DESIGNER-USER INTERACTION WITHOUT ACTUAL USERS: A LESS ON FROM TWO FIELD STUDIES

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Abstract

This paper explores the actual user-designer interactions in the design process. To address this, I conducted two field studies, in which I observed designers in two leading user-centered design firms over five months, documenting seven user-centered design projects. The observations revealed how designers bring ideas about users into design without physically interacting with users during the design process. Based on this, this study introduces the concept of 'design attitude', by which designers incorporate user ideas into the design process without actual involvement of users in the process. I contribute to the body of knowledge by introducing the concept of "design attitude" as a bridge between theoretical and actual designer-user interactions in the IS design process.

Keywords: Design & IT innovation Processes, Designer-User Interaction, Field Study, Bourdieu's Theory of Practice, Boundary Objects

1 INTRODUCTION

In previous information systems (IS) investigations into the design process, researchers and practitioners have believed that identifying users and their information environments is the critical component in creating reliable IS artifacts and determining the IS success (Boland 1978; Churchman & Schainblatt 1965; Ginzberg 1981). Interactions between designers and users have become the core of all design actions that lead to successful IS artifacts or process innovations in the design process. With this belief, they have struggled to understand users with a variety of research approaches such as user involvement (Gurpal 2009; Ives & Olson 1984; Tait & Vessey 1988) and end-user collaboration (Marakas & Elam, 1998; Newman & Robey, 1992). In IS, information systems development (ISD) and design science research (DSR) communities have also developed user-invited models and methodologies to lead creation of successful IT artifacts (e.g. IS products, systems, and services) during a design process. To understand users and user-information environments adequately, ISD and DSR communities have incorporated user-oriented approaches and methodologies from two disciplines: user-centered design (UCD) (Doblin 1987; Moholy-Nagy 1947; Norman & Draper 1986) and participatory design (PD) (Muller & Kuhn 1993; Schuler & Namioka 1993).

While, the importance of designer-user interaction has been recognized as theoretical levels of knowledge, and IS communities did not suggest how the designer-user interactions could be interplayed in the actual settings. Hence, these previously established theories, models, or methodologies of users and user information environments remain in the ideal levels of knowledge and practice. Therefore, this study explores how designers incorporate user expectations into the design process to understand the gaps between ideal and real designer-user interaction. Throughout this study, it highlights differences between ideally established knowledge and actually applied practices about the designer-user interaction.

This study asks a research question: *How do designers actually incorporate user expectations in user-centered design?*

To address this question, Bourdieu's theory of practice (Bourdieu 1986; Bourdieu & Nice 2002; Bourdieu & Wacquant 2004) and boundary objects (Star 1990; Star & Griesemer 1989) are taken up as theoretical underpinnings. Based on these two theories, I consolidate a theoretical framework to demonstrate how actual interactions between designers and users occur and evolve in the IS design processes. I hypothesize a structural relationship between designers and users based on Bourdieu's theory of practice. On the other hand, I explore whether relationships between the designer-user interaction and their resulting outcomes are tangible (e.g. prototypes) or intangible (e.g. design orientations) based on Star and Griesmer's boundary objects.

Based on these theoretical foundations, I analyzed observations from the two field studies. As the extended field observations (Agar 1996; Hammersley & Atkinson 1995), the two field studies include seven design projects in two design firms recognized for their user-centered design methods during five months. Using ethnographic research techniques (photo observations, qualitative interviews, and self-diary), I collected the data and analyzed the data collected over five months of on-site observations using a grounded theory approach (Charmaz 2006; Strauss & Corbin 1990).

The first revelation from these two field studies was that there were huge gaps between ideal and real designer-user interactions. Surprisingly, even though all seven projects were labelled as being user-centered, there was no designer interaction with actual users of the design objects. The analysis and interpretation of the transcripts, videos and other data collected in those field studies revealed that the designers employed a series of practices to *bring the user needs* into the design projects. In previous research, Michlewski (2008) characterized the concept of design attitude with a view of managing by designing (Boland & Collopy 2004); however, it was not fairly defined to apply this knowledge and themes to designer-user interaction context. In reality, designers only brought virtual users into their everyday design practices.

This study brings to the forefront the notion of *designer-user interaction without actual users* in the design process. It theoretically requests a rethink on two critical issues for the communities of information systems development (ISD) and design science research (DSR). The one is what aspects of the design process could be modified to bridge the gaps between ideal and real designer-user interaction. The other is to consider how the bridges can be optimized in order to achieve better relationships between designer-user interactions and their resulting outcomes in IS. Consolidating these two issues, this study consequently argues for the concept of 'design attitude' (Boland & Collopy 2004; Michlewski 2008) on the science of design (Simon 1996), proposing it as the bridge across the gap between ideal and actual designer-user interactions.

2 LITERATURE REVIEW

The following studies on designer-user interactions in information systems development (ISD) and design science research (DSR) in IS were reviewed in order to situate the concept of design attitude appropriately in the body of knowledge on designer-user interaction in the design process.

Propositions on Designer-User Interactions	Authors
P1: Interactions between designers and users is the most important factor in creating better design or organizational outcomes	Churchman & Schinblatt (1965), Boland (1978), Salaway (1987)
P2. Degree of user involvement is a critical factor in creating a final IS product	Gurpal (2009), Ives & Olson (1984), Tait & Vessey (1988)
P3: Users and designers co-create design episodes and patterns together as a social practice in ISD	Newman & Robey (1992), Marakas & Elam (1998)
P4: Tailoring computing is a form of collaboration between designers and users in the software development process	Mørch& Mehandjiev (2000)
P5: Users as designers in ISD	McLean (1979), Kozar & Mahlum (1987), Kasper (1996)
P6: Users and designers have different design attitudes and requirements between designers and users in ISD process	Kaiser & Bostrom (1982), Gingras & McLean (1982), Robey (1994), Chakraborty et al. (2010)
P7: IT artifacts are the outcomes of social interactions between designers and users	Griffith (1999), Kujala & Väänänen-Vainio-Mattila (2003)
P8: No effective prototyping methods exists between designers and users in ISD	Alavi (1984), Baskerville & Stage (1996)

Table 1. Summary of designer-user interaction in IS research

As Table 1 shows, previous IS scholars have researched various aspects of designer-user interactions with a variety of theoretical and methodological approaches. Through this literature review, I identified eight themes as follows:

Theme 1: interactions between designers and users; Theme 2: degree of user involvement is a critical factor in creating a final IS product; Theme 3: designer-user co-creation in ISD; Theme 4: tailoring computing as a form of collaboration between designers and users; Theme 5: users as developers (designers); Theme 6: users and designers have different design attitudes and requirements in ISD; Theme 7: IT artifacts as the outcomes of mutual interpretations of designers and users; Theme 8: the absence of an effective prototyping tool between designers and users.

P1 and P2 seek to explore the importance of interactions between designers and users, focusing on the roles of designers and users in a design process. Since Churchman & Schainblatt (1965) empirically argued the importance of mutual understanding users and designers in management science; Boland (1978) tested two protocols of designer-user interaction and suggests that user-enacted protocol is more effective in developing better products in IS. Salaway (1987) also tested the effectiveness of two organizational learning models between designers and users and theorized about impact of mutual learning on user-invited models in ISD.

In P2, the community of user involvement argues that the degree of user involvement is a critical factor in creating a final IS product (Gurpal 2009; Ives & Olson 1984; Tait & Vessey 1988). It suggests a more dynamic role of users in determining the success of IS implementation (Ginzberg 1981; Schonberger 1980).

P3, P4, and P5 propose the concept of co-creation and its impact in the process of design. In P3, Newman & Robey (1992) argued that users and designers co-create design episodes and patterns as a social practice in order to create appropriate IS design outcomes. Marakas & Elam (1998) investigated the semantic questioning patterns between designers and users as an alternative approach for effective communication in software system development. In P4, Mørch & Mehandjiev (2000) proposed tailoring computing is a form of collaboration between designers and users in the software development process. In P5, McLean (1979) persuasively argued end-users as application designers for effective implementation. Kasper (1996) sought to enhance the design of decision support systems (DSS) through user calibration of their performance.

P6 argues that designers and users have different perspectives, so that it has considered how designers and users can produce a shared communication space in ISD. Kaiser & Bostrom (1982) pointed out the communication gaps between users and designers because the users take a broad organizational view, while designers take a local view, focusing on technical concerns in ISD. Gingras & McLean (1982) suggested that designers and users have different information systems because of their different patterns of interaction. Robey (1994) proposed a model of interpersonal processes, which overcomes the conflicts between designers and users by understanding the importance of interpersonal activities in ISD.

P7 defines an ecological view between designers' and users' interaction in the whole cycle of design process. Griffith (1999) theorized a framework which highlights mechanisms related to the social construction of technology and technology use in organizations. This framework deals with how users could conduct users' sense-making for the complex and often unpredictable technology implementation that developers made. Kujala & Väänänen-Vainio-Mattila (2003) argued the issue of how developers aim at providing value through their systems and products, and they highlight the concept of value from the users' perspective and the role of user involvement in providing value.

P8 identifies lack of effective tools for the interactions between designers and users. Alavi (1984) argued that there are not effective prototyping methods between designers and users in ISD. Baskerville & Stage (1996) suggested prototypes as risk analysis tools between IS developers and users to control their actions and resulting outcomes in ISD.

Although few studies have been conducted on designer-user interactions in information systems development (ISD) and design science research (DSR), and these studies have argued the importance of designer-user interaction and the ideal opportunities of how designers could interact with users with theoretical approaches. Most of the studies have revealed certain propositions, and they have conducted preliminary studies or case studies, and these models, frameworks, or prototypes of designer-user interactions have not been tested in actual design settings. Also, the detailed constructs or aspects of designer-user interactions have not been developed adequately. Therefore, this study seeks to explore the designer-user interaction in an actual design practice setting.

3 THEORETICAL FOUNDATION

This study adopts Bourdieu's theory of practice (Bourdieu & Wacquant 2004) and Star and Griesmer's boundary objects (1989) to address the following research question--What are the actual user-designer interactions in user-centered design? In this research I outline, using Bourdieu's theory of practice, a structural relationship between actual designer(s)-user(s) interactions and resulting outcomes. Then, I categorize the outcomes based on designer-user interactions as tangible and intangible boundary objects according to the framework proposed by Star and Griesmer.

3.1 Bourdieu's theory of practice

Bourdieu's theory of practice (Bourdieu 1986; Bourdieu & Nice 2002; Bourdieu & Wacquant 2004) defines three conceptual terms—'field', 'habitus', and 'practice'. These three terms define the social structure collectives and individuals within a social system. In this theory, he demonstrates a structural whole of how individuals could take a given social 'field' and make 'habitus' by individuals' interpretations, and then how the individual practices reflecting the habitus might construct / reconstruct the given 'field' in a society. This study applies Bourdieu's theoretical definition to the designer-user interaction to interpret it as: 'field as history of action', 'habitus as mode of action', and 'practice as situated action'. With this interpretation, this study seeks to identify where the actual designer-user interactions entail, occur in, and evolve in the design process in a practice setting.

3.2 Star and Griesmer's boundary objects

Star and Griesmer's boundary objects (Star 1990; Star & Griesemer 1989) demonstrate objects that deal with different cultures, inter-disciplined organizations, or shared meanings among multiple stakeholders in a given society. They conceptualized the following four boundary objects: 1) repositories; 2) ideal type; 3) coincident boundaries; and 4) standardized forms (Star & Griesemer 1989). Out of their four conceptual definitions about boundary object, previous IS scholars have persuasively consolidated the original concept of boundary objects with two different perspectives. The one is 'boundary objects are artifacts', while the other is 'boundary objects are actions'. Consolidating the points of view presented in previous IS studies on boundary objects, this study admits these two views of previous researchers' arguments on boundary objects and applies them to the designer-user interaction. The tangible outcomes deal with visible and physical boundary objects that designer-user interaction creates (e.g. prototypes). On the other hand, intangible boundary objects entail invisible outcomes such as design ideas, problems, or strategic directions that the designer-user interaction makes (e.g. design orientations) in the design process. In this study, I use this categorization to define the outcomes of designer-user interactions observed from the two field studies.

4 METHODOLOGY

As a qualitative study, this study comprises two field studies in two user-centered design companies. Understanding actual designer-user interaction calls for a close examination of the everyday interactions among designers and those with users in their working environments. Thus, these two field studies followed the ethnographic research format (Geertz 1977; Hammersley 1995; Spradley & Baker 1980; Wolcott 2005) as a methodology for understanding real occurrence of designer-user interactions.

4.1 Field Site Selection

To select suitable research sites, I listed user-centered design consultancies and firms in the United States, Europe, and South Korea. After sending the request for field observations to over 50 companies, I only received six positive replies, and they requested additional information to accommodate me to conduct a field study in their firms. Because of the confidentiality related to their clients, only two companies decided to facilitate my research project. Alpha Design is a product design consultancy located in Cleveland, OH and Beta Lab is a mobile application company located in Seoul, South Korea.

4.2 Data Collection and Analysis

The field study data consisted of two field observations of the everyday life of designers and users, as summarized in Table 2 below. For the field observations, ethnographic techniques (Geertz 1977; Hammersley 1995; Spradley & Baker 1980; Wolcott, 2005) were used to collect the data and in-depth qualitative interviews (Kvale & Brinkmann 2008; Schultze & Avital 2011; Spradley 1979) are

conducted in order to collect more detailed backgrounds of projects' stories and the involved interactions between designers and users in the projects.

	Field Sites	Observed Projects
Two Field Studies (5 months)	Alpha Design (3moths)	5 design projects and staff interviews: New product development & prototypes
	Beta Lab (2months)	2 design projects and staff interviews: New product solutions and process communication

Table 2. Summary of data collection

The data from two field studies were collected over five months. The first Alpha Design field study was conducted for three months from Jan to Mar. 2011, and the second Beta Lab field study was performed for two months from Jun to Aug. 2011. In the Alpha Design field study, I observed five design projects and interviewed the team members involved. Using ethnographic research techniques, I observed direct designer-user interactions and collected data using the following methods: (1) daily diaries (field notes), (2) photographs taken of the process, and (3) audio and video interviews. As a confirmatory field study, I applied the same ethnographic research approaches at the Beta Lab.

To analyze these data, open, axial, and theoretic coding process were applied to identify the latent patterns of designer-user activities and interactions during a design project based on a grounded theory approach (Eisenhardt 1989; Glaser & Strauss 1967; Strauss & Corbin 1990).

5 FIRST FIELD STUDY: ALPHA DESIGN

Alpha Design deals with a wide range of design innovations using dynamic brainstorming; towards this it has developed a quick process to identify possible design opportunities and direction. To do this, they use a series of techniques (methods) such as brainstorming, concept ideation, and configuration development. Based on this design strategy, they also manufacture prototypes, using 3D form development, aesthetic development, and human factors development. During the Alpha Design field study, I attended this field site five days a week, from Monday to Friday, from 9:00 AM to 5PM. I observed five-design innovation or refinement projects, in which designer-user interactions create design outcomes in the design process.

5.1 Three Themes of Designer's Interaction

All observed projects revealed the process between discovering designers' interactions and resulted in design outcomes (e.g. design ideas, concepts, and prototypes). From this project observation, I elucidated three themes: (1) transforming interaction from individual to group ideas; (2) reflexivity with tangible and intangible outcomes; and (3) collaboration in everyday and infrequent interactions among designers.

5.1.1 Theme 1: Transforming Interaction from Individual to Group Ideas

The first theme, transforming interaction from individual to group ideas, shows how an individual designer can share original ideas and develop group knowledge. The Food Saver project is an example in discovering design ideas, concepts, and prototypes. In the Food Saver project, the designers' interactions generated six conceptual design prototypes, which dealt with the issues of understanding design-business contexts, existing products, creating new value points among design, clients, and users.

Location: Alpha Design Studio; Date: Jan. 20th, 2011; Main Events: Design Brainstorming
Topic: Food Saver; Main Players: Three Designers; Visual Resource: Video-recording

As Figure 1 presents, the first theme includes three following actions: (1) understanding product / service contexts to create a shared common knowledge among designers, (2) generating individual

ideas as design opportunities, and (3) sharing individual, collaborating each other, and integrating them as group ideas.

Figure 1. Designers' interactions in Alpha Design

To understand product / service contexts for creating a shared common knowledge, the three designers involved in the project examined the existing design products with respect to their forms, functions, and styles. For example, they argued that the existing food savers were black & white in color, steel materials, pretty simple and cleanly styled. Also, they thought about the product mechanism linked to product & engineering design issues. With this general group research process, they identified a major design challenge: what they can change a new design solution from a traditional huge and tall metal box style food saver?

Generating individual ideas as design opportunities, designers agreed to draw individual sketches for thirty minutes, and then discuss them. When they drew their own individual ideas, they kept talking about their ideas whether the other designers listened or not. When one designer drew his design idea as a conceptual prototype, he explained what he meant and gave reasons why it was useful as a new design idea. With this exercise, they generated different types design ideas.

By sharing each of the individual design ideas, they actually developed all initial rough ideas together. They kept asking each other to develop more desirable functions, features, or forms in the design process. In this sharing and development process, they retouched the other designers' ideas by adding or deleting design considerations. Based on that, they categorized and consolidated their design ideas. As a result, they generated six design ideas as conceptual design prototypes. Finally, they discussed the next design actions from this ideation session.

Thorough this process, the theme, transforming interaction from individual to group ideas, reveals how the participants modify the design process from an individual to a group design action.

5.1.2 Theme 2: Reflexivity between Tangible and Intangible Outcomes

Location: Alpha Design Studio; Date: Jan. 18th, 2011; Main Event: Design decision and concept development; Topic: Vaporizer; Main Players: Three Designers Visual Resource: Video-recording

The vaporizer project is a sample to present reflexivity between tangible and intangible outcomes as the second theme. It synthesizes ongoing design ideas, prototypes, and concepts more suitable ways for identifying the next stage of design directions. In this project, the project manager and two designers developed the first prototypes (sketch or rough digital drawing). With these initial outcomes (the first design prototypes), the designers discussed all design ideas to decide what ideas they should keep and take away for the future design development (the next versions of design prototypes).

While they criticized every design prototype, they also worked together to develop each prototype and decided right directions or not. In this action, designers conducted design decision-making and design development at the same time. Like Food Saver project, they focused on how they can generate new prototypes compared to the existing projects. Therefore, their design direction was to create a combined idea called "vaporizer with lighting." With this evaluation and concept development action, they expanded the idea from the original functions of vaporizer to new design applications like a touch screen with smart phone, equalizer with temperature, led lighting, and so on. As a result of this design co-creation session among designers, they selected three existing prototypes to polish the first prototypes and also produced several alternative new ideas to be considered for the next round of prototypes.

In the process of these activities and interactions, designers continued the action, reflexivity between tangible and intangible outcomes in order to identify a set of design directions and construct / reconstruct their design ideas, concepts, and prototypes in a design project.

5.1.3 Theme 3: Collaboration in Everyday and Infrequent Interactions among Designers

The third theme, collaboration in everyday and infrequent interactions among designers, shows two design actions: (1) discovering design ideas, prototypes, and concepts among designers in everyday interactions and (2) validating them in infrequent interactions. The first design action presents the previous two themes in designers' everyday design interaction among designers, users or other stakeholders, while the second action represents infrequent interactions in the design project.

Location: Alpha Design Studio; Date: Jan. 12th, 2011; Main Events: Product Project Meeting; Topic: Engineering and Medical Project Evaluation and Development; Main Players: CEO, an Engineer, a Designer, and a Project Manager; Visual Resource: Video recording

Engineering and Medical Product Project Meeting demonstrates the third theme, collaboration in everyday and infrequent interactions among designers. In this project collaboration, multiple companies located in different locations in U.S were involved and Alpha Design also invited a professional project manager and an engineer to synthesize more suitable design-business solutions. Therefore, this project was made up of four members in Alpha Design, a professional project manager, a client in Virginia, and an engineer working with Alpha Design as an external consultant.

The objective of this project meeting was to discover design directions by sharing different perspectives, ideas, and opinions. In this meeting, they mostly argued about engineering issues focusing on project effective assembling or disassembling procedures on current prototypes. For example, the project manager explained the detailed engineering and design issues to the clients, designers, and engineers in order to enhance their current knowledge and perspectives. In this process, they encountered new engineering and design issues and clarified what prototypes they should select to develop the next version or the final solution. In particular, they argued about specifications of the suggested five prototypes (A, B, C, D, and E) to determine a mock up version prototype, which included grip and ergonomic studies. To do this, they discussed A (simple and refinement) and F (risky and innovation) prototypes from different points of view such as between simple vs. risky and refinement vs. innovation. This project meeting presents how everyday designers' interactions can encounter different design perspectives in infrequent interactions. Thus, I can summarize this as collaboration in everyday and infrequent interactions among designers.

5.2 Lesson from Alpha Design Field Study

Based on our analysis and findings from the first field study, I learned a lesson. That is the company conducts designer-user interaction without actual user interaction. Alpha Design defines itself as a user-centered design agency; however, in reality, I did not observe designers direct interactions with actual users during the first field study.

Although there was an absence of designer-user interactions in the Alpha Design field study, the designers identified alternative interactions. Designers sought to consolidate user's knowledge and practice boundary into their own. In this study, the three themes of designers' interactions represent 'design attitude' of how designers could consider the ways for inviting 'virtual users' in their design projects. I assume the reasons for absence of user interactions include: 1) they lack knowledge of theoretical or methodological approaches to designer-user interaction; and 2) they cannot conduct direct user interaction because of time or financial constraints, or their limited relationship with clients.

Resulting from the first field study, I present three themes of designers' interactions, demonstrating limited ways of bringing users into design. Therefore, designers accumulated the knowledge of users and applied it to their everyday interactions to understand users with indirect ways.

6 SECOND FIELD STUDY: BETA LAB

To validate the result of first field study from Alpha Design, the second field study was conducted at Beta Lab as a confirmatory field study. Beta Lab is a social media and mobile application company, located in Seoul, South Korea. As a user-centered software and experience solution company, they summarize their process with three steps: 1) discovery, 2) translation, and 3) delivery. In the discovery stage, they conduct a series of actions such as understanding users' contexts, identifying problem statements from users, ideations, and project blueprint. In the second translation stage, they conduct multi-layered analysis, innovation worksheet, and multi-layered synthesis. Finally, in the delivery stage, they integrate execution.

During two months (June ~ August, 2011), I applied the same ethnographic research techniques that he used in the first field study as follows: photo-observation, employee interviews, and design project observations. Normally, I visited this field site five days a week, from Monday to Friday, from 9:00 AM to 5PM. Most of the time there, I was a non-participating observer and performed short interviews with creative designers and IT developers to understand better the working environment and their everyday design activities and interactions.

As a user-centered design application and mobile solution company, Beta Lab and its employees understood the methods and interactions of user-centered design processes fairly well; however, during my field study in Beta Lab, I observed only a few real user interactions in their projects. In the second field study, creative designers and IT developers had slightly different cultural understanding of users' roles and involvement in the design process. For example, the Congressman Mobile Apps project presents how different designers (creative designers versus IT developers) develop their own methods (e.g. manuals) to understand each other and synthesize users' requirements in the process of creating an integrated manual. The designers' interaction was an alternative method for bringing users into their design and IT development processes.

Similar to the first field study, there were no physical designer-user interactions in the field. Yet, designers have also sought to identify the alternative design approaches to invite users into their design processes.

7 FINDINGS: LESSONS FROM TWO FIELD STUDIES

From these two field studies, I have explored means by which designers bring the user into the design without actual user participation in the design process. Based on this, I conclude that there are huge

gaps between ideal design methods & practices and real designer-user interactions. In the published research, researchers have conceptually discussed the importance of user-driven innovation, user-centered design approaches and methods, co-creation between designers and users, and the values of participatory interaction. On the other hand, based on my two field studies, designers regarded designer-user interaction as knowledge and the interactions with real users were very limited and expensive.

Instead of this costly approach, the designers considered virtual users without necessitating real interactions in design. Although I did not observe real user interactions in their design projects, designers conducted user studies in limited design processes, insufficient design concept evaluation, and partial prototypes testing with users. In reality, the designers theoretically understood the ideas, concepts, and practical methods for bringing users into their design project; however, the alternative ways for inviting users to design were applied to inspire designers' collaborations when real users to synthesizing ideas, concepts, and prototypes in the design process were unavailable. Therefore, the designers' interactions reflect users' ideas in order to encourage designers' interactions in the design process.

8 IMPLICATION AND CONCLUSIONS

This study investigated what actual aspects of interactions between designers and users in the design process. Based on the two-field studies, I found a lesson--designer-user interaction without actual users and apply this to the concept of 'design attitude' on 'science of design'.

In the established information systems (IS) research, the concept of 'design attitude' (Michlewski 2008; Boland & Collopy 2004) has followed Simon's theoretical definition about 'science of design' (Simon, 1996). In this book, he argued the nature of design and design professionalism (1996, p.111¬114) and criticized the current problematic education curriculums on the concept of design. In particular, he maintained the science of design should be dealt with the actions of design synthesis and design analysis that support multiple disciplines with a variety of perspectives.

Concerning the direction of 'science of design', the previous IS design studies have not followed the fundamental direction adequately, because they fairly focused on IS design as IT artifacts rather IS design processes. Yet, some IS scholars have enhanced the boundaries of IS design with a holistic view. Their endeavours have been considered a variety of alternatives for effective decision-making, concerning a fairly fixed established managerial methods and methodologies. To address alternatives managerial values, these IS researchers have also interpreted "designing as organizing" (Yoo, Boland, & Lyytinen 2006) and "designing as managing" (Boland & Collopy 2004) based on the view of 'science of design' (Simon 1996). These previous IS studies have conceptualized how IS managers can operate their thoughts, logics, and behaviors with designerly ways that designers do (Cross 2006). Based on this, Michlewski (2008) conceptualized the 'design attitude' with five characteristics and argues the culture of professional designers. Yet, the established studies of design attitude only present the ideal aspects of design attitude that occur in very limited projects and cases in the real design setting. Therefore, this study explored the gaps of ideal and actual designer-user interactions, highlighting concept of 'design attitude' on the science of design.

This study provides two messages, and it emphasizes how the current design attitude concept should be reconfigured with the knowledge and practice of designers in the design process.

First, it presents the huge gaps of interactions between ideal and actual professional designers and argues the necessity to reconfigure the ideally established design thinking concepts with empirical approaches. The existing user-centered design theories, methodologies, and languages are challenging to provide appropriate fundamental directions and guidelines to the current business-design process. Because current design and management require a more contextualized theoretical view, which deals with the relationships from customer experiences in order to identify new latent services (Kimbell 2012).

Second, it calls for reconsideration about a philosophical conflict between user-centered design (UCD) and participatory design (PD) approaches on the interactions of professional designers on the design attitude. In particular, the approaches between UCD and PD have similarities; however, they also have different theoretical foundations, concerning the design attitude. In the UCD (Doblin 1987; Moholy-Nagy 1947; Norman & Draper 1986), design attitude means designers can be users through the action of "being the customers"; however, users are challenging to be designers in the design process. On the other hand, PD (Muller & Kuhn 1993; Schuler & Namioka 1993) offers the opportunities of how users can be designers and designers could understand the moments of role-reversed in order to elicit the shared design knowledge and practice between designers and users using PD workshops with a limited access in the design process.

From the lesson, this study suggests to conduct empirical studies that validate currently established knowledge and practice of design for improving the gaps between ideal and actual ones. These theoretical efforts would identify designers' manners in order to develop the quality of designer-user interaction with a well-balanced approach to interact with actual users in the design process.

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