To inform</td>
<td>INF</td>
<td>Occurs when the designers provide additional information in order to improve the users’ understanding</td>
</tr>
<tr>
<td>To engage</td>
<td>ENG</td>
<td>Occurs when the designers provide user-relevant information in order to engage users into certain problems or situations</td>
</tr>
<tr>
<td>To elaborate</td>
<td>ELB</td>
<td>Occurs when the designers ask the users to collectively develop alternative ideas, solutions or concepts</td>
</tr>
<tr>
<td>To challenge</td>
<td>CHE</td>
<td>Occurs when the designers put the users in a different situation or problems in order to evoke the users’ unexpected responses</td>
</tr>
</tbody>
</table>

Table 7 shows a list of designers’ individual utterances found to be the most relevant to the description of social management activities. For example, (INT: To introduce) is
coded when the designers ask for the users’ attention in order to facilitate the process of transferring knowledge from the designers to the users.

### 5.4.3 Collective activities

Users’ and designers’ individual contributions needed to be mutually clarified, understood, and then transferred to other participants within the shared workspace in order to proceed. Collaborative activities (CA) were used as the mechanism to facilitate this process. In a conversational situation (user-designer collaboration), collective activities work as indicators of acceptance, rejection, agreement, disagreement, compliance, and refusal (Clark and Schaefer, 1989). Clark and Schaefer (1989) described collective activities as adjacent pairs of utterances produced by two different speakers. Examples were pairs of ‘question – answer’, ‘request – compliance/refusal’, ‘request – acceptance/rejection’, ‘proposal – acceptance/rejection’, ‘offer – acceptance/rejection’, and ‘assessment – agreement/disagreement’. These pairs of utterances contributed to the construction of a mutual belief that the utterances were understood by both parties (Clark and Schaefer, 1989). In this thesis, pairs of utterances were used to code the users’ and the designers’ collective activities. The collective activities are summarised in Table 8.

Table 8 shows the various types of collective activities employed by the participants during the user involvement cases. For example, a pair of ‘utterances-interruption’ (INR) was coded when the flow of conversation was broken by the speaker, and then new topic was brought into the shared workspace by both parties. When the respondents repeated what the speaker has mentioned as a sign of understanding, it was coded as a pair of ‘utterances-repetition’ (REP). A pair of ‘utterances-confusion’ (CFS) was coded when the respondents showed a sign of misunderstanding and asked for further explanations.
Table 8. Coding scheme for collective activities (CA)

<table>
<thead>
<tr>
<th>Categories</th>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utterances - Interruption</td>
<td>INR</td>
<td>When the presenters’ utterances are interrupted</td>
</tr>
<tr>
<td>Utterances - Repetition</td>
<td>REP</td>
<td>When the respondents repeat what the speaker have mentioned</td>
</tr>
<tr>
<td>Utterances - Rephrase</td>
<td>REH</td>
<td>When the participants rephrase what they have been told using different terms</td>
</tr>
<tr>
<td>Utterances - Reminder</td>
<td>REM</td>
<td>When the opponents try to return their attention to the main topic</td>
</tr>
<tr>
<td>Utterances - Reasoning</td>
<td>REN</td>
<td>When the participants provide reasons for their choices and decisions</td>
</tr>
<tr>
<td>Utterances - Agreement</td>
<td>AGR</td>
<td>When the participants agree to a suggestion or a statement</td>
</tr>
<tr>
<td>Request - Refusal</td>
<td>RFS</td>
<td>When the participant refuses to accept what is proposed by the speaker</td>
</tr>
<tr>
<td>Question - Answer</td>
<td>UQE</td>
<td>When the users articulate a question regarding a task, situation or problem</td>
</tr>
<tr>
<td>Utterances - Confirmation</td>
<td>COM</td>
<td>When the participants agree to confirm what they have been told</td>
</tr>
<tr>
<td>Suggestion - Utterances</td>
<td>SUG</td>
<td>When the participants suggest something</td>
</tr>
<tr>
<td>Utterances - Confusion</td>
<td>CFS</td>
<td>When the participants get confused</td>
</tr>
<tr>
<td>Utterances - Correction</td>
<td>CCC</td>
<td>When the participants make a collective effort to correct a situation or task</td>
</tr>
</tbody>
</table>

5.4.4 Collaborative outcomes

Tacit knowledge transfer and new knowledge generation are expected as collaborative outcomes (Hardy et al., 2003). Tacit knowledge transfer, in this thesis, refers to the revelation of the users’ tacit knowledge about their preferences and requests. Once the users’ tacit knowledge have been revealed, the users’ preferences and requests have to be reformed, enriched, and translated in order to be internalised as new knowledge within the design teams (Nonaka and Takeuchi, 1995).

New knowledge generation was thought to be different from knowledge transfer (Hardy et al., 2003; Leonard and Rayport, 1997; Nonaka and Takeuchi, 1995). Leonard and Rayport (1997) described new knowledge generation as a higher level of interaction,
integration and involvement, which required the development of a sense of trust, openness to the information sources, and willingness to understand and accept differences among participants. In this thesis, co-discovery and co-development activities were coded as new knowledge generation.

Table 9. Collaborative outcomes (OT)

<table>
<thead>
<tr>
<th>Category</th>
<th>Sub Categories</th>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>New knowledge elicitation</td>
<td></td>
<td>KE</td>
<td>New idea generation</td>
</tr>
<tr>
<td>Co-discovery</td>
<td></td>
<td>CDS</td>
<td>Collaborative problem re-structuring</td>
</tr>
<tr>
<td>Co-development</td>
<td></td>
<td>CDV</td>
<td>Collaborative concept generation and development</td>
</tr>
<tr>
<td>Tacit Knowledge transfer</td>
<td></td>
<td>KT</td>
<td>Learning from users</td>
</tr>
<tr>
<td>User Acceptance</td>
<td></td>
<td>UAC</td>
<td>Revelation of the users’ opinion about acceptance of the system</td>
</tr>
<tr>
<td>User Requirements</td>
<td></td>
<td>URE</td>
<td>Revelation of the users’ functional needs</td>
</tr>
</tbody>
</table>

Table 9 illustrates the types of collaborative outcomes. As most user involvement sessions were expected to include the user requirements as outcomes, the identification of the users’ latent needs (User requirement: URE) and of the users’ attitudes toward acceptance or rejection (User acceptance: UAC) were coded as evidence of tacit knowledge transfer.

A higher level of collaborative outcomes requires synergy, the outcomes exceed the sum of the capabilities of the individual participants; this is a type of improvisation (Seddon, 2004). New knowledge elicitation through collective problem restructuring (Co-discovery: CDS) and collective concept generation (Co-development: CDV) were coded when signs of new knowledge elicitation were recognised.

5.5 METHOD OF ANALYSIS

All the utterances in the video clips were transcribed and each utterance was coded as a minimal protocol unit. The left side of the software screen in Figure 10 shows the actual transcription of the dialogue between users and designers during the user-designer
collaboration workshop. The transcription shows the time, the speakers and their
utterances. The right side of the screen in Figure 10 shows the coding.

07:40 Designer: The diagram is developed from the diaries that you
posted on the web.

You need to attach these images onto the diagram.

08:17 User: How? Do you mean that I need to glue these
images? At these sections?

9:01 Designer: You need to match these images onto proper
sections in the diagram.

9:04 Designer: I'll give you more instruction.

9:14 Designer: The objectives of this session are to identify a new
solution from your perspectives.

So, it is not that critical to glue images on the board.

More important thing is to identify new products and
services from the tasks.

So, you don't need to post every single image on the
board.

Figure 10. Representative coding (example)

Figure 10 shows coding example. Each protocol unit/string has been coded and a prefix
has been added to distinguish between user knowledge (UK), designer knowledge (DK),
knowledge management (KM), social management (SM), and collective activities (CA)
respectively. For example, in the first line of Figure 10, when the designer provided
additional information to the users, designer information was coded and represented as
‘DK-DTK-Information.’ The ATLAS.ti software was used to assist the coding. Cause-
and-effect relationships between the coded activities were also illustrated as a way to
understand the interaction mechanisms among the codes (Figure 11).

Figure 11 describes a cause-and-effect relationship among the designers’ individual
contributions, collective activities and the designers’ social management activities. This
relationship diagram indicates that the designers’ social management activity (INT: to
introduce) is caused by the designers’ knowledge (DTK: information and DIS:
instruction) and collective activities (REP: utterances-repetition).
In order to make a cause-and-effect relationship diagram, core concepts should be identified first (Strauss and Corbin, 1990). In this research, the designers’ knowledge and social management activities were determined as core concepts, in order to investigate the possible roles of these activities in the construction of a common ground, and the generation of new knowledge. The cause-and-effect relationship diagrams were then developed with the types of coded activities such as individual contributions, collective activities, and collaborative outcomes. In this example (Figure 11), the cause-and-effect relationship diagram was developed around the designers’ social management activity INT (to introduce), which was implemented with the support of the designers’ individual contributions (DTK: information and DIS: instruction) and collective activities (REP: utterances-repetition).
5.6 SUMMARY

This chapter presented the overall research plan, research methods, data collection procedures, and coding scheme. The coding scheme was developed in order to see the interaction mechanisms between users and designers when they are working together. The analysis of the case studies will reveal how the designers use their individual contributions, knowledge management activities, and social management activities in order to facilitate the transfer of knowledge and new knowledge generation. Analysis methods were also introduced: protocol analysis and cause-and-effect analysis. For the cause-and-effect analysis, core concepts were determined and the relationship diagrams were developed around the core concepts. Next chapter will describe the case studies, participants, procedures and user-designer collaboration tools.
Chapter 6:

CASE STUDIES

6.0  INTRODUCTION

Three different industry-sponsored case studies were undertaken, and a total of six user involvement sessions chosen for the study. Case study 1 was sponsored by SK communication and comprised three user involvement sessions to investigate users’ latent needs associated with the use of mobile telephones whilst driving. Case study 2 was done by SK Context Lab and comprised one user involvement session to evaluate and clarify mobile service concepts. Case study 3 was carried out by Openmaru and comprised two user involvement sessions to enhance the usability and functionality aspects of the on-line community services. As each case study employed different types of user involvement, the following sections will describe details of the participants, the procedures and the user-designer collaboration tools used in each one.

6.1  GUIDELINES FOR USER INVOLVEMENT

The following guidelines to maximise the interactions between the users and the designers were generated by this researcher. The designers were encouraged to use the guidelines when designing the procedures of the user involvement sessions and were given as follows; the user involvement sessions should be designed to:
• encourage the users to bring their own experiences into the workspace,

• encourage the users to express their personal and emotional feelings freely,

• encourage the users to use collaborative-design tools as much as possible, such as cultural probes, generative tools, paper prototypes and software mock-ups,

• encourage the users to collaborate with the designers, and

• stimulate collaborative outcomes.

The use of collaborative-design tools, such as cultural probes, generative tools, paper prototypes and software simulators, was highly recommended in the guidelines. These tools are considered effective for differentiating the user-designer collaboration sessions from traditional interview approaches (Gaver et al., 1999; Sanders and Dandavate, 1999). The inquiries and the tasks imposed by the designers varied in the case studies and different types of tools were employed in order to achieve different goals.

Table 10 shows details of the three case studies, their goals, the number of user involvement sessions, and the number of video clips collected. Case study 1 was conducted as part of need finding activities and three user involvement sessions were carried out. Each user involvement session was composed of orientation, image-collaging and scenario building as the user tasks, plus interviews and wrap up. The entire video clips were reviewed by the researcher and sections of the video clips were selected for analysis purposes. Video clips 1 and 2 were selected from the image-collage activities where the interactions between the users and the designers were seen to be the most active. Video clip 3 was selected from the scenario-building activities because of a low-quality sound problem in session 3.
Table 10. Six user involvement session in three case studies

<table>
<thead>
<tr>
<th>Case studies</th>
<th>Goals</th>
<th>Tools</th>
<th>User involvement sessions</th>
<th>Video clips</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case study 1</td>
<td>Need finding</td>
<td>Cultural probes, Image collage, Scenario building</td>
<td>Session 1, Session 2, Session 3</td>
<td>Video clip 1, Video clip 2, Video clip 3</td>
</tr>
<tr>
<td>Case study 2</td>
<td>Concept clarification</td>
<td>Prototypes</td>
<td>Session 1</td>
<td>Video clip 4</td>
</tr>
<tr>
<td>Case study 3</td>
<td>Concept clarification</td>
<td>Prototypes</td>
<td>Session 1, Session 2</td>
<td>Video clip 5, Video clip 6</td>
</tr>
</tbody>
</table>

The objectives of case study 2 were to clarify the mobile service concepts developed by the design team. Four local users and two designers participated in the session. Paper prototypes were employed as collaborative design tools. One user involvement session was held, and one video clip (video clip 4) was collected. The entire video clip was selected for the analysis since the mutual knowledge was grounded and then evolved based on the one mobile phone concept used in case study 2.

Case study 3 was conducted to clarify the usability and functionality aspects of software concepts. Case study 3 comprised an orientation, an interview, the prototype evaluation, and the wrap up discussion. Video clips 5 and 6 were taken from the prototype evaluation section where the user and designer interactions were observed to be the most active. The software mock-ups were used as collaborative design tools. The following sections will describe the goals, participants, procedures and collaborative design tools used for each case study.

6.2 CASE STUDY 1

The aim of the user involvement in case study 1 was to identify latent users’ needs through the exploration of the users’ current mobile experiences in driving situations. The company involved in this case study was SK telecommunication, which is one of the biggest mobile service and network providers in Korea. The project manager wanted to explore new types of contexts and user experience in order to articulate user’s latent needs and tacit knowledge for use in the design of mobile intelligent applications.
Three user involvement sessions were prepared with the participation of six domestic users with driving experience and two designers, who possessed domain knowledge of software application design. The user participatory design approach was employed to facilitate active user-involvement and collaboration. All participants were encouraged to actively participate and collaborate with the design teams to perform the given tasks. Cultural probes and generative tools were introduced to the users for collecting and accessing their daily experiences. Two users were paired with one local designer to conduct user-designer collaboration sessions, which included image collage, scenario making and in-depth interviews. Video clips 1, 2, and 3 were taken from the case study 1. The objectives and goals of the user-designer collaboration were presented on a consent form (Appendix 1) prior to the workshop (Crook, 1996).

6.2.1 PARTICIPANTS AND PROCEDURES

Six users with basic mobile communication skills and prior experience of driving cars were hired as participants. User involvement was carefully designed to maximise the interaction between the users and the designers. The users’ utterances, the designers’ knowledge and social management activities, collaborative activities and the outcomes of the session were video taped by the researcher. Typical cultural probes (Gaver et al., 1999) and a collaborative workshop comprising generative tools (Sanders and Dandavate, 1999) were employed to acquire information and inspiration from the participation of the users (Figure 12).

Figure 12 shows how the user involvement session was composed of three user tasks; a user diary, an image collage and scenario building activities. The user diary was prepared as a cultural probe and given to the users one week before the collaborative workshop. The participatory workshop for image collage and scenario building took place at a meeting room during the weekend. Resources taken from the user diaries were used to assist image collaging and scenario building activities.
STEP 1 – User diary (Cultural probes)

A package of probes was handed to the users and they were asked to perform specified tasks and record their feedback, experiences and feelings in a diary format. The users were given one week to collect, record, and report their everyday experiences with the mobile phone. A typical internet posting service (a blog) was used to collect data from the users and to give them tasks. The users were given the following tasks:

- Take photos of the things in your car that you use for recording; for managing information; for initiating communication; for leaving messages for others; and for decoration.

- Take photos of the places you regularly visit on weekdays and at weekends.

All six participants were able to report their experiences through the dedicated web sites. However, some showed very little enthusiasm for the tasks they had been given, arguing that they had no interest in reporting tedious aspects of their daily routines.
Figure 13. Things users used in the car, and while driving (from the probes)

Figure 13 shows photos of the things users used in the car. The different contexts of usage; the meanings attached to each object; and the reasons for using particular objects were reported in their diaries.

Figure 14. Various users’ activities while driving (from the probes)

The participants also reported their various activities while driving (Figure 14). Almost seventy percent of the activities were categorised as communication: sending and receiving text messages; searching for information in the mobile services; and connecting to internet services through a mobile handset.
STEP 2 - User-designer collaborative workshop (Image collage)

The workshop began with a review and discussion of the experiences expressed in the users’ diaries, which helped to stimulate the participants’ memories.

Figure 15 shows a user describing her experiences with the mobile services, as expressed in her diary. An image collage activity was given as the first user task. It was used to see the way in which the users use everyday products for achieving various objectives within a car: how they communicate, record, manage and express their identities to others. While they completed the image collage task, the participants were encouraged to express their personal needs, desires and feelings and any problems they had experienced with the specified mobile services.

The initial layout for the image collage task was provided by the designers. The contents of the users’ diaries were used to develop the layout of the image collage work. The image collage work was developed as a diagram (Figure 16).
Figure 16. Layout of the image collage

Figure 16 shows that the layout of the image collage comprised of tools for:

- managing information
- decoration
- recording information
- communicating with families
- communicating with friends
- communicating with colleagues
- communicating with others

The users were asked to put their pictures on top of the corresponding categories within the image collage. The pictures were taken from the users’ diaries and printed in advance. While all six participants showed a higher-level of engagement in this activity, some users questioned the terminology used in the layout. For example, one user was confused, and asked where she should put the personal calculator. The user was advised to put it in the tools for management category.
After the image collage activity was completed, the users were able to express their feelings regarding the usability problems of the artefacts and why specific artefacts were being used in a certain way in their daily lives. After a short break, the next user task was given to the users; the scenario building activity.

**STEP 3. User-designer collaborative workshop (scenario building)**

The objective of the scenario building was to project the future of the new products and services in a real life context. As mentioned in several participatory design case studies (Dandavate, Steiner, and William, 2000; Westerlund et al., 2003), in practical design cases, the user’s experience should not be separated from the context of real life.

Figure 17 shows the user-designer collaboration tools generated to assist in the scenario-building activities. These layouts were prepared by the same designer who designed the layouts for the image collage task. A ‘day in the life’ (Sanders and Dandavate, 1999) technique was employed, where experiences were expressed through context, behaviour, and device.

![Figure 17. Scenario building](image-url)
Layer 4 in Figure 17 represents the events, situations and contexts that the users might come across during the day. For example, layer 4 in Figure 17 indicated the ‘situation where someone is calling’. Then layer 3 provided various optional activities such as answering the phone while driving, pulling over, and connecting to the hands free. Since the objective of the scenario building was to help the users engage in the development of a future scenario, the materials were used only to stimulate the users’ memories. Layer 2 symbolized the devices or mediators that the user might use when solving the problem. In Figure 17, layer 2 represents ‘mobile phone’, ‘hands free’ and ‘navigator’ devices. Finally, layer 1 represents the users’ positive or negative experiences.

The participants were then asked to generate their own scenarios of usage when employing technologies in their everyday environments, using this scenario-building tool.

6.3 CASE STUDY 2

Case study 2 was conducted with SK ContextLab. Two prototypes had been developed from an on-line dating concept and the project manager wanted to evaluate the prototypes and clarify the concepts through the users’ participation. Four local users with prior experience in mobile services were invited to the session. The session was composed of prototype testing, evaluation and discussion. All users were asked to talk aloud while they were involved in testing, evaluating and discussing. To maximise the outcomes from the session, the users were asked to visit the place and experience the real situations one day before the actual participatory session.

6.3.1 Participants and procedures

Four local users with prior knowledge of mobile services were invited to conduct a series of user tasks in a user involvement session. Since the theme of the project was dating services, participants in the age range from 18 to 24 were chosen. Two women and two men were selected through recruiting agencies. The session was designed to test whether the concepts were appropriate to the target users and to generate new ideas
from the users’ spontaneous responses. A typical prototype evaluation method (Aurum, Cross, Handzic, and Van Toorn, 2001) was used to capture the users’ quick and spontaneous responses. (Figure 18).

Figure 18. A piece of paper was used as a paper prototype

Figure 18 illustrates the users working with a paper prototype. A hypothetical mobile phone paper prototype and a scenario were given to the users and users were asked to test the concept in their real life situations. It was quite a challenging activity for the users. However, once the shared common knowledge had been established, the users were able to work with the dummy handsets. The users were also able to express their emotions, preferences and problems associated with the functions and interfaces of the mobile services.

Figure 19 illustrates one of the scenarios given to the users. The scenario included situations, users’ roles and internal mechanisms of the service concepts, so that the designers could explain the mechanism of the service and contexts at the same time.
The users were able to evaluate the service concepts by simulating the concepts in their life contexts. The evaluation was carried out while the users were spontaneously commenting on the given services. Possibilities and deficiencies of the service concepts were reported. The users were also able to visualise their concepts on paper mock-ups of a screen. They drew their own ideas, concepts and wishes on the paper screen mock-ups during the break time (Figure 20).
Figure 20 shows users involved in generating new interface design ideas on the paper mock-ups. The users drew labelled icons and buttons on the paper mock-ups expressing their functional needs on a particular circumstance. The user-generated paper mock-ups were collected and used as resources for understanding the users’ latent needs and tacit knowledge.

6.4 CASE STUDY 3

The design team of case study 3 aimed to enhance on-line software concepts through user feedback. User-designer collaboration was employed as a mechanism for facilitating users’ active participation in the evaluation process of the system. This case study employed a working prototype to determine the users’ functional needs, and any usability issues. Three user involvement sessions were carried out consecutively with expert users, a software developer, and a designer.

All three-user involvement sessions were video taped. Of the user involvement sessions, only two of the sessions were taken for analysis. Video clips 5 and 6 were taken from the session 1 and session 2 of this case study respectively. Each user involvement session comprised four subsections: orientation, interviews, working prototype testing, and wrap up. Video clips 5 and 6 were taken from the working prototype testing sections.

6.4.1 Participants and procedures

The objective of the user involvement in case study 3 was to evaluate the software concepts at the early stage of the development process in order to minimise the cost of change in the later stages of the process. Three user involvement sessions were conducted with the following procedures: orientation, interviews, working prototype testing, and wrap up discussion.

- Orientation: describing the users’ tasks and session structures; clarifying the user-involvement session,
- Interview: asking about the participants’ past experiences,
- Working prototype testing: testing the software mock-ups,
- Wrap up discussion: discussing the functionality and acceptability of the software concept.

Three individual participants were selected from the user groups. The users were asked to express their positive and negative feelings freely and loudly during the session.

![Figure 21. User involvement environment of case study 3](image)

Figure 21 shows the user involvement environment where each user worked with one designer and one software developer. Each session lasted about two hours and the sketchbook was used as a collaborative tool so that the user could express his opinions in a visual format. The users were asked to bring the photos of their workplaces. These photos were used to provide the context of the daily lives of the participants.
6.5 SUMMARY

This chapter describes the nature of the case studies; procedures and participants of each session; and the collaborative tools employed in the sessions. Case study 1 was implemented to identify ‘users’ unknown needs’ through user involvement sessions. Generative tools were actively employed, including cultural probes, image-collaging and scenario building. Three sessions were conducted and overall six users and two designers were invited to work with the generative tools. Three video clips were taken for analysis from these sessions. Video clip 1 was taken from session 1 of case study 1. Video clip 2 was taken from session 2 of case study 1. Video clip 3 was taken from session 3 of case study 1. It was expected that using the generative tools would facilitate the revelation of users’ tacit knowledge, latent needs and wants.

The aim of case studies 2 and 3 was to clarify the concepts through user involvement. Scenarios, prototypes and simulators were employed in order to facilitate user participation in the user tasks. Video clip 4 was taken from case study 2, where two designers and four users conducted service concept evaluation sessions. Video clips 5 and 6 were taken from case study 3 where users were asked to evaluate internet-based system software.

Throughout the workshops, both the users and the designers were informed that they would be video-taped for research purposes. Consent packages were given to both the users and the designers (Appendix 1). The following chapter (Chapter 7) will discuss the analysis of the need finding cases, whereas Chapter 8 will describe the analysis of the concept clarification cases.
Chapter 7:

NEED FINDING ANALYSIS

7.0 INTRODUCTION

A coding scheme was developed to describe the actual interactions between users and designers during the user involvement sessions. The analysis was done with ‘ATLAS.ti’ software, which is designed to assist in the analysis of qualitative data. This chapter analyses the need finding cases, starting with the video tape recordings of the user-designer interactions, moving through to the transcription of the video clips, coding of the transcription, analysis of the coding, and then comparisons among the video clips. Cause-and-effect relationships were then determined based on these analyses.

In need finding analysis (case study one), three video clips were taken from three separate user involvement sessions. These user involvement sessions were conducted in order to elaborate new ideas and alternative concepts through user-designer collaboration. In order to facilitate the process of dialogue among participants during the user involvement sessions, the users were asked to keep records of their daily life in a diary format for one week before the sessions. The user involvement sessions were comprised of two sub tasks; image collage and scenario building. Video clips 1 and 2 were taken from the image collage activity with two local users and two designers. Video clip 3 was taken from the scenario building section due to audio technical deficiencies during the image collage section in video clip 3.
7.1 VIDEO CLIP 1

The analysis of video clip 1 began with the analysis of coded activities, which included the occurrence rates of each activity and an observation of their changes over time.

7.1.1 Occurrences

In video clip 1, two local users were asked to conduct an image collage task. At the end of the session, the users and the designers were engaged in wrap-up discussions, where alternative elaborations were expected in the form of collaborative outcomes. User-designer collaboration was employed as a strategy for facilitating the transfer of the users’ tacit knowledge throughout the whole session. How user-designer collaboration was implemented in video clip 1 affected the interaction patterns of the session.

As a percentage of the total interactions (Figure 22), the users’ and the designers’ individual contributions comprised 55.4% of the total interactions (user knowledge 29.3% and designer knowledge 26.1%). The designers’ knowledge and social management activities comprised 31.5% of the total interactions (social management
18.5% and knowledge management 13.0 %) and 9.6% of the total interactions were coded as collaborative outcomes of the session. Collective activities were observed to comprise 35.9% of the total interactions. Figure 22 represents the types and characteristics of the interactions observed in video clip 1.

Figure 23 illustrates the occurrence rates of the designers’ and the users’ individual contributions. The designers’ and the users’ individual contributions were represented (coded) as designer knowledge (DK) and user knowledge (UK), which means the knowledge that the designers and the users brought into the shared workspace. The designers brought three types of designer knowledge into the shared workspace: instructions (DIS: 12.8%), domain knowledge (DAK: 1.6%) and information (DTK: 5.6%); whereas the users brought two types of user knowledge: product experiences (UPP: 4.0%) and their contextual experiences (UCP: 11.2%) (Figure 23).

Figure 23. Occurrence rates of designer knowledge (DK) versus user knowledge (UK)

In video clip 1, various types of knowledge management and social management activities were found. Among the knowledge management activities, the designers used clarification (CLA: 8.8%) mostly, whereas to inform (INF: 0.8%), to engage (ENG: 7.2%), to elaborate (ELB: 3.2%), to introduce (INT: 1.6%), and to challenge (CHE: 0.8%) were implemented as the social management activities (Figure 24).
7.1.2 Times

The user-designer session in video clip 1 lasted 40 minutes and 29 seconds. The session was divided into four sections: orientation (2’58”), image collage (19’13”), interview (13’08”), and wrap up (5’10”). The designers explained the objectives of the session and the instructions for the image-collage tasks to the users during the orientation section.

While designer knowledge (DK) was decreasing, more user knowledge (UK) and collaborative outcomes (OT) were generated as time progressed. This indicates that the designers’ individual contributions were mainly used for the construction of a common ground. Once the common ground had been constructed, more users’ individual contributions were brought in and then used to expand the shared understanding of the common ground. More collaborative outcomes (knowledge transfer and new knowledge generation) occurred as the shared understanding of the common ground was expanded. These interactions generated a relationship between designer knowledge, user knowledge and the construction of a common ground (Figure 25).
Figure 25 illustrates how the occurrence rates of designer knowledge, user knowledge and collaborative outcomes changed over the time period. There is a relationship between outcomes and time. As the session progressed, more collaborative outcomes were generated. This might be caused by the designers’ social management activities to eliciting more user requirements towards the end of the session.

Figure 26 shows how the occurrence rates of knowledge management activities, social management activities, and collective activities changed over the time period.
The interaction patterns of the designers’ knowledge activities and social management activities, and collective activities were established (Figure 26). The designers’ knowledge management activities declined (from 5.0% to 2.5% to 0% to 0.8%) while social management activities fluctuated (from 3.3% to 4.1% to 1.7% to 5.8%). Collective activities were evenly distributed (from 7.0% to 8.8% to 6.1% to 8.8%).

It is important to note that as time progressed, the designers’ knowledge management activities (KM) decreased while the user knowledge (UK) increased till the interview section. This indicates that the designers’ knowledge management activities (KM) were performed before the users’ knowledge (UK) generation. The designers seemed to manage the ‘time’ of the workshop through the knowledge management activities (KM) so that the users could spend more ‘time’ on generating user knowledge during the rest of the workshop (Figure 26).
7.2 VIDEO CLIP 2

The analysis of video clip 2 began with the analysis of coding system, which included counting the occurrence rates of each code and observing the change of the occurrence rates of each code over the time.

7.2.1 Occurrences

In video clip 2, two local users conducted the image collage task. At the end of the task, the wrap up interview was implemented, where the users were asked to generate a list of the things that they liked to do with the given technology. User-designer collaboration was employed as a strategy for facilitating the transfer of the users’ latent needs and tacit knowledge.

![Figure 27. Types of interactions in video clip 2](image)

Figure 27. Types of interactions in video clip 2

Figure 27 represents the types and characteristics of the interactions observed in video clip 2. As a percentage of the total interactions, users’ and designers’ individual contributions comprised 42.5% of the total interactions (user knowledge 32.9% and designer knowledge 9.6%); whereas the designers’ knowledge and social management activities comprised 34.2% of the total interactions (social management 21.9% and
knowledge management 12.3%); and 23.3% of the interaction was coded as collaborative outcomes of the session. Collective activities were observed as 46.6% of the total interactions (Figure 27).

The occurrence rates of the designers’ and the users’ individual contributions are illustrated in Figure 28. The designers brought two types of designer knowledge into the shared workspace: instructions (DIS: 4.7%) and information (DTK: 1.9%); whereas the users brought three types of user knowledge: users’ product experiences (UPP: 4.7%), user contextual experiences (UCP: 6.5%), and user preference (UVE: 11.2%).

![Figure 28. Occurrence rates of the designers’ individual contributions versus users’ individual contributions](image)

In video clip 2, various types of knowledge management and social management activities were found. Among the designers’ knowledge management activities, the designers used confirmation (CLA) mostly, whereas to challenge (CHE), to engage (ENG), to elaborate (ELB), and to orient (ORI) were used as the social management activities (Figure 29).
Figure 29. Designers’ efforts (knowledge versus social management)

Figure 29 illustrates the types of knowledge management and social management activity employed by the designer. In video clip 2, the designers asked the users to generate a list of the things that they liked to do with the given technology. It seems that social management activities were implemented by the designers to facilitate the transfer of the users’ tacit knowledge to the designers.

7.2.2 Times

Video clip 2 was implicitly divided into four sections: orientation, image collage, user interview and wrap up. Each section lasted 24 seconds; 4 minutes and 42 seconds; 7 minutes and 31 seconds; and 4 minutes and 11 seconds respectively.

While designer knowledge fluctuated slightly (from 1.0% to 3.1% to 2.1% to 1.0%), more user knowledge (UK) and collaborative outcomes (OT) were generated toward the end of the session. This indicates that the designers’ individual contributions were used to construct a common ground, and once the common ground was constructed, more users’ individual contributions were generated and used to expand the shared understanding of the common ground. More collaborative outcomes were generated as
the shared understanding of the common ground was expanded. A relationship was observed between user knowledge (UK), and collaborative outcomes (OT) (Figure 30).

![Graph showing occurrence rates between user knowledge, designer knowledge, and collaborative outcomes](image)

**Figure 30.** Change of occurrence rates between user knowledge, designer knowledge, and collective outcomes (video clip 2)

Figure 30 shows how user knowledge, designer knowledge and collaborative outcomes changed over the time period. There is an observable relationship between the collaborative outcomes over time: As the session progressed, more collaborative outcomes were generated.

Figure 31 shows how knowledge management activities, social management activities, and collective activities changed over the time period. The interaction patterns between the designers’ knowledge management activities, social management activities, and collective activities were established. The social management activities increased (from 0% to 3.1% to 3.1% to 8.2%) while the knowledge management and collective activities fluctuated.
It is interesting to note that the occurrence rates of the designers’ knowledge management activities (KM), social management activities (SM) and collective activities (CA) increased during the first part of the workshop and then dropped as time progressed (till the interview section). Considering the fact that the user knowledge increased as time progressed, the collaborative activities (KM, SM and CA) might have a positive relation to the generation of user knowledge (UK). It seemed that in video clip 2, the designers implemented KM, SM, and CA in order to help the construction of a common ground between the users and the designers. And once the common ground was built, the designers implemented the KM, SM, and CA to facilitate the user involvement in the workshop.

7.3 VIDEO CLIP 3

The analysis of video clip 3 began with the analysis of coded activities, which included observing the occurrence rates of each activity and their changes over the time period.
7.3.1 Occurrences

In video clip 3, the designers asked the users to generate a scenario of use, through which the designers expected to have a better understanding of the users’ latent needs. As a percentage of the total interactions, the users’ and designers’ individual contributions comprised 48.8% of the total interactions (user knowledge 24.4% and designers knowledge 24.4%); whereas the designers’ knowledge and social management activities comprised 41.4% of the total interactions (social management 26.8% and knowledge management 14.6%); and 6.3% of the total interactions were coded as collaborative outcomes of the session (Figure 32).

![Types of Interactions]

Figure 32. Types of interactions in video clip 3

Figure 33 describes the occurrence rates of the individual contributions that the designers and the users brought into the shared workspace. The designers brought one type of designer knowledge into the shared workspace: instructions (15.9%); whereas the users brought two types of user knowledge: users’ contextual experiences (UCP: 6.3%) and their preferences (UVE: 9.5%).

Figure 34 shows the occurrence rates of the designers’ efforts for knowledge and social management. In video clip 3, various types of knowledge and social management activities were found. Among the knowledge management activities, the designers used
clarification (CLA: 10.0%) mostly; whereas to engage (ENG: 3.3%), to elaborate (ELB: 6.7%), and to orient (ORI: 8.3%) were implemented as social management activities (Figure 34).

Figure 33. Types of individual contributions in video clip 3

Figure 34. Designers’ efforts (knowledge management vs. social management)
7.3.2 Times

Video clip 3 was composed of four sections: orientation, a scenario building, interview and wrap up. Each section lasted 3’02”, 18’03”, 11’34” and 5’23” respectively. The designers introduced the scenario building technique to the users during the orientation session, and then explained the objectives of the user task.

![Graph showing changes in occurrence rates](image)

**Figure 35. Change of occurrence rates in user knowledge (UK), designer knowledge (DK), and collaborative outcomes (OT) (video clip 3)**

Figure 35 shows the changes of occurrence rates in designer knowledge, user knowledge and collaborative outcomes. Users’ knowledge (UK), designers’ knowledge (DK) and collaborative outcomes all increased toward the end of the session. This indicates a positive relationship between the designers’ individual contributions (DK: designer knowledge), the users’ individual contributions (UK: user knowledge) and the collaborative outcomes (OT: outcomes). During the orientation section, most of the designer knowledge was used to build a common ground for better understanding of the user tasks. Once the common ground was constructed, the users could generate user knowledge during the interview section. As user knowledge was brought into the shared workspace, the designers needed to intervene during the wrap up section.
A positive relationship was found between user knowledge (UK), designer knowledge (DK), and collaborative outcomes (OT). Also a positive relationship was found between the collaborative outcomes and time. As time progressed, more collaborative outcomes were generated.

Figure 36 represents how the designers’ knowledge management activities (KM), the designers’ social management activities (SM) and collective activities (CA) changed over time. The designers’ knowledge management activities (DK), social management activities (SM) and collective activities (CA) were densely observed during the first part of the workshop and then decreased during the scenario building section.

![Graph showing change of occurrence rates between collective activities (CA), social management (SM), and knowledge management (KM)](image)

Figure 36. Change of occurrence rates between collective activities (CA), social management (SM), and knowledge management (KM) (video clip 3)

It is interesting to note that as time progressed, the designers’ knowledge management activities (KM), social management activities (SM), and collective activities (CA) were observed during the first part of the session and then fluctuated. More of user knowledge (UK) was generated during the last part of the session (Figure 35). This
implies that the designers’ knowledge management activities (KM), the social management activities (SM), and collective activities (CA) were contributing to the generation of user knowledge (UK) in video clip 3. High occurrence rates of collective activities (CA) during the interview section may imply that the more the designers and the users interact, the more user knowledge was generated (Figure 36).

7.4 COMPARISON BETWEEN NEED FINDING CASES

The comparison of the overall occurrence rates of each category showed the following patterns (Figure 37). This shows the relationships between collective activities (CA), the designers’ knowledge management (KM), social management activities (SM), user knowledge (UK) and designer knowledge (DK).

Figure 37 shows the comparison between collaborative outcomes (OT), collective activities (CA), designer knowledge management (KM) and social management activities (SM), and the users’ and the designers’ contributions manifested as user knowledge (UK) and designer knowledge (DK). It indicates that 1) the designers’ knowledge management activities (KM) were rather limited in the need finding cases;
2) collective activities (CA) were very active; and 3) collaborative outcomes seemed to be affected by all the coded activities.

The comparisons of the users’ and the designers’ individual contributions, and collaborative outcomes are illustrated in Figure 38. Figure 38 shows possible relationships between the users’ individual contributions and collaborative outcomes (especially in video clip 2). For example, in video clip 2, the more user knowledge was generated, the more collaborative outcomes were generated. In video clip 3, the less user knowledge was generated, the less collaborative outcomes were generated.

![Figure 38. Comparison between individual contributions and collaborative outcomes among video clips 1, 2, and 3](image)

The designers’ knowledge and social management activities were compared between video clips 1, 2, and 3 (Figure 39). The comparison indicates that video clip 3 showed slightly different patterns from video clips 1 and 2. The differences were mostly observed in social management activities. For example, in video clip 3, the occurrence rates of ORI (to orient) and ELB (to elaborate) were rather higher than the ones in video clips 1 and 2; whereas the occurrence rates of ENG (to engage) in video clip 3 were lower than the ones in video clips 1 and 2. This comparison implies that the designers spent more time orienting the users to better understand the user task in video clip 3,
whereas the designers spent less time in orienting the users toward the user task in clips 1 and 2. Instead, the designers needed to engage the users to generate more user knowledge within the shared contexts of the common ground in video clips 1 and 2 (Figure 39).

![Figure 39. Types of the designers’ efforts between video clip 1, 2, and 3.](image)

### 7.5 CAUSE AND EFFECT RELATIONSHIPS

Grounded theory approach is a "qualitative research method that uses a systematic set of procedures to develop an inductively derived theory about a phenomenon"(Strauss and Corbin, 1990, p.24). Because grounded theory approach (Strauss and Corbin, 1990) offers a systematic set of procedures to generate a theory tied with the evidence; it is suitable for the analysis of the video clips, the aim of which is to understand the interaction mechanisms amongst the coded activities. The cause-and-effect relationships amongst the coded activities were generated based on the procedures of the grounded theory approach(Strauss and Corbin, 1990). The Atlas.ti software’s network view function was used to assist in the visualisation of the interaction mechanisms. Firstly, the transcript of the conversation was coded and then formed the coding system (Figure
9). This procedure allowed the researcher to conceptualise the core concepts amongst the coded activities (Strauss and Corbin, 1990). Axial coding - examining coded activities in terms of conditions, interactions, strategies, tactics, and consequences - was carried out. Axial coding enables the researcher to link subcategories to a category as a form of relationship (Strauss and Corbin, 1990). In this thesis, the designers’ knowledge and social management activities were determined as core concepts and ‘how the common ground was constructed’ and ‘how collaborative outcomes were generated’ were investigated through the axial coding of the coded activities.

7.5.1 Video clip 1

The cause-and-effect relationships were generated with the core concepts - designers’ knowledge and social management activities - to see how the common ground was constructed and how collaborative outcomes were generated. In video clip 1, the users’ contextual experience and the designers’ knowledge management activity (clarification) were mainly used to construct a mutual understanding of the contexts among the participants. A sample of the knowledge management verbal statement is presented in Table 11.

Table 11. Knowledge management verbal statements (example)

<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker</th>
<th>Protocol Statements</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:01</td>
<td>Designer</td>
<td>You need to put these images onto the proper section.</td>
<td>DIS: Instruction</td>
</tr>
<tr>
<td>13:03</td>
<td>User</td>
<td>(Putting the images on the generative tool)</td>
<td>UCP: Users’ contextual experience</td>
</tr>
<tr>
<td>17:05</td>
<td>User</td>
<td>What do you mean by others? (looking at the generative tool)</td>
<td>QUE: User question</td>
</tr>
<tr>
<td>17:55</td>
<td>Designer</td>
<td>Other than family, friends and colleague</td>
<td>CLA: Clarification</td>
</tr>
<tr>
<td>18:08</td>
<td>Designer</td>
<td>Sometimes, you happened to receive a phone call from someone you do not know. That's others.</td>
<td>CLA: Clarification DTK: Information</td>
</tr>
<tr>
<td>20:00</td>
<td>User</td>
<td>(Writing a comment on a generative tool)</td>
<td>UCP: Users’ contextual experience</td>
</tr>
<tr>
<td>21:05</td>
<td>Designer</td>
<td>You can use a POSTIT</td>
<td>DIS: Instruction</td>
</tr>
</tbody>
</table>
Table 11 illustrates how the common ground was constructed through the interactions of the designers’ knowledge (DK-DIS-Instruction), the users’ contextual experiences (UK-UCP-Contextual Experience) and the designers’ knowledge management activity (KM-CLA-Clarification). The users’ knowledge was brought into the shared workspace by allowing the users to arrange their experiences on the generative boards. The designers implemented knowledge management activity (clarification) to construct a shared context in a common ground that the users and the designers could communicate within.

![Diagram](image)

Figure 40. Designers’ knowledge management activity for the construction of a mutual understanding among the participants in video clip 1.

Figure 40 illustrates the cause-and-effect relationships between the designers’ knowledge management activity (KM-CLA-clarification), user knowledge (UK-UCP-Contextual Experience), designer knowledge (DK-DIS-Instruction/ DK-DTK-Information) and the construction of a common ground. It indicates that user knowledge and designer knowledge contributed to the construction of a common ground and that the designers implemented knowledge management activity (clarification) in order to construct a common ground between the users and the designers.

The cause-and-effect relationships between the designers’ social management activities and the related coded activities were generated. The designers employed the social management activities (ENG: to engage / ELB: to elaborate) in order to facilitate the generation of collaborative outcomes, which include knowledge transfer (KT) and new
knowledge generation (KE). User knowledge (UK), designer knowledge (DK) and the designers’ social management activities seemed to have a relationship with the generation of collaborative outcomes (OT). The more user knowledge was generated, the more collaborative outcomes seemed to be generated. Collective activities (COM: Confirmation, REP: Repetition, REM: reminder) were used to support the designers’ social management activities. A sample of social management verbal statements is presented in Table 12.

Table 12. Social management verbal statements (example)

<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker</th>
<th>Protocol Statements</th>
<th>Code</th>
</tr>
</thead>
</table>
| 42:59 | Designer| Then I want you to think about three major functions | DIS: Instruction  
|       |         |                                      | ENG: To engage |
| 43:14 | User    | Hands-free? Function...?             | REP: Repetition |
| 43:16 | Designer| Yes, you can refer back to what you have told us | REM: Reminder  
|       |         |                                      | ELB: To elaborate |
| 43:21 | User    | Easy access to the important messages. | UK: User knowledge  
|       |         |                                      | URE: User requirement |
| 43:41 | Designer| Signs of understanding               | COM: Confirmation |

Table 12 illustrates how the designers’ social management verbal statements contributed to the generation of collaborative outcomes (URE: user requirement). Once the common ground was constructed, the designers implemented social management activities (ENG: engage/ELB: elaborate) in order to encourage the users to generate more collaborative outcomes (URE: user requirement).

Figure 41 illustrates the cause-and-effect relationships between designer knowledge (DK-DIS-Instruction), the designers’ social management activities (SM-ELB-to elaborate/SM-ENG-to engage), collective activities (CA-REP-Repetition/CA-REM-Reminder), and collaborative outcomes (OT-URE-User requirement). It indicates that the designer used instruction as a part of the social management activities (engage/elaborate). It also indicates that collective activities (repetition and reminder) were used to support the designers’ social management activities.
The interaction mechanisms of video clip 1 are summarised in Figure 42. User knowledge, designer knowledge and the designers’ knowledge management activities (clarification) were used to construct the common ground. Once the common ground was constructed, the designers implemented social management activities (engagement and elaboration) to facilitate the generation of collaborative outcomes.

“Designer knowledge (Instruction/ Information) + “User knowledge (Contextual experience)” + “Knowledge management (Clarification)” ==> “Common Ground”

“Social management activities (to engage / to elaborate)” ==> “Collaborative Outcomes”

Figure 42. Role of the designers’ knowledge and social management activities in the construction of a common ground and the generation of collaborative outcomes (video clip 1)

7.5.2 Video clip 2

In video clip 2, the designers brought their knowledge (DIS: instruction) into the shared workspace and then implemented clarification (CLA) as a way to construct a mutual understanding of the contexts for the user tasks. The users asked questions (CA-UQE-Question) while they were working with the generative design tools. Collective
activities (CA-REP-Repetition) were implemented to support the designers’ knowledge management activity (KM-CLA-Clarification).

Figure 43. Designers’ knowledge management activity for the construction of a mutual understanding of the contexts for the user tasks in video clip 2.

Figure 43 illustrates the relationships between designer knowledge (DK-DIS-Instruction), collective activities (CA-QUE-Question/CA-REP-Repetition), and the designer’s knowledge management activity (KM-CLA-Clarification) for the construction of a common ground. The mutual understanding of the contexts for the user tasks was established with the support of the collective activities. A sample of knowledge management verbal statements is presented in Table 13.

Table 13. Knowledge management verbal statements (example)

<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker</th>
<th>Protocol Statements</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>0:00</td>
<td>Designer</td>
<td>Instruction for image collage</td>
<td>DIS: Instruction</td>
</tr>
<tr>
<td>0:24</td>
<td>User</td>
<td>What do you mean by decorative tools?</td>
<td>UQE: User Question</td>
</tr>
<tr>
<td>0:34</td>
<td>Designer</td>
<td>'Mood light', 'Massimaro'</td>
<td>CLA: Clarification, DTK: Information</td>
</tr>
<tr>
<td>2:18</td>
<td>User</td>
<td>There is no 'information gathering objects' in this diagram</td>
<td>UQE: User Question</td>
</tr>
<tr>
<td>2:23</td>
<td>Designer</td>
<td>Consider it as a recording object</td>
<td>CLA: Clarification</td>
</tr>
<tr>
<td>2:26</td>
<td>User</td>
<td>Recording device?</td>
<td>REP: Repetition</td>
</tr>
</tbody>
</table>
Once the common ground was constructed, the designers used various social management activities as ways to facilitate the generation of collaborative outcomes (Figure 44).

![Figure 44. Designers’ social management activities for facilitating the generation of collaborative outcomes](image)

Figure 44 illustrates the relationships between social management activities and the generation of the users’ product experiences (UK-UPP-Product Exp), contextual experiences (UK-UCP-Contextual Exp) and user preferences (UK-UVE-User Value). It indicates that the designer used social management activities (SM-ELB-To Elaborate) as a way to encourage the users to generate collaborative outcomes.

Table 14 illustrates examples of social management verbal statements. Firstly, the designer asked the user to generate new functions for the future products (line 1). Then the user responded with the functions (lines 2 and 4), which reflected her preferences. The user referred back to her contextual experiences (line 3) in order to construct a common understanding of the context. In line 4, the user provided a detailed explanation of the function, which also reflected her preferences. The designers contextualised a different context and then challenged the users to generate new functions in the new context (line 5). Finally, collaborative outcomes were generated (line 6).
Table 14. Social management verbal statements (example)

<table>
<thead>
<tr>
<th>Line</th>
<th>Time</th>
<th>Speaker</th>
<th>Protocol statements</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>12:47</td>
<td>Designer</td>
<td>I want you to think about three major functions.</td>
<td>ELB: To elaborate</td>
</tr>
<tr>
<td>2</td>
<td>13:26</td>
<td>User</td>
<td>Then first function should tell my position to my friends. Also, identify friends' locations</td>
<td>UVE: User preference</td>
</tr>
<tr>
<td>3</td>
<td>14:16</td>
<td>User</td>
<td>If you are in a car, you are going somewhere. Right? You happened to forget something.</td>
<td>UCP: contextual experience</td>
</tr>
<tr>
<td>4</td>
<td>14:19</td>
<td>User</td>
<td>The function should be able to check these situations and let me know ‘You shouldn’t go back to home; You should do this and that.’</td>
<td>UVE: User preference</td>
</tr>
<tr>
<td>5</td>
<td>14:23</td>
<td>Designer</td>
<td>Then, do you want the machine inform you of the schedule when you activate the button?</td>
<td>CTN: Contextualisation CHE: To challenge</td>
</tr>
<tr>
<td>6</td>
<td>14:28</td>
<td>User</td>
<td>Yes. If you are in the car, that means you finished the one thing and wanted to move to the other one. I want the machine to alert me not to go to the other place if you forgot to do something important.</td>
<td>URE: User requirement UVE: User preference</td>
</tr>
</tbody>
</table>

7.5.3 Video clip 3

In video clip 3, the designer implemented designer knowledge (instruction for the scenario building) and knowledge management activity (KM-CLA-Clarification) for the construction of a common understanding of the contexts for the user task.

Figure 45 illustrates the relationships between designer knowledge (DK-DIS-Instruction), collective activity (CA-REM-Reminder), the designer’s knowledge management (KM-CLA-Clarification) and social management (SM-ORI-Orient) activities for the construction of a common ground. This shows that the designer implemented both knowledge management and social management activity in order to construct a common understanding of the contexts for the user task. Table 15 exemplifies a conversation between the users and the designers.
Figure 45. The role of the designers’ knowledge and social management activities in the construction of a common ground (video clip 3)

Once the common understanding of the contexts for the user tasks was established, the users could bring their contextual experiences (UCP), user suggestions (SUG) and user preferences (UVE) into the shared workspace in the form of a scenario.

Table 15. Conversation showing how the common ground was constructed (example)

<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker</th>
<th>Protocol statement</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>0:48</td>
<td>Designer</td>
<td>Tell us about a day in your life</td>
<td>DIS: Instruction</td>
</tr>
<tr>
<td>0:54</td>
<td>User</td>
<td>Is it OK to make up?</td>
<td>QUE: Question</td>
</tr>
<tr>
<td>0:57</td>
<td>Designer</td>
<td>Yes. The important thing to remember is to use the software technology when you build a scenario.</td>
<td>DTK: Information, REM: Reminder</td>
</tr>
<tr>
<td>1:11</td>
<td>Designer</td>
<td>For example, you have to elaborate a new recording technology when developing a scenario.</td>
<td>ORI: To orient, DIS: Instruction</td>
</tr>
<tr>
<td>1:28</td>
<td>User</td>
<td>Is everything possible?</td>
<td>QUE: Question</td>
</tr>
<tr>
<td>1:30</td>
<td>Designer</td>
<td>Yes, you can suppose the technology is so advanced that it can be smoothly integrated into your daily life</td>
<td>CLA: Clarification, ORI: To orient</td>
</tr>
</tbody>
</table>

Table 16 exemplifies a sample conversation where the designer implemented social management activity (ELB-To elaborate) for the generation of collaborative outcomes (URE-User requirement).
Table 16. Conversation showing how a user suggestion was transformed into user requirements (example)

<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker</th>
<th>Protocol statement</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>29:03</td>
<td>Designer</td>
<td>How about movie? Is it on a phone?</td>
<td>ELB: To elaborate</td>
</tr>
<tr>
<td>29:25</td>
<td>User</td>
<td>How about inside of the car? It should be in the car Then, the man should drive to Han River for the utilization of a function</td>
<td>URE: User requirement, SUG: Suggestion</td>
</tr>
<tr>
<td>32:00</td>
<td>Designer</td>
<td>How about a card? Should it be a service? Or a product?</td>
<td>CLA: Clarification, ELB: To elaborate</td>
</tr>
<tr>
<td>32:26</td>
<td>User</td>
<td>Probably, it should be a built-in service</td>
<td>SUG: Suggestion</td>
</tr>
</tbody>
</table>

Table 16 indicates that the designer implemented social management activity (ELB-To elaborate) to facilitate the generation of collaborative outcomes toward the end of the session. The user responded to the question and her response reflected a user requirement (URE). The user wanted the function to be inside of the car. The designers’ knowledge management activity (clarification) followed as a way to elaborate the user requirement. The user responded with new suggestions.

The cause and effect relationships between the designers’ social (SM-ELB-To elaborate) and knowledge management activity (KM-CLA-Clarification) for the generation of collaborative outcomes (URE-User requirement) is illustrated in Figure 46.

![Figure 46. The process of new knowledge generation in video clip 3](image-url)
Figure 46 indicates that toward the end of the session, the designer implemented social management activity (SM-ELB-To elaborate) in order to facilitate the generation of collaborative outcomes. The user responded with user suggestions (CA-SUG-Suggestion), and then the designer’s clarification of user suggestions (KM-CLA-Clarification) facilitated the generation of collaborative outcomes (OT-URE-user requirement).

### 7.6 SUMMARY

The activities in the need finding cases were analysed to see the actual interactive mechanisms of the user involvement in the product development process. The user-designer collaboration framework was applied to the investigation of the cases. The following are the findings from that analysis:

Firstly, the designers used knowledge management activity (CLA) to build a common ground between the users and the designers. Knowledge management was mainly implemented through the clarification of the ambiguous contexts, so that the participants (the users and the designers) could participate in generating, sharing, negotiating and expanding the common ground through the process of dialogue and collaboration.

Secondly, there were a positive relationship between collaborative outcomes and time. As time progressed, more collaborative outcomes were generated in the video clips (1, 2, and 3). Also, the findings showed that the collective activities (KM, SM, and CA) were occurred before the generation of user knowledge (UK). It seemed that in need finding cases, the collective activities (KM, SM and CA) were implemented in order to construct a common ground so that the user could spend more time on generating more of user knowledge (UK) and collaborative outcomes (OT) during the rest of the workshop.

Thirdly, the users’ contextual experiences (UCP) were modified and referred to through the collective activities. Engagement and elaboration were mainly used to encourage the users to generate more of their user preferences (UVE) and requirements (URE). The iterative processes of ‘engage’ and ‘elaborate’ as well as ‘reminder’ and ‘rephrase’ were employed as ways to facilitate the generation of the users’ own contextual experiences.
Fourthly, once the common ground was constructed, the designers allowed the users to bring their contextual experience (UCP) into the shared workspace. Then, the designers used the users’ contextual experiences (UCP) to evoke user suggestions (SUG), which contained user preferences (UVE) and user requirements (URE).

The following chapter will describe the procedures for analysing the concept clarification cases, which include video recording, transcription, coding and comparative analysis. The cause-and-effect relationships will follow.
Chapter 8:  

CONCEPT CLARIFICATION ANALYSIS

8.0 INTRODUCTION

In this chapter, the interactions between users and designers in the concept clarification cases are analysed. Three video clips were taken from two different industry-practice user involvement cases. The first case was about mobile service concept clarification and the second one was about reviewing on-line community service concepts. The users were mainly asked to evaluate software mock-ups and make suggestions for their enhancement. In order to facilitate the process of dialogue among the participants, the designers provided a scenario of use, paper mock-ups, and software simulators. Video clip 4 was taken from the mobile service workshop and video clips 5 and 6 were taken from the on-line service review workshops. The video clips were recorded, transcribed, coded with the coding system and then analysed and compared. Cause-and-effect relationships were developed based on these analyses, in order to see 1) how the users’ and the designers’ individual contributions (designer knowledge and user knowledge) contributed to the construction of a mutual understanding of the contexts among the participants; and 2) the types of designers’ efforts that facilitated the transfer of users’ tacit knowledge and new knowledge elicitation (collaborative outcomes). This chapter describes the analysis of video clips 4, 5, and 6; and the comparisons between them.
8.1 VIDEO CLIP 4

Video clip 4 comprised four users and two designers, conducting concept testing, clarification and wrap-up interviews. Video clip 4 lasted 33 minutes and 2 seconds, including two short breaks. The participants were asked to evaluate the given mobile telephone service concepts by hypothetically applying the concepts to their real life situations.

8.1.1 Occurrences

The session comprised instruction, mobile service concept evaluation, concept modification, and wrap up. The designers prepared the materials for the users’ involvement, which included one service concept, two scenarios of use, and several paper prototypes. The designers wanted the users to explore the concepts in their real life contexts, outside of the laboratory settings. The users were asked to act as realistically as possible, so that they could evaluate the mobile service concepts in real contexts. The service concepts were described in the form of service descriptions and scenarios of usage at the beginning of the session.

In video clip 4, as a percentage of the total interactions (Figure 48), the users’ and designers’ individual contributions comprised 46.5% (user knowledge 30.7% and designer knowledge 15.8%). The designers’ management efforts comprised 43.8% of the total interactions (social management 36.8% and knowledge management 7.0% respectively) and 9.6% of the total interactions were coded as collaborative outcomes. Collective activities (CA) were 77.2% of the total interactions. High occurrence rates of collective activities (77.2%) indicate that the users and the designers quite frequently exchanged signs of understanding and signs of confusion during the session. Figure 47 shows the types and characteristics of the interactions observed in video clip 4.
Figure 47. Types of interactions in video clip 4

Figure 48. Occurrence rates of individual contributions (designer knowledge vs. user knowledge)
Figure 48 illustrates the occurrence rates of the individual contributions. The designers brought two types of designer knowledge into the workspace, which were instructions (DIS: 5.0%) and additional information (DTK: 4.0%); and the users brought two types of user knowledge which were contextual experiences (UCP: 12.4%) and their preferences (UVE: 5.0%). Evidence of product experiences (UPP) was not found.

Figure 49 describes the designers’ efforts for managing the social relationship (social management) and the knowledge (knowledge management). In video clip 4, various types of knowledge and social management activities were found (Figure 49). The designers made relatively little effort to introduce new contexts to the users (CTN: contextualisation 2.5%); instead, the users were encouraged to modify and challenge the supplied contexts through the process of dialogue among themselves (CA: collective activities 77.2%) (Figure 49). Orientation (ORI: 9.4%), elaboration (ELB: 5.9%) and engagement (ENG: 4.9%) were used as social management activities for facilitating the transfer of user knowledge and new knowledge generation.

Figure 50 describes the occurrence rates of collective activities in video clip 5. The users’ latent needs were expressed through the users’ suggestions (SUG: 13.6%), agreement (AGR: 13.2%), and confirmation (COM: 15.4%). This is demonstrated during collective activities (Figure 50). The users expressed their concerns regarding
privacy and security; and pointed out problems that the service might cause them in real life. The users then suggested service modifications and improvements. The users’ suggestions (SUG) were rationalised by reasoning (REN), through which the users’ latent needs were revealed.

Forlizzi and Ford (2000) explained that since tacit knowledge is embedded in the user’s unconscious experience, cognitive reasoning plays an important role in externalising the users’ latent needs. Table 17 illustrates a dialogue in which the users made suggestions as a way of delivering their latent needs. Table 17 shows the process of clarification, suggestion, reasoning and agreement toward a new context generation. Once the newly generated contexts were agreed among the participants, the session could proceed with the service concept evaluation, clarification and modification. For example, user1 suggested (SUG) a service concept modification. User2 confirmed (COM) user1’s suggestion and then user1 explained the reason (REN) for his suggestion. User1’s suggestion was further modified (developed) by user2’s suggestion, and these suggestions were used to construct a new context for service improvement (CDS).

![Figure 50. Occurrence rates of collective activities](image-url)
Table 17. Process of clarification, suggestion, reasoning and agreement toward a new context (example)

<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker</th>
<th>Protocol Statement</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>25:41</td>
<td>User1</td>
<td>This service might be more suitable for teenagers</td>
<td>SUG: Suggestion</td>
</tr>
<tr>
<td>25:46</td>
<td>User2</td>
<td>Teenage students?</td>
<td>COM: Confirmation, REP: Repetition</td>
</tr>
<tr>
<td>26:00</td>
<td>User1</td>
<td>Dating with someone you are unaware of is bit risky for ladies. Who knows what will happen? But, for man, this service might work.</td>
<td>REN: Reasoning, SUG: Suggestion</td>
</tr>
<tr>
<td>26:17</td>
<td>User2</td>
<td>How about this? We are having a dinner together as a couple. And then we connect to the service for playing the game. One who got high score will get free beer</td>
<td>REN: Reasoning, SUG: Suggestion</td>
</tr>
<tr>
<td>26:30</td>
<td>User1</td>
<td>Then they all should have connected to the database</td>
<td>CDS: Co-discovery</td>
</tr>
<tr>
<td>26:45</td>
<td>User2</td>
<td>Hmm. We can fool the service easily. That will be more likely happen.</td>
<td>AGR: Agreement</td>
</tr>
</tbody>
</table>

8.1.2 Times

The user task in video clip 4 lasted 33 minutes and 12 seconds. The session was divided into four sections: instruction (1’ 53’’), concept evaluation (11’ 51’’), concept modification (10’ 36’’), and wrap up (8’ 52’’). During the instruction section, the designers explained the objectives of the user involvement including the instructions for the concept evaluation activities. The prototypes, service concepts and service scenarios were provided to the users.

Amongst user knowledge, designer knowledge and collaborative outcomes (Figure 51), user knowledge (UK) and designer knowledge (DK) decreased while collaborative outcomes (OT) increased toward the end of the session. Higher rates of user knowledge (UK) were seen during the concept evaluation and concept modification periods than during the wrap up period. This indicates that the users were actively involved in the process of negotiation in order to confirm and agree to the newly generated contexts, in which they could evaluate the service concepts. User concerns in the form of elaborative solutions were generated during the concept modification and wrap up periods.
Figure 51 shows the occurrence rates of designer knowledge (DK), user knowledge (UK), and collaborative outcomes (OT) over the time period. There is a positive relationship between collaborative outcomes and time. As time progressed, more collaborative outcomes (OT) were generated. However, user knowledge (UK) increased first and then declined toward the end of the workshop. The occurrence rates of designer knowledge (DK) were high and then declined toward the end of the workshop.

Figure 52 shows the occurrence rates of the designers’ knowledge management activities (KM), social management activities (SM), and collective activities (CA) over the time period.
As time progressed, the designers’ knowledge management activities (KM) and collective activities (CA) increased and then decreased while the designers’ social management activities (SM) declined firstly and then increased slightly toward the end of the workshop. The high occurrence rates of the designers’ knowledge management activities (KM), collective activities (CA) and user knowledge (UK) during the concept evaluation sections show a positive relationship between collaborative activities (KM and CA) and user knowledge (UK). Activities such as clarification, modification, and correction were observed mostly during the concept evaluation section.

Figure 52. Change in occurrence rates of knowledge management (KM), social management (SM), and collective activities (CA) in video clip 4
8.2 VIDEO CLIP 5

In video clip 5, mock-ups of software were developed and presented to the users. The users were asked to evaluate the concepts in terms of their usability, functionality and acceptability. Video clip 5 comprised orientation, interview, prototype evaluation, and wrap up discussion sections.

8.2.1 Occurrences

The user was asked to review three mock-ups of software and to express his/her personal opinions about them as an evaluator. The user involvement session was prepared to determine whether the user would accept and use the functions and features of the newly-developed software concepts. The main goal of the user involvement session was to identify factors that could affect the usability, functionality and acceptability of the software. Most of the contexts given to the users were selected based on the designers’ own decisions.

In video clip 5, the users’ and the designers’ individual contributions comprised 38.8% (user knowledge 10.7% and designer knowledge 28.1%) of the total interactions (Figure 53). The designers’ management efforts comprised 57% of the total interactions (social management 19.0% and knowledge management 38.0% respectively) and 4.1% of the total interactions were coded as collaborative outcomes of the session. Collective activities comprised 48.8% of the total interactions. The high collective activities rate (48.8%) indicates that the users and the designers actively exchanged signs of understanding and confusion during the session. Figure 53 shows the types and characteristics of the interactions observed in video clip 5.
Figure 53. Types of interactions in video clip 5

Figure 55 shows the occurrence rates of the designers’ knowledge and social management activities and the collective activities. In video clip 5, various types of knowledge and social management, and collective activities were found (Figure 54). High occurrence rates of hypothesis (HYP) and contextualisation (CTN) corresponded to high occurrence rates of agreement (AGR), reasoning (REN), and refusal (RFS). This reflects the fact that the interactions between the users and the designers included a series of contextualisation and refusals. For example, when the designers wanted to evaluate the software concept, they determined to construct (contextualisation) a common ground in the shared workspace. Then, the users contributed to the construction (modification) of the common ground with their passive responses such as refusal, reasoning, and agreement. This iterative process caused the high occurrence rates of collective activities (48.8% of the total interactions).
The designers’ knowledge and social management activities were mostly used to introduce the new concepts and contexts to the users for evaluation. Table 18 exemplifies the process of the designers’ introduction of the new contexts and the user’s rejection of them.

Table 18. The iterative process of software evaluation (example)

<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker</th>
<th>Protocol Statements</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>46:16</td>
<td>Designer</td>
<td>I want you to tell me about the service that you just used</td>
<td>DIS: Instruction ELB: To Elaborate</td>
</tr>
<tr>
<td>46:47</td>
<td>User</td>
<td>It looks convenient, yet it doesn’t seem to have any innovative features at all</td>
<td>RFS: Refusal</td>
</tr>
<tr>
<td>46:55</td>
<td>Designer</td>
<td>How about using this service for your own case?</td>
<td>HYP: Hypothesis CTN: Contextualise</td>
</tr>
<tr>
<td>47:01</td>
<td>User</td>
<td>I might keep on using my own service</td>
<td>RFS: Refusal</td>
</tr>
</tbody>
</table>
Table 18 shows the interaction process of the software evaluation, which began with the instruction (DIS: Instruction) in an effort to elaborate (ELB: To elaborate) with the user. The software was refused (RFS: refusal) by the user. Then the designer proposed a different context (CTN: Contextualise) where the user might use it. However, the user refused again and generated the reasons for not accepting the software (REN: Reasoning). In video clip 6, the designer generated several contexts as a way to facilitate the software evaluation process. The designer’s contextualisation activity (CTN) contributed to the generation of several contexts; however, the users were not allowed to modify or change the given contexts with their experiences.

### 8.2.2 Times

In video clip 5, the designers’ goal was to test the software concepts as much as possible. Therefore, the user could only express his/her preferences through the process of rejecting or accepting the designer’s hypothetical proposals. The user was not allowed to modify or challenge the given contexts.

Figure 55 shows the occurrence rates of designer knowledge (DK), user knowledge (UK) and collective outcomes (OT) over the time period. As time progressed, designer knowledge (DK) fluctuated while user knowledge (UK) and collaborative outcomes (OT) increased toward the end of the session. This seems to be caused by the way the session was structured. As the session progressed, the users could learn more about the subjects; therefore, they could construct a common ground for better performing the task. That shows why more of user knowledge and new suggestions were generated during the last part of the session.
Figure 55. Change in occurrence rates of designer knowledge (DK), user knowledge (UK), and collaborative outcomes (OT) (video clip 5)

Figure 56 shows the occurrence rates of the designers’ knowledge management activities (KM), social management activities (SM), and collective activities (CA) over the time period. As time progressed, the designers’ knowledge management activities (KM) increased, while social management activities (SM) and collective activities (CA) fluctuated. In video clip 5, the designers implemented the knowledge management activities (KM) as a way to facilitate the evaluation process; however the users could not react properly (low user knowledge generation at the beginning) since the designers did not spend enough ‘time’ to construct a common ground for the users.
In summary, the designers implemented contextualisation as the main activity for the construction of a common ground between the users and the designers. Since the designers did not allow the users to determine which types of user experience to include, the users responded with rejection, reasoning and agreement. Only through these collective activities could the users participate in the decision making process of constructing a common ground.

8.3 VIDEO CLIP 6

The procedure in video clip 6 was identical to that in video clip 5. Software simulations were presented to the users, and the users made suggestions for their improvement.
8.3.1 Occurrences

The goal of user involvement in video clip 6 was to identify the various aspects of the software to be improved, which include usability, functionality and acceptability. In video clip 6, as a percentage of the total interactions (Figure 57), the users’ and the designers’ individual contributions comprised 56.9% (user knowledge 36.4% and designer knowledge 20.5%), while the designers’ efforts comprised 41.7% of the total interactions (social management 5.3% and knowledge management 36.4%). 1.5% of the total interactions were coded as collaborative outcomes of the session. Collective activities were observed as 19.7% of the total interactions. Figure 57 shows the types and characteristics of interactions observed in video clip 6.

![Figure 57. Types of interaction in video clip 6](image.png)

As show in Figure 58, the designers brought three types of designer knowledge: instructions (DIS: 9.5%), information (DTK: 7.0%), and domain knowledge (DAK: 0.6%). The users’ knowledge comprised product experiences (UPP: 4.0%) and their contextual experiences (UCP: 19.6%).
Figure 58. Occurrence rates of the individual contributions in video clip 6

Figure 58 shows the occurrence rates of designer knowledge and user knowledge in video clip 6. High occurrence rates of the user’s contextual experience (UCP) were observed. For example, the designer asked the user to try out various aspects of the software by proposing various contexts for the user to explore iteratively.

This implies that the designers brought various contexts into the shared workspace where the user could evaluate various aspects of the software, and that the users were allowed to bring as many of their contextual experiences as possible into the workspace for the creation of a common context.

Figure 59 shows the occurrence rates of the sub categories of the designers’ efforts and the collective activities. It shows high occurrence rates of the designers’ contextualisation activities (24.7%). This reflects the designers’ efforts to provide as many contexts as possible for the user to evaluate the software concepts in.
8.3.2 Times

The user task in video clip 6 lasted 15 minutes and 59 seconds. The session was divided into three sections: introduction (2’34’’), concept evaluation (11’06’’), and wrap up (2’19’’). The designers introduced the objectives and procedures of the session and the concept evaluations followed.

Figure 60 describes user knowledge (UK), designer knowledge (DK) and collaborative outcomes (OT) over time. As time progressed, user knowledge (UK) and designer knowledge (DK) all increased during the middle of the session and then decreased towards the end of the session. This reflected the designers’ and the users’ active engagement in knowledge exchange during the concept evaluation period.
Figure 60. The change of occurrence rate between user knowledge (UK), designer knowledge (DK), and collaborative outcomes (OT) (video clip 6)

Figure 61 shows the occurrence rates of knowledge management activities (KM), social management activities (SM), and collective activities (CA) over the time period. Knowledge management activities (KM) and collective activities (CA) increased and then decreased toward the end of the session while social management activities (SM) slightly declined. It shows that most of collaborative activities (KM, SM, and CA) were performed during the concept evaluation section, where most of user knowledge (UK) and designer knowledge (DK) were generated. It indicates that the collaborative activities (KM, SM, and CA) and knowledge (UK and DK) generation have a positive relationship. However, user knowledge (UK) and collaborative outcomes (OT) did not increase as time progressed. It may imply that if the designers failed to construct a common ground through the collaborative activities (KM, SM, and CA), time did not contribute to the generation of new knowledge in the concept clarification phases.
8.4 COMPARISON BETWEEN CONCEPT CLARIFICATION CASES

A comparison of the overall occurrence rates of each of the coded activities showed the following pattern (Figure 62).

Figure 62 shows relationships between the designers’ knowledge management (KM), social management (SM), user knowledge (UK), designer knowledge (DK), collective activities (CA), and collaborative outcomes (OT) amongst video clips 4, 5, and 6. In video clip 4, the designer implemented less knowledge management activities than in video clips 5 and 6. The designers in video clip 4 seemed to allow the users to change (modify) the given contexts, instead of providing (generating) the contexts for the users. Video clips 5 and 6 showed higher occurrence rates of the designers’ knowledge management activity (KM). This indicates that the designers generated several different contexts through the process of contextualisation (KM: knowledge management...
activity). This also implies that the designers in video clips 5 and 6 did not allow the users to generate, change or modify the contexts of the common ground.

![Comparison of video clips 4, 5, and 6](image)

Figure 62. Comparison of video clips 4, 5, and 6

A comparison of the overall occurrence rates of user knowledge (UK), designer knowledge (DK) and collaborative outcomes (OT) was made (Figure 64). In the concept clarification cases, the construction of a common context for the software evaluation mainly used the users’ contextual experiences; however, the users were not allowed to determine which types of their experience to include. Figure 64 shows a comparison of user knowledge (UK), designer knowledge (DK) and collaborative outcomes (OT) amongst video clips 4, 5, and 6.
Figure 63. Comparison between user knowledge (UK), designer knowledge (DK) and collaborative outcomes (OT)

Figure 64. Comparison between social management and knowledge management
Figure 64 shows the comparison of the designers’ social (SM) and knowledge management (KM) activities. It indicates that the designers implemented ‘CTN: contextualise’ as the main knowledge management activity, while engagement (ENG: To engage), orientation (ORI: To orient), and elaboration (ELB: To elaborate) were implemented as social management activities. This indicates the designers’ efforts to generate as many contexts as possible for an effective evaluation. Engagement (ENG), elaboration (ELB), and orientation (ORI) contributed to the users’ active participation in the evaluation process.

In summary, in video clip 4, the users were allowed to change (modify) the contexts for better concept evaluation. This caused more frequent occurrence rates of collective activities and collaborative outcomes. In video clips 5 and 6, the designers generated as many contexts as possible and asked for user evaluation. However, this iterative process of contextualisation and rejection (video clips 5 and 6) seemed to be less collaborative than allowing the users to determine their contexts by themselves (as in video clip 4): Interactions in video clip 4 generated the most frequent occurrence of collaborative outcomes.

8.5 CAUSE AND EFFECT RELATIONSHIPS

The overall interaction pattern in the concept clarification cases showed that the users’ contextual experiences helped them to construct a basis for the evaluation of the software mock-ups. The designers did not allow the users to change or modify the given contexts in the shared workspace. The cause-and-effect relationships between the categories were generated using Atlas.ti software.

8.5.1 Video clip 4

A relationship was found between the designers’ knowledge management activities (contextualisation) and the collaborative outcomes (OT) throughout the comparison analysis. The cause-and-effect relationships were generated to identify how and why the designers’ knowledge management activities affected the generation of collaborative outcomes.
In video clip 4, the designers’ knowledge management activities (contextualise) were used for the construction of a shared context for evaluation among the participants. Once the common ground was constructed, the users actively participated in negotiating, discussing and modifying the given contexts by themselves. The high occurrence rates of collective activities (77.2%) reflected the user-to-user collaboration in video clip 4 (Figure 62). The process of the users’ active involvement in rejecting the given context and then suggesting and generating a new context is illustrated in Figure 66.

![Diagram](image)

**Figure 65. Interaction mechanisms of the shared workspace in video clip 4**

Figure 65 illustrates the interaction mechanism between the designers’ knowledge management activity (KM-CTN-contextualisation) and collective activities (CA-SUG-suggestion and CA-RFS-refusal) in the process of construction and modification of the common ground.

At the beginning of the session, the designers introduced the intended (designed) context to the users so that the users could perform the evaluation tasks. Then this context was clarified through the designers’ knowledge management activities (contextualisation and clarification). Once the context was clarified, the context was then modified by the users in order to equate with the users’ real life contexts. The users exchanged, shared, and modified their knowledge in order to build a new context or facilitate the process of evaluation. A user refusal was usually followed by user reasoning (REN) which explained the reasons for rejecting the concepts (Table 17).
Table 17. Collaborative context negotiation (example)

<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker</th>
<th>Protocol Statements</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:07</td>
<td>Designer</td>
<td>Actually, it is a mobile phone</td>
<td>DTK: Information</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>ORI: To orient</td>
</tr>
<tr>
<td>9:08</td>
<td>User</td>
<td>Little bit confused</td>
<td>CFS: User confusion</td>
</tr>
<tr>
<td>9:17</td>
<td>Designer</td>
<td>We thought of putting a ‘monopoly’ game instead</td>
<td>CTN: Contextualisation</td>
</tr>
<tr>
<td>9:35</td>
<td>User</td>
<td>That is a good idea</td>
<td>AGR: Agreement</td>
</tr>
<tr>
<td>9:36</td>
<td>Designer</td>
<td>But, that is a face-to-face game</td>
<td>RFS: Refusal</td>
</tr>
<tr>
<td>9:56</td>
<td>User</td>
<td>How about playing a ‘Genga’</td>
<td>SUG: Suggestion</td>
</tr>
<tr>
<td>10:00</td>
<td>Designer</td>
<td>Aha! Rock-scissor-paper is the one</td>
<td>AGR: Agreement</td>
</tr>
</tbody>
</table>

Table 17 illustrates how the new context was negotiated and agreed through the process of the designers’ contextualisation (CTN), user suggestion (SUG) and refusal (RFS). In video clip 4, relatively low occurrence rates of the designers’ knowledge management activity (7.0% of the total interaction) were found. The designers used their knowledge management activity (contextualisation) as little as possible, which allowed the users to suggest, refuse and modify the given context through user-designer negotiation. The designers’ knowledge management activity was mainly employed as a strategy for initiating the users’ active participation in collaboration.

8.5.2 Video clip 5

In video clip 5, the designers used their knowledge management activity (KM-CTN-contextualisation) quite frequently. This caused the frequent occurrence of collective activities (CA-RFS-refusal, CA-REN-reasoning and CA-AGR-agreement). As the session progressed, refusal and reasoning were used to reveal user preferences (UK-UVE-preference). The relationship between the designers’ knowledge management activity (KM-CTN-contextualisation) and collective activities (CA-RFS-refusal, CA-REN-reasoning and CA-AGR-agreement) is illustrated in Figure 66.
The main purpose of the user involvement in video clip 5 was for concept evaluation. Concept evaluation was pursued by introducing as many of the contexts, functions, and features as possible to the users and this was facilitated through the designers’ knowledge management activities (contextualisation): refusal (RFS), reasoning (REN) and agreement (AGR) followed as the users’ responses.

Figure 66. The cause-and-effect relation between knowledge management activity (KM), collective activities (CA), and user knowledge (UK) in video clip 5

The users’ preferences (UK-UVE-preference) were implicitly expressed through the process of refusal (CA-RFS-refusal), reasoning (CA-REN-reasoning) and agreement (CA-AGR-agreement). Once the concept was rejected, a new context was constructed and then provided by the designers’ contextualisation activity (KM-CTN-Contextualise). The new concept was brought in and then evaluated. Table 18 illustrates how the user preference (UK-UVE-preference) was generated through the iterative process of the designers’ contextualisation (KM-CTN-contextualise), the users’ refusal (CA-RFS-refusal), reasoning (CA-REN-reasoning) and agreement (CA-AGR-agreement).
Table 18. Process of contextualisation, refusal, reasoning, and agreement (example)

<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker</th>
<th>Protocol Statements</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>62:46</td>
<td>Designer</td>
<td>What if the software shows a entire link in the left side of your computer screen?</td>
<td>CTN: contextualise</td>
</tr>
<tr>
<td>63:03</td>
<td>User</td>
<td>That's somewhat unrealistic</td>
<td>RFS: refusal</td>
</tr>
<tr>
<td>63:22</td>
<td>User</td>
<td>That will be clutter and a chaos</td>
<td>REN: reasoning</td>
</tr>
<tr>
<td>63:22</td>
<td>Designer</td>
<td>Just because you can not account on the recommendation?</td>
<td>CTN: contextualise</td>
</tr>
<tr>
<td>63:23</td>
<td>User</td>
<td>Yes</td>
<td>COM: confirmation</td>
</tr>
<tr>
<td>63:29</td>
<td>User</td>
<td>You will never satisfy the user with those features, that I am sure.</td>
<td>RFS: refusal</td>
</tr>
<tr>
<td>63:39</td>
<td>Designer</td>
<td>What if the link operates based on your will</td>
<td>CTN: contextualise</td>
</tr>
<tr>
<td>64:06</td>
<td>Designer</td>
<td>Suppose you are reading an article in a computer screen. Do you ever feel like you need some other references that happened to be saved in another place?</td>
<td>CTN: contextualise, ORI: To orient</td>
</tr>
<tr>
<td>64:20</td>
<td>User</td>
<td>Of course. I do</td>
<td>AGR: agreement</td>
</tr>
<tr>
<td>69:45</td>
<td>Designer</td>
<td>Then, you mentioned that you want to use a planet service, instead</td>
<td>CTN: contextualise</td>
</tr>
<tr>
<td>71:00</td>
<td>User</td>
<td>Just because I prefer to use a paper</td>
<td>REN: reasoning, UVE: user preference</td>
</tr>
</tbody>
</table>

8.5.3 Video clip 6

In video clip 6, the designers used the user’s contextual experiences (UK-UCP-contextual experience) and knowledge management activity (KM-CTN-contextualisation) quite frequently for the construction of a common context. However, the occurrence rates of collaborative outcomes (OT) were very low (1.5%) (Figure 57) in video clip 6. The cause-and-effect relationship between the users’ contextual experiences (UK-UCP-contextual experience), the designers’ knowledge management activity (KM-CTN-contextualisation), social management activity (SM-ORI-To orient) and collective activities (CA-REN-reasoning) is illustrated in Figure 67.
Figure 67. The cause-and-effect relations in video clip 6

Figure 67 indicates that the designers used the user’s contextual experiences (UK-UCP-contextual exp) to construct a shared context for the software evaluation. Then the designers used social management activity (SM-ORI-to orient) as a way of engaging the users in a shared (or supplied) context. However, the shared contexts were generated and provided by the designers even if the user’s contextual experiences were used as a resource for the construction. The users were not allowed to change or modify the contexts throughout the session. Instead, the users could only participate in the development process by actively reacting to the supplied contexts (REN: reasoning). Table 19 illustrates how the designers used the user’s contextual experience and the knowledge management activity (KM-CTN-contextualise) for the construction of a common context.

Table 19. The designers’ knowledge and social management activities (example)

<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker</th>
<th>Protocol Statements</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>36:25</td>
<td>Designer</td>
<td>Do you know wiki? Have you ever used the software?</td>
<td>CTN: contextualise</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>ENG: to engage</td>
</tr>
<tr>
<td>36:28</td>
<td>User</td>
<td>Yes</td>
<td>AGR: agreement</td>
</tr>
<tr>
<td>36:30</td>
<td>Designer</td>
<td>In what purpose?</td>
<td>ENG: to engage</td>
</tr>
<tr>
<td>36:37</td>
<td>User</td>
<td>Penpic</td>
<td>UCP: contextual experience</td>
</tr>
</tbody>
</table>
Table 19. The designers’ knowledge and social management activities (example) (continued)

<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker</th>
<th>Protocol Statements</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>36:39</td>
<td>Designer</td>
<td>Shin Wha pen club?</td>
<td>COM: confirmation</td>
</tr>
<tr>
<td>36:43</td>
<td>User</td>
<td>That is not a penpic. Just a pen club site, where I implemented wiki as a sub section. GOD pen club was famous at that time</td>
<td>UCP: contextual experience</td>
</tr>
<tr>
<td>37:11</td>
<td>Designer</td>
<td>It seemed that you did a lot of on-line community activities</td>
<td>CTN: contextualise</td>
</tr>
<tr>
<td>37:15</td>
<td>User</td>
<td>Because I need to manage many on-line club at the same time</td>
<td>REN: reasoning UCP: contextual experience</td>
</tr>
</tbody>
</table>

8.6 SUMMARY

The concept clarification cases were analysed in order to see the actual interaction mechanisms between the users and the designers. The user-designer collaboration framework was applied to the investigation of the interactions. The following are the main indicative findings.

Firstly, the designers employed contextualisation (CTN) as the key knowledge management activity to construct a shared context between the users and the designers. The designers repeatedly projected several different contexts into the shared workspace, so that the users could participate in evaluating the software concepts.

Secondly, the users gained involvement in the development process by indicating their latent needs: first through their responses (refusal and agreement) and then through reasoning (REN). The iterative process of hypothesis, contextualisation, refusal, reasoning, and agreement was the principal cause of the high occurrence rates of the collective activities in video clips 5 and 6.

Thirdly, the designers used the user’s contextual experiences (UCP) as a way of orienting the users’ attention towards the tasks. However, the users were not allowed to determine which types of their contextual experiences to include. The users could only participate by expressing their reasons for acceptance or rejection.
Finally, time played an important role for the construction of a common ground between the users and the designers. As time progressed, the users were able to learn more about the subject, so that they could participate more toward the end of the workshop. However, when the construction of a common ground was failed, time did not contribute to the generation of collaborative outcomes.

The following chapter will report the overall findings and discuss factors that allowed the users to be integrated in the product-development process. Then, a user-designer collaboration model will be suggested.
Chapter 9:

FINDINGS AND DISCUSSION

9.0 INTRODUCTION

In practice, user-designer collaboration has been used as a strategy for facilitating the transfer of users’ tacit knowledge and new knowledge elicitation (Sanders, 2000; Sanders, 2005; Suri and Buchenau, 2000). For any user involvement session to be successful, user-designer collaboration strategies should be developed as a part of the designers’ competences. Observation of the video clips from the case studies revealed that both the users and the designers brought various types of knowledge in the shared workspace for the construction of a common ground. The designers employed various types of knowledge management activities in order to consolidate the construction of a common ground and social management activities to facilitate the generation of new knowledge. These activities, however, sometimes had a negative influence on the generation of collaborative outcomes, meaning that the more the designers contextualised the contexts for the evaluation, the fewer collaborative outcomes (OT) were generated. There were relationships between time and collaborative outcomes: As the session progressed, more collaborative outcomes were generated. In this chapter, the occurrence rates of each category in the need finding cases (video clips 1, 2, and 3) were summed and the sum divided by 3 to get an average value. The same operation was performed for the concept clarification cases (the occurrence rates of each category in video clip 4, 5, and 6 were summed and the sum divided by 3 to get an average value). Finally, the average occurrence rate of each category for the need finding cases was compared with the equivalent average occurrence rate for the concept clarification cases. Overall findings including insights, ideas, and answers to the research questions will be presented, which directed to the generation of a user-designer collaboration model.
9.1 OVERALL FINDINGS

The overall findings were made from a comparison of the findings in the need finding and the concept clarification cases:

Firstly, the designers used clarification as the main knowledge management activity to build a common ground between the users and the designers, whereas the designers in the concept clarification cases used contextualisation. While the designers in the need finding cases clarified the given user tasks at the beginning of the session, the designers in the concept clarification cases generated several different contexts in the shared workspace for facilitating the evaluation process.

Secondly, in the need finding cases, the users’ contextual experiences (UCP) were modified (rephrased) and referred to (reminded) through the collective activities. Engagement and elaboration were mainly used to encourage the users to generate more of their user preferences (UVE) and requirements (URE). The iterative processes of ‘engage’ and ‘elaborate’ as well as ‘reminder’ and ‘rephrase’ were employed to facilitate the process of user knowledge generation. In the concept clarification cases, the users gained involvement in the development process by indicating their latent needs: first through their responses (refusal and agreement) and then through reasoning (REN). The iterative process of hypothesis, contextualisation, refusal, reasoning, and agreement was the principal cause of the high occurrence rates of the collective activities.

Thirdly, in the need finding cases, once the common ground was constructed, the designers allowed the users to bring their contextual experience (UCP) into the shared workspace. Then, the designers used the users’ contextual experiences (UCP) to evoke user suggestions (SUG), which contained user preferences (UVE) and user requirements (URE). In the concept clarification cases, the designers used the user’s contextual experiences (UCP) as a way of directing the users’ attention towards the shared contexts. However, the users were not allowed to determine which types of users’ contextual experiences to include. The users could only participate in the development process by expressing their reasons for acceptance or rejection.

In order to see the overall differences in the coded activities between the need finding and the concept clarification cases, the average values of the occurrence rates of each category were compared. In order to get the average value of the occurrence rates, the occurrence rates of each category were added together and divided by the number of
video clips. For example, the average values of the occurrence rates in the need finding cases were generated by adding the occurrence rates in video clips 1, 2, and 3, and then dividing them by 3.

A comparison was made among the overall coded activities. The average value of the designers’ knowledge management activities (KM) in the need finding cases was lower than in the concept clarification cases. More collaborative outcomes (OT) were generated in the need finding cases than the concept clarification cases (Figure 68).

![Figure 68. Comparison of the average values of each category (the need finding and the concept clarification cases)](image)

Figure 68 shows the differences in the average value of the occurrence rates of each coded activity between the need finding and the concept clarification cases. The way the designers managed the knowledge (KM) in the shared workspace also affected the generation of collaborative outcomes (OT). This implies that the more the designers contextualised the contexts in the shared workspace, the fewer collaborative outcomes were generated.

The average occurrence rate of knowledge management (KM) was 13.3% in the need finding cases and 27.1% in the concept clarification cases. The average occurrence rate of collaborative outcomes was 15.4% in the need finding cases and 5.1% in the concept
clarification cases (Figure 68). Higher rates of the designers’ knowledge management activities indicate that the designers managed the knowledge in the common ground more frequently in the concept clarification cases than in the need finding cases.

Figure 69 indicates that the designers’ clarification (CLA) activity was employed more often in the need finding cases than in the concept clarification cases, while contextualisation (CTN) and hypothesis (HYP) were more frequent in the concept clarification cases. The designers in the concept clarification cases might have thought that they had more ownership of the concepts, therefore they constructed too many contexts (contextualisation and hypothesis) and this seemed to lead to a failure to generate collaborative outcomes (OT).

Figure 69. Average value of the designers’ knowledge and social management activities (need finding versus concept clarification)

Figure 69 shows that the designers employed clarification more often in the need finding cases and that they used more hypothesis and contextualisation in the concept clarification cases. More collaborative outcomes were generated when the designers’ implemented a passive participation approach in the need finding cases (Lee, Popovic, Blackler, and Lee, 2006). The designers allowed the users to bring as many of their experiences as possible into the shared workspace. Instead, the designers in the concept
Clarification cases actively managed the construction of a common ground, and did not allow the users to modify or change the contexts. The differences in the designers’ knowledge management activities (style) affected the generation of collaborative outcomes.

Figure 70 indicates the relationships between the user knowledge (UK), designer knowledge (DK) and collaborative outcomes (OT). The combination of user knowledge (UK) and designer knowledge (DK) affected the generation of collaborative outcomes.

Figure 70. Comparison of the average value of user knowledge and designer knowledge (need finding versus concept clarification)

The more product experience (UPP) user preferences (UVE) and designers’ instructions (DIS) occurred, the more collaborative outcomes were generated. The more the users’ contextual experience (UCP) and designers’ information (DTK) occurred, the fewer collaborative outcomes (OT) were generated. This reflects the role of the designers’ knowledge for the construction of a common ground. In the concept clarification cases, more information (DTK) was provided to the users as a way to build (provide) a better shared understanding of the project, in exchange for which, the users could bring more contextual experiences into the shared workspace. However, fewer collaborative outcomes (OT) were generated. It seemed that the more the designers had ownership of
the construction of a common ground with designer knowledge (additional information), the fewer collaboration opportunities occurred. Instead, when the designers provided instructions without further additional information about the project, the users could generate more of their preferences (UVE) and therefore more collaborative outcomes (OT).

9.2 DISCUSSION

The overall findings address the answers to the research question, “How can users be integrated during the early stage of the design process?” In this section, important aspects of collaboration, which include knowledge transfer and new knowledge generation, will be discussed in terms of their relationships with user knowledge, designer knowledge, and designers’ knowledge management and social management activities.

9.2.1 Knowledge transfer

Many authors have argued that a primary rationale for collaboration is the acquisition of resources that one part does not have internally (Hamel and Prahalad, 1989 in Hardy et al., 2003; Huxham, 1991, 1993). From this viewpoint, collaboration is highly regarded among product developers as a means of acquiring user knowledge. The users’ knowledge, from the analysis, actually worked as the key resource for the construction of a common ground between the users and the designers. The users’ knowledge was brought into the shared workspace, and then transferred to the design team through the process of the designers’ knowledge management (clarification or contextualisation) and social management activities (orientation, engagement and elaboration). The acquisition process reflected the designers’ particular interests in identifying the relevant elements from the knowledge that have the most value for the product development (Hamel and Prahalad, 1989 in Hardy et al., 2003).

Collaboration serves its purpose once the necessary knowledge of one party is successfully transferred to the partners (Hardy et al., 2003). The process of acquiring the users’ knowledge continued until the necessary knowledge was successfully identified through the user-designer collaboration. For example, in the concept clarification cases, the designers continued to contextualise several different contexts in the shared
workspace until they acquired the necessary information from the users. In contrast, in the need finding cases, the designers continued to orient (engage and elaborate) the users to generate more user knowledge within the contexts created by the users’ contextual experiences.

9.2.2 New knowledge generation

New knowledge generation was also considered to be an important aspect of collaborative outcomes (Dillenbourg et al., 1996; Hardy et al., 2003). In the field of innovation, knowledge creation was considered to be something that could not be generated and possessed by individuals (Powell and Tangsantikul, 1996 in Hardy et al., 2003). Hardy et al. (2003) argued that sources of innovation reside in the interstices between firms, universities, research laboratories, suppliers, and that a high level of involvement among the participants is likely to be associated with the facilitation of knowledge transfer and new knowledge creation. The analysis of each video clip showed that as time progressed, more collaborative outcomes were generated. This implies that as the session progressed, the level of user involvement got higher and the users and the designers could produce more collaborative outcomes.

However, interesting points were revealed when the need finding and the concept clarification cases were compared. A higher level of designer involvement in the construction of shared contexts (through the contextualisation activities) led to the generation of fewer collaborative outcomes (OT) in the concept clarification cases than in the need finding cases. This might be caused by the fact that the time devoted to the construction of each common ground was shorter in the concept clarification cases than in the need finding cases and that this resulted in fewer collaborative outcomes.

This implies that the depth of user involvement should be considered for better collaboration, and various ways to improve the depth of involvement of both sides (the users and the designers) should be developed. As reviewed in Chapter 3, direct access, ambiguous situations, and shared experiences were suggested as strategies to improve the depth of user involvement. However, in order to improve the depth of user involvement, the designers should spend more time on the construction of a shared context. The construction of a shared context can be facilitated by allowing the users to determine which types of experiences to include in the shared workspace.
9.2.3 Depth of user involvement

Hardy, Phillips and Lawrence (Hardy et al., 2003) identified the effects of involvement in the collaboration environment. After four years of investigations of the collaborative activities of a small nongovernmental organisation in Palestine, they identified that the level of involvement determined the process of knowledge transfer and new knowledge generation. Reasons for user involvement in the product development cases (video clips 1 to 6) were to acquire necessary elements from user knowledge and to generate synergic solutions from new knowledge. Various knowledge (KM), social management (SM) and collective activities (CA) were implemented by the designers to facilitate the process. Most designers directed the process of acquiring user knowledge and new knowledge generation during the sessions. However, it can be argued that intensifying the depth of user involvement can actually help to increase the effectiveness of user-designer collaboration.

In the need finding cases, the designers allowed the users to determine which types of contextual experiences to include, and it helped to intensify the depth of user involvement in the shared workspace. However, in the concept clarification cases, the designers constructed several different contexts and yet did not allow the user to participate in the process. The depth of user involvement was lower in the concept clarification cases, and it seemed to affect the lower occurrence rates of collaborative outcomes in the concept clarification cases.

The designers directed the process of acquiring user knowledge and new knowledge generation both in the need finding and the concept clarification cases. In the need finding cases, the designers used social management activities (engagement, and elaboration) in order to facilitate the process of acquiring necessary elements for the product development. As the time progressed, the designers implemented more social management activities to enforce the users to generate more user knowledge. The designers in the concept clarification cases also enforced the users to generate more user knowledge during the session. However, different from the need finding cases, the designers enforced the users to respond to the contexts that they had constructed from the beginning. The users were excluded from the construction process of the common ground, since the designers constructed several different contexts by themselves.

Throughout the video clips 1 to 6, as the time progressed, more collaborative outcomes were generated. This indicates that time played an important role for intensifying the
depth of user involvement during the session. Therefore, it can be argued that ‘time’ and ‘ownership over the construction of the shared contexts’ were factors that contributed to intensifying the depth of user involvement, and to improving the effectiveness of user-designer collaboration.

9.2.3 Time

Time played an important role for the construction of a common ground and generation of collaborative outcomes both in the need finding and concept clarification cases. The designers implemented collaborative activities (KM, SM, and CA) in order to facilitate the generation of user knowledge and collaborative outcomes in both cases. The collaborative activities (KM, SM, and CA) occurred and then user knowledge (UK) followed in the need finding cases. Whereas, the collaborative activities (KM, SM, and CA) were implemented in order to facilitate user knowledge (UK) generation in the concept clarification cases. Sometime, when the designers failed to construct a common ground, time did not contribute to the generation of new knowledge in the concept clarification cases.

9.3 USER-DESIGNER COLLABORATION MODEL

In Chapter 4, Figure 6, a theoretical framework was proposed for the investigation of user-designer collaboration. In this framework, user-designer collaboration was described as 1) knowledge outside of the shared workspace, 2) interactions observed within the shared workspace, and 3) outcomes from the shared workspace. The interaction mechanisms were investigated in the analysis of six industry-supported user involvement cases. The findings from the analysis were used for the construction of a theoretical model for user-designer collaboration.
Figure 71. The role of designers’ knowledge and social management activities in the user-designer collaboration model

Figure 71 represents the interaction mechanisms between the users and the designers, and shows how 1) the common ground was structured, 2) the acquisition (transfer) of user knowledge occurred, and 3) the new knowledge was generated. The process of common ground construction, of user knowledge acquisition (transfer) and new knowledge generation could be explained as follows:

Firstly, as indicated in Section 9.2, user knowledge, designer knowledge, and the designers’ knowledge management and social management activities played key roles in the construction of a common ground.

Secondly, the designers implemented knowledge and social management activities to facilitate the transfer (acquisition) of user knowledge. In the need finding cases, the designers implemented knowledge management activities to facilitate the construction of a shared context. Then, the designers implemented social management activities only for facilitating the transfer of necessary elements from the user knowledge. In the concept clarification cases, the designers implemented knowledge management and social management activities both for the construction of several different contexts, and for facilitating the transfer of necessary elements from the user knowledge.
Thirdly, the new knowledge generation process was facilitated by intensifying the depth of user involvement in the shared workspace. The depth of user involvement can be intensified by allocating more time to the construction of a shared context, and allowing the users to determine the types of experiences to include in the shared workspace.

Finally, ‘time’ contributed to the construction of a common ground and generation of new knowledge. However, if the designer failed to construct a common ground during the workshop, ‘time’ could not contribute to the generation of new knowledge.

9.4 SUMMARY

The user-designer collaboration model was established based on the analysis of the need finding cases and the concept clarification cases. In both cases, user-designer collaboration was implemented as a way to facilitate the transfer of user knowledge and new knowledge generation. In the need finding cases, the designers encouraged the user to bring as many of their experiences as possible into the shared workspace, and this contributed to intensify the depth of user involvement in the construction of a shared context. The designers implemented social management activities as a way to facilitate the transfer of user knowledge and new knowledge generation. There were relationships between the generation of collaborative outcomes (knowledge transfer and new knowledge generation) and time. As time progressed, more collaborative outcomes were generated.

In the concept clarification cases, the designers generated several different contexts as a way to involve the user into the evaluation process. However, less time was devoted to the construction of shared context than in the need finding cases. Also the users were not allowed to determine which types of user experience to include to the construction of a shared context. These factors seemed to contribute to loosen the depth of user involvement in the construction of a shared context. The designers implemented social management activities to facilitate the transfer of user knowledge and new knowledge generation. However, fewer collaborative outcomes were generated in the concept clarification cases than the need finding cases. This implies that the depth of user involvement in the construction of a shared context contributed to the generation of collaborative outcomes. The following chapter will report the conclusions, contributions to the body of knowledge and the limitations of the study.
10.0 INTRODUCTION

This chapter draws conclusions from the research results presented in Chapters 7 to 9. Based on the conclusions, the user-designer collaboration models of the need finding cases and the concept clarification cases were described. This is followed by the design recommendations, research limitations and contributions to knowledge.

10.1 CONCLUSIONS

The aim of the research was to increase the level of understanding of user-designer collaboration in the product development process. Therefore, the research question, “How can the users be integrated during the early stage of the product development process?” was developed and investigated through the analysis of the user involvement in the need finding and the concept clarification cases. The findings indicated that the user-designer collaboration was employed in order to facilitate the transfer of user knowledge and new knowledge generation. In the user involvement cases, various types of knowledge management (KM), social management (SM), and collective activities (CA) were implemented to achieve the goals (to facilitate the transfer of user knowledge and new knowledge generation).

The research identified that 1) the more time devoted to the construction of a context, the more collaborative outcomes likely to be generated, and 2) the more the designers contextualised a context, the fewer collaborative outcomes likely to be generated, and 3)
the more the users had ownership of the construction of a context, the more collaborative outcomes likely to be generated.

10.1.1. Interaction mechanism in the need finding cases

Figure 72 illustrates the interaction mechanism in the need finding cases. In the need finding cases, designer knowledge was used to construct a common ground for discussion. Then user knowledge was brought in and used to intensify the contexts within the common ground between the users and the designers. Neither users nor the designers know exactly which types of user knowledge would be most beneficial for the product development at the beginning of the session because most user knowledge is so deeply embedded in the users’ unconscious minds and behaviours. Both users and designers need to discuss and search for relevant elements for the product development from the materials that the users have brought in or generated during the session.

Time played an important role for the successful generation of new knowledge in the need finding cases. Designer knowledge, user knowledge and the designers’ knowledge management activities played key roles in the construction of a common ground. Time devoted to the construction and intensification of the common ground affected the depth of involvement.

Ownership also had an effect on successful new knowledge generation. Muller et al.(1997) showed the importance of end-user participation in the design process as early as the problem identification or problem clarification phase for better understanding of the problems. By allowing the users to determine the types and characteristics of their contextual experiences to include in the shared workspace, more new knowledge was generated. The designers then implemented social management activities in order to facilitate the transfer of relevant elements from the knowledge that had the most value for the product development.
10.1.2. Interaction mechanism in the concept clarification cases

User knowledge transfer was the main goal of the designers in the concept clarification cases. Therefore, the designers determined to generate several different contexts for facilitating effective knowledge transfer. Figure 73 illustrates the interaction mechanism in the concept clarification cases. The designers constructed several different contexts in the common ground first and then asked the users to respond to them. Knowledge transfer was facilitated by creating as many contexts as possible. Less time was devoted to the construction of a context, therefore the depth of involvement was low.
10.2 DESIGN RECOMMENDATIONS

This section offers ideas and insights about how the research findings can be integrated into the product development process.

Firstly, the product development process should focus on ways to intensify the depth of involvement in the contexts. As Muller, Haslwanter, and Dayton (1997) clearly stated, “quality of the design and the resulting system is improved by including the users’ expertise early in the design process, before much investment has been made in any design” (p. 258). Active participation by users, from Muller et al.’s perspective (1997), was seen as a means of improving collaboration through a better combination of the diverse contexts brought into the workspace by the various participants. The design process should encourage the participants to bring in as much of their knowledge as
possible during the early stage of the design process.

Secondly, the product development process should provide ways to bring as many of the users’ experiences as possible in the construction of a shared context. Quite often users and designers could not acknowledge necessary elements for the product development from the user knowledge during the early stage of the user involvement session. Therefore, the design process should allow the users to bring as many of their experiences as possible during the early stage of the user involvement.

Thirdly, users should be encouraged to participate in the design process, especially in the construction process of a shared context. User knowledge and user’s active involvement in the construction of the shared context played an important role for improving the effectiveness of the user-designer collaboration (transfer of user knowledge and new knowledge generation) during the user involvement sessions.

10.3 RESEARCH LIMITATIONS

The research identified that user knowledge has to be the main resource for the construction of a common ground within a shared workspace. In this research, user knowledge was defined as product experiences (UPP), contextual experiences (UCP) and user preferences (UVE). However, which types and characteristics of user knowledge had a direct effect on the generation of collaborative outcomes was not studied in this research.

The designers in the need finding cases encouraged the users to bring as many of their experiences as possible into the shared workspace at the beginning. And then the designers enforced the users to generate more user knowledge in order to facilitate the generation of necessary elements that had values to the product development. However, if the structures and characteristics of user knowledge were better known, the designers could have encouraged the users to generate more relevant user knowledge for the product development. Through better understanding of user knowledge, more effective user-designer collaboration could be realised.
10.4 CONTRIBUTIONS TO KNOWLEDGE

This research makes three sets of contributions to the understanding of user-designer collaboration in the product development process. Firstly, the research contributes to extending the understanding of user involvement in the product development process. While different literature has developed different views of user involvement in the product development process, which include studies in the field of user-centred design, participatory design and design for experiencing (Buur and Bagger, 1999; Sanders, 2000; Sanders and Dandavate, 1999; Sanders and Stappers, 2008; Spinuzzi, 2002, 2005; Stappers and Sanders, 2003), this research developed a more comprehensive view of user involvement. Using the coding system (Figure 9), user involvement in this research could be described as a set of user-designer collaboration activities, which aim to facilitate the transfer of user knowledge and new knowledge generation.

Secondly, the research contributed to extending the understanding of the role of shared contexts in the collaboration process. The user knowledge and the designers’ knowledge, social management, and collective activities contributed to the construction of a shared context in a common ground. The construction of a shared context was the one of the common strategies that the designers employed during the early stages of the user involvement sessions. Sometimes, the designers implemented knowledge management, social management and collective activities to intensify the depth of user involvement. At other times, the designers determined to construct a shared context by themselves. How the shared context was constructed affected the effectiveness of user-designer collaboration. The more the users were empowered to determine which types of user knowledge to include in the shared context the more collaborative outcomes could be generated.

Finally, the research contributed to extending the understanding of user empowerment in the product development process. Various ways of involving users in the product development process have been studied (Hippel, 2001; Hippel and Katz, 2002; Muller and Kuhn, 1993; Sanders, 2000). However, none of the previous studies focused on the activities involved in the construction of a shared context in the common ground. This research identified the importance of user empowerment in user-designer collaboration. By encouraging the users to bring much of their knowledge into the shared context, and allowing them to determine which types to include, the effectiveness of user-designer collaboration can be improved.
The knowledge generated through this research can be used to inform better ways of integrating the users in the product development process.
References


Buur, J. and Bagger, K. (1999). "Replacing usability testing with user dialogue". 

165


Kujala, S. (2007). "Effective user involvement in product development by improving the analysis of user needs". *Behaviour and Information Technology*.


Appendices
Appendix 1:

User consents forms
Research Information Package for Case Study (Designers)

EXPERIENCE DESIGN AND USER INVOLVEMENT IN THE PRODUCT-SERVICE DEVELOPMENT PROCESS

JongHo Lee
Ph.D Candidate / School of Design
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Description

This project is being conducted as part of Mr JongHo Lee's Ph.D of User Involvement studies in product-service development process.

- **purpose / objectives of the project**
  The objective of the project is to see how the user can be integrated into the early stage of the product-service development framework.

- **participant involvement**
  You, as a designer, will be asked to conduct a user-dialogue or co-creative session with selected users. The objective of the session is to generate innovative ideas and concepts from users for high-technology service industry. Service scenarios and situation with a technical brief will be given before the session.

  During the session, you will be asked to generate materials (verbal, visual) as much as you can for engaging users into the situation so that users can generate new ideas and concepts based on their experience.

  This will last no more than three hours

- **expected outcomes**
  Designers' behavioural pattern during user involvement.
  Materials being used by designers and
  Information generated by designers during the session.

Your involvement in this project will not directly benefit you. However it is hoped that by increasing the community's
understanding of these issues, the services provided to people such as you can be improved in the future.

Designers or design researchers with at least two years of experience will be selected and subjects who are not selected will be well informed the screening procedures and reasons.

Only the research team will have access to the information you provide. Your anonymity and confidentiality will be safeguarded in any publication of the results of this research, through the use of pseudonyms.

Your decision whether to participate in this project is voluntary, and you can withdraw at any time without comment or penalty. Your decision will in no way impact upon your relationship with QUT.

If you have any additional questions about the project or procedures, please contact main investigator on 011-402-8751 or jhlee@lion.woosong.ac.kr

If you have any concerns or complaints about the ethical conduct of the project, you should contact the Research Ethics Officer on 3864 2340 or ethicscontact@qut.edu.au

When the result is published, each participant will receive a copy of the publication.
Research Information Package for Case Study (Users)

EXPERIENCE DESIGN AND USER INVOLVEMENT IN THE PRODUCT-SERVICE DEVELOPMENT PROCESS

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Description

This project is being conducted as part of Mr JongHo Lee’s Ph.D of User Involvement studies in product-service development process.

• purpose / objectives of the project

  The objective of the project is to see how the user can be integrated into the early stage of the product-service development framework.

• participant involvement

  You, as a participant, will be asked to work with designers to generate new ideas and concepts for current market. You will also be encouraged to generate your own personal concerns on new technologies and new markets.

  During the session, you will be asked to utilize materials (verbal, visual) given by designers as much as you can for generating new ideas and concepts.

  The session will last no more than three hours.

• expected outcomes

  users' behavioural pattern during the session
  Materials being utilized by users and
  Information generated by users during the session.

Your involvement in this project will not directly benefit you. However it is hoped that by increasing the community's
understanding of these issues, the services provided to people such as you can be improved in the future.

Designers or design researchers with at least two years of experience will be selected and subjects who are not selected will be well informed the screening procedures and reasons.

Only the research team will have access to the information you provide. Your anonymity and confidentiality will be safeguarded in any publication of the results of this research, through the use of pseudonyms.

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When the result is published, each participant will receive a copy of the publication.
Consent Form (Designers)

EXPERIENCE DESIGN AND USER INVOLVEMENT IN THE PRODUCT-SERVICE DEVELOPMENT PROCESS

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Brisbane QLD 4001

Statement of consent

By signing below, you are indicating that you:

• have read and understood the information sheet about this project;
• have had any questions answered to your satisfaction;
• understand that if you have any additional questions you can contact the research team;
• understand that you are free to withdraw at any time, without comment or penalty;
• understand that you can contact the research team if you have any questions about the project, or the Research Ethics Officer on 3864 2340 or ethicscontact@qut.edu.au if they have concerns about the ethical conduct of the project; and
• agree to participate in the project.

Name

________________________________________

Signature

________________________________________

Date

______ / ______ / ______
Consent Form (Users)

EXPERIENCE DESIGN AND USER INVOLVEMENT IN THE PRODUCT-SERVICE DEVELOPMENT PROCESS

JongHo Lee
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(07) 3864 9184
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- understand that you are free to withdraw at any time, without comment or penalty;
- understand that you can contact the research team if you have any questions about the project, or the Research Ethics Officer on 3864 2340 or ethicscontact@qut.edu.au if they have concerns about the ethical conduct of the project; and
- agree to participate in the project.

Name

______________________________

Signature

______________________________

Date

_____/_____/_____
Appendix 2:

Transcripts
**Video Clip 1 (48’ 09’’)**

<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker</th>
<th>Protocol Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>07:40</td>
<td>Designer:</td>
<td>The diagram is developed from the diaries that you posted on the web. You need to attach these images onto the diagram.</td>
</tr>
<tr>
<td>08:17</td>
<td>User:</td>
<td>How? Do you mean that I need to glue these images? At these sections?</td>
</tr>
<tr>
<td>09:01</td>
<td>Designer:</td>
<td>You need to match these images onto proper sections in the diagram.</td>
</tr>
<tr>
<td>09:04</td>
<td>Designer:</td>
<td>I’ll give you more instruction.</td>
</tr>
<tr>
<td>09:14</td>
<td>Designer:</td>
<td>The objectives of this session are to identify a new solution from your perspectives. So, it is not that critical to glue images on the board. More important thing is to identify new products and services from the tasks. So, you don’t need to post every single image on the board. You can post a couple of key images on the board and then while explaining the images; you can mention your wish products and services.</td>
</tr>
<tr>
<td>09:40</td>
<td>User:</td>
<td>Nodding head.</td>
</tr>
<tr>
<td>09:48</td>
<td>Designer:</td>
<td>Secondly, we create a hypothetical day in the life based on your diaries. Hypothetical one. Then you two have to work together to create a new hypothetical user scenario. Hypothetical one.</td>
</tr>
<tr>
<td>10:14</td>
<td>User:</td>
<td>Nodding head.</td>
</tr>
<tr>
<td>10:38</td>
<td>Designer:</td>
<td>Do we need to explain to the participants how to do the image collage? Yes. Before the session, we analysed your diaries and noticed that several instruments were used in a car such as log book and so on. These are the things that you can post onto the personal device section. Then, when you talk to somebody or meet someone, the social device was being used. These devices are the things you can post onto the social device section. This section here is little bit interesting. If you have anything in your car for decoration, then you can post those things into the decoration section.</td>
</tr>
<tr>
<td>11:43</td>
<td>User:</td>
<td>I don’t need to put every single image on the board. Isn’t that right? I need to use only the relevant images for image collage.</td>
</tr>
<tr>
<td>11:51</td>
<td>Designer:</td>
<td>Yes, that’s right. You need to put descriptive images that you can explain later.</td>
</tr>
<tr>
<td>12:50</td>
<td>User:</td>
<td>What do you mean by organization objects? (looking at the generative board)</td>
</tr>
<tr>
<td>12:51</td>
<td>Designer:</td>
<td>Car maintenance history book and home accounting books which help you to organize something.</td>
</tr>
<tr>
<td>13:03</td>
<td>Designer:</td>
<td>When you talk about your experience earlier in this session, you mentioned that you happen to have a lot of things to record while driving. (Continue working)</td>
</tr>
<tr>
<td>17:05</td>
<td>User:</td>
<td>What do you mean by ‘others’? (looking at the generative board)</td>
</tr>
<tr>
<td>17:55</td>
<td>User:</td>
<td>I just wrote down my comments on the board.</td>
</tr>
<tr>
<td>18:08</td>
<td>Designer:</td>
<td>Other than family, friends and colleague. Sometimes, you happened to receive a phone call from someone who you do not know. That’s why we put the ‘others’ word on the board.</td>
</tr>
<tr>
<td>20:00</td>
<td>User:</td>
<td>You can use POSTIT. (Writing a comments on the board)</td>
</tr>
<tr>
<td>21:05</td>
<td>Designer:</td>
<td>That’s all right. That’s OK. We can use an eraser later.</td>
</tr>
</tbody>
</table>
User: It is lucky that I used a pencil instead.

Designer: I want you to use your imagination and generate new concepts and ideas based on the image collage board that you have just worked out. When you comment on the board, you can write down things that you needed.

User: I put hands-free in my left ear
User: I took English lesson
User: I travelled a lot since I am a salesperson.
That’s how I used traffic card as history book.
User: The main communication device in a car is a mobile phone
User: I use mobile phone for recording.
For example, scheduling and memo even if I am driving
User: I am a thumb people.
One hand on the wheel and the other hand for text messaging on a stop sign
Some people say it is dangerous. Some one thinks it’s amazing.
Not taking a phone call while some one is on the car is one way of protecting customers’ secret.
That is why I am using text messaging for urgent communication instead of hands-free.
I thought it is not illegal sending text message while driving.
That’s why.

User: I always keep the diary in the car.
I need to check schedules and keep memos all the time.
User: I use text messaging when some one is in the car while I use hand writing when no one is in the car
User: I use PDA for checking schedule and memos.
I wish my mobile phone has similar function.
User: I wish I can have more functionality in scheduling, memo writing and navigation.
User: The problem is that you can not use navigator while taking a phone call
User: My idea is the navigator with hands-free
So people can use both navigator and hands-free at the same time
User: The way people organise the information is totally up to their habit and characteristics.
Of course I have contact lists on my mobile phone.
But I use name card book when urgent.
User: I need a mobile phone with a functionality of organising and scheduling
I do not think it is quit new function since current mobile phone support these functions somewhat already

Designer: One question.
In your diary, you mentioned that you sometimes forgot what you have talked on the phone.
You have so many phone calls that you sometimes forget things.

User: I happened to have a case where the messages were mixed.
I happened to send parcels to a different person.
(Smiling)
The order came through at the same day and the order was similar.

User: When having a phone call, I need to summarize and record the key issues on the note right away.
But since I am driving, I can’t memorize all those important messages on my brain. That’s the problematic situation.

User: For example, by utilizing a voice recording technology which is available right now, you know you can use the voice recording function

Designer: But in that case, you need to listen the whole thing from the beginning.
So what if the mobile phone can display a key point on each message as a short message, that’s what you need. Isn’t that right?

42:06 User: Then, even if typical navigation system has a large display, Nate Drive usually utilizes a human voice and arrow symbols to indicate the direction. No map.

42:08 Designer: Shows negative reaction.

42:08 User: Is a map available? Is it due to the different model?

42:59 Designer: Then I want you to think about three major functions.

43:14 User: Hands-free? Function…

43:16 Designer: Yes, you can refer back to what you have told us.

43:21 User: Easy access to the important messages.

43:41 Designer: Signs of understanding

43:43 User: Next one is to control the voice level with direct access.

44:18 User: I saw someone is talking over phone with hands-free on it, yet, the voice of the opponent was so loud, everybody can hear what they were talking.

44:45 User: As I mentioned earlier, I need to talk to the receiver privately when I am with someone else on the car.

By pushing the silence button, I can talk privately while not disturbing the partner in the car.

And that button should be invisible because I want to use this function then I need privacy. It will be just perfect for me.

Designer: You have a situation where you have to mumble on the phone to let the opponent on the phone know that someone else is listening your voice on the car.

User: That’s right.

User: Finally, I want to talk about the speed dialling feature. I know that I do manage the phone call list.

Even if I do not have an idea how to do it better, I want something very innovative and easy to use.

I need to use both Personal Computer and mobile phone to mange the phone call list.

But I want the things can be done without Personal Computer.

Designer: Do you mean automatic way?

User: No automatic.

Voice recognition system.

User: Detail concept – operational level)

With voice recognition technology, I want to manage the phone call list – such as creating a folder, recording a caller id, sorting and searching the list if this can be done or not.

User: I should push a keypad several times to save new caller’s name into my phone.

48:07 User: I want the phone recognize my voice message so that I can just do the operation by saying a short message such as ‘save’ and ‘go’.

48:09 Designer: Do you have any comments or ideas on the thing that HongSuk has presented?
### Time | Speaker | Protocol Statement
--- | --- | ---
00:00 | Designer: | Instruct
00:24 | User: | What do you mean by decorative objects? (looking at the generative board)
00:26 | Designer: | Decorative tools?
00:34 | Designer: | ‘Mood light’, ‘Masimaro’
00:36 | Designer: | Your ‘Masimaro’ is the sample of decorative objects.
01:55 | Designer: | What is the most expensive one in your car?
02:07 | User: | Thinking…. ‘Masimaro’.
02:18 | User: | There is no ‘information gathering objects’ in this diagram (looking at the generative board).
02:23 | Designer: | Consider it as a recording object.
02:26 | User: | Recording device?
02:28 | User: | Is ‘car navigator’ a recording object?
02:37 | Designer: | Are you using a navigator for your own purpose?
02:41 | User: | (Not showing any attention to the designer). Of course I do.
03:19 | Designer: | You don’t need to put every single image on the generative board. You need to just explain it.
03:22 | User: | You should have told me.
03:22 | Designer: | I did
04:46 | User: | Why do I need to put these images on the generative board? I already show these images through the internet. *(What are the intentions of doing this?)*
05:16 | User: | I’m done.
05:17 | Designer: | Then, you need to tell us new ideas and concepts spontaneously by looking on the board that you have just finished.
06:55 | User: | This is my personal belongings. Among them, look at this mobile phone.
07:03 | User: | The screen should be upside down when charging a battery, that is a real problem. This sliding-type mobile phone quite easily shut down when car is moving.
07:36 | User: | I beep to the person, I feel really sorry.
07:44 | User: | Then, something like ‘dododo’ might be useful.
07:52 | User: | I used to drive a car inside the university. The students have to give a way to the car. So, I put a loud music instead.
08:48 | User: | This business card can be useful when no one seemed to have anything to do.
09:01 | User: | I want the dashboard itself turned out to be a recording device.
09:13 | User: | This picture shows car mirror.
09:31 | User: | Woman does not want to go to the car service centre alone.
09:37 | User: | Car log book was very useful.
10:06 | User: | This is my car. I managed to clean that up.
11:20 | Designer: | I want you to put extra three images on top of the board.
11:30 | User: | *(Putting images on the board)*
12:47 | Designer: | I want you to think about three major functions.
13:10 | User: | Thinking…..
13:14 | User: | Except the calling button. Right?
13:20 | Designer: | Yes, you should think that this service is for social communication.
Then first function should tell my position to my friends.
Also, identify friends’ locations.
And then, optimise the way back home and the status of friends’ availability.
The machine should inform me ‘now you meet someone.’
If there is no one around me, then search for a one who is not busy.
That is function one.
Three functions?
Second thing, Second thing
If you are in a car, you are going somewhere. Right?
You happened to forget something.
The function should be able to check these situations and let me know ‘You shouldn’t go back to home, You should do this and that.’
Then, do you want the machine inform you when you activate the button?
Yes. If you are in the car, that means you finish this situation and move toward the other one. In that situation, I want the machine to tell me you are not supposed to go the other place.
The thing that manage my schedule or other things.
The third thing is…
How do you do?
Schedule management?
I use POSTIT when I do scheduling. I put POSTIT on my mobile phone. So that I flip over the phone, I can see that.
I couldn’t do that after I changed my mobile to slide type.
That caused me break the appointment.
The most important thing in mobile phone is….
Third thing is….
Something that comes with emotional pleasure.
I do not know what it could be…
I want one emotional feature in my device.
You mentioned that MP3 player and mood light….
Then if you turn on, let me imagine big and huge mood light.
What if all the car is cover with mood light?
I am not doing that often. But using Jungwhan’s story, he is dating with someone in the car. You lay down on the car and imagine the car is covered with mood light.
Car top can be used as a movie screen.
Could be interesting.
Mood light button
Mood light button.
Music itself.. It could not be possible to follow my status. But, anyway, emotional one.
For example, perfume sort of thing.
Things like that. Emotional one.
If then, how much do you think you can pay for the machine that you have just created?
I do not want to spend too much money on that.
How much do you willing to pay?
I want the hands free comes with the car.
And then I will buy that car.
Usually, the car options are expensive.
50 M won
16:58  End of the session
**Video Clip 3 (38’ 55")**

<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker</th>
<th>Protocol Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>00:48</td>
<td>Designer:</td>
<td>Instruct. Tell us about a day in the life.</td>
</tr>
<tr>
<td>00:54</td>
<td>User:</td>
<td>Is it OK to make up?</td>
</tr>
<tr>
<td>00:57</td>
<td>Designer:</td>
<td>Yes. Important thing is the user will utilise new service software in his life.</td>
</tr>
<tr>
<td>01:11</td>
<td>Designer:</td>
<td>For example, new recording service is coming out.</td>
</tr>
<tr>
<td>01:22</td>
<td>Designer:</td>
<td>You should develop a story someone using that service.</td>
</tr>
<tr>
<td>01:25</td>
<td>Designer:</td>
<td>Hypothetical person</td>
</tr>
<tr>
<td>01:28</td>
<td>User:</td>
<td>Something that I really wanted is all available.</td>
</tr>
<tr>
<td>01:30</td>
<td>Designer:</td>
<td>Yes. All resolved</td>
</tr>
<tr>
<td>01:48</td>
<td>User:</td>
<td>Can I have something to write down?</td>
</tr>
<tr>
<td>01:52</td>
<td>User:</td>
<td>Working</td>
</tr>
<tr>
<td>02:41</td>
<td>User:</td>
<td>We should separate weekdays and weekends</td>
</tr>
<tr>
<td>02:44</td>
<td>User:</td>
<td>Should we make two stories?</td>
</tr>
<tr>
<td>02:45</td>
<td>Designer:</td>
<td>Not necessarily</td>
</tr>
<tr>
<td>02:47</td>
<td>User:</td>
<td>Then, Just One day…</td>
</tr>
<tr>
<td>02:47</td>
<td>Designer:</td>
<td>Just one day.</td>
</tr>
<tr>
<td>03:42</td>
<td>User:</td>
<td>Discuss about who should be main actor for the story.</td>
</tr>
<tr>
<td>03:42</td>
<td>User:</td>
<td>Would it be a man or a woman?</td>
</tr>
<tr>
<td>03:50</td>
<td>User:</td>
<td>Discussion (Asking about each others’ schedule)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Develop a story</td>
</tr>
<tr>
<td>21:53</td>
<td>User:</td>
<td>Done</td>
</tr>
<tr>
<td>21:53</td>
<td>Designer:</td>
<td>Then you can present your story</td>
</tr>
<tr>
<td>22:20</td>
<td>User:</td>
<td>Can I say like a diary?</td>
</tr>
<tr>
<td>22:21</td>
<td>Designer:</td>
<td>Yes</td>
</tr>
<tr>
<td>22:27</td>
<td>User:</td>
<td>He is Mr. Kim</td>
</tr>
<tr>
<td>22:30</td>
<td>User:</td>
<td>He is about late 20 to early 30s.</td>
</tr>
<tr>
<td>22:41</td>
<td>User:</td>
<td>Tell the story</td>
</tr>
<tr>
<td>23:10</td>
<td>Designer:</td>
<td>Continue Sound ‘m’</td>
</tr>
<tr>
<td>29:03</td>
<td>Designer:</td>
<td>How about movie? Is it on a phone?</td>
</tr>
<tr>
<td>29:25</td>
<td>User:</td>
<td>Inside a car. Go to Han River.</td>
</tr>
<tr>
<td>32:00</td>
<td>Designer:</td>
<td>How to make a card? Is that a service? Or?</td>
</tr>
<tr>
<td>32:26</td>
<td>User:</td>
<td>Probably, built in service.</td>
</tr>
<tr>
<td>32:30</td>
<td>User:</td>
<td>(Reason to believe)</td>
</tr>
<tr>
<td>33:00</td>
<td>Designer:</td>
<td>Then, how the story ends?</td>
</tr>
<tr>
<td>33:11</td>
<td>User:</td>
<td>Back to home.</td>
</tr>
<tr>
<td>33:27</td>
<td>Designer:</td>
<td>When you do write a story, what was you feeling?</td>
</tr>
<tr>
<td>33:35</td>
<td>Designer:</td>
<td>What’s your first impression about the social network service. Then, after you wrote a story, is there any difference?</td>
</tr>
<tr>
<td>33:48</td>
<td>User:</td>
<td>For Mr. Kim.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Everything should be aligned from the beginning.</td>
</tr>
<tr>
<td>34:10</td>
<td>User:</td>
<td>You are always hooked on the internet.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Life might be better.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Much easier…</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Convenient</td>
</tr>
<tr>
<td>34:50</td>
<td>User:</td>
<td>You can control over your time better than ever with this service.</td>
</tr>
<tr>
<td>36:18</td>
<td>Designer:</td>
<td>Last question. If you want to say anything, please do.</td>
</tr>
<tr>
<td>36:33</td>
<td>User:</td>
<td>This is very short period of time.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>But I wish I could contribute to the development of a new service.</td>
</tr>
</tbody>
</table>
37:20 User: The service will be a part of myself. Security is very important. Should be considered.

38:50 Designer: Done.
### Video Clip 4 (33’03’’)

<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker</th>
<th>Protocol Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>09:02</td>
<td>Designer:</td>
<td>(Hand over the paper prototypes)</td>
</tr>
<tr>
<td>09:07</td>
<td>User:</td>
<td>It looks like a ‘chance card’</td>
</tr>
<tr>
<td>09:07</td>
<td>Designer:</td>
<td>Actually, that is a mobile phone. (Smiling)</td>
</tr>
<tr>
<td>09:07</td>
<td>User:</td>
<td>Little bit confused</td>
</tr>
<tr>
<td>09:17</td>
<td>Designer:</td>
<td>It might be good if we have a real game playing in the prototype. Yet, that was impossible, so we put only a name - ‘hamburger game’ that we can’t play in real. So, we thought about preparing a ‘monopoly’ board game.</td>
</tr>
<tr>
<td>09:35</td>
<td>User:</td>
<td>‘Monopoly’, that is good.</td>
</tr>
<tr>
<td>09:36</td>
<td>Designer:</td>
<td>But, that is face-to-face board game. It is little bit different from the given situation where you don’t need to see each other. (Think about the mobile game)</td>
</tr>
<tr>
<td>09:44</td>
<td>User:</td>
<td>Then, roll the die to the side way.</td>
</tr>
<tr>
<td>09:48</td>
<td>Designer:</td>
<td>Eh (Probably not)</td>
</tr>
<tr>
<td>09:56</td>
<td>User:</td>
<td>How about playing a ‘Genga’. One can play apart from the actual board.</td>
</tr>
<tr>
<td>10:00</td>
<td>Designer:</td>
<td>‘Rock, Scissor, Paper’ that is the game. You can play apart from the board and you don’t need to see each other. (Smiling)</td>
</tr>
<tr>
<td>10:13</td>
<td>User:</td>
<td>‘Rock, Scissor, Paper’? (Acting up a real game gesture)</td>
</tr>
<tr>
<td>10:22</td>
<td>Designer:</td>
<td>(Explains the situation)</td>
</tr>
<tr>
<td>10:27</td>
<td>User:</td>
<td>Who should I act up?</td>
</tr>
<tr>
<td>10:29</td>
<td>Designer:</td>
<td>Whatever you want…</td>
</tr>
<tr>
<td>10:31</td>
<td>User:</td>
<td>You should act up ‘Dong Gun’.</td>
</tr>
<tr>
<td>10:32</td>
<td>Everyone:</td>
<td>Oh~~~</td>
</tr>
<tr>
<td>10:43</td>
<td>Designer:</td>
<td>(Indicating that there is an actual map on the wall)</td>
</tr>
<tr>
<td>10:51</td>
<td>User:</td>
<td>Do it?</td>
</tr>
<tr>
<td>10:51</td>
<td>Designer:</td>
<td>Yes.</td>
</tr>
<tr>
<td>10:52</td>
<td>User:</td>
<td>What?</td>
</tr>
<tr>
<td>10:55</td>
<td>Designer:</td>
<td>You do act up like you meet as a friend for a drink.</td>
</tr>
<tr>
<td>10:55</td>
<td>User:</td>
<td>‘How are you my friend?’ ‘Long time no see’ ‘How about a drink tonight?’ Is it right?</td>
</tr>
<tr>
<td>10:55</td>
<td>Designer:</td>
<td>That’s right. (Smiling)</td>
</tr>
<tr>
<td>11:00</td>
<td>User:</td>
<td>Should we continue?</td>
</tr>
<tr>
<td>11:03</td>
<td>Everyone:</td>
<td>Laughing Wha haha ~~~~~</td>
</tr>
<tr>
<td>11:09</td>
<td>User:</td>
<td>(Looking at the map on the wall) We should talk while referring back to the map on the wall.</td>
</tr>
<tr>
<td>11:14</td>
<td>User:</td>
<td>(Acting up)</td>
</tr>
<tr>
<td>11:28</td>
<td>User:</td>
<td>(CCN: Co-contextualization with users)</td>
</tr>
<tr>
<td>11:50</td>
<td>User:</td>
<td>Shouldn’t it be stopped?</td>
</tr>
<tr>
<td>12:00</td>
<td>Designer:</td>
<td>(Thinking) Did you decide?</td>
</tr>
<tr>
<td>12:07</td>
<td>Designer:</td>
<td>Ladies, you go the other side.</td>
</tr>
<tr>
<td>12:12</td>
<td>User:</td>
<td>We are passing by the crosswalk.</td>
</tr>
<tr>
<td>12:21</td>
<td>Designer:</td>
<td>Let’s start again.</td>
</tr>
<tr>
<td>12:25</td>
<td>User:</td>
<td>(UCE: Acting up)</td>
</tr>
<tr>
<td>12:54</td>
<td>Designer:</td>
<td>Do you really make a decision that quick?</td>
</tr>
<tr>
<td>12:56</td>
<td>User:</td>
<td>No, not in real situation. I wondered around.</td>
</tr>
</tbody>
</table>
Looking and talking to someone on a street….

Designer: Let’s change the position again.

You are in a bar.

Should we act like we are drinking a beer at the bar? Or…

Yes, in the bar….

Then drink….

Here you are.

A!

Is it something wrong?

No, (Embarrassed) Things go too well.

It feels like something wrong.

The situation goes wrong if we meet someone we know.

We should be abandoned, so that we will have a chance to meet someone we do not know.

That would be better.

Acting Up

Finishing acting Up

Referring back the prepared plan sheet.

Then, how about ladies?

Suppose that you ladies are in the restaurant for dinner. Please act on that after the scene.

Acting up What’s the menu?

Finishing acting up

Is this game is inside the ‘NATE’ service? Do we just play game?

This game allows you to meet someone after the game. Is that right?

Nodding her head.

Is ‘doublin’ a name of the bar? (Looking at the prototype)

Yep. There is not much function in this paper prototype. But, you can add ‘message’ function in this prototype.

After the game, whoever wins the game can send a message to the opponent.

Suppose that we already should know the opponent’s phone number. Is that right?

You can create your own function.

Let’s use it.

But, using this has a bit of possibility of danger.

Well. That’s right. However, only cool guy might use it.

No one will use it.

Ha Ha Ha

Let’s stop

Let’s drink

(Acting up)

I’ve got NATE service.

What is that?

You can use this service whenever you would like to meet a girl.

Can we account on it?

Shouldn’t we play together?

That’s right, we should play the game together.

Ladies, you should play the game too.

Acting up and turn-taking

(Break)

(Start again) Can I write something on it?

(Drawing a mobile phone interface screen)

This service can be more suitable for younger generation
19:51 User: Teenage students?
20:00 User: We, as a woman, think this service is a high risk. We don’t know who we will meet.
20:16 User: But, for men, this service can be quite acceptable.
20:17 User: Rather, we altogether have a meeting and play a game as a team.
20:30 User: They should have a data
20:45 User: Hmm. We can trick this service by bringing our friends and play a game.
20:47 User: That will be more likely happen.
20:51 User: Whoever want to have a free beer can deceive the software
20:59 Designer: You seemed to decide where to go
21:09 User: Yes, we are going the same place again.
21:19 User: Yes, we first check on the internet.
21:22 User: Or new friend can suggest new restaurant
21:29 User: We never get into the any restaurant on the street
21:35 Designer: Nodding head. Yes…
21:45 User: People tend to account on the internet a lot.
21:52 User: Positive or negative comments on the restaurant
22:08 User: Information with emotional value.
22:10 User: Nodding head too.
22:33 Designer: Where can I get such information?
In Naver Location Service?
22:53 User: On Saturday afternoon, we have a lot of TV program with food on it.
23:03 User: Right after the program, send a text about the location of the restaurant.
Then, people might use it a lot.
23:28 Designer: Stop
23:34 User: Shall we continue?
23:39 Designer: You were doing a game.
23:00 User: Acting up
23:34 User: How should I know?
23:34 All together: Ah~~~~
23:45 User: Then, tell me your phone number.
23:50 User: I will give you a call when I get there.
(Short break)
23:58 Designer: You mentioned that ‘how should I know?’ Right?
23:00 User: Don’t you think you are not going to use it?
23:06 User: In my case, I might not use it. I might use it only if the service provides free beer.
23:28 Designer: You think you are going to use it?
23:32 User: I use it. It has a free beer chance.
23:41 Designer: What if the service provides a free when you go together.
23:44 User: I might use it once.
23:56 User: Someone might use it just for talking not gaming.
23:59 User: This service might be good when you are waiting for someone on the street.
23:44 Designer: Then where do you go when you are waiting?
23:50 Designer: Why are you waiting for your friend on a street?
23:02 User: Just because we don’t know yet where to go.
23:16 User: I think this service is for younger generation, not for us.
23:36 User: If it will target the university students, modify the concept.
23:45 User: If it is not, it should target for younger generation.
23:02 User: How about board game room?
23:15 All together: Nodding head all together.
23:34 Designer: Let’s wrap it up
39:49 Designer: How will you call the other partner?
40:01 User: Call the opponent with no number function.
            Then look for a person who is talking a phone call.
40:21 Designer: Nodding head.
41:21 Designer: Men will go to use the service. Right?
42:04 (End of the first session)
**Video Clip 5 (35’ 23’’)**

**Time**  | **Speaker** | **Protocol statement**
--- | --- | ---
41:06 | Designer: | I will show the sample site.  
41:16 | Designer: | Time has already passed much  
41:23 | Designer: | I will show you sample sites. I want you to tell me what you think about each sample while reviewing them.  
41:25 | Designer: | I will demonstrate the software by myself since you are new.  
41:35 | User: (Smiling) |  
41:35 | Designer: | What this program does for you was that when you need to write down something, this program gives you a tool for writing a simple memo whenever you need while you are surfing on the web.  
42:01 | Designer: | I know you do web surfing a lot. While you do surfing, you felt that this is worth to keep, and then you can pop up open notebook, which is located at the bottom of the browser.  
42:22 | Designer: | If you click this, then note pad pops up and various notes can be added on top of the existing notes.  
42:45 | Designer: | You can save the note.  
42:46 | Designer: | One more good thing was that while dragging the note, you can save the note as well as web address.  
43:33 | Designer: | If you see, the note shows what I have dragged. Look at the page where I have created. I can create a note pad with contents from web pages, even images.  
44:18 | Designer: | This service can have a feature of clipping, linking the contents of web pages with your memo.  
44:32 | Designer: | That’s all  
44:36 | Designer: | This is the first one. How do you think?  
44:43 | Designer: | This can serve you anytime whenever you need, even if it is not synchronised with mobile services.  
44:46 | User: | That looks convenient.  
44:51 | Designer: | I will show another working prototype.  
Designer: | Showing the demonstration |  
45:06 | Designer: | This is different than others. This is for short message.  
45:24 | Designer: | This is a scrap. You can create the categorisation that you need.  
45:52 | Designer: | This page was shared with my boy friend.  
46:09 | Designer: | This can be similar but little bit different.  
46:16 | Designer: | I want you tell me the features and functions that you like and don’t like.  
46:29 | Designer: | Again, you can add your own opinions on the existing functions and features that you like.  
46:31 | User: (Thinking…..) |  
46:46 | Designer: | You can even say, it looks good, yet I wouldn’t use it.  
46:47 | User: | It looks convenient, yet it doesn’t seem to have any innovative features at all. I don’t see any functions or features that change the whole paradigm.  
46:55 | Designer: | How about using this program for your own case?  
47:01 | User: | I might keep on using my own program.  
47:04 | Designer: | Traditional way?  
47:06 | User: | First of all, I need to move all of my stuff to a new one. And then, I need to modify it.  
47:13 | Designer: | What if you can move all of your stuff including the history to a new one
easily.

47:19 User: Then, there is another thing that irritates me - “Stability”. This new program needs to be settled down. I rather use this traditional program even if it is little bit inconvenient since it is stable.

47:36 Designer: (Signs of understanding) Nodding head.
47:57 User: Even if this traditional program is now inconvenient, wouldn’t it be improved later on?
48:26 Designer: This is second prototype.
48:40 Designer: I want you to just look at it.
48:41 Designer: Would it be handy if you have this program when you need to write down a short note?
48:44 User: Smiling.
49:49 Designer: This is a sort of bulletin board. Yet, this can use grouping feature. So, you can work hierarchical work easily with this software.

50:50 Designer: How do you think?
50:53 User: It is a bit weak. (Smiling)
50:58 Designer: (Little bit upset) Then, what would it be good?
51:02 User: (Mumbling) You know… Um… The reason why I am doing a note taking is to organize information. This program is more than note taking. If you need to do format a document, you have other options.
51:22 Designer: (Signs of understanding) Nodding head.
51:29 User: When you need to write a note with a style, you have a ‘MS Word.’
51:31 Designer: But, ‘MS Word’ is not a web-based program. You can not upload a ‘MS Word’ document to a web-site.

51:37 User: (Signs of refusal) You can upload it.
51:39 Designer: (Signs of refusal) You can not.
51:39 User: (Signs of refusal) Yes, you can.
51:39 Designer: (Signs of understanding) As a attachment file?
51:40 User: Yes.

Designer: (Signs of refusal) But, you can not upload a formatted document as it is onto the web.

51:46 User: (Signs of understanding) A~~. You can upload the file as it looks.
51:53 Designer: That is exactly how it looks on the web.
51:59 User: (Um……..) It looks convenient. It looks good though.
52:05 Designer: (Assuring comments) It looks good, yet it feels like you don’t want to use.
52:08 User: (Signs of refusal) No, No. What I mean by that is not that I don’t want to use it.
52:11 Designer: (Rephrasing comments) You still don’t know your feeling?
52:22 User: (Rephrasing comments) I don’t know yet. This is… Um…. (Thinking)
52:26 User: Is this a technologically hard work?
52:30 Designer: Not really.
52:34 Designer: But no one is ever doing like this yet.
52:42 User: (Reasoning) If this is not technologically hard and people feel that it is convenient function, then wouldn’t it be possible for other company to copy it quickly?

I don’t see any reason why people want to change their program just because of this function.

52:51 Everyone: (Signs of agreement) Nodding head.
53:00 Designer: Is it at least attractive?
53:04 User: It looks convenient. Yet, I don’t think people will change their software just because of that function.

53:19 Designer: I will show the third prototypes.

(Demonstration and user exploration)
Designer: Ask users to try out the new functions
Designer: I want you to use it and write something on it.
Designer: Why don’t you do it.
User: (Using)
Designer: This is so called template. I want you to test it one by one.
Designer: Push another button.
Designer: In one page, you can create photo gallery, schedule and so on
Designer: Why don’t you write anything on it
User: (Signs of appraisal) I think this function is good.
Designer: I want you to put your message.
User: Umm...(Still using)
User: Should I do something?
Designer: That’s enough. What do you think?
User: (Stop using the software)
User: It is good. I feel like I am going to use some of the functions of this program.
Designer: What?
User: This weekly schedule....
User: Will I ever have wanted to link my documents to the others?
Designer: mm...
User: That will be impossible.
User: I don’t know what is in my documents. How should I want to make a link?
Designer: (New concept) What if the program provides you an automatic feature?
Designer: Similar page... Sort of thing
Designer: Similar to the recommendation
User: Within the bulletin board?
User: Yes. That will be OK.
User: That will be OK but not necessarily.
User: I’ve got a feeling that google mail does the similar thing. But to me, it was just a junk.
User: What if you have the entire link in your left side of the screen.
User: That’s somewhat unrealistic.
User: If it works, it will be clutter.
User: The link will be chaos.
Designer: Just because you can not account on the recommendation?
User: Yes.
User: You never satisfy the user with those features, that I am sure.
Designer: What if the link works based on your will.
Designer: I will ask you a final question. When you read something, do you ever feel that you want to read another article?
Designer: Suppose you are reading one article in a particular folder. Do you ever feel that you want to read an article that happened to be saved in another folder?
User: Yes, of course
Designer: Can you tell me any of your experience?
User: (Confused) Reading the paper, and ....
Designer: What I mean by that is.... For example, while you read some article, you happened to find a word ‘SDS’. Then, I want to read something about SDS in my folder. Do you ever feel in that way?
User: Nodding head.
Designer: Is there any other case?
Designer: Is it common in your case? While reading the article, you feel that you need something else.

User: Not really.

Designer: Same folder. I see.

Designer: We will finish up with the following two questions. How do you think about the situation?

Designer: For example,

User: I don’t listen very carefully.

Designer: Do you happened to have a case like this?

Designer: You said you are using a planethood at the office? Is there any thing get better?

User: That’s obvious. It allows us to work collaboratively.

Designer: You said you are sharing the documents with others using a planethood.

User: I prefer to have a paper instead of electronic one.

Designer: Nodding head.

Designer: The last question is that do you prefer the cyworld menu structure?

User: For me, it is quite clear to me.

Designer: What if you can change the main page of the cyworld?

User: I don’t think it is necessary. That’s too much.

Designer: How about in club?

User: Hmmmmm…

User: I don’t think it is that convenient.

Designer: This is the sample page. How do you think?

User: I think there is something more.

User: I think this can be applicable to my case if it changes little bit.

User: I think this new interface help me a lot.

Designer: Do you ever have a case recently?

User: I didn’t have the case. But I think I will like it.

User: In this new interface, I feel that it will be fresher.

Altogether: Nodding head.

User: I think I will use it.

Done.
### Video Clip 6 (15’59")

<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker</th>
<th>Protocol statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>35:51</td>
<td>Designer:</td>
<td>We will show some demonstration programs. I want you to tell us how you think and feel about the program after trying out the demonstration software.</td>
</tr>
<tr>
<td>36:25</td>
<td>Designer:</td>
<td>Do you know wiki? Have you ever used a wiki?</td>
</tr>
<tr>
<td>36:28</td>
<td>User:</td>
<td>Yes.</td>
</tr>
<tr>
<td>36:30</td>
<td>Designer:</td>
<td>In what purpose?</td>
</tr>
<tr>
<td>36:34</td>
<td>Designer:</td>
<td>You happened to mention about the ‘penpic’ wiki the other day</td>
</tr>
<tr>
<td>36:37</td>
<td>User:</td>
<td>Penpic?</td>
</tr>
<tr>
<td>36:39</td>
<td>Designer:</td>
<td>Shin Wha Penpic?</td>
</tr>
<tr>
<td>36:43</td>
<td>User:</td>
<td>That is not a penpic. Just a pen club site of GOD where I use wiki as a sub menu. GOD pen site was famous for a member whose interest was multi-purpose.</td>
</tr>
<tr>
<td>37:05</td>
<td>Designer:</td>
<td>You used to be a big fan of GOD.</td>
</tr>
<tr>
<td>37:07</td>
<td>User:</td>
<td>I used to be a fan.</td>
</tr>
<tr>
<td>37:08</td>
<td>Designer:</td>
<td>Not any more?</td>
</tr>
<tr>
<td>37:11</td>
<td>Designer:</td>
<td>You did a lot of on-line community activities</td>
</tr>
<tr>
<td>37:15</td>
<td>User:</td>
<td>I used to manage on-line fan club sites.</td>
</tr>
<tr>
<td>37:24</td>
<td>User:</td>
<td>But I do not want to use Daum or Naver Café services.</td>
</tr>
<tr>
<td>37:31</td>
<td>Designer:</td>
<td>When you were using wiki, wiki is little bit different. How do you think about using a wiki when you were the leader of the on-line club?</td>
</tr>
<tr>
<td>37:43</td>
<td>User:</td>
<td>The wiki was just one part of the fan club service. The whole site was nothing to do with wiki.</td>
</tr>
<tr>
<td>37:50</td>
<td>User:</td>
<td>That was exactly the same as wikipedia. User interface and so on…</td>
</tr>
<tr>
<td>37:55</td>
<td>Designer:</td>
<td>What subject people were?</td>
</tr>
<tr>
<td>37:56</td>
<td>User:</td>
<td>At the beginning, the people write a short message about GOD. Then, it was grown to be a representative of real idols in Korean music market.</td>
</tr>
<tr>
<td>38:05</td>
<td>Designer:</td>
<td>Did you post something on the fan-club service?</td>
</tr>
<tr>
<td>38:07</td>
<td>User:</td>
<td>Nothing about GOD or ShinWa. But things about soccer… World cup and so on. (Giggling)</td>
</tr>
<tr>
<td>38:25</td>
<td>Designer:</td>
<td>This is a software called paint. I want you to write a new message in this program.</td>
</tr>
<tr>
<td>38:30</td>
<td>Designer:</td>
<td>Why don’t you try it out?</td>
</tr>
<tr>
<td>38:33</td>
<td>Designer:</td>
<td>You can put anything you want.</td>
</tr>
<tr>
<td>38:38</td>
<td>Designer:</td>
<td>Try to put on something that you might put on real life</td>
</tr>
<tr>
<td>38:39</td>
<td>Designer:</td>
<td>Didn’t you go to movies?</td>
</tr>
<tr>
<td>38:48</td>
<td>User:</td>
<td>(Thinking)</td>
</tr>
<tr>
<td>38:51</td>
<td>Designer:</td>
<td>Recent movie or drama?</td>
</tr>
<tr>
<td>38:53</td>
<td>User:</td>
<td>What did I see recently?</td>
</tr>
<tr>
<td>38:59</td>
<td>User:</td>
<td>I should open a word document.</td>
</tr>
<tr>
<td>39:04</td>
<td>User:</td>
<td>I didn’t update the word file recently.</td>
</tr>
<tr>
<td>39:11</td>
<td>User:</td>
<td>(Putting something on the software)</td>
</tr>
<tr>
<td>39:20</td>
<td>Designer:</td>
<td>You aren’t using a tag system?</td>
</tr>
</tbody>
</table>
39:21 User: I do use tag, only the message that I am creating.
39:32 User: If it is a sound of music. Do this.
39:34 Designer: If you see here, here is a template function. I want you to try out. If you click it changes. And you can choose.
40:02 User: This can be different based on the types. For example, in my case, I will use weekly calendar for keeping my schedule. If it was a case of a sound of music, I might use this menu for just post-it.
40:34 Designer: Click there. And then try it out.
40:42 Designer: Try edit, you can put things that you want after erase the things.
40:45 User: Should I have a image in order to put a new image?
40:50 Designer: You can upload a image by simply clicking the previous image.
40:57 Designer: Try to use text mode.
41:05 User: (Writing a message)
41:16 Designer: Do you memorise every name?
41:20 Designer: There is a editor function on the upper side of the screen.
41:35 Designer: You seemed not to be satisfied.
41:37 User: I want to change the font.
41:41 Designer: Size?
41:41 User: Size and styles.
42:00 Designer: The network is not good.
42:03 Designer: (Fixing)
42:07 User: (Shows what she has created) For example, Like this
42:25 Designer: Make it smaller, smaller
42:28 User: (Having a trouble to show something on the screen)
42:32 Designer: This is the movie web site that I usually go.
42:49 User: There is a list of movies.
43:00 User: After quick reviewing, then I am copying necessary information. Do as I do in real world?
43:11 Designer: Do it as you do.
43:17 User: Then, I will use my current work for testing the program. It will make it much more easier.
43:22 Designer: Word?
43:23 User: Yes, Word. (Working)
43:45 User: (Having a trouble using the software)
43:51 Designer: Technical difficulties.
44:02 User: I will start again from the previous one (Working)
44:49 Designer: When you write this article, do you refer back to the original article?
44:50 User: Yes.
44:55 Designer: Translate?
44:55 User: Sometimes, I translate or I put my knowledge
45:00 Designer: Do you print or use ‘ALT-tab’?
45:04 User: Sometimes, I use my word file or sometimes I use my memory.
45:17 Designer: This software has a function which allows you to make a link on the site. Let’s say you put ‘dumbldor’ in that.
45:31 Designer: Let’s do it in that way?
Designer: You mentioned that it would be convenient. If you do it real, how would you feel?
User: How should I make a link?
Designer: ‘Dumbledore’
User: (Working)
Designer: That’s right. You should make a new one.
Designer: You can take the link out.
User: I can organise like this. And...
Designer: How do you think about it when you really use it? What is the usability problem?
User: Not many fonts and...
Designer: Do you need more fonts or do you need what you usually use.
User: Doesn’t have what I usually use.
User: I don’t know how to use a link function.
Designer: Then could you push the link button?
Designer: Write anything, then....
Designer: There should be a test page.
Designer: Try ‘test’ page.
Designer: See. There is a test page.
Designer: Then make a link. (After following the user’s action)
Designer: Then save the file
Designer: You missed the save button. (Clarifying the reason)
User: Nodding head (Signs of understanding about how program works)
User: I think it is better than wiki.
User: (Reasoning) For example, you have to put a symbol in wiki. And you have to save it.
User: But, if you do link with the button like this, I think it will be easier than using wiki.
User: You have to memorise the symbol.
Designer: What if it uses Hangul, do you think you will use it?
User: I think I will use it for my personal website.
User: But I will still use the Word file.
Designer: What if the word document provides link function, Do you think you are going to use the function?
User: If it is possible in Word file?
User: Yes, I will do.
Designer: What is your favourite function in Word? You mentioned font.
Designer: Even if you are the only person seeing the document, you mean you need to use the font?
User: This is quite convenient for my own eye.
Designer: There is a way in this program. For example, you can change the font style using CSS function. But you cannot change the word by word.
User: Nodding head.
Designer: You mentioned that you create new page, then start with new tiles Is that right?
User: Nodding head.
Designer: You use ‘search’ function.
User: Yes (Nodding head)
Designer: Is there any other functions?
User: Image insertion function
Designer: Umm.
Designer: There is another service that I would like to show you. But there is no time to do that. I want you to try out on the internet and let us know how you think....

Designer: One more question. Someone hates the auto-formatting function in Word file. For example, bulletin point makes the whole document changed. Someone say they hate these function. Do you like it?

User: For example, in Word document, if you click '*' and enter, then the word generate the automatic formatting. I think it is uncomfortable.

User: But, I use it as it is.

User: Because I can change it later.

Designer: Nodding head