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Designer-User Interaction without Actual Users : A Lesson from a Field Study

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ABSTRACT

The purpose of the paper is empirically to explore 'design manner', focusing on the designer's knowledge boundary on the designer-user interactions in the design process. This study conducts a field study and observed designer's interactions with actual users in a leading user-centered design firm over three months. The observations revealed how designers bring ideas about users into design without physically interacting with users during the design process. Based on Bourdieu's theory of practice and the concept of boundary objects, this study introduces the concept of 'design manner', by which designers incorporate user's ideas into the design process without actual involvement of users in the process. This paper contributes to the body of knowledge by introducing the design manner in-between designer's and user's knowledge boundaries and argue bridge between theoretical and actual designer-user interactions in the IS design process.

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

Ⅰ. Introduction

In previous information systems (IS), researchers and practitioners have believed that identifying users and their information environments is the critical component in creating reliable IS artifacts and de termining success of the system (Boland, 1978; Churchman and Schainblatt, 1965; Ginzberg, 1981). Interactions between designers and users have be come the core of all design actions that lead to successful IS artifacts or process innovations in the design process. With this belief, designers have struggled to understand users with a variety of research approaches such as user involvement (Ives and Olson, 1984; Tait and Vessey, 1988) and end-user collaboration (Jung et al., 2009; Marakas and Elam, 1998; Newman and Robey, 1992).

To understand the importance of users, in particular, information systems development (ISD) and design science research (DSR) communities have

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ar-gued user-invited models and methodologies to lead creation of successful IS artifacts (e.g., IS products, systems, and services). Recently, IS design requirement community has also deeply highlighted users into the systems design requirements using the agile and software methodologies (Hong et al., 2011; Moon et al., 2010; Maruping et al., 2009).

As the inter-disciplinary approaches, ISD and DSR communities have opened and enhanced the ideal knowledge and practice in designer-user interaction in IS. 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; Norman and Draper, 1986) and participatory design (PD) (Muller and Kuhn, 1993; Schuler and Namioka, 1993).

Based on their endeavours, the importance of designer-user interaction has been recognized as theoretical levels of knowledge. Yet, IS communities have two research problems. First it challenges to present *how the designer-user interactions could be interplayed in the actual settings*. Second, these previously established theories, models, or methodologies of designer-user interaction, reflecting user information environments remain in the *ideal* manners of knowledge and practice. Therefore, this study explores design manner of how designers incorporate user expectations into the design process, and it asks a research question as follows:

Research Question: How does designers' knowledge boundary actually incorporate user expectations in the design process?

To address this question, Bourdieu's theory of practice (Bourdieu, 1986; Bourdieu and Nice, 2002; Bourdieu and Wacquant, 2004) and boundary objects (Star, 1990; Star and 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 a field study (Agar, 1996; Hammersley and Atkinson, 1995), and this field study includes five design projects in a design firm recognized for the user-centered design methods. Using ethnographic research techniques (photo observations, qualitative interviews, and self-diary), the data over three months of on-site observations was collected and analyzed them using a grounded theory approach (Charmaz, 2006; Strauss and Corbin, 1990). The first revelation from the field study was that there were huge gaps between ideal and real designer-user interactions. Surprisingly, even though all five projects were labelled as being user-centered, there was no designer interaction with actual users of the design projects. 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's needs* into the design projects. During their design processes in the field, designers ignored the ideally collected design knowledge and practice by previous design theorists (Doblin, 1987; Muller and Kuhn, 1993; Norman and Draper, 1986; Schuler and Namioka, 1993). 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.

Ⅱ. Literature Review

The following studies on designer-user interactions in information systems development (ISD) and design science research (DSR) in IS were reviewed. Also, I expanded the literature study on design methodologies and approaches (e.g., agile methodologies, user-centered design, and participatory design) as a relevant review scope. Based on this, I situate design manner, focusing on designer's interaction boundary that can be encountered, occurred in, or evolved with actual users in the design process.

2.1. Designer-User Interaction in IS

In prior IS research, scholars seeks to explore the importance of interactions between designers and users, focusing on the roles of designers and users in a design process. Since Churchman and Schainblatt (1965) empirically argued for the importance of mutual understanding between 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.

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

Newman and 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 and Elam (1998) investigated the semantic questioning patterns between designers and users as an alternative approach for effective communication in software system development. Mørch and Mehandjiev (2000) proposed tailoring computing is a form of collaboration between designers and users in the software development process. 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.

Designers and users have different perspectives, so that it has considered how designers and users can produce a shared communication space in ISD. Kaiser and 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 and 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.

An ecological view between designers' and users' interaction in the whole cycle of design process is defined. 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 devel-opers made. Kujala and 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.

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

In recent design science research (DSR), the meanings of designer-user interaction have been elusively reconfigured in terms of mutual interaction between designers and users. Lin and Shao (2000) conceptualized the relationship between user participation and information system (IS) success and empirically tested 32 organizations, highlighting user attitudes and user involvement for IS success. Coughlan and Macredie (2002) argued the importance of socially-oriented designer-user interaction methodologies for capturing user requirements in the early stage of system development. Béguin (2003) suggested the importance of a mutual learning process among users and designers in the project management. Weedman (2008) argued mutual understanding among multiple stakeholders with different perspectives in the collaborative design project.

Some DSR scholars have argued diverse designer-user interaction by co-creation and co-design features and functions. Brandt and Messeter (2004) proposed the design game is an effective tool to facilitate a user-centered design process for cross-disciplinary design groups early in the design process. Sanders and Stappers (2008) maintained a user-centered design approach has changed the designer's roles and attitude in inviting users to create better domains of collective creativity. Hisarciklilar et al. (2009) explored the designer-user collaboration in the case of new surgical instruments and they argued the importance of user involvement for effective decision making. Kohler et al. (2011) investigated how to design co-creation systems and enriches research on co-creation to fit the virtual world context. Shen and Sun (2012) empirically proposed information modeling-based user activity simulation and evaluation method (UASEM) in generating a series of interactions between the designers and users Casakin and Badke-Schaub (2017) empirically investigated the value of Shared team mental models in-between designers and users in the design project.

Although few studies have been empirically conducted on designer-user interactions in information systems development (ISD) and design science research (DSR), and these studies have argued for the importance of designer-user interaction and the ideal opportunities of how designers could interact with users with theoretical approaches.

2.2. Designer-User Interaction in Systems Design Methodologies

Recently, IS scholars have explored new systems design methodologies in creating more effective IS artifacts and processes. As actual forms of systems

design methodologies, most current systems design methodologists condensed the designer-user interaction in agile methodology (Dybå and Dingsøyr, 2008; Hong et al., 2011; Maruping et al., 2009; Meso and Jain, 2006; Nerur et al., 2005; Pearlson ang Saunders, 2004), user-centered design (Lieberman et al., 2006), and participatory interaction (Asaro, 2000).

In general, some methdologiests explored effective methodological directions in the software and systems development. Pearlson and Saunders (2004) proposed successful project management factors, concerning effective methologies and practices. Based on this, Maruping et al. (2009) empirically investigated effective use of agile methodologies in the actual project management settings. To support this, they considered control theory as the theoretical foundation to maximize the benefits of agile methodology use during a project. Ågerfalk et al. (2006) supported agile methodology as a better methdology for the commuties of software development. Nerur et al. (2005) highlighted the importance of flexibility in software development methodologies to adapt dynamically changing technologies and users' requirements. Meso and Jain (2006) also pointed out the mealleable software development methodologies in the changing business environments, and it proposes the complex adaptive systems (CAS) for elucidating product, process, and people as the best practices in systems development.

The software development community has considered users as the core issue in the design process. Stapleton (2003) proposed dynamic software development with nine principles, in which the user involvement is considered at the core of them. Dybå and Dingsøyr (2008) summarized previous agile software development methodology studies, and dynamic software development (DSDM) considers the user involvement in their methodology. Hong et al. (2011) empirically investigated the relationships between users' requirements and agile IS in order to identify changing systems requirements. In this research, they integrated a unified theory for the users' requirement into the agile IS, concerning user acceptance, use of technology, and IS continuance.

For effective interactions with actual users, joint application design (JAD) scholars argued the inefficiency of inviting actual users and they explored alternative effective methodologies in software and systems development (Carmel et al., 1993; Davidson, 1999; Duggan and Thachenkary, 2004; Jones, 2009; Wood and Silver, 1995). Davidson (1999) empirically investigated the merits of JAD, dealing with the issues of inviting user participation, expediting the development process, and increasing the quality of system specifications. Based on this, she suggested JAD as an effective methodological direction for the software / systems design development. Duggan and Thachenkary (2004) empirically tested the efficiency of JAD of how it can be used as a group technique in the systems requirements determination (SRD).

The agile research scholars strongly supported designer-user interaction as a core value in identifying design requirements (Blomkvist, 2005; Chamberlain, Sharp and Maiden, 2006), and they sought to understand users' information environments as a critical value in developing successful IS artifacts (Cohn, 2004; Mackay et al., 2000). Blomkvist (2005) also proposed agile software methodology with a view to usability and user-centered design in order to suggest relevant usability activities within the agile methodology. Chamberlain et al. (2006) also proposed a framework, which integrates the merits of user-centered design and agile software development. Endorsing effective tools for identifying user requirements, Mackay et al. (2000) propagated rapid application development (RAD) with designer-user inter-

action in the computer system development, in which they view decoding by users and encoding by producers as the foundation for ICT-enabled products and services. Cohn (2004) proposed an effective tool emcompassing user requirements, use cases, and user scenarios in the early stage of informaiton systems development.

To increase our understanding of the knowledge and practice, some interdisciplinary researchers have documented the ways for inviting users in software and systems development. Asaro (2000) argued theoretical foundation in the participatory design methodologies and suggested it in order to apply a model for involving users, designers and the technology in the design development. Lieberman et al., (2006) maintained the advantage of changing users' role from a system user to a system developer and they suggested effective methods and tools for users.

In sum, the previous IS scholars have supported the contribution of designer-user interactions in information systems development (ISD) and design science research (DSR) in creating successful IS artifacts since 1960s. In addition, current system design methodologists have also argued for consideration of the value of designer-user interaction in software development, design requirement, and agile research. Their endeavors have resulted in identification of the potential value of designer-user interaction studies; yet, they did not effectively define where the designer-user interactions are situated and how the interactions could be interplayed to complement each other in the design process. Therefore, this study seeks to explore the designer-user interaction in an actual design practice setting.

Ⅲ. Theoretical Foundation

This study adopts Bourdieu's theory of practice (Bourdieu and Wacquant, 2004) and Star and Griesmer's boundary objects (1989) to address the following research question-How does designers' interaction boundary actually incorporate user expectations 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 and Nice, 2002; Bourdieu and 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'(Park, 2012; Park, 2013).

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. Based on Bourdieu's theory, it highlights the structural relationships between designer-user inter-

actions as 'history of action (field)', and 'mode of action (habitus)' as situated in the design practice setting (practice). In particular, in this study, I seek to understand the designer's interaction boundary of how designers do actually interact with users in order to incorporate user expectations in the design process.

To address the research concentration, this study highlights the designer's information boundary on Bourdieu's theory of practice. Basically, designers take their design attitude as the form of designer's interaction boundary from Field (history of action) in their design process, and they make their design attitude as the design strategy or orientation, with regard to the given design condition between field (design knowledge) and habitus (design orientation). After taking a defined design attitude from the reciprocal interaction between field and habitus, designers represent designers' interactions in practice (practice as situated action) in the design process.

In this study, I view the designer's interaction boundary as the adaptation of design attitude in the designer-user interaction on the basis of Bourdieu's theory of practice. Therefore, I highlight how the designer's information boundary could be identified in habitus (design orientation) among the three stages: field, habitus, and practice.

3.2. Star and Griesmer's Boundary Objects

Star and Griesmer's boundary objects (Star, 1990; Star and 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 and 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 (Henderson, 1991; Subrahmanian et al., 2003; Yakura, 2002) that highlight boundary objects as the outcomes of actions among different cultures, organizations, and multiple stakeholders. On the other hand, the other is 'boundary objects are actions' (Boland et al., 2007; Carlile, 2002; Levina and Vaast, 2005) that consider the artifacts create new actions among them in the design process.

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 boundary objects as artifacts deal with tangible and physical outcomes that designer-user interaction creates (e.g., prototypes). On the other hand, the boundary objects as actions entail intangible and 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 field study. In sum, this study invite Bourdieu's theory of practice and Star and Griesmer's boundary objects as theoretical foundations, in which I interpret Bourdieu's theory in order to argue how the designers could take and make their information boundary with actual users. In particular, designers cold take the established design knowledge (e.g., design vocabularies—design approaches, methodologies, and methods) and make their own design orientation of know they could interact with users in the actual design projects. On the other hand, I view boundary objects as tangible

and intangible outcomes of the designer-user interaction in the design process. In this study, designers' interactions and outcomes with users can be interpreted as boundary objects in the design project.

Ⅳ. Methodology

As a qualitative study, this study performed a field study in a user-centered design company, which has relevant knowledge and practice about user-centered design methodologies and methods. 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, this field study followed the ethnographic research format (Geertz, 1977; Hammersley, 1995; Spradley and 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 conduct a field study in their firms. Because of the confidentiality related to their clients, only two companies decided to facilitate this research project. Alpha Design is one of the two companies, and it is a user-centered design consultancy located in Cleveland, OH.

4.2. Data Collection and Analysis

The field study data consisted of field observations of the everyday life of designers and users. For the field observations, ethnographic techniques (Geertz, 1977; Hammersley, 1995; Spradley and Baker, 1980; Wolcott, 2005) were used to collect the data. In-depth qualitative interviews (Kvale and Brinkmann, 2008; Schultze and Avital, 2011; Spradley, 1979) are also conducted in order to collect more detailed backgrounds of projects' stories and the interactions between designers and users in the projects.

The data from the field study was collected over three months. The Alpha Design field study was conducted for three months from Jan to Mar. 2011. During this period, I observed five design projects that involved new product development and prototype creation 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.

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

Ⅴ. Field Study

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, hey 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 develop-

ment, aesthetic development, and human factors development.

The uniqueness of Alpha Design, compared to other design agencies is that they are not a conceptual design consultancy but a prototyping and production company providing physical outcomes with a user-centered design approach. Therefore, the competency of Alpha Design is to generate a variety of cost effective prototypes in collaboration with Alpha Design in China. Prototypes are powerful tools in the design and innovation process, and Alpha Design studies a prototype to learn and discover unforeseen opportunities for improvement in the process of their design / IT innovation.

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 projects. These five observed projects are the sample of Alpha Design projects, in which designer-user interactions create design outcomes in the design process. The Alpha Design dealt with new product innovation and redesign by offering prototypes and manufacturing solutions for their clients. These samples revealed overall designer's activities and interactions as a part of the whole project to generate new design outcomes.

5.1. Three Themes of Designer's Interaction Boundary without Users in the Design Process

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.

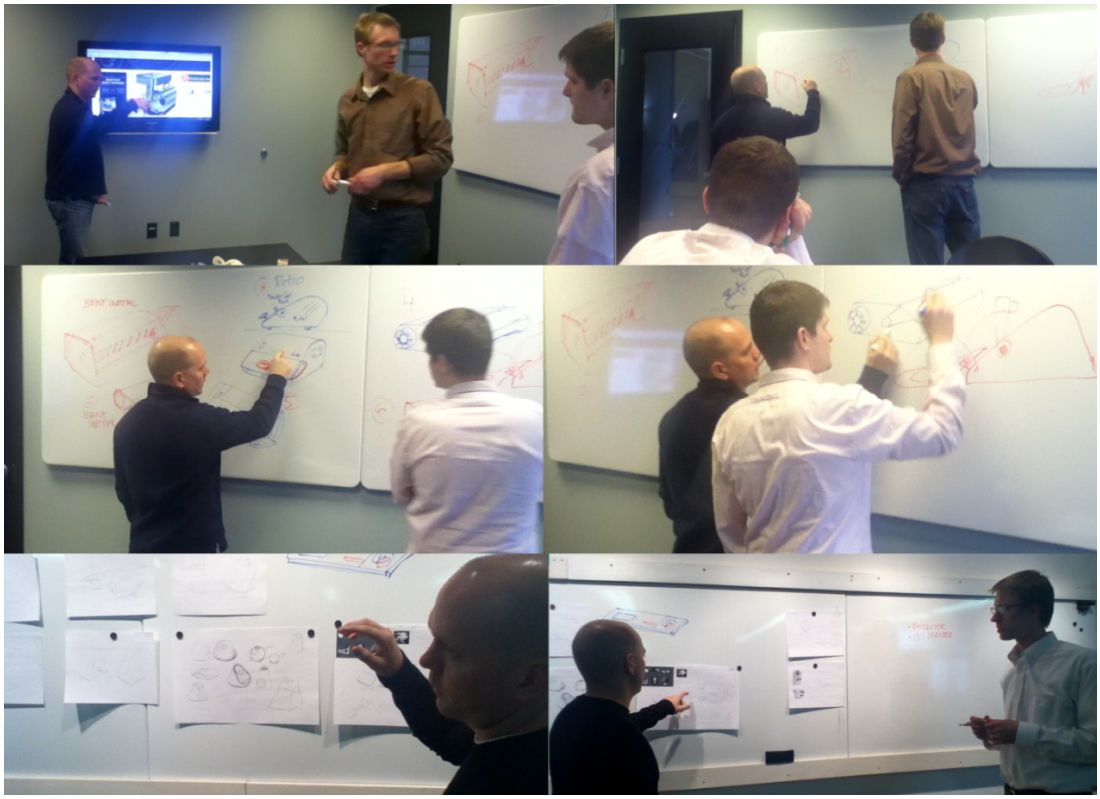
5.1.1. Theme 1: Transforming Interaction from Individual to Group Ideas

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. In this design practice, designers discovered how they could identify new product definitions on their projects.

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.

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



<Figure 1> Designers' interactions in Alpha Design

food savers were black and white in color, steel materials, pretty simple and cleanly styled. Also, they thought about the product mechanism linked to product and engineering design issues such as the position of handler, weight, and grip materials, process of sealing and sucking air, and so on. 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 30 minutes design ideation exercise, they generated different types design ideas as the first conceptual prototypes.

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 designer's information boundary 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, discovering design ideas, prototypes, and concepts among designers in everyday interactions, presents the previous two themes ((1) transforming interaction from individual to group ideas and (2) reflexivity between tangible and intangible outcomes) in designers' everyday design interaction among designers, users or other stakeholders. While the second action, validating design ideas, prototypes, and concepts among designers or other stakeholders, represents infrequent interactions in the design project.

Location:	Alpha Design Studio
Date:	Jan. 12th, 2011
Main Events:	Engineering and Medical Product Project Meeting
Topic:	Engineering and Medical Project Evaluation and Development
Main Players:	CEO, an Engineer, a Designer, and a Project Manager Three different locations in the United States
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. For the projects, they dealt with engineering and design projects and developed a variety of prototypes to identify design directions. In this project meeting, Alpha Design designers shared their preliminary concepts (five different prototypes) about engineering and medical device projects and explained their design rationales to get feedback and recommendations from the participating designers and engineers.

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.

In sum, designers' interactions create design ideas, concepts, and prototypes in the design process. From these observed projects, the three themes can be summarized: (1) transforming interaction from individual ideas to group ideas; (2) reflexivity between tangible and intangible outcomes; and (3) collaboration in everyday and infrequent interactions among designers. These three themes exist in everyday designers' activities and interactions as the designer's interaction boundary in the design project.

VI. Findings

My first finding was that there was no direct designer-user interaction, which is contrary to the recommendations of most design resarchers. Yet, the ab-

sence of users does not indicate that there is no user contribution – user inputs are also contributed by the designers themselves - in their role as users. Therfore, while boundary objects I may be able to distinguish, it is important to note that the boundary lies between the roles of the designers as users and then subsequently as designers.

From the three themes, I assume the reasons for absence of actual 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 field study, I present three themes of designers' interactions as '*design manner*', 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.

In this study, I have explored 'design manner' by which designers bring the user into the design without actual user participation in the design process. This led to a recognition of the difficulties associated with the inclusion of real users in the design process. The discovery at this stage was the ways in which designers compensated for the absence of real users in the design process that I discussed about how designers could invite virtual users into the designers' interaction and knowledge boundary with the three themes in a design project.

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 manner' of how designers could consider the ways for inviting 'virtual users' in their design projects. In the first theme (transforming interaction from individual ideas to group ideas), individual designers invite virtual users from the designers' individual understanding and their previous design projects. Based on this, the individual designers interact with themselves to develop multiple design prototypes that include individual designers' ideas and opportunities, concerning virtual users. Following that, the designers argue the identified design outcomes (e.g., prototypes) to integrate better design outcomes (e.g., features, functions, and interactions) and to decide group's final design solutions. To effective the design development and decision, designers invite the virtual users in the core of their design dialogues in the design process.

In the second theme (reflexivity between tangible and intangible outcomes), designers invite virtual users in order to discover and validate different levels of tangible (e.g., prototypes) and intangible outcomes (e.g., design orientations). To increase the quality of design outcomes, designers wrestle with different levels of tangible and intangible design outcomes, in which virtual users exist in designers' cognition and dialogues. These designers' interactions for inviting virtual users act as a critical factor in determining better design decision and qualified design outcomes in a design project.

In the third theme (collaboration in everyday and infrequent interactions among designers), designers represent the first and second themes over time. In everyday design activities and interactions, designers invite virtual users from their cognition and design experience in order to discover multiple levels of design outcomes, while the designers could meet together in order to validate the design outcomes by understanding users virtually on their design language (cognition and dialogues) infrequently in a

design project.

Based on this, I conclude that there are huge gaps of design manner in-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 the field study, 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 'design man-ner' in the design process.

Ⅶ. Implication and Conclusions

This study investigated what actual aspects of interactions between designers and users in the design process. Based on the Alpha Design field study, I found a lesson--designer-user interaction without actual users and apply this to the concept of 'design manner' about how designers could change their interaction boundary for inviting users. In particular, this study consequently argues 'design manner' as designers' information boundary in reflecting users and their information environments (Park, 2012; Park, 2013), proposing it as the bridge across the gap between ideal and actual designer-user interactions in the science of design (Simon, 1996).

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 (Casakin and Badke-Schaub 2017; Levina and Vaast, 2005; Shen and Sun 2012; Weedman 2008). Their endeavours have been considered a variety of positive opportunities for effective decision-making, concerning fairly fixed established managerial methods and methodologies.

To address alternatives managerial values, these IS researchers have also interpreted "designing as organizing" (Yoo et al., 2006) and "designing as managing" (Boland and 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). Boland and Collopy (2004) have sought to expand the theories and methods the existing meanings of managing from 'analyzing for effective decision making' to 'synthesizing new values and directions' with a view of 'managing by designing. Youngjin et al. (2006) suggest 'design gestalt', which deals with how managers could organize design and design organizations, in which they argued how managers could theorize their organizational and mana-gerial decisions from architect designers' design attitude. Based on this, Michlewski (2008) conceptualized the 'design

attitude' with five characteristics and argues the culture of professional designers. In the established information systems (IS) research, the concept of 'design attitude' (Michlewski 2008; Boland and Collopy, 2004) has followed Simon's theoretical definition about 'science of design' (Simon, 1996) that argues the nature of design and design professionalism, dealing with the actions of design synthesis and design analysis that support multiple disciplines with a variety of perspectives (1996, p.111-114). This concept suggested how managers could take more synthetic attitude in creating multiple aspects of ideas, problems, and alternative solutions in the managerial decisions. Yet, 'design manner', which highlights the designer's knowledge boundary for the effective designer-user interactions in the design process, has not been documented. Based on this, the concept of design attitude criticized current management education and curriculums, focusing on analytic techniques for managerial decision making, and the design attitude suggested syntactic techniques for managers in generating more holistic approaches for effective decision making process. Yet, the established design vocabularies (methods and methodologies) did not deal with design manner of how designers could interact with users in the design projects. Therefore, this study explored the gaps of ideal and actual designer-user interactions, highlighting concept of 'design manner' of how the designers practically change their interaction boundaries with users in the design process. From this study, surprising, I realized designers only brought virtual users into their everyday design practices. Actual designer-user interactions exist in only a few limited cases, and most users exist in designers' inter-action boundary virtually in the design process.

This study provides two messages, and it emphasizes design manner of how IS designers could actually work with IS users in the design process.

First, it presents the huge gaps of design manner in-between ideal and actual designer-user interactions 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). To create suitable theoretical directions, evolutionally transforming new business models and offering systems based on customer engagement from real field studies are required in this business-design innovation process.

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 manner. In particular, the approaches between UCD and PD have similarities, highlighting users or participants in the process of design in order to elicit users or participants' information environments. Yet, they also have different theoretical foundations, concerning the design manner. In the UCD (Doblin, 1987; Norman and Draper, 1986), design manner 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 and Kuhn, 1993; Schuler and 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 lim-

ited 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 'design manner' in order to develop the quality of designer-user interaction with a well-balanced approach to interact with actual users in the design process.

Ⅷ. limitations and future studies

Like other studies, this study has some limitations. First, as an exploratory field study, it is a single field study but, I have tried to highlight the various modalities of designers' role as users through more than one event. Secondly, the finding regarding the multiplicity of roles played by the designers was unexpected and opens up avenues for research into pathways for user inputs to reach and influence the design process.

As future studies, a confirmative field study would be required for clarifying the themes of designer's interactions and their design manner in the design process. Also, the findings from this study should be compared to the previous studies by other empirical studies for justifying the values of design thinking approaches and methodologies in information systems development (ISD) research. Furthermore, I hope to expect more studies on designer-user interaction, because current ISD methodologies do not provide actual protocols of how IS developers could communicate, collaborate, and co-create with actual users in their design process. Thus, these future studies would enhance the body of knowledge and practice on the limited boundary of current ISD studies methodologically and practically.

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