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Cross-Cultural Design

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P.L. Patrick Rau
Tsinghua University
Department of Industrial Engineering
100084 Beijing, China
E-mail: rpl@mail.tsinghua.edu.cn

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Foreword

The 16th International Conference on Human–Computer Interaction, HCI International 2014, was held in Heraklion, Crete, Greece, during June 22–27, 2014, incorporating 14 conferences/thematic areas:

Thematic areas:

- Human–Computer Interaction
- Human Interface and the Management of Information

Affiliated conferences:

- 11th International Conference on Engineering Psychology and Cognitive Ergonomics
- 8th International Conference on Universal Access in Human–Computer Interaction
- 6th International Conference on Virtual, Augmented and Mixed Reality
- 6th International Conference on Cross-Cultural Design
- 6th International Conference on Social Computing and Social Media
- 8th International Conference on Augmented Cognition
- 5th International Conference on Digital Human Modeling and Applications in Health, Safety, Ergonomics and Risk Management
- Third International Conference on Design, User Experience and Usability
- Second International Conference on Distributed, Ambient and Pervasive Interactions
- Second International Conference on Human Aspects of Information Security, Privacy and Trust
- First International Conference on HCI in Business
- First International Conference on Learning and Collaboration Technologies

A total of 4,766 individuals from academia, research institutes, industry, and governmental agencies from 78 countries submitted contributions, and 1,476 papers and 225 posters were included in the proceedings. These papers address the latest research and development efforts and highlight the human aspects of design and use of computing systems. The papers thoroughly cover the entire field of human–computer interaction, addressing major advances in knowledge and effective use of computers in a variety of application areas.

This volume, edited by P.L. Patrick Rau, contains papers focusing on the thematic area of Cross-Cultural Design, addressing the following major topics:

- Cross-cultural product and service design
- Cross-cultural issues in interaction
- Social aspects and implications of cross-cultural design

- Cross-cultural issues in e-commerce, marketing and branding
- Cross-cultural design for knowledge sharing and learning
- Cross-cultural design for the smart city

The remaining volumes of the HCI International 2014 proceedings are:

- Volume 1, LNCS 8510, Human–Computer Interaction: HCI Theories, Methods and Tools (Part I), edited by Masaaki Kurosu
- Volume 2, LNCS 8511, Human–Computer Interaction: Advanced Interaction Modalities and Techniques (Part II), edited by Masaaki Kurosu
- Volume 3, LNCS 8512, Human–Computer Interaction: Applications and Services (Part III), edited by Masaaki Kurosu
- Volume 4, LNCS 8513, Universal Access in Human–Computer Interaction: Design and Development Methods for Universal Access (Part I), edited by Constantine Stephanidis and Margherita Antona
- Volume 5, LNCS 8514, Universal Access in Human–Computer Interaction: Universal Access to Information and Knowledge (Part II), edited by Constantine Stephanidis and Margherita Antona
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- Volume 8, LNCS 8517, Design, User Experience, and Usability: Theories, Methods and Tools for Designing the User Experience (Part I), edited by Aaron Marcus
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- Volume 10, LNCS 8519, Design, User Experience, and Usability: User Experience Design for Everyday Life Applications and Services (Part III), edited by Aaron Marcus
- Volume 11, LNCS 8520, Design, User Experience, and Usability: User Experience Design Practice (Part IV), edited by Aaron Marcus
- Volume 12, LNCS 8521, Human Interface and the Management of Information: Information and Knowledge Design and Evaluation (Part I), edited by Sakae Yamamoto
- Volume 13, LNCS 8522, Human Interface and the Management of Information: Information and Knowledge in Applications and Services (Part II), edited by Sakae Yamamoto
- Volume 14, LNCS 8523, Learning and Collaboration Technologies: Designing and Developing Novel Learning Experiences (Part I), edited by Panayiotis Zaphiris and Andri Ioannou
- Volume 15, LNCS 8524, Learning and Collaboration Technologies: Technology-rich Environments for Learning and Collaboration (Part II), edited by Panayiotis Zaphiris and Andri Ioannou

- Volume 16, LNCS 8525, Virtual, Augmented and Mixed Reality: Designing and Developing Virtual and Augmented Environments (Part I), edited by Randall Shumaker and Stephanie Lackey
- Volume 17, LNCS 8526, Virtual, Augmented and Mixed Reality: Applications of Virtual and Augmented Reality (Part II), edited by Randall Shumaker and Stephanie Lackey
- Volume 18, LNCS 8527, HCI in Business, edited by Fiona Fui-Hoon Nah
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- Volume 26, CCIS 434, HCI International 2014 Posters Proceedings (Part I), edited by Constantine Stephanidis
- Volume 27, CCIS 435, HCI International 2014 Posters Proceedings (Part II), edited by Constantine Stephanidis

I would like to thank the Program Chairs and the members of the Program Boards of all affiliated conferences and thematic areas, listed below, for their contribution to the highest scientific quality and the overall success of the HCI International 2014 Conference.

This conference could not have been possible without the continuous support and advice of the founding chair and conference scientific advisor, Prof. Gavriel Salvendy, as well as the dedicated work and outstanding efforts of the communications chair and editor of *HCI International News*, Dr. Abbas Moallem.

I would also like to thank for their contribution towards the smooth organization of the HCI International 2014 Conference the members of the Human–Computer Interaction Laboratory of ICS-FORTH, and in particular George Paparoulis, Maria Pitsoulaki, Maria Bouhli, and George Kapnas.

April 2014

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HCI International 2015

The 15th International Conference on Human–Computer Interaction, HCI International 2015, will be held jointly with the affiliated conferences in Los Angeles, CA, USA, in the Westin Bonaventure Hotel, August 2–7, 2015. It will cover a broad spectrum of themes related to HCI, including theoretical issues, methods, tools, processes, and case studies in HCI design, as well as novel interaction techniques, interfaces, and applications. The proceedings will be published by Springer. More information will be available on the conference website: `http://www.hcii2015.org/`

General Chair
Professor Constantine Stephanidis
University of Crete and ICS-FORTH
Heraklion, Crete, Greece
Email: `cs@ics.forth.gr`

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The Sino-Italian Collaborative Design Platform: Designing and Developing an Innovative Product Service System

Wei Liu, Yongqi Lou

Tongji University, China
{liuwei.dk,lou.yongqi}@gmail.com

Abstract. This research aims to explore how to bring the richness of collaborative design into the (formal) context of the offices and colleagues. This research went through five stages to design product service systems: 1) product service system analysis, 2) collaborative design, 3) Research on computer supported cooperative work (CSCW) model, 4) User experience research, and 5) Product service system design. Recommendations are given to design and develop interactive collaborative design platforms in the work context. Researchers and designers who are interested in designing and developing rapidly evolving and experiential ICT systems would benefit from learning this research.

Keywords: Product service system, collaborative design, user experience, information technologies.

1 Introduction

Social innovation requires collaboration between individuals. Collaboration requires individuals working together in a coordinated fashion, towards a common goal. Accomplishing the goal is the primary purpose for bringing the team together. Collaborative platform helps facilitate action-oriented teams working together over geographic distances by providing tools that aid communication, collaboration and the process of problem solving. Additionally, collaborative platform may support project management functions, such as task assignments, time-managing deadlines and shared calendars. The artefacts, the tangible evidence of the problem solving process and the final outcome of the collaborative effort, require documentation and may involve archiving project plans, deadlines and deliverables. This would create a more sustainable working and living environments, which is in line with the theme of this session: Future urban sustainability and social innovation. In this research, by integrating international design resources and the most advanced information technologies (e.g., cloud computing), we aim to achieve a real-time, remote, collaborative and digital product service system from a 'human-centered' perspective. This product service system is called the Sino-Italian collaborative design platform, which includes a set of technological toolkit, intellectual property databases, an easy-to-use cross-

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border digital prototype and a collaborative design network. This platform connects professional design laboratories geographically spread around the world, and supports co-design through seamless digital and physical computer supported cooperative work (CSCW) collaborations. Researchers and designers who are interested in designing and developing rapidly evolving and experiential ICT systems would benefit from learning this research.

2 Related Work

In the work context, Keller [8] designed cabinet that helps designers collect and organize their visual material for inspiration. The design makes interaction with digital material more physical by dragging digital images on a table as if they are real objects. It offers a fluent way to add physical material to the digital collection by digitizing and projecting any objects placed on the table. This type of study was followed by several other recent projects in the domain of computer supported collaborative work (CSCW), such as designing an intelligent robot worker that transports goods and samples in semi-public hospital context [11] and designing a shape-changing communication device that facilitates expressive 'knocking' communications between two office workers [16]. Another example is the intelligent reading lamp, which aims to demonstrate ethics and esthetics in products and systems [21]. By moving the hand over the lamp, a 'living light' can be directed onto an object such as a book. This interaction design can fit into both the home and work contexts.

3 Research Objectives

Our research objective has been to explore how to bring the richness of collaborative design that people currently experience in the experimental context into the (formal) context of their offices and colleagues. This is an interesting challenge that presents itself to developers, designers and researchers.

4 Approach

From the beginning and throughout the whole research, digital and physical prototypes that are rich in aesthetic, expressive and experiential quality will be built and tested in real contexts. In the first phases of the project emphasis lies in the exploration of new ways of interacting and new technologies, while later on in the project the focus shifts to applying these new techniques within the domain of collaborative design platform. To ensure a high flow of thoughts, ideas and knowledge, a research through design approach is taken, in which the generation of knowledge and the development of applications go hand in hand. Research through design is used as a form of research to contribute to a design activity [1], [21]. It is recognized as a form of action research, defined as systematic investigation through practical action calculated to devise or test new information, ideas, forms or procedures and to produce com-

municable knowledge [1], [9]. Action research is an iterative process involving researchers and practitioners acting together in a particular cycle of activities [2], [20]. The research through design approach is highly iterative, integrating theory and practice from different fields into working experiential prototypes. These prototypes can be experienced as working artefacts and can be used as research means to demonstrate and explore these theories [14]. Designing and building working prototypes that are rich in experiential quality therefore plays a key role in this approach. The reflection on the action (of designing and building) creates new knowledge. The designing act of creating prototypes is in itself a potential generator of knowledge [6], [17], leading to new design insights and refinement of research issues.

Our research went through the following 5 stages: 1) Product service system analysis: analyzing the characteristics of collaborative products service systems, understanding their information architecture, comparing the advantages and disadvantages of existing systems, referencing these systems for the our design and development. 2) Collaborative design: comparing creative design approach (e.g., brainstorming and exchanging ideas with co-workers through inspirational channels) and other design approaches (e.g., engineering design). 3) Research on computer supported cooperative work (CSCW) model: researching on possible technical solutions of realizing creative collaboration and looking for a new computer supported cooperative work model. 4) User experience research: understanding user behaviors and demands on collaborative product service systems. 5) Product service system design: designing specific use cases, user stories and user interface, developing the whole product service system, e.g., user interface and cloud solutions.

4.1 Product Service System Analysis

Products are no longer just products, services not only services. This type of thinking requires new design and development structures, moving people out of their traditional compartments, meeting the needs of an often diverse and evolving group of end-users [3]. Product service systems are designed in highly dynamic network environments, mixing people and parties, models, interests and goals. The design of PSS requires an integrated effort to create the product, the related service and the underlying business model in one comprehensive proposition. For many companies and creative professionals this a relatively new way of working, requiring a more strategic way of thinking. By creating tools and methods, the projects will enable designers to strategically contribute to product service system development. From a conceptual point of view, product service system design requires the creation of experiential value for users. This is a complex process, as the design effort of the sum is greater than that of the individual parts. The user experience research line will look for knowledge, methods and tools to allow the designer to more effectively design these experiences. The intelligence incorporated in functions as an extension to both the product and service components. This may significantly influence the design, testing and prototyping of product-service combinations. The intelligence research line will focus on the optimal application of smart, enabling technology by developing new knowledge, tools and methodologies.

4.2 Collaborative Design

Collaborative design is a generic term, which combines the understanding of the way people design in groups with the enabling technologies of computer networking, and associated hardware, software, services and techniques [4]. Essentially, collaborative design goes beyond building technology itself and looks at how people work within groups and organizations and the impacts of technology on those processes. 'Collaborative' means we have to creatively solve problems and engage in design project activities, management and coordination in both public and private organizations. Techniques for generating and communicating good ideas are needed, both independently and as part of a team. 'Design' means we need a deep understanding of the process of design. We have to understand, advocate and facilitate good design. We have to obtain an understanding of the range and purpose of several design disciplines, strong communication skills and knowledge about the sustainability and economic impact of design thinking.

4.3 Research on CSCW

CSCW is a design-oriented academic field that is interdisciplinary in nature and brings together economists, organizational theorists, educators, social psychologists, sociologists, anthropologists and computer scientists, among others [5]. The expertise of researchers in various and combined disciplines help researchers identify venues for possible development. It is an identifiable research field focused on understanding characteristics of interdependent group work with the objective of designing adequate computer-based technology to support such cooperative work [12].

Collaborative design has a great extent of mixing between social scientists and technologists as developers work together to overcome both technical non-technical problems within the same user spaces [13]. For example, many professionals working with collaborative design are computer scientists who have realized that social factors play an important role in the development of collaborative design systems. On the opposite side, many innovation designers and social scientists who understand the increasing role of technology in our social world become 'technologists' who work in research labs to develop cooperative systems [19]. Over the years, researchers have identified a number of core dimensions of collaborative work, including:

- Awareness: individuals designing together need to be able to gain shared knowledge about each other's activities [5].
- Articulation: cooperating individuals to partition design into units, divide it amongst themselves and, after the work is performed, reintegrate it [12].
- Appropriation: how an individual or group adapts a technology to their own particular situation; the technology may be appropriated in a manner completely unintended by the designers [7], [19].

4.4 User Experience Research

User experience was considered as an important dimension in designing and developing this product service system. User scenarios in using software and hardware were fully considered and compared in the design and development process. Literature research paid specific attention to ergonomic platform, handheld terminals, input and output devices and operating experience. Analysis of creative collaboration helped to summarize the characteristics of user experience of existing systems. Design and development took care of software interface, logical relationships, user interactions, interface visual experience and user testing at different stages of software development.

12 interviews with 12 office workers have taken place at 12 companies, with the number of office workers varying from 10 to 1000 employees. They were young entrepreneurs, wholesalers and office managers. We used basic interviewing technique [9], [10], [15] in the form of face-to-face conversation between researcher and participants. The interview made use of generative toolkit [18]. See Fig. 1 for an impression. Each interview included six steps as described below:

1. Start with an observation of the work context.
2. Ask the participants to work on the toolkit, i.e., select a number of pictures, which express their behaviors and interactions in life and work the best.
3. Participants use the words and the selected pictures to make collages in order to illustrate their personal experiences.
4. Collect stories, trigger discussion and gain reflection from their experiences.
5. Cluster the collages in order to find categories of interaction qualities.
6. Round up discussion and reflection. Audio recordings were taken for the interviews, which

Audio recordings were taken for the interviews, which then later were turned into transcripts. Photographs were also taken during the interviews. In addition, during the interviews, field notes were taken by the researcher to capture informal conversations and contextual observations.

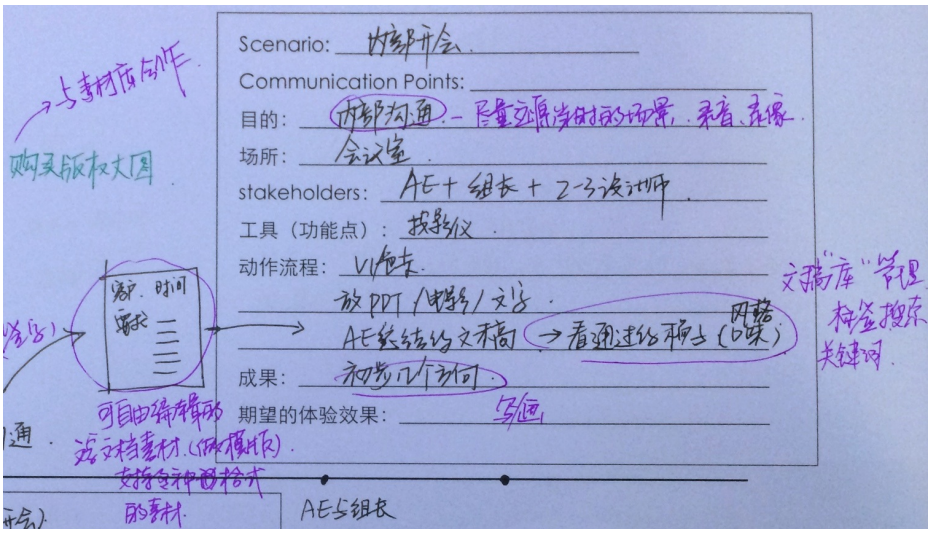

Fig. 1. Example of the filled toolkit

Qualitative analysis started with all the data (transcripts, collages, field notes and visual materials) gathered in the interviews, followed by communicating the 'selected and distilled insights' [17]. First, each researcher individually read the transcript, marking possibly relevant quotes. Secondly, the researchers consolidated the selection by turning about 80 quotes into explicit interpretations in the format of a statement card. Key part of the format was the interpretation (paraphrase), in which the researchers made explicit in their own words what the quote is saying. Third, the researchers clustered these statement cards into manageable groups, which were labeled and described. Finally, the words and pictures from the collages were also clustered together with the statement cards to help describe the interpretations and convey insights.

4.5 Product Service System Design

From the perspective of experience and service to the major stakeholder in-depth product analysis, rendering the overall economic trend graph and cooperation from key areas, key activities, core resources, the promotion of economic operators and other design subsystems. Positioning of the main attributes of specific platforms: design tools, creative showcase, the owners issued a platform for design projects, entrepreneurs seeking venture platform, shared resource platform, global network manufacturing alliance. High low-end platform defines different forms. Consider intertwined stakeholder and design procedures, and specifically designed to select a representative scenario as in the late part of the project implementation.

Platform overall system architecture design and software interface design was performed. On the basis of the first part of the research on the needs and status of the building, products, clothing, media, creative design five typical areas of in-depth analysis. Depending on the stage of the design ideas of user needs further categorized,

and each corresponds to the specific needs of the platform elements were conceived and finishing. Based on the above-depth study on the overall system architecture platform preliminary build. In the software interface has also made the concept, structure and interaction design with features to support the design and creative process. Platform and operating environment of space design and related components of product design was also performed. Domestic and foreign high-tech office space and products for the study, combined with the overall system architecture of the platform design of the physical space in the form of interface platform and the platform for the overall planning and design. See Fig. 2 for an impression of the user interface design.

Fig. 2. Example of the user interface design

5 Recommendations

Based on the results of our research approach, we identified a number of key design recommendations, which are given to design and develop interactive collaborative design platforms in the work context. These recommendations are as follows:

- Support typical user behaviors and meet their expectations
- Optimize styles of interaction
- Match context of use and design tasks
- Adopt iterative design and evaluation process
- Move from product to service system and platform
- Enable cross-platform seamless connection
- Reach ease-of-use and joy-of-use level
- Establish collaborative and multi-tasking user experience
- Apply and innovate modern technologies
- Promote rapid prototyping

6 Conclusions

We have gone through five stages on exploring product service system, user experience and technology in the work context. The goals were to explore how to bring the richness of collaborative design into the (formal) context of their offices and colleagues. Our design challenges lie in supporting innovative interactions and apply innovative technologies within the context of collaborative design work.

Our contribution to the existing body of knowledge is to draw attention to IT supported new ways of interacting that will have a great influence on collaborative design context. We gave a number of recommendations, which were then used as criteria to design and develop the experience of user-system interactions. We have a strong focus on studying our users and meeting their wishes in (the early phase of) design. Our findings have implications on the development of the future collaborative design product service systems that should utilize the power and advantages of modern, appropriate and innovative interactions and technologies. Our approach of design and development can also be used in the development of other services and/or tools for conceptualization.

7 Future Work

In the future, we envision going further by completing developing the collaborative design platform prototype in which the design recommendations are implemented. The prototype will also get evaluated based on how it functionally works, how its user interactions fit into the work context and how it can benefit future collaborative design work.

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