Design For Experiencing and User Involvement in the Product-Service Development Process

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1.0 Introduction

Designers today are required to work with consumers more directly to understand the way consumers interact with the artifacts (products and services). However, not many have studied how and why interaction between users and designers works at the early stage of the process. This study is to investigate the ways designers are dealing with users and user experiences for the purpose of gathering information, provoking inspirations, and encouraging active participation and collaboration within the new product-service development environment. The investigation of these interactions between users and designers during the design process will help designers and design educators understand ways of dealing with users and user experiences more systematically and efficiently as a part of design practices.

1.1 Design for experiencing

Pine and Gilmore (1999) introduced the concept of 'experience' as a new economic value emphasizing personal interactions with the environments being served. They argued that a traditional product development approach which focuses only on the 'price' value will fail to meet the customer expectations that put a value on the 'time' they spend.

As such, the 'experience' as an economic value is determined directly by customers not by manufacturers and distributors. Pine et al. (1999) also argued the need for re-structuring the existing manufacturing and distribution system in order to meet customer demands. Through the experience economy, the focus has shifted from manufacturing-oriented development to human-based innovation that aims to enhance the quality of the customer experience of the system as a whole (Goulden et al., 2003)

A theoretical background for 'design for experiencing' where the aim is to create the users' experiences of things, events and places is emerging with the help of social science and anthropology (Sanders and

Dandavate, 1999). Ethnographic observation techniques (Kumar and Whitney, 2003) and activity theory (Kaptelinin, 1996; Nardi, 1996) provide a theoretical framework for clarifying current user needs. However, the weakest part of this approach is that in most cases, user needs, goals, and motivations are inferred from the re-interpretation process, which means that the quality of the findings is heavily dependent on the perspectives of the investigators.

The concept of 'experiencing' was described (Sanders et al., 1999) as a constructive human activity which one person can not perform by oneself. For example, when one is involved in communication, user experience occurs when what the communicator provides meets what the communicatee brings to the interaction (Figure 1).
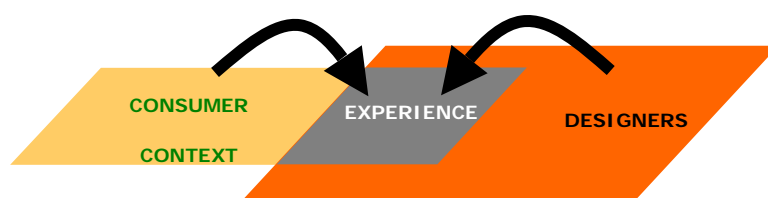

Figure 1. Mechanism of consumer experience (Sanders, 2001)

This model concurs with Mitchell's concept of a collaborative design approach (Mitchell, 1993) as "a means 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".

In the collaborative design environment, the designers' task shifted from the geometrical shaping (form giving) to "making of a context, a situation, in which it is possible for others as users… to determine the geometry ourselves (Mitchell, 1993). In addition, Jones (cited in Mitchell, 1993) perceived that the object or the product was of secondary importance to the experience of the system as a whole, and stressed the importance of peoples' experiences and actions as a basis for designing.

Therefore, 'design for experiencing' can be characterized as
- the process of redefining the way people interact with the environment being served;
- the collaborative process where designers and non-designers are participating as a equal partners in the design process; and
- the field of dealing with the ways the product or the service is being served.

1.2 Nature of user experience

The idea of bringing user experience into the product-service development process has been explored by designers (Shedroff, 2001) and marketing people (Schmitt, 1999),as well as interaction design firms and e-business providers (Forlizzi and Ford, 2000). Many have seen the experience as the driving force for the product and service innovation in current competitive market environments.

For example, as a panel of judges for an 'interactions' magazine, Alben et al.(1996) defined the concept of successful and engaging experience as "the way [a product] feels in their hands, how well they understand how it works, how they feel about it while they're using it, how well it serves its purpose, and how well it fits into the entire context in which they are using it."

However, very little study has been done in defining the nature of user experience and its relation to the consumer needs in the design domain. Recently, Forlizzi et al. (2000) developed a theoretical framework where user 'experience' is defined as consumer needs that grow from the interaction between users and 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 recognized and transformed during daily activities: sub-consciousness, cognition, narrative and storytelling.

Within the traditional user-centered design approach, the cognitive aspects of the experiences were captured, stored and studied in order to use them as a source for improving the usability aspect of the products and services. This approach proved useful to the evaluation and improvement paradigm (Preece et al., 2002), yet it proved more difficult to apply at the fuzzy front end of the design process where more explorative than evaluative thinking is required (Cagan and Vogel, 2002; Sanders et al., 1999).
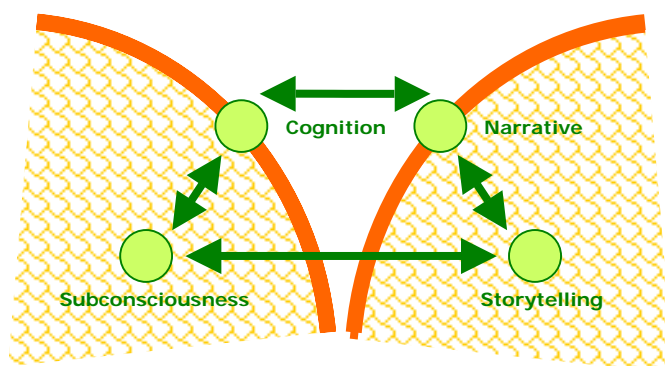

Figure 2. User experience model (Forlizzi et al., 2000)

Folizzi et. al (2000) developed user experience model and explained the different characteristics of user experiences: sub-conscious, cognitive, narrative and storytelling experiences. This is illustrated in figure 2 and described as follows:

- 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 formalized in the user's head. Examples of the 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 schematizes 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 personalized 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 story.

Jordan (1999) pointed out that the traditional HCI approach generated a narrow view of human experiences and articulated ways to access human experiences with a holistic vision. He introduced the concept of 'pleasure' as a basis for the user research and product concept development. Four different types of human experience were identified (Figure 3).
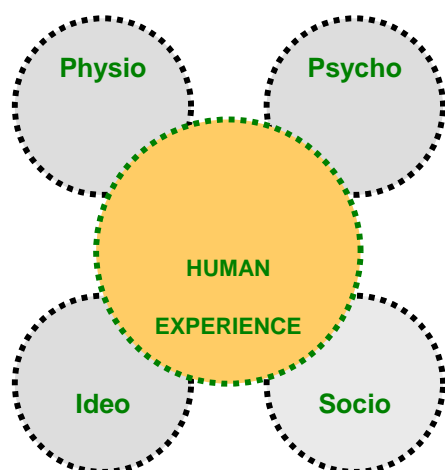

Figure 3. Four layers of human experience (Jordan, 1999)

Figure 3 illustrates the four layers of human experiences identifying their physio, psycho, socio and ideo characteristics (Jordan, 1999). They are described as follows:
- The physio-characteristic is to do with the body – the senses, the muscular-skeletal system and the size and appearance of the body. "Physical relaxation" could be one of the consumer-needs identified in the consumer-research phase.
- The psycho-characteristic refers to the cognitive characteristics of the consumer needs. 'Sense of achievement' could be considered as a psycho-characteristic of the consumer needs.
- The socio-characteristic is to do with a person's relationships with others that include relationships with friends and loved ones, with colleagues and peers, and with society as a whole. "Status" could be a consumer need associated with socio-pleasure.
- The ideo-characteristic is to do with consumer values, which pertains to their tastes, morals and aspirations.

1.3 Summary

The main purpose of 'design for experiencing' is to provide better methods to match, replace or enhance the way the system has been delivered to users. 'Design for experiencing' therefore means reorganizing and restructuring existing manufacturing and distribution systems to meet ever-changing consumer expectations, needs and aspirations.

This section reviewed the nature of user experiences and how traditional designers have utilized these as valuable resources for design development. Four characteristics of user experiences were identified in association with consumer needs: Physio, Psycho, Socio and Ideo.

The next section describes the overall structure of the research and introduces the cultural probes as a participatory design tool for evoking active user participation and designer's inspiration within the product-service development process.

2.0 Research Design

Case study was selected as a research method for inquiring into interactions between users and designers at the early stage of the design process in commercial environment. A series of participatory design workshops was developed in conjunction with a industry design team in order to:

- understand the way users experience the artifacts;
- determine any problematic situations arising from the use of artifacts and services; and
- generate new concepts, ideas and scenarios form the perspective of users.

Different types of cultural probes – for example, diary reporting, image collage and scenario building – will be employed in the participatory design workshops in order to evoke various types of interactions.
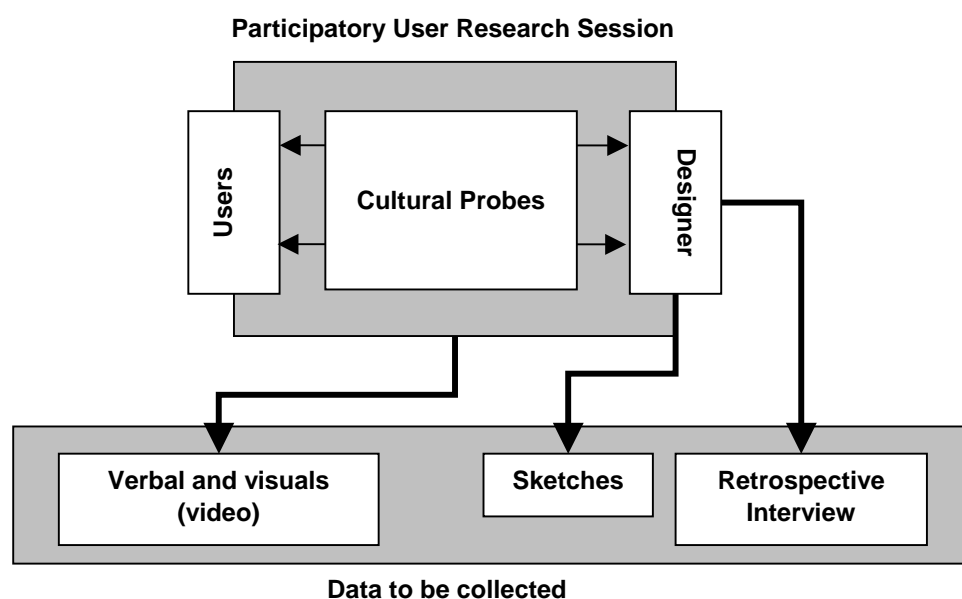

Figure 4. Research design

Figure 4 illustrates the research design as a part of the participatory design project. It includes the following:

- imposing the cultural probes within the participatory design workshop;

- asking designer to record user experiences;

- video recording of the whole session including users, facilitator and designer working together with the cultural probes; and

- analysing the interaction between two users; user and designer; and user and probes.

After the session, the retrospective interview with the designer will be conducted to see how designer's intention transforms the users' experiences into the design concepts.

2.1 Cultural probes

The cultural probes were devised to facilitate the interactions among groups of people, i.e. designers, researchers and users in participatory design projects. They 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).

3.0 Pilot Case Study

In order to explore the research question - "How can users and user experiences be integrated within the early stage of the product-service development framework?" a series of participatory design workshops was developed in conjunction with a corporate design team. The industry involved was keen to investigate innovative ways of delivering new mobile technologies to customers in future markets. This allowed the researcher to participate in the process of planning and conducting the participatory design workshop with the users.

The aim of the pilot study is to explore the nature of the interactive mechanisms when designers are working with users during the participatory design projects.

3.1 Procedure

Three consecutive participatory workshops with the participation of six local users, one designer and one facilitator were carried out.
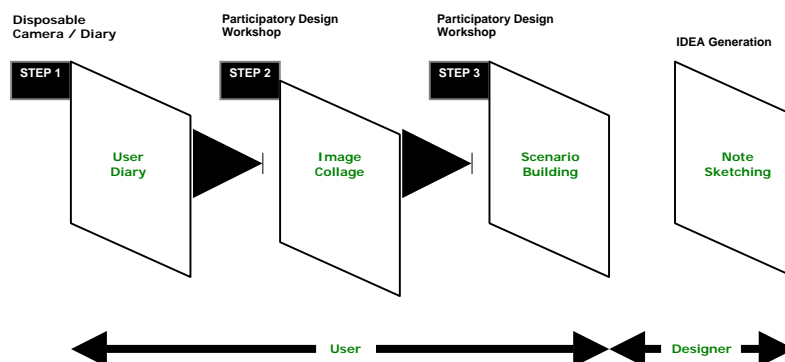

Figure 5. Pilot case study procedure

First, a package of probes is handed to the person(s) and participants are asked to perform specified tasks and record their feedback, experiences and feelings in a diary format.

One week was given to users for collecting, recording and reporting their everyday experiences with the mobile phone or services. A typical internet posting service – for example a blog - was used for collecting data from the users and offering tasks to the users.

The following tasks were given:

- Take photos of things in your car that you use for recording; for managing information; for initiating communication; for leaving messages to others; and for decoration.
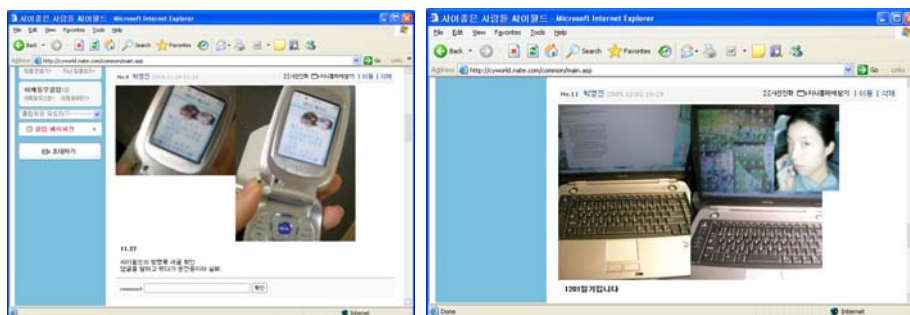- Take photos of places that you visit regularly during weekdays and weekends.

Figure 6. Various activities while driving (From the probes)

Then, the participatory workshop was conducted with the probes as generative tools that help stimulate the participant's memories. At the beginning, each participant was asked to present his/her past experiences to the rest of the group (Figure 7).
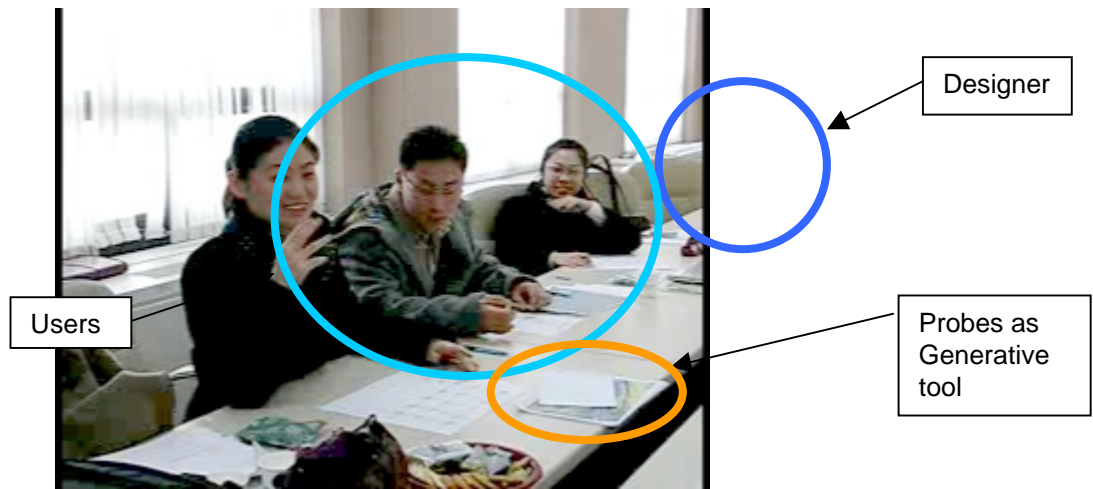
Figure 7. The user-designer collaborative design workshop

3.2 Coding System

Interactive mechanisms between users and designers have framed with the following aspects (i) the types of user experience, (ii) the types of designer's intention, and (iii) the types of the collaboration (Figure 8).
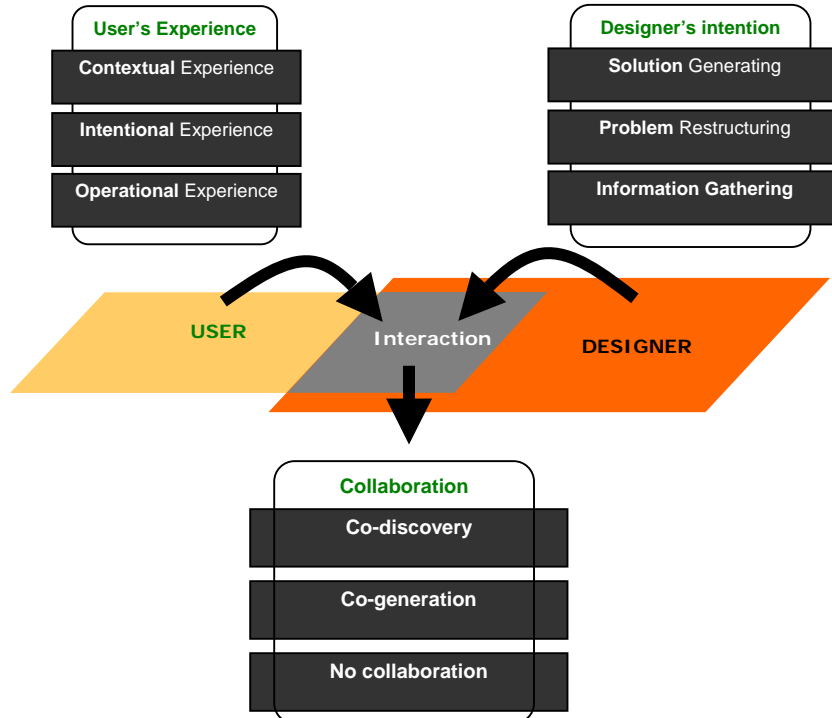

Figure 8. Interactive mechanisms between users and designers during the participatory design workshop

Figure 8 illustrates the interaction mechanisms between (i) the types of designer's intention, (ii) the levels of user experience, (iii) the levels of the collaboration and (iv) the types of the collaboration. For example, the user-user collaboration can be understood as the interaction between the first user's stories and the second user's responses. The level of the collaboration is determined by the outcome of user-user interaction. If the user recognises new situations, circumstances, activities, use cases and problems as a response to the first user's story, then that illustrates the co-discovery activities. When the user generates new concepts, ideas and solutions as a response to the other's story, then that illustrates the co-generation activities. Mere interaction between two users is also observed.

User-designer collaboration is the outcome of the interaction between the first user's story and the designer. When the designer generates something new (service ideas) as a response to the user's story, then that is co-generation activity. If the designer identifies new problems based on the user's story, then that is co-discovery activity.

Table 1 shows the coding system for the analysis of verbal and video data, sketches and retrospective interviews.

The analysis of the video material was supported using professional analysis software called Noldus Observer XT. The subject (designer, user 1, user 2 and facilitator); the types of activities; and the levels of collaboration were established as a coding system.

Table 1. Basic Coding System

Participants	Categories	Modifier
User and Designer	Level of collaboration	Co-discovery (Empathic understanding) Co-generation (Synergy) No Collaboration
	Type of collaboration	User-User User-Designer
User	Level of user experience	Contextual Experience / Storytelling Intentional Experience / Narrative Operational Experience / Cognitive
Designer	Intention	Gathering Information Problem Restructuring Generating Partial Solution

4.0 Pilot case study findings

4.1 Analysis

Figure 9 demonstrates the participants' time-event plot showing behaviours plotted horizontally against a time axis. Each colour represents the sequence of behaviours or events and each section represents each subject's activities and events. For example, the upper two sections represent the user's events while the bottom section

represents the designer's events. In each section, each event is coded with a different pattern with a length that corresponds to its duration.
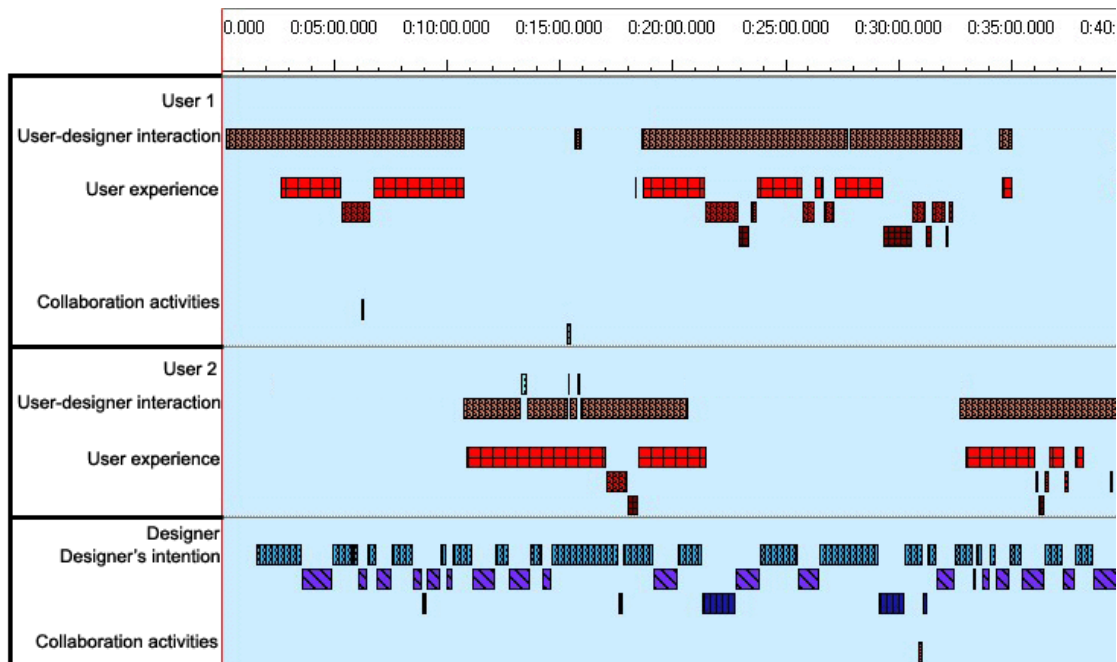

Figure 9. Time-event visualization data

Figure 10 shows that the designer seemed to fluctuate from general to specific design issues as the user generated general to specific experiences. It implies that user's level of experience determines the intention of designer's responses.
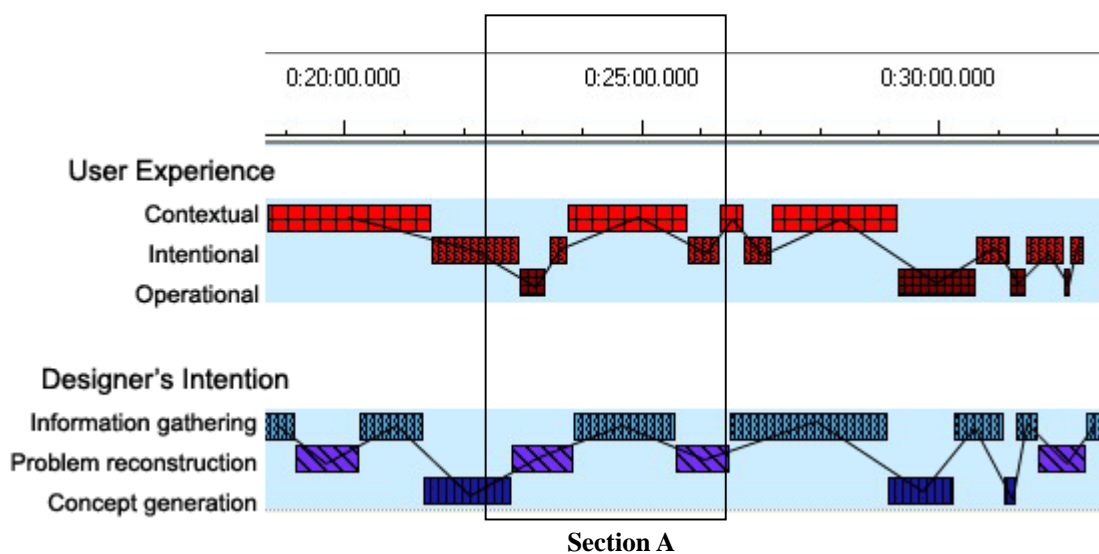

Section A

Figure 10. Portions of segments showing the relation between the level of user experience (red) and type of designer's intention (blue)

Section A (Figure 10) also indicates that the designer asked the user to generate tangible solutions as the user begins to talk about his/her wishes, intentions and preferences. Section A shows that designer seems to use the word 'associate', 'exemplify' and 'summarize' to ask the user to generate more specific information about the issues. The dialogue between user 1 and designer in section A was shown in Table 2

Table 2. Dialogue between user 1 and designer in section A (Figure 11)

|	
User 1	(Show images with the stacked boxes)
Designer (Generating)	How can you **associate** the meanings of the image with the personalization software used in the car?
User 1 (Intentional)	For example, keeping in touch with friends all the time is very important to me even though I am very busy right now.
Designer (Generating)	If there is a mobile service, how can it be served to please your needs?
User 1 (Intentional)	I want the service to let me know where they (friends) are and what they (friends) are doing at the time. Also, it might be good if the service can tell me who to meet and where to go at the moment. (By recognizing the road condition and calculating the time to be taken to get there) I am doing that by calling them one by one manually.
Designer (Generating)	Isn't there a service called 'buddy finder' already?
User 1 (Operational)	But you have to be connected to a desk-top computer with the internet to use the service.
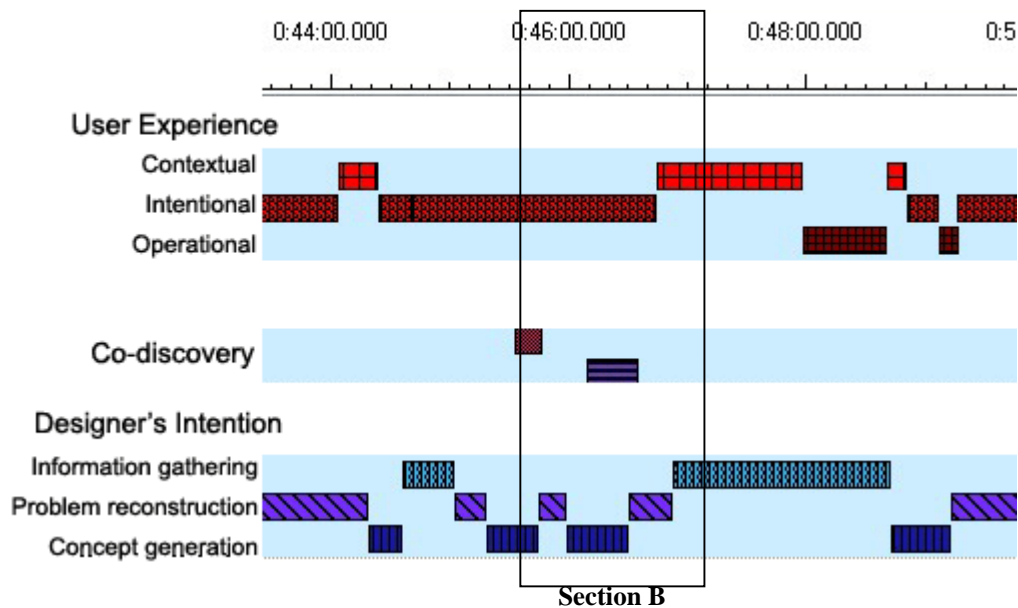
Figure 11. Portions of segments showing collaborative activities (Co-generation)

Section B (Figure 11) represents the segment where the designer asks the user to generate new concepts and ideas by directly prompting them to imagine new things. Collaboration between the user 1 and designer was identified within this section (Table 3).

Table 3. Dialogue between user 1 and designer within section B (Figure 12)

|	
User 1	(She talks about the story associated with the images that she brought)
Designer	What is the meaning of the story to you?
User 1	When I got so bored, I do crazy things like that.
Designer	Can you think about it a little bit differently?
User 1	I like the river. So romantic
Designer	So, is it that important to you to be romantic?
…………	
Designer	How can you **associate** the act of lighting up on the bridge with the mobile service?
User 1	As I mentioned in my diary, I usually put a pink colour post-it on top of my car radio. It creates such a mood in my car.
Designer	How do you feel when you see the pink light on your car?
User 1	It made me giggle and feel happy when I was driving with my friend.
Designer (Generating)	Can you **imagine** any mobile service that makes you giggle and happy?
User 1 (Operational)	When I first bought the car it had a built-in hands-free feature. One day, some friends and I happened to be in the car and shouted at the hands-free and giggled.

As indicated in the above analysis, the participatory design workshop sessions were used as a way of exploring users' context rather than working with users to generate concepts.

In order to explore how the user-generated context can be integrated into the ideation activities, the designer was asked to record user-generated new concepts and ideas as a diagram or a sketch format. Figure 12 showed the example of the designer's sketches

The analysis of the sketch was done after the workshop by asking the same designer to watch the whole video clip with the researcher again and to explain intentions on making each comment, mark, and diagram on each note. During this retrospective interview, the designer was able to describe the process of making comments and reasons for making such comments on the notes. The square marks and arrow in Figure 12 show the steps that the designer has taken to capture a user-generated new context.

The designer intended to:

- describe the user-generated new context as much as possible (A),
- group them (B),
- transform into a word that she/he might be able to use for designing (C) and;
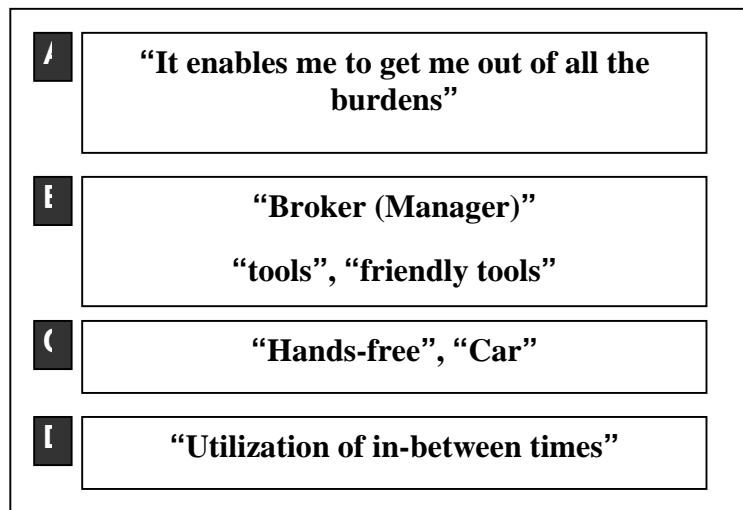- generate possible key solution concepts out of the whole context (D).
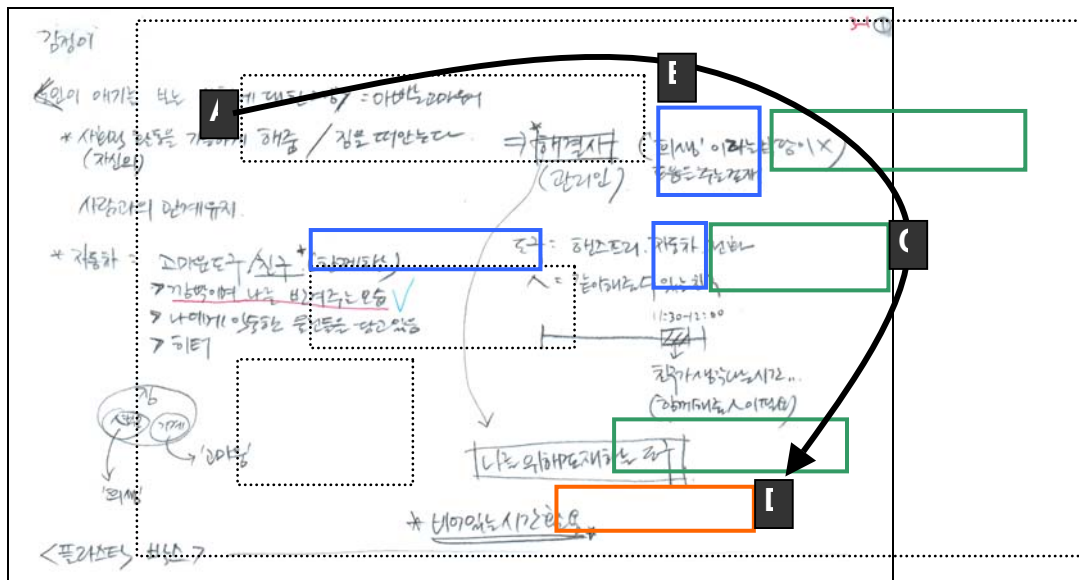
Figure 12. Examples of the designer's note taking

Figure 12 (A) indicates the user needs expressed from the user 1's contextual experiences:
"It enables me to get me out of all the burdens"

Then, the designer conceptualizes the user's need by adding her comments (B) on it:
"A trouble-solving broker"

At the next stage, the designer associates her concept with the existing tools (C):
"Hands-free"

Finally, the designer conceptualizes the whole session with the key phrases (D):
"Utilization of in-between times"

The designer seemed to spend some time trying to understand the user's whole contextual circumstances first and then try to make a link between them with the design keywords. The process also highlighted the point that the designer's tendency to make a general concept out of the specific user-generated information. This tendency might help the designer see the whole context from the abstract perspective; however the user might have a difficulty to see the relationship when the general concept is provided to them as an abstract form.

The abstract concept has to be materialized or visualized before it is to be imposed on the users during the workshop. The 'scenario of use' was also explored as a way of bringing the user-generated input into the design process. The following scenario of use (Figure 13) was developed after the workshop. The designer was able to generate several scenarios of use quickly based on the key words and concepts developed and described in the designer's notebook.
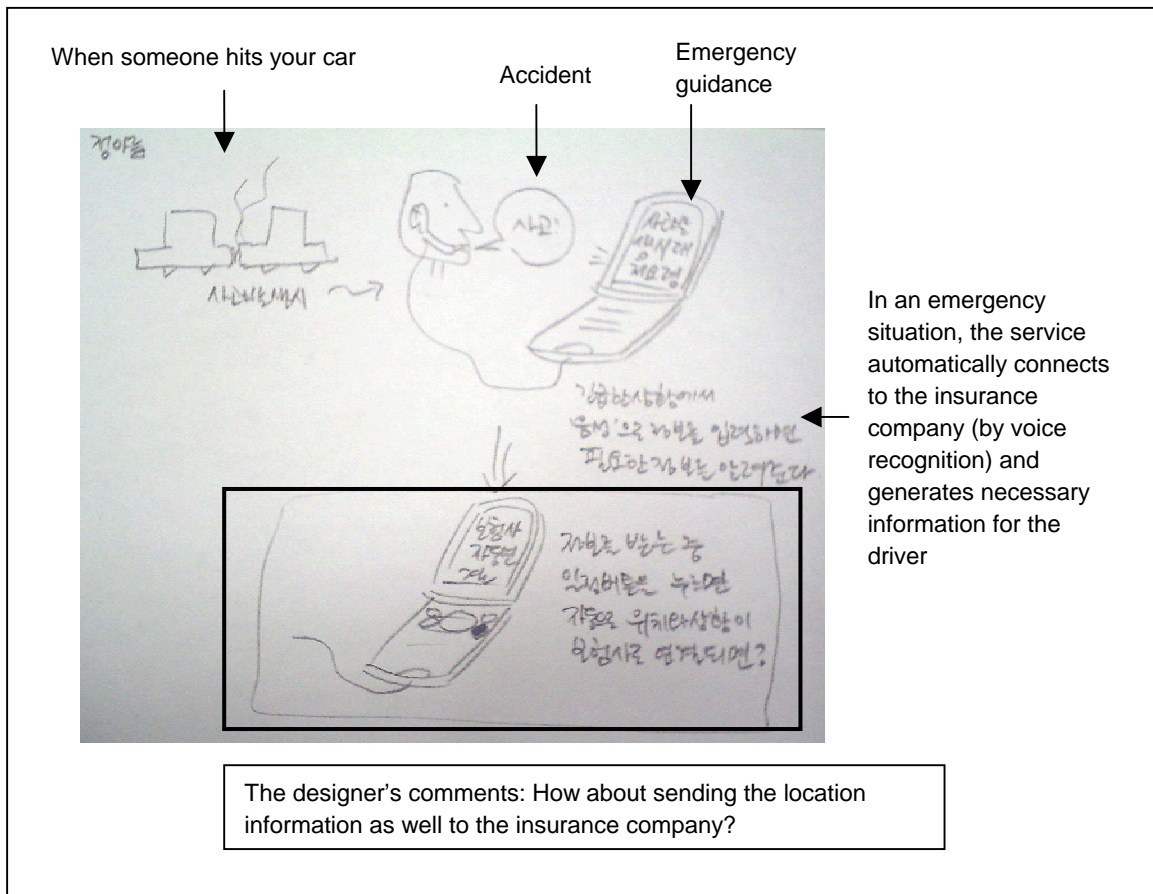
When someone hits your car

Accident

Emergency guidance

In an emergency situation, the service automatically connects to the insurance company (by voice recognition) and generates necessary information for the driver

The designer's comments: How about sending the location information as well to the insurance company?

Figure 13. Designer's comments described in the scenarios of use

However, most parts of the 'scenarios of use' developed by the designer seemed to devoted to the development of functions and features based on the user's personal wishes, goals, problematic situations and operational difficulties. This implies that the use of 'future scenarios' developed by a designer might not function well as a way of transforming the user-generated new context into the ideation activities.

4.2 Findings

This section discusses the initial findings. The findings demonstrate that it is the level of user experience in combination with the type of designer's intention that determines the overall collaborative outcomes.

These initial findings address the following issues:

- Finding 1: The cultural probes were very successful for evoking active user involvement into the workshop.
- Finding 2: The designer utilized the association technique when prompting the users to generate more specific experiences.
- Finding 3: The designer's level of participation was very low throughout the workshop.

- Finding 4: The designer was more engaged when users were delivering tangible and operational information to the workshop.
- Finding 5: Asynchronous collaborative activities were observed when the designer was working with such participatory materials as the layouts for image collage and scenario building.

The findings demonstrate that the user's experience determines the intention of designer's responses. The designer seems to use the words 'associate', 'exemplify' and 'summarise' to prompt the user to generate more specific information about the issues. Active collaborative activities between the users and designer were expected; yet few occurred during the participatory design session. The designer was generally passive during the workshop.

Cultural probes were successful for engaging users to actively participate in the early phase of the design process, aimed more toward problem identification. However, the level of the domain specific knowledge - design, technology and the market – was the issue among participants.

Most of the designer's attention was focused on the clarification of the recognized issues. Interpretation, correction, comparison, rephrasing, summarizing and confirmation were found to be the clarification activities. Interactions between two users showed higher level collaboration than interactions between users and designer. Exchanges involved consent, disagreement, referring to another's experience and raising questions based on other users' stories and experiences.

The designer seemed to be overwhelmed by the information generated from the original user experiences. The designer utilize the 'associate', 'summarise' or 'exemplify' questions in order to get the users to generate more specific and relevant experiences. It was not until the time the designer sought a response to the issues that the users generated the intentional and operational level experiences.

This implies that user experiences were used mainly as a source for gathering the users' information (situational information). The transition from users' experiences to innovative concepts or ideas was seldom witnessed in the designer's sketches. Sketches were instead found to be more effective in recording and exploring the functions and features of the products and services

5.0 Discussion and Future Work

Initial findings imply that the participatory tools could only function as an information gathering tool when the designer's participation toward the collaborative activities was very passive. Also they suggest that the designer's inclination to the tangible aspects of the design might lead to the passive approach toward the collaborative activities.

Several literature sources indicated that active participation and collaborative interaction could contribute to the innovative aspects of the new product and service development. The cultural probe was proposed as a participatory design tool to increase the chances of designers getting inspired. However, the initial findings

challenged further investigation on the development of new participatory design tools or approaches which aim to evoke active participation from both parties users and designers.

It seems that there was a gap between what makes the user engaged and what makes the designer motivated. The users were more engaged in responding to the everyday life stories while the designer was more motivated by the tangible aspects in the story.

Therefore, evoking active participation from both parties (users and designers) requires different approaches and tools different from the cultural probes. The tools and frameworks should be able to encourage both parties (designers and users) to exchange information and reflective comments with each other. Further investigation on the functions of participatory design tools in terms of the interaction mechanisms will provide insights for the development of new participatory design tools and frameworks.

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