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Understanding the Collaboration Difficulties Between UX Designers and Developers in Agile Environments

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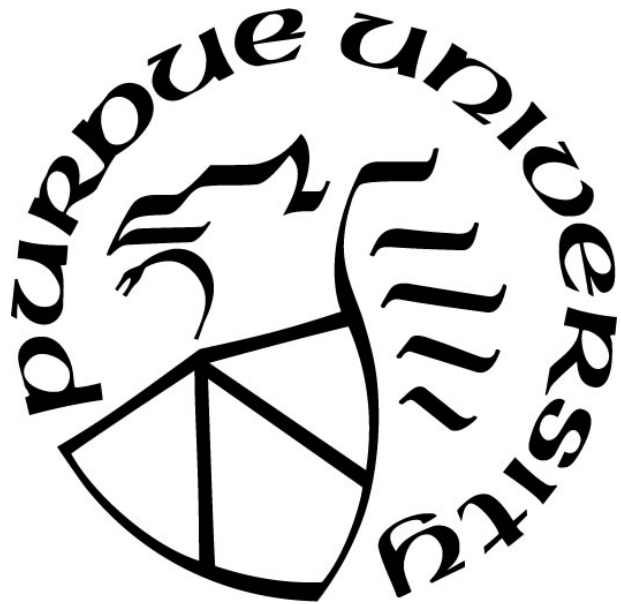
**UNDERSTANDING THE COLLABORATION DIFFICULTIES BETWEEN
UX DESIGNERS AND DEVELOPERS IN AGILE ENVIRONMENTS**

by
Yun-Han Huang

A Thesis

*Submitted to the Faculty of Purdue University
In Partial Fulfillment of the Requirements for the degree of*

Master of Science



Department of Computer Graphics Technology
West Lafayette, Indiana
August 2018

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ABSTRACT

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Title: Understanding the Collaboration Difficulties Between UX Designers and Developers in Agile Environments

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With the growing number of UX designers in tech companies in the U.S., the collaboration between UX designers and developers in Agile environments has become a new challenge in the industry. This research study aims to understand the collaboration difficulties between UX designers and developers in Agile environments and further provides insights from the results. The research method was semi-structured interview. A total of five professional UX designers and five professional developers in the industry were interviewed about topics surrounding their collaboration difficulties. The results indicated that UX designers integrating in Agile environments and factors related of organizational context are the collaboration difficulties, and different mindsets between UX designers and developers and misunderstanding and ignorance of UX and UX designers are the causes of the collaboration difficulties. In the end, the author discussed some suggestions on achieving better collaboration and implications for developer education, UX, and Agile communities.

CHAPTER 1. INTRODUCTION

This chapter introduces the background of this research study. It consists of the statement of problem, scope, significance, research goal, and research questions.

1.1 Statement of Problem

With the increasing demand of UX designers, developers who have been the main role in the engineering-dominated tech companies for a long time have begun to face a new challenge in how to collaborate with UX designers, which was a new role appeared in recent years. On the other side, UX designers as the new comers also face the challenge in how to integrate themselves into the tech companies whose internal culture is hostile to the UX mentality.

In 2017, O'Reilly Media collected 1,085 survey responses from modern design professionals about design tools, design trends, job titles, and salaries. The data showed that 97% of the design-profession respondents worked with people in a variety of roles. Among these varied roles, developer was the role which designer worked with the most. Eighty-five percent of the respondents worked with developers in their jobs. It implied that collaboration between designers and developers had become a common phenomenon in the industry.

Although most designers have experiences in collaborating with developers, collaboration with developers was reported as one of the most challenging parts in their jobs. UXPin, the creator of one of the most popular collaborative design tools, conducted the Enterprise UX Industry Report 2017–2018 on 3,157 UX practitioners. The report indicated that collaboration with developers was one of the top challenges which designers faced in the UX process. The report stated that 44% percent of respondents were facing this challenge. Especially in the

companies which developers outnumbered designers, collaboration became even more challenging.

In addition, during these years, UX design has been taken more seriously in the industry. Gray et al. (2015) revealed that a wide range of technology corporations had advocated in adopting the concept of user experience and design culture. However, for these companies which were engineering-dominated during the past decades, it was still challenging for designers to face the internal culture which was hostile to the new design and UX culture.

1.2 Scope

For this research study, the research subjects are UX designers and developers who work in Agile environments. Agile software development is a popular approach for developing software in a flexible and rapid way. It has been widely applied in huge amount of tech companies nowadays.

In summary, the goal of this research study is to understand the collaboration difficulties between UX designers and developers in Agile environments. I collected data about the participants' work experience and perspectives. The goal is to identify the collaboration difficulties, the causes behind them and provide some insights based on the results. A solution or proposed framework for the problem is not the goal of this research study. In addition, during these years, UX design has been taken more seriously in the industry. Gray et al. (2015) revealed that a wide range of technology corporations had advocated in adopting the concept of user experience and design culture. However, for these companies which were engineering-dominated during the past decades, it was still challenging for designers to face the internal culture which was hostile to the new design and UX culture.

1.3 Significance

The concept of User Experience comes from the human-computer interaction (HCI) community (Hassenzahl & Tractinsky, 2006). It's related to various meanings including traditional usability to beauty, hedonic, affective or experiential aspects of technology use (Forlizzi & Battarbee, 2004). It took decades for the field to absorb these concepts. In recent years, UX has gained momentum (Hassenzahl & Tractinsky, 2006) and been more widely applied in the industry. "In business today, user experience has come to represent all of the qualities of a product or service that make it relevant or meaningful to an end-user (Fabricant, 2013)." According to Gray et al. (2015), technology corporations have started to prioritize UX and design in their culture. Traditional engineer-oriented companies such as IBM, Intel, and Microsoft had invested significant funds into organization-wide design cultures. In many companies, there was an expanding demand of UX and design practitioners and an increase of related training programs (Gray, 2014). Harvard Business News also stated that "The value of UX as a corporate asset is no longer in question (Fabricant, 2013)." Tech giants like Google, Apple, and Microsoft worked toward to unifying design and hiring more design professions. However, the novice transition happened so quickly that it came out contradiction within the organizations. There was an existing problem that internal culture was hostile to the consideration of new perspectives on design or UX (Gray, Toombs, & Gross, 2015).

By understanding the collaboration difficulties between UX designers and developers in Agile environments, this research study aims to contribute on providing deeper understandings of the collaboration difficulties and useful insights on achieving better collaboration environments which can benefit not only UX designers and developers but also the team managers.

1.4 Research Goal

The goal of this research study is to understand current collaboration difficulties between UX designers and developers in Agile environments in the United States and to explore and explain the causes of these collaboration difficulties. I worked on the research study from a UX designer's perspective. The ultimate goal is to reduce the collaboration friction and help UX designers and developers collaborate better with each other and further collaboratively create better professional performances and products.

1.5 Research Questions

To address the research goal, I answered the following research questions:

1. What are the common collaboration difficulties between UX designers and developers in the U.S.?
2. What are the causes of these collaboration difficulties?

CHAPTER 2. LITERATURE REVIEW

This chapter reviews previous literature related to this research study. The literature review focuses on four parts: UX design competence, Agile methods in software development, and inter-disciplinary collaboration.

2.1 UX Design Competence

User Experience is an expanding multi-disciplinary field combining psychology, communication, social science, design, technology, and other areas which attempts to understand how users interact with products and how practitioners can design better products (Lauer, Brumberger, 2014). Due to the quick growing and the skill sets includes expertise from multiple fields, there has not been a clear definition of UX design competence. In addition, as Stoleterman (2008) defined, design complexity is “the complexity a designer experiences when faced with a design situation.” The design complexity makes specify UX design competence more challenging. Also, there is a gap between HCI research and UX practice (Gray, 2015). Gray (2015) proposed a co-construction of identity between the designers and their environment. The author listed seven emergent elements of design competence: tool/representational knowledge, dealing with complexity, vocabulary/language/communication, design leadership, internal/external upskilling, reconciling corporate reality/culture, and design identity. Collaborating with developers was discussed in one of the design competence - vocabulary/language/communication. Gray’s (2015) addressed the collaboration issue in the study results:

Communicating with developers was a common struggle, with one early practitioner noting the barrier of “learning how to talk to developers” and another intern describing their strategy of “drawing insights quickly from research to build a convincing argument for developers to get onboard”. (p.1650)

2.1.1 UX Adoption in Corporate

In the past several years, it was significant that many companies used UX adoption as a strategy advantage (Gray, Toombs, & Gross, 2015). More and more companies were transferring from outsourcing design to valuing UX as a core business asset. Companies used different UX adoption methods such as lean UX, UX in R&D, Baby-Step UX, Six Sigma UX, and Customer-Driven UX (Fabricant, 2013). Although companies started to be aware of the value of UX and decided to adopt UX, companies were facing some challenges during the process. For example, Gray et al. (2015) revealed that there was often a gap between executives-desired efficiencies and the knowledge of how the issues should be addressed by UX. The author conducted interviews with design practitioners for reframing the concept of competence in UX. The findings indicated that while designers worked on bring design cultures to their companies, they were facing the difficulties that other people such as team managers and developers lacking knowledge on design and overlooking the value of UX. After companies adopt UX, they will face the next challenge – UX integration.

2.1.2 UX Integration

As Kashfi et al. (2016) defined, UX integration is the process of integrating UX principles and practices into development processes and organizations. It is challenging but is identified as

a type of Software Process Improvement (SPI). Salah et al. (2014) listed the three main reasons for UX integration. First, it makes developers be aware of the users' needs and how the software can support the users from the UX perspective. Second, there is a lack of guidance for developers to follow the UX principles. Third, the principles and practices of UX design and software development are conflicting, which make the integration fundamentally challenging. Therefore, the demand and advantage of UX integration is distinct. However, due to the paradoxical principles and practices between design and development, integrating UX into development process is evidently not an easy task. In the last section, more research on inter-disciplinary collaboration is reviewed.

2.2 Agile Software Development

The term "Agile" appeared in 2001 (Singh, Singh, & Sharma, 2013). As more companies targeted to be competitive through timely deployment of Internet-based services, developers were asked to produce new or enhanced implementation speedily (Turk, France, & Rumpe, 2002). Agile software development was proposed to solve this problem (Turk, France, & Rumpe, 2002). Over the last few years, Agile software development is widely discussed among software development practitioners and researchers. Agile methods are a reaction to traditional software development methods (Cohen, Lindvall, & Costa, 2015). Traditional development methods require high-level design, development, and inspection (Cohen, Lindvall, & Costa, 2015), which could not adapt to the rapid changes of users' needs and technology requirements nowadays. In contrast to traditional development methods, Agile software development embraces four values (Collier, 2011). First, with individuals and interactions over processes and tools, it's a move towards collaborative development (Dingsøyr, Nerur, Balijepally, & Moe, 2012). Second, it

minimizes unnecessary work (Dingsøy et al., 2012) by working software over comprehensive documentation and reduce wasteful documentation. Third, customers are actively involved and are able to shape and guide the product (Dingsøy et al., 2012). Fourth, developers are responsive to change over following a plan product (Dingsøy et al., 2012) and accept uncertainty as a part of software development (Collier, 2011). Changes includes: changes derived from experiences gained during development, changes in software requirement, and changes in the development environment (Turk et al., 2002). In short, being Agile means being able to “Deliver quickly. Change quickly. Change often (Highsmith, Orr, & Cockburn, 2000).”

2.2.1 Difficulties in Integrating Agile and UX

Laubheimer (2017) discussed how UX practitioners dealt with Agile. Agile is currently the most popular software development methodology. Its benefits are: an incremental approach, the ability to change direction based on customer and stakeholder feedback, and short timeframes that keep the teams focused. Nevertheless, the problem was that the primary idea of Agile principles did not involve UX practitioners. In other words, it only focused on developers. Agile methods and UX methods were different in how they allocated resources (Silva et al., 2011). In Agile environments, developers deliver small sets of features in short iterations. On the contrary, UX designers have to put much efforts on research and analysis before development (Silva et al., 2011). With Agile methods, practitioners followed sprint process, the team focused on certain features within a two-week period. It resulted in designers suffering time pressure to go through the design process with little context and big-picture thinking. Designers might focus on particular features or user story at hand instead of large-scale concepts and design implications (Laubheimer, 2017). However, there were some similarities between Agile methods and UX

methods. These two methods were both user and customer focused (Silva et al., 2011). UX methods obviously kept users in mind during the design process. Agile methods valued feedback from customers and worked toward to respond quickly.

2.2.2 Key Aspects on Integrating Agile and UX

Laubheimer (2017) pointed out some critical points which were helpful for UX practitioners dealing with Agile. The four points were: managers understanding the value of UX, UX practitioners showing leadership, taking advantages of the flexibility of Agile, and putting designers and developers in the same team. When managers understood the value of UX, UX practitioners were no longer just working on crafting features and user workflows. UX practitioners participated in the early stage of the product and the decision-making process to determine how things should work. Besides, the author noticed that when designers and developers had the same level of ownership for the product, the team was more likely to be success. It was important that developers respected UX designers and their processes and were willing to understand the design insights and rationale.

Silva et al. (2011) also listed some key aspects concerning integrating Agile and UX. The first aspect is Little Design Up Front. The author suggested to conduct UX related activities before the official kickoff of the project. The second aspect is prototyping. Prototypes should be proposed at the initial stages of development processes. They are also help with communication between developers and UX designers. The third one is user testing. The team should conduct user testing in every sprint aiming to refine the design for next iteration. The fourth aspect is One Sprint Ahead, UX designers are suggested to work one sprint ahead of the developers. By doing

this, the team is able to make sure that design is aligned with business goals and users' needs in order to maintain the Big Picture.

2.3 Inter-disciplinary Collaboration

Wood & Gray (1991) defined collaboration as “Collaboration occurs when a group of autonomous stakeholders of a problem domain engage in an interactive process, using shared rules, norms, and structures, to act or decide on issues related to that domain”. D'Amour et al. (2005) summarized the purpose of developing collaboration processes as to serve client needs and serve professional needs.

Multi-disciplinary collaboration refers to the team consisting of different professional but work independently or in parallel (Siegler & Whitney, 1994). In contrast, Holbrook (2013) defined inter-disciplinary as “the integration of two or more disciplines focused on a common (and, it is sometimes insisted, a complex) problem.” The inter-disciplinary team is a structured entity with common goal and decision-making process (D'Amour et al., 2005). To be more specific, inter-disciplinary refers to a greater degree of collaboration, involving integration and translation (D'Amour et al., 2005). It refers to not only a plurality but also cohesion and shared ownership (Gusdorf, 1990). Therefore, I defined the collaboration between UX designer and web developer as a type of inter-disciplinary collaboration. Klein (2014) further addressed the importance and benefit of inter-disciplinary collaboration: “it is especially needed when complex, real-world problem cannot be understood or solve by only one discipline.”

However, inter-disciplinary teamwork can be challenging. Klein (2014) pointed out some problems which occurred in inter-disciplinary teamwork. For instance, problems related to social and psychological obstacles includes resistance to innovation, mistrust, and marginality. Besides,

participants lacking integrating skills, system thinking, and familiarity with interdisciplinary might also interfere inter-disciplinary teamwork. Disciplinary defaulting is also a common problem (Klein, 2014). Without sharing understanding, participants maintain orthodox expert roles and prioritize their own goals rather than others'. Conflict in inter-disciplinary can be related to technical issues or interpersonal issues. Technical issues could be definition of problem, methodologies, and scheduling; Interpersonal issues could be leadership style and disciplinary ethnocentrism.

2.3.1 Collaboration Between Designers and Developers

Brown et al. (2012) stated that collaboration between designers and developers was essential in software development. The authors analyzed real designer and developer collaboration practices in eight different organizations. All teams experience significant collaboration challenges since designers and developers had different mindsets: UI centric and software-centric. The analysis showed that tension caused by breakdown happened regularly and made the collaboration not always enjoyable. The study listed some contradictions the authors concluded, such as negotiating overlapping work responsibilities, arguing between client-suitable and business-suitable directions, and different assumptions about the user's need made by designers and developers. The study also articulated the phases which designers and developers jointly achieved in the development process. Thus, it indicated that inter-disciplinary collaboration between designers and developers was necessary and challenging.

2.4 Summary

In literature review, I discussed UX competence and the value of UX in corporate. Furthermore, I reviewed the literature related to integrating Agile and UX. Inter-disciplinary collaboration was also a critical concept for this research study.

CHAPTER 3. METHODOLOGY

This chapter includes the methods that were used to answer the research questions of this research study. This includes the research type, data collection method, data sources, analysis, sampling strategy, and trustworthiness.

3.1 Research Type

To understand the collaboration difficulties between UX designers and developers in Agile environments, a qualitative research was conducted.

3.2 Data Collection Method

According to Berg et al. (2012), “The interview is an especially effective method of collecting information for certain types of research and assumptions. Particularly when investigators are interested in understanding the perceptions of participants or learning how participants come to attach a certain meaning to phenomena or events.” Therefore, I chose interview as the data collection method for this research study.

Semi-structured interview was the selected type of interview for this research study. The researcher prepared a list of questions for the participants, and the order and wording of questions depended on each interview itself. By doing this, I believed that the interviews would be more flexible and contextual and make the participants more comfortable. Since participants’ experiences were different, the interview questions could be modified for different participants. According to Berg et al. (2012), the semi-structured interview is a type of interview located between completely standardized and completely unstandardized interviewing structures. This

type of interview involves several predetermined questions and special topics. Questions used in a semi-structured interview seek to approach the world from the subject's perspective. The interviews focused on their work experience and collaboration experience.

3.3 Data Sources

The collected data were researcher notes and audio recordings. If a participant did not allow audio recording during the interview, I tried to take as many notes as I could. If an interview was audio recorded, I completed an interview transcript for further analysis.

3.4 Analysis

Thematic analysis is the data analysis method for this research study. According to Braun et al. (2006), "thematic analysis is a method for identifying, analyzing and reporting patterns (themes) within data. It minimally organizes and describes your data set in (rich) detail." I took advantage of the flexibility of thematic analysis to provide rich and detailed results. As Braun et al. (2006) mentioned, "Through its theoretical freedom, thematic analysis provides a flexible and useful research tool, which can potentially provide a rich and detailed, yet complex, account of data."

I followed the process provided in the study of Braun et al. (2006). First, I transcribed the audio recordings into text and skim the transcripts as a whole. Then I spent time familiarizing with the data by reading the transcripts one by one, line by line. After reading through the data repeatedly, I started labeling some relevant codes such as words, phrases, sentences, and sections. The codes were labeled because they were repeated, they were emphasized by the interviewees, they were related to some published reports or research studies, and they were

impacts surprised the researcher. With all the initial codes generated, I reviewed all the codes and combined some codes to generate new codes, abandoned some codes, looked for the relations and patterns between the codes, and started searching for themes. Then I reviewed themes and defined them.

During data analysis process, I also kept refining the research questions based on the emergent themes coming from interviews. At the beginning, there were four research questions:

1. How do UX designers and developers in the U.S. report collaborating with each other?
2. What are the common collaboration difficulties between UX designers and developers in the U.S.?
3. What are the causes of these collaboration difficulties?
4. What are some strategies they used to address collaboration difficulties? How successful are these strategies?

Due to the limitation of not acquiring enough information on how UX designers and developers report collaborating with each other, the data collected from interviews was not able to answer this research question. Also, the strategies used to address collaboration difficulties were not discussed as expected. Because the participants were mostly inexperienced practitioners in the industry, most contents they shared with me were about collaboration difficulties and they had limited thoughts on strategies due to lacking experience and not allowed to execute the strategies when under supervision. As a result, I decided to remove research question 1 and research question 4 because these two research questions were not answered as expected in the results.

3.5 Sampling

The population was selected from technology companies in United States. Within the company, the practitioners were working in Agile environments. In addition, the UX designers and developers should work in the same team and collaborate interpersonally.

Key informants is the sampling strategy method of this study. Patton (1980) defined the method as, “These are people who are especially knowledgeable about a topic and are willing to share their knowledge. They inform our inquiry when we tap into their knowledge, experience, and expertise. Key informants are especially important sources on specialized issues.” For this research study, the participants must be professional developers collaborating with UX designers and professional UX designers collaborating with developers working in Agile environments. In total, I interviewed five developers and five UX designers who match the criteria mentioned above and achieved data saturation. The participants were recruited from online forums, Spectrum communities, Slack workplaces, and personal network.

3.6 Trustworthiness

The strategies used for validating the trustworthiness and credibility of this research study are: rich data, respondent validation, expert view, searching for discrepant evidence and negative cases, and triangulation.

According to Maxwell (2013), rich data is one of the strategy to validate the results. It allows the researcher to provide a full picture of the phenomenon. The data collected from interviews came into data saturation. Also, the collected data are verbatim transcripts of the interviews instead of notes on researcher’s feelings (Maxwell, 2013). In the interviews, I avoided leading questions.

When completed interview transcripts, I applied respondent validation by confirming with the participants that the transcripts corresponded with their perceptions and opinions. By doing this, I could reduce the possibility of misinterpreting the meaning of what participants say and identify the biases of from my perspectives and observations (Maxwell, 2013) to clarify the results represented the participants' viewpoints.

Besides, I outreached expert review with committee members. By doing this, the committee's expertise supported validating if the data analysis process goes on the right track. For triangulation, I tried my best to collect information from diverse participants in different settings (Maxwell, 2013).

3.7 Summary

This chapter provided an overview of the process of achieving the research goal. I chose interview as data collection method, thematic analysis as analysis method, and key informant as sampling strategy. The deliverables of this research study will be the themes generated from the collected data.

CHAPTER 4. RESULTS

The following chapter summarized the results of this research study. The chapter begins with an overview of the data collected in the sample section and how to results related to the research questions. The next section describes the themes that came from data analysis. Four themes coming from analysis are: UX designers integrating in Agile environments, factors related to organizational context, different mindsets between UX designers and developers, and misunderstanding and ignorance of UX and UX designers. Each theme contains direct quotes from participants in the interviews. These quotes were not altered or changed.

4.1 Overview

4.1.1 Sample

I spread the recruitment information with a survey for validating if the participants meet the criteria of the sampling strategy. Out of 24 responses, 16 were qualified, and six canceled the interview. I interviewed ten people, including five UX designers and five developers. All participants agreed to be audio recorded in the interviews. An overview of the demographics of each participant can be seen in Table 2 and Table 3 below.

Table 1. Participant Demographics (UX designers)

	Gender	Education	Work experience	Company type
UX1	Male	PhD, Anthropology	1.5 year	Geographic Information System
UX2	Female	M.S., Biology	7 years	Freelance Consultant
UX3	Female	B.A., Advertising & Psychology	5 years	Marketing and Advertising
UX4	Female	M.S. UX Design	1.5 year	Human Resources
UX5	Female	B.A. Software Engineering	2 years	Information Tech and Services

Table 2. Participant Demographics (Developers)

	Gender	Education	Work experience	Company type
Dev6	Male	B.A. Visualization	2.5 years	Game Development
Dev7	Female	B.A. Web Development	4.5 years	Marketing and Advertising
Dev8	Male	M.S. Computer Science	1.5 year	Electronic Commerce
Dev9	Male	M.S. Computer Graphics Technology	4 years	Investment Banking
Dev10	Female	B.A. Electrical and Computer Engineering	1.5 year	Automobile

The interviews varied from 49 minutes to 90 minutes. In total, I collected 10 hours and 47 minutes of audio recordings. After each interview, all the recordings were transcribed and de-identified for the purpose of analyzing the data. The transcripts have 87 pages in total.

4.1.2 How the Results Related to Research Questions

The goal of this research study is to understand the collaboration difficulties between UX designers and developers in Agile environments by answering the following research questions:

1. What are the common collaboration difficulties between UX designers and developers in the U.S.?
2. What are the causes of these collaboration difficulties?

When generating the interview questions and conducting the interviews, the researcher always kept the research questions in mind. In the interviews, the researchers asked the participants to describe the scenarios of their collaboration experiences as detailed as possible. The researcher also asked a lot of follow up questions to make the information as coherent and complete as possible. From the information provided by the participants, the researchers could learn what kind of difficulties the participants faced during the collaboration and further understood more about how the participants dealt with the difficulties and what strategies they

used to address the difficulties. With the above information in hand, the researcher could go for data analysis and to figure out what the causes of these collaboration difficulties were and provided some insights on that.

Since the research goal is to understand the collaboration difficulties between UX designers and developers in Agile environments, I considered listening to the both sides with a neutral standpoint was imperative. I carefully focused on both sides' opinions evenly and honestly presented both UX designers and developers' statements to allow readers to understand both UX designers and developers' viewpoints with rich information provided by both UX designer and developer participants.

Research question 1 is answered by Theme 1 and Theme 2. Research question 1 aims to figure out what the common difficulties between UX designers and developers are. From the data I collected, two themes emerged which answered research question 1 – UX designers integrating in Agile environments and Factors related to organizational context. Research question 2 is answered by Theme 3 and Theme 4. Research question 2 aims to explore the causes of collaboration difficulties. Two themes appeared from the data which were defined as the causes of collaboration difficulties – Different mindsets between UX designers and developers and Misunderstanding and ignorance of UX and UX designers.

4.2 Theme 1: UX Designers Integrating in Agile Environments

4.2.1 UX Designers Struggling in Integrating in Agile Environments

UX designers were not involved in the initial settings of Agile software development. All UX designer participants mentioned the challenges for UX designers to get involved and the

difficulties of adapting their design process to sprints. UX3 mentioned how UX designers not gaining enough attention in Agile environments which was not a good phenomenon,

“Typically, in agile environments they don't consider designers as another member because they really just look at developers, but user experience designers worked really closely with developers to identify a solution. You don't have to be able to write in order to come up with a problem and the solution, right? Like by nature you are a problem solver that you're part of the team and you work together with your skillset that you have.” -UX3.

In general, developer participants were all comfortable with working in Agile, and they regarded Agile as a very efficient way to distribute features and meet the deadline. *“I like it, feel like it allows you to get a lot done. Just like it's just an efficient way to create a website it allows you to split stuff up and I like it.” -Dev2.* On the contrary, some UX designer participants thought that working in this way made developers lose the big picture of the product and focusing on only one small part of it at one time. When working in Agile environments, UX designers' work were shipped in pieces without a comprehensive UX design which was opposite to the UX mindset they usually had.

“They(developers) are just thinking about things in small chunks. I think they're so focused on delivering something technically and it's just very like, oh my feature just affects these two screens that they're extremely narrow.” -UX2.

“Right now, for our current project it's not really working out because sometimes the designer will take a little bit longer for a specific feature, but the developers are already done building a feature and they're just waiting on to designer to finish, um, before they can build it. So, for us, I think it might be more helpful just to have all the designs done first before we move on to developing the designs and then as development goes on and things

come up we can iterate on the design and then send it back to development, but now just build like a small part of the design and then send it to development and then do it again. Um, there's too much going on and the designer gets really, like both designer and developer gets kind of overwhelmed because designer might change like a small part, but then now the developer has to like to change a small part again. It's taking up more time than we expected.”-UX5

Having enough time for doing user research is hard to fulfill for all UX designer participants. They have to spend extra efforts on persuading the team or the manager to believe in the need for conducting serious user research. *“The problem is that we sometimes don't have the budget for it, so I have to justify like why it's important.” -UX5.*

UX designer participants not only suffered from not having enough time for user research but also had to put extra efforts on convincing the team to believe in the need for user research which was sometimes exhausting.

“I tried, I tried like three times like, Hey, can we talk to the client? Even though there are other ways to talk to them, like doing a survey on the website or asking usertesting.com to recruit people, but still it would take us a lot of times and budget, which I don't have time and we don't have budget for now. So, I'm trying to push this idea but that would take me a long time to actually start working on user research.” -UX4.

UX5 mentioned that some developers still got confused when UX designers were working on user research. The developers didn't know the purpose of user research comparing to the purpose of other design deliverables which they could perceive the outcomes visually.

“Sometimes he(the developer) doesn't know what's going on, like when we do user research, that part can get a little bit confusing for him as to why we need to do it and what it's for, but when it comes to doing the actual, like wireframes and mockups and the prototyping, like he's been very involved with that part when it comes to the research and learning more about the user and trying to find out what the user needs are. That's all me and the other designer.” -UX5.

All UX designer participants said that they had to work ahead of sprint but still did not have enough time for doing user research.

“So, for instance, if I know there's a feature that's really complicated and I need a lot of time to research and dig around than I do a sprint ahead. So that means I have two additional weeks before developers even start coding that out. I need those two extra weeks to talk to the people and to understand what we are solving for and coming up with different ways to solve it. And then the following sprint, that's when the designer will come in and make it look nice and then will ab test and then we'll get that to the developers and be like, this was tested and validated it and now we know these are the problems and this is how we solved it.” -UX3.

4.2.2 UX designers Should be Active Participants in Agile environments

UX4 mentioned that UX designers should work on more than getting themselves involved in Agile environments, *“UX designers should remind everyone in each phase that, hey, we have to think from a user perspective.” -UX4.* They should not only strive to integrate into Agile environments but also play the role of UX lead to remind the team of user perspectives during the whole process.

“You can't just wait to be invited to whatever meeting, like if you want to be a part of the team that would be a part of the team, be more vocal about it and try to participate as much as I can whenever you can.” -UX3.

That is to say, UX designers should step up in the Agile environments and lead the team with the goal of understanding the value of UX and user's perspectives instead of just being a listener and follower in the Agile environments.

4.3 Theme 2: Factors Related to Organizational Context

All participants mentioned they have to make compromise when it comes to supervision, product ownership, company culture, and leadership. Among the companies the participants working in, they prioritize UX design and development in a different way based on the organizational context. Due to this, the decision making also relies on different roles. The factors related to organizational context have different effects on the practitioners depending on the context they are in.

4.3.1 Internal Hostility to UX within the Company

In some tech companies having been successful for a long time without UX designers, the developers question the value of UX. UX1 who works in a geographic information system company talked about how the culture of his company being hostile towards UX and UX designers.

“The company has been very successful for 35 years before they hired anyone with UX as the title. So, there is resistant like why we need to do this? This has been their(developers') domain, they have been making decision for the last decades” -UX1.

The same issue also happened in the company which is more technical-oriented.

“In my company usually designers have to make compromise. XXX(the participant’s company name) doesn’t focus on UI. I know in some company like Apple. Designers are in a high position. Basically the engineers have to compromise all the time. My supervisor would say we should make the feature feasible first. Of course, we want to pursue something better, but the point is that we have to meet the deadline. We have to meet the deadline no matter what.” –Dev3.

Also, he still believes that the product ownership belongs to those who “actually” implement it.

“The product still belongs to us since it’s our team’s technology. UX designers are working on making it more user friendly. But we(developers) can decide on whether we are going to take their design decisions or implement following their design.” -Dev3.

All UX designer participants faced the difficulties of making developers more open to embracing UX in their process and the company’s culture.

“So when a designer talks to the developers and tells them while we’re doing it this way, because when we did this research, the user say this and that, it’d be helpful for a developer to be, I guess more involved with the initial user research and to try to understand the user too and not just build the feature. It’s not all developers are curious enough to ask why is the user want this and that.” -UX5.

When being in a more engineering-oriented company, the company culture and developers in the company tend to be more hostile toward UX designers. In general, although most companies advocated the value of UX and tried to promote UX to their core vision, the results showed that there was still a gap between the company’s vision and developer’s mindset.

4.3.2 Different Types of Business Models Affect the Priorities of the Companies

For different types of companies, they have different priorities among design and development.

“Because I feel like the, it depends on the business model of the company. And that have taken me a while to understand. So how the company makes money is going to determine the priorities of the company if the company makes money by being able to sell more products. So instead of one you have two then the developers are going to be pushed to work on the second product, even if the first one is not very good from a UX perspective, if the company is able to solve more features, say like, hey, you weren't able to use our product before because you thought it was limited. It didn't completely fill your need. Then the salespeople can say, OK, add these features in and I can approach these clients and then we're going to sell more. So, uh, from a designer's point of view, simply interface is better. and from a sales point of view, it's often contradictory because if you can sell more stuff than they essentially, like their goals are met. Right? And if a company doesn't sell anything, then what's the point? So yeah, if the business model was based on feature or the number of products being output, then definitely the designers are less of a priority than developers.” -UX2.

When the company prioritizes development over UX design, not only developers outnumber UX designers, but also UX designers have to work on multiple projects and different teams at the same time. Being the minority in the team and having to work on different projects in parallel affect UX designers' professional performance and their impacts on the product. Sometimes they don't even feel like they are working as a UX designers, they feel like they are just making limited changes to make the product not “look” too bad.

“It's more like cleaning up messes that have already been made. Um, do you know the phrase putting lipstick on a pig? So it's like you have something very ugly and you just, you want to make it a little bit prettier. So that happens a lot. I think the product doesn't have a UX vision.” -UX2.

On the other side, some companies are very serious about the design process and developers have to follow all the design decisions strictly, which made the developer feel that they were not involved in the decision making and lacking product ownership. Or, when UX designers acting as a leader of a project, developers feel more restricted and were afraid of providing feedback.

“The problem is he's at a manager status, like he has a title of like a manager, so that makes it so that we can't really say anything about it. That's what ends up happening if you have a UX person or a designer that is above your job title, you know, they're almost like a dictator.” -Dev4.

When the UX designer have seniority over the developer, the developer feels that they can only follow the instructions. In this case, the developer expects the team to have a senior developer fixing the imbalance when design decisions always overriding development.

“Yeah, most of the time I compromise. I mean, I obviously had to compromise every time, because the designer had seniority over me and I feel like that was one of the big takeaway as a designer. Having seniority over a developer can cause a lot of tension. he had seniority over me. So you told me to do something I had to do. It was also like a precursor and having a designer that's also your producer I feel like, and I don't know how typical that is that other companies or other developers, um, but I do feel like general teams tend to have UX designers and they tend to give them more project management, kind of role like, you know,

they're the ones pushing the project forward and stuff. But yeah, I just wish there had been like either another developer above me that could sort of override design decisions” -Dev1.

4.3.3 Junior Practitioners Being Limited to Speak Up and Make Changes

As collaborating with UX designers, four developer participants except Dev4 mentioned that, since they are entry-level or in mid-career, they don't really have the authority to get involved in the early design stage. What they can do was just following the design artifacts and implement the features. UX5 also noticed that not all the developers are involved in the design process, *“Right now they just follow all the features that are requested. The only developer involved with the design process is the senior developer.” -UX5.* Being not able to get involved in the design process reflects a bad impact on the collaborations between UX designers and developers. All of the developer participants agreed that it happened when they couldn't understand the rationale of the design decisions and changes, which led to developers feeling wasting time on implementing something meaningless and cause more discontent on working on implementing the design.

“I mean at a certain point, like I kind of had to accept it more of like, and this might be something that other developers get into when they worked with designers are like on products they don't fully get the rationale behind it. I sort of told myself this is the job, I'm just going to implement whatever the designer says and not really care about it. And I sort of like lost my emotional investment in the product.” -Dev1.

“We had a lot of frustration with the design team because that lack of communication and we didn't understand why they made the decisions they made. It's like, oh, why didn't you make the design interface to this way? Definitely makes more sense to do it this other way” -Dev5.

4.3.4 The Impact of a Strong Leadership

To promote the value of UX and UX designers somehow relies on a strong leadership. A strong leader knows how to organize team, measure the success, and provide UX education.

UX3 talked about how she tried to adapt UX into the team gradually.

“We do an incremental, do it very slowly with little things here and there first and then the team sees the value of it, then you keep pushing more as you progress instead of changing everything tomorrow that's not gonna work. You have to do it very slowly and then be able to prove like, hey remember that one little project we did in a week and we did it so much faster because these are the things that we did differently. Now let's try this, but for a bigger project and see what happens.” -UX3.

Among the participants, those who work with a more flexible process tends to reach a more successful collaboration. Also, the UX designer participants who were leading the team being more comfortable in Agile environments.

4.4 Theme 3: Different Mindsets Between UX Designers and Developers

The first theme came out from data is the essential differences between UX designers and developers. It includes different collaboration attitudes and focusing on different perspectives of the product. The data shows that UX designers are more active in cross-disciplinary collaborations and have a stronger mindset of team vision. While developers focus on working their own tasks more and mostly only care about technical perspectives of the product.

4.4.1 Different Attitudes towards Collaboration

When collaborating with developers, UX designers emphasize on understanding where each other comes from, and are eager to have more time for communications and answering each other's questions.

"I'm trying to talk to them and trying to have a conversation with them and to understand where the developers coming from and trying to get them to understand where I'm coming from as a designer. I think the most important part is just being able to talk about it in person, having an actual conversation I think is the most helpful." -UX5.

The UX designer participant even expected developers to ask more questions because she thought the developers were not asking enough questions during the collaboration. It ended up the UX designer participant still had to go to the developers and asked them if they need any help.

"If I were to rate like one to 10, 10 being the asked too many questions and one being they don't ask enough. I will say about four or ideally we would have to at five, but some of them don't really ask questions until I come to them and I'm like, Hey, do you have any questions? How's it going? And then that's when they asked me questions." -UX5.

They regard conflicts in collaborations as a normal phenomenon and are willing to face and deal with the challenges. *"We fight with each other, I am being annoying, making him cry, then we hug." -UX4.*

"We try to bring them(developers) in as soon as possible because we want their take on. If we have a solution in mind, I would like to show them, like, this is what I had in mind, this is what we're solving for, what are your thoughts? And they would typically poke holes through my solution. And be like, OK, well there is the better way to do this, or an alternative option.

And then from there we find a solution together instead of me just telling them, hey, this is what I came up with, just do it. And it never works out that way.” -UX3.

In general, UX designer participants emphasize the importance of collaborating well with developers and how do the collaboration quality affect their work.

On the other side, when facing with collaboration difficulties, developers tend to stay silence and bear with the uncomfortable feelings.

Dev4 talked about how he dealt with some uncomfortable feelings when collaborating with UX designers. He took the conflicts and tolerance for granted, and he thought sometimes he should just let them go.

“I guess that's the difference when your work, when you actually start working is you know, you have to work with that person for like quite a while. So you know, you have to build some tolerance. You can't be that person that just like every conflict, you just fight it. Some of them you just have to let it go. Yeah. unfortunate truth.” -Dev4.

Dev3 also expressed his feelings on unhappy experiences with UX designers, *“I don't like the way that they keep changing design decisions, and I don't get the points. Anyways, it's just work.” -Dev3.* Although the developers that I interviewed consider collaboration difficulties unpreventable, they are less motivated to ask for more communications and resolve it actively. They tend to have a mindset that spending time on communications would reduce their work efficiency, which is the opposite to the UX designer participants' mindset. Developers being tolerant and not asking for help when needed could also be frustrating for UX designers.

“When you tell them(the developers), OK, these are the problems, can you fix it? Even if they don't know the answer, they'll be like, yes, I can fix it and then I'll get back to you. And you know, it took longer, but they won't say anything. I have had where I've worked with

developers that were in that exact situation where they didn't say anything. We ended up pushing, you know, our deadline way past the way that we're supposed to do because she wasn't raising her hand and you know, she wasn't raising a red flag when she needed to.” - UX3.”

Other than creating better collaboration environments, developers are more into meeting technical requirements and deadlines. Developers complained about UX designers' behavior with other developers but were reluctant to communicate with UX designers about the situation directly because developers think themselves being too busy to have a talk, not interested in how UX designers work, or not expecting the communication can make changes to current situation. *“I don't really care about the design, or I am not interested at all. I hope they(the UX designers) don't increase my work load.” -Dev3.*

“We complain to ourselves. Maybe it's this person's fault, maybe like, like you can't tell what's real, you know, when you're working with someone you can't tell, so you have to let it like go for a certain amount of time.” -Dev4.

Four out of five UX designer participants mentioned the problem that developers not asking questions and trying to implement and solve the problems on their own instead of having more communications and further discussions.

“I saw the output of his work totally didn't match my expectations of the design and all the, like the descriptions that I put in, this is how it needs to interact. This is needs to look like they didn't match at all and he didn't ask for help. He did not get clarification. He just did it. It was finished. It was like he didn't really care” -UX2.

Different attitudes toward collaboration cause some frictions between UX designers and developers. All UX designer participants mentioned that they expected developers to ask more

questions. On the contrary, developer participants argued that UX designers should put more efforts on making the design artifacts easier to understand in order to reduce their confusions and the time they had wasted in.

“They should hand in the deliverables in the way that saves me the most time. If the designer wants me to do something and felt like, OK, I already made this, put it in, I'm more willing to accept that. Like OK fine, like I'll take that, put it up, but, it needs to be this way and I need to figure out how I'm supposed to fix that. Yeah. I'm not going to be as willing to take them.”
-Dev4.

4.4.2 Focusing on Different Perspectives of the Product

The other essential difference between UX designers and developers is that they focus on different perspectives of the product. UX designers pursue the ideal design and try to optimize user experience of the product. Developers prioritize technical feasibilities when developing the product. Lacking consistent product vision increases the misunderstanding between UX designers and developers. UX designers believe themselves making meaningful impacts on the products but developers consider technical implementation should be the fundamental of the product and do not really appreciate the visions which UX designers asked for. Besides, UX designer participants have a stronger team vision, they generally consider UX perspectives, technical feasibilities, and business goal all together.

“We identify all the business subjective from the business side, what can this new website redesign gain for us? How can we measure that? Um, what are the values that we're trying to go for? And then from there, um, as a team, we kind of break out, these are all the things that were asked from the client that we needed to do was prioritize them from like which ones

are the quickest wins from a user experience perspective and design perspective and development perspective.” -UX3.

Yet developer participants tend to prioritize technical feasibility first and were less willing to make compromises or spending extra time on improving UX. According to the interviews, there are different reasons for that: developers not getting the design rationale, engineering-dominated culture and not valuing UX, and sacrificing UX in order to meet the deadline.

“In my company we prioritize the technology and release date first. Usually the user experience need to be sacrificed. We don’t wait for the UX designers to complete all their works, we started implementing earlier in order to release earlier. When they are proposing some design changes, they have to mark the priority: critical, major, and minor. To be honest, I only work on those critical issues. If I implement all the design changes, I will not have time to work on more important tasks.” -Dev3.

Besides, developers tend to settle down in limited solutions they had in mind. They are sometimes not willing to open to other solutions and are harder to be convinced due to technical feasibilities or time constraint. UX3 talked about some developers she used to collaborate with,

“with developers sometimes it’s hard to convince them of trying something different than what they are used to.” And “well I wouldn’t say that I don’t enjoy working with them. I think it’s more understanding where they’re coming from. The developers that are harder to work with, a little bit more fixed in a specific solution and not open minded enough to see what else is out there. Typically with like design work, there isn’t only one way to solve something, there’s more than one way to do it. Right? And so that’s the same thing for development. There’s more than one way to solve a solution. There’s more than one way to create a form more, you know, whatever it is, whatever functionality. There’s definitely more than one way

to do it. And so, um, I think the only challenges that I've had with developers are sometimes they get really tunnel vision and they see one solution and that's the only one they think makes sense, realized that they need to take a step back and see, hey, there's actually other ways that we can do this and that some of them might actually be easier.” -UX3.

UX designers are used to explore more possibilities and keep refining the solutions but that also annoyed developers sometimes since they thought they were wasting time doing duplicate work and they didn't understand the value of the iteration process and the reason of making those changes.

“You know how many versions we have for the revisions on that? Twenty-two. Isn't that insane? We kept revising on one tiny stuff. What I have done before are all wasted.

Sometimes I can't tell why we are making a change again.” -Dev3.

Developers even think UX designers were not on the same sides with them because UX designers agreed on clients' requests and putting extra work on the developers which the developers consider unnecessary. Sometimes it might result in developers being hostile towards UX designers.

“I find that designer they tend to add... I've been in meetings where we're trying to figure out what we want to get done for a sprint. We already have designs and then the client might say oh you know maybe we should change that. The business analyst is always trying to not allow the client to add more to the plate. I find that designer is kind of encouraging. Like yeah you are right. we should change that, update that, and I'm just thinking okay that's more work! there's more work! there's more work. But I get it, it's a creative process you know and you get excited and that energy and everything. But he was adding more to my plate unknowingly and unknowingly.” -Dev7.

4.4.3 Mostly UX designers being the only side making efforts

Although with these differences existing, some participants shared how they manage the differences and achieve better collaborations. Unfortunately, they were all UX designers. As developers being more goal-oriented, UX3 described how she adapted the way she worked when collaborating with developers according to their behaviors and characteristics, for example, the meeting has to be on time and with a very specific goal and plan.

“I pull them into a brief meeting because I know that they don’t really like to be in a meeting for a long time. I was telling very specifically like, this is the goal of this meeting, this is the problem we are solving. And by the end of the meeting we will have a very clear idea of how we would approach it” -UX3.

Representing users’ pain points is also an efficient way for UX designers to make developers establish empathy. UX designer participants tried to convince developers by demonstrating the real situations which users were facing.

UX4 demonstrated how users suffered from viewing the website on mobile when it was not mobile friendly.

“So I actually asked her to optimize the copy for mobile. We can hide some elements on mobile, just showing the icon and the tagline. At first she’s like, I don’t really think it’s necessary because a lot of our traffic, like eighty percent of our traffic is from desktop, but still we have twenty percent of traffic from mobile, which is actually a pretty large number. So I actually brought my cell phone and just gave it to her to see her actual experiences on cell phone to see if she can read. Then she’s just convinced because her eyesight is not that great for her to see. she got the points, she agreed to do some work.” -UX4.

UX3 also showed videos of usability testing to the developers. She believed that it worked for developers to understand how the design and implementation affected users' behavior.

“The whole core of UX is building empathy right? So what you've done in the past is not all the developers sitting in all the usability testing. But we would have a very high level takeaway out of these are the things that we asked the people to do and here are some snippet videos of them using the product and developers can actually hear that users trying to find like the go to cart button or create an account button and they're seeing like people can't find it or people are really frustrated because they just want it to pay for this item and now they can't do anything. So it gives them insight to see how people are using the product. And so then they are slowly building that empathy and they're understanding, OK, I need to make something easier for people. And this is how we can do that.” -UX3.

4.5 Theme 4: Misunderstanding and Ignorance of UX and UX Designers

UX has gain a lot of attention during these years and becomes a buzzword in the industry. However, people outside the field still have a lot of misunderstandings and ignorance of UX and UX designers. Except the two developer participants who took formal education in UX design, the other three developer participants regarded UX design only as the visual parts. Also, they think UX designers were only working on delivering the design artifacts.

Although developer participants agreed that they knew what UX is, their explanations were vague and superficial, and sometimes misleading.

“So what I think it is you have like a product. There is an interface on it and like UX design is everything to design that interface so that the, the menus people go through like how you navigate when you touch or you swipe or you go up or down or sideways. navigation on how

it looks like, the colors, where the buttons are, whether or not it makes sense to have like a button in the top right corner, the bottom left corner.” -Dev5.

The misleading understandings could also lead to the ignorance and disrespect of UX designers and what they have been working on. Some developer participants thought UX designers’ work were just “moving things around” and “selecting colors”, and developers were still the people who do “serious” work.

“After they(UX designers) deliver the wireframes and prototype to us, they have nothing else to do, right? It is the time for us to write the code. Still, developers are those who make the functions work. It’s in high demand for coders to work on the implementation.” -Dev3.

“What is that. I believe UI UX is... Oh my gosh. If the design process of a Web site is the curation of taking a design and or taking an idea and putting it to a Website design taking what the client wants to take in the client's vision for the site and making it real, like putting paint tool and I guess like I guess put a color to the vision that they're trying to create I guess. And I think like UX as more so like how like when a user gets on the website are they clicking right or left. What were their eyes look and flow.” -Dev2.

4.5.1 UX as a New Buzzword

Although not every developer has a clear understanding in UX and what UX designers do, “UX” is a familiar term that all developers heard and even use very often. The developers know that UX is a popular concept in the industry and the company started to pay more attention on making a product with good user experience. With only a smattering of UX can somehow make UX designers feel more challenged and disrespected. UX4 talked about how other developers misused the term UX sometimes and considered themselves as a UX designers.

“The nature of UX in this company is still a very new thing to them. I am the only UX designer in this department and when we talk everyone use the word user experience, it’s a buzz word, everyone is UX professional, which is OK because this is a basic concept. Like as human being we should provide things easier for users. Right? but I think one differentiator that differentiate UX designers and other professionals is to actually ask users what they want, we can’t kind of made up things we have to do. We do research before actually go with design phase.” –UX4.

UX5 stated that developers didn’t know how much efforts UX designers had spent on user research and questioned UX designers’ design decisions based on personal assumptions or bias.

“I think what's really important is to understand that the designer is designing for users’ best interest. Sometimes when developers come up with problems, they're like, well why would the user want something like that or why would the user want to do this. They don't know designer has already done all this work to try to understand user. And sometimes they have like a preconceived idea of what the user is like.” -UX5.

4.5.2 UX Designers’ Work Lacking Visibility

Even UX designers handed in the design artifacts for the upcoming development, developers didn’t follow the design all the time and did it on their own without communication. Four UX designer participants said that this situation happened in their work more or less.

“We'd have to always talk to the developers to make sure that what they develop is what we have in mind for the design. Um, there happened a couple of cases where the design states this is how exactly how it should look like, but the developer kind of disregards it and then design something else like they design and develop something else” -UX5.

UX4 mentioned how frustrating when they saw the implementation being so different from the design unexpectedly. And she blamed the situation on developers never tried to reach them during the implementation.

“It's quite challenging because every time we send them a visual assets or design, every time the look and feel was way off. It's just off alignment, the color, the font, the look of feel that you've actually just completely different on the origin one we communicate with them. I'm trying to say, Hey, can you make this look exactly or 90 percent exactly to what we provide. Can you make this? And every time when they went back to us, hey, can you please review this every time just off. They've never asked us is this OK, they never talked to us. I think maybe the problem is the communication. They never talked to us, they never ask why are we doing this and they never explained to us why they made bad decisions. So, I think that creates the friction between the whole process.” -UX4.

UX1 also faced the same situation and he found that the developers ignored some design based on their own judgement without notifying UX designers.

“Here's how it's supposed to work here is like all the specs for like the color and spacing and padding. Um, and then they(the developers) can build it without asking any questions. Um, because there's always going to be things that you can't account for it in the design and things like that. And then it turns out when they stick to originally to it, that becomes a problem because then it's like, oh, this thing doesn't work. Kind of use their own judgment and interpretation.” -UX1.

All UX designer participants agreed that developers should know more about what they had been working on. *“I think there's a lack of visibility into how we work, why we need time and how rushing things sort of affect us.” -UX2.* What she said was exactly an existing problem.

When being asked how much they know about UX designer's work responsibilities, developer participants answered with uncertainty.

"I probably, I'm not sure. Like I, we watched through their office space once in like, yeah, they have the, they have, when they design the interface for the new product, like I'm sure they have a prototype on their desk that they can, you know, work with." -Dev5.

"I really don't know. Like I Said I usually get this style guide that has primary colors. Buttons should be looking like this. I have no idea where they start. I just change it to code so quickly that I don't look at how it even got to that point. I don't know how to even start designing. All I know that they gave me design." -Dev2.

But later she talked about how her understanding changed after sitting next to a UX designer and seeing what he was working on every day.

"I worked with that kid, so I think that's why I learned a lot of UI/UX from him. Just because he was right there. It made me appreciate designer because I feel like... before that I kind of... whatever, they don't even code. They are not doing anything serious, but it wasn't until I sat down and saw him creating designs I'm just saying what is that? How do you...? It's really cool that designers they can look at a medium so technical like the Website. It's a very technical medium to express and design and be able figure out how to do that. That is really painful to me." -Dev2.

On the contrary, UX designer participants are more familiar with what developers have been working on since they are asked to join the standup meeting. The UX designer participants learned what developers do from the daily standup meeting.

"I know more than they know about mine. Because I have been a part of stand-ups, I know at least what they are working on, I know there's multiple days of database involved, I know

there are front-end and back-end validations. I know there's complexity in the browsers. I feel like I follow in parallel with their process much more than they are aware of what I do."

-UX2.

As mentioned, in the stand-up meetings, the team only focused on the developers' progress, UX designers did not have a chance to talk about their progress. When UX designers are sitting nearby and accessible all the time, developers unintentionally know more about what exactly UX designers are working on besides the design artifacts they receive. For the developer participants who had a chance to sit next to UX designers, they admitted that their attitude toward UX designers changed. They became more respectful and empathic for UX designers. That is to say, UX designers' work should be more exposed and understood in the team.

CHAPTER 5. DISCUSSION AND CONCLUSION

This research study aims to understand the collaboration difficulties between UX designers and developers in Agile environments and hopefully it can provide some insights on how UX designers and developers can collaborate better with each other. The goal of this chapter is to summarize what I have done for this research study and highlight some takeaways from the results.

5.1 Discussion

In this section, some critical collaboration issues in the results are discussed in more detailed along with the interpretations, the root causes of the issues, how other studies' findings related to the issues, and some suggestions for achieving better collaboration between UX designers and developers in Agile environments from the researcher's perspective. The issues are: different mindsets between practitioners, losing the big picture in Agile, and the current status of UX and UX designers. At the end of this section, I discussed the implications for some related communities.

5.1.1 Different Mindsets Between UX Designers and Developers

One of the causes of collaboration difficulties come from different mindsets between UX designers and developers. Ferreira, Sharp, & Robinson (2012) also mentioned the necessity to fix the consequence of the differences between UX designers and developers, "our studies suggest that similar expectations about acceptable behavior, mutual awareness, negotiating progress and engaging with each other are mechanisms that allow practitioners from different backgrounds,

with different perspectives on the software, to combine their efforts.” (p.18) Different education backgrounds and training result in the differences. Developers’ education and training mostly focus on fulfilling the technical difficulties and lacking attention on cross-discipline collaboration. Developers’ unwillingness to collaborate with non-developer team members was also observed by Najafi & Toyoshiba (2008). The authors found that with developers’ lacking communication with UX designers, the development team interpreted and implemented the design incorrectly. On the contrary, UX designers are trained to be team members and the education focused a lot on how to express their ideas and communicate with others. Tracing back to the beginning of software development, there were not multiple roles involved in the development process. Developers believed and were able to build products on their own. With the emergence of HCI and UX, considering users’ perspectives has become a necessary process in software development. Software development has reached a new stage that not only implements a product but also a life experience, a lifestyle, a service, and a value. Professional developers should not be left behind the trend. As a result, it is essential for developers to gain more collaboration experience in education and be open to the UX and UX designers and put more effort on understanding them.

Collaborating with cross-discipline roles is inevitable. Currently, we are still at the stage that most developers are starting to be aware of the issue after they go to the industry or encounter with the collaboration difficulties. To bridge the gap, developers’ education and training should not remain the same as the old times. They must have the mindset that cross-discipline collaboration is as important as technical skills and learn on how to collaborate in education.

Besides making changes in education, in Agile work environments, there were some strategies proposed to overcome the differences between UX designers and developers. For

example, making good use of collaboration tools, enhancing certain skills to understand each other more, and collocation.

Making good use of collaboration tools and prototype tools can reduce a lot of frictions within UX designers and developers' communication. UX designers should have the design artifacts accessible in the easiest way in terms of the file format and shared platforms. Collaboration tools can help with bridging the gap between UI design and front-end development. The tools reduce developer's frustrations on accessing and managing the files and measuring the accuracy by providing systematically design specs. Using a high fidelity prototype when needed can reduce developers' confusion and uncertainty when implementing it. Besides the benefit of utilizing tools, Maudet, Leiva, Beaudouin-Lafon, & Mackay (2017) pointed out the problem of current design and development tools which was not found by this research study. The authors stated that most of current tools are tool-specific and ad-hoc, so that they couldn't reduce the rework across design document and development. Therefore, they proposed the tools should support syncing among different tools to reduce the redundant and tedious work every time the design was updated.

Lárusdóttir, Cajander, & Gulliksen (2012) pointed out that HCI and the agile communities are not sharing the same understanding on how detailed the design should be before development started. Maudet, Leiva, Beaudouin-Lafon, & Mackay (2017) suggested having UX designers learn about programming concepts and developers receive design training to fix the problem that both UX designers and developers lacking adequate skills to bridge the gap between different expertise. The conclusions are consistent with my findings in the results. Developers acquiring the UX skills and UX designers acquiring the development skills can help with making more preparations when they try to persuade each other. UX designers can learn more about the

development perspectives and show developers that they have thought from their sides to make sure it's feasible. Developers can share with UX designers that what kind of resources they have and which framework they are using, so that UX designers can know where to start the design or how to utilize the resources that the team already has.

The results also show that collaboration might benefit from collocation. When UX designers and developers are physically closer to each other in working environments and have more chances to talk to and observe each other, their work is more exposed to each other and they tend to understand what each other have been working on more. The impact of collocation was also discussed by Kollmann & Blandford (2009). The study stated that with collocation, the benefit of Agile was more understood and respected by practitioners. It suggested to have a future long-term ethnographic study on the relationship between collocation and identity shaping and team building processes.

5.1.2 Losing the Big Picture in Agile Environments

Due to the essence of Agile, many UX designer participants pointed out the problem that when aiming on the goal of each sprint, the team loses the big picture of the long-term goal of the product. The issue of losing UX vision is also discovered by Lárusdóttir et al. (2012). Lárusdóttir et al. (2012) pointed out one of the challenges UX specialists encountered is that UX vision being especially difficult to maintain in Scrum projects. Kollmann et al. (2009) even stated that the risk of losing UX vision is one of the biggest disadvantages of working in Agile environments.

According to the results of this research study, we can't not only blame the characteristics of Agile software development. UX designers were not involved in the initial design of Agile

software development. As we now facing the situation that UX designers are expected to get involved in Agile, how Agile works and the practitioners' attitude should be adapted.

From a high-level viewpoint, we should adapt the characteristics of Agile. Developers should not be the only main characters in Agile. In the results, we can tell that in most cases, developers are still acting as the main characters. In the stand-up meetings and when planning for the sprints, the team still focus on the progress of development and the number of features done. None of the UX designer participants got the chance to share their design process or user research insights in the stand-up meetings. Although they were invited or asked to join the stand-up meetings regularly or randomly, they were more like listeners in the meetings and had to follow up any updates from the developers' side spontaneously. UX design should receive more attention in Agile software development. To make the collaboration closely and have developers aware of what UX designers are doing and the UX vision of the product, UX designers should also speak up in the meetings and take the lead of UX perspectives. This idea is also addressed by Lee (2006), the author emphasized the importance of UX designers being active participants in Agile teams and be more embedded. Also, we should figure out a more reasonable time schedule for tracking UX process instead of compromising UX process in order to match the development process.

In the current situation, under the constraints of Agile, UX designers should be flexible in terms of schedule and deliverables in order to adapt their process into Agile environments in order to maintain the big picture of the products. Having UX designers to work ahead of the development sprints was proposed by Kollmann et al. (2009) as a collaboration strategy. Najafi et al. (2008) also verified the effect of using Sprint zero in cross-functional team. Sprint zero helped UX designers to understand the users better and identify the ultimate goal for the projects.

The idea is also shared by Ferreira et al. (2012) with the argument that having UX designers remain ahead of developers.

5.1.3 The Current Status of UX and UX Designers

The importance of UX has been advocated by many literature studies, the industry, and companies. Nevertheless, the communities still need to undergo efforts to let the practitioners establish correct UX mindset and apply to their work. In the results it shows that currently there's still a gap between ideally and practically how UX should work in tech companies. This might result in the high attention on UX occurs in a short time. UX becomes a buzzword and produces many myths, misunderstandings, and ambiguity.

One of the cause is that comparing to developer's work, UX designers' work are less visible. From developers' perspective, they mostly know UX designers spending time on the design artifacts that they get. They don't really have a concrete idea on how much efforts UX designers spend before and after working on the design artifacts, such as user research, ideation, usability testing and so on. Without understanding the rationale, it's hard for developers to get the meanings of design decisions by only just looking at the design artifacts and specs. When developers can not be involved in decision making on the product but only follow the design decisions made by UX designers without understanding the design rationale, developers tend to lose their emotional investment and ownership in it. The positive impact of involving developers early in design process was also addressed by Maudet et al. (2017). The authors explained how involving developers early could mitigate the miscommunication between UX designers and developers.

In the results, UX designer participants emphasized the importance of involving developers in design process. They were aware of that without doing this, developer would feel like they were just being told to do something. They suggested that UX designers should pay attention on making everyone part of the problem solver and the owner of the product. Lárusdóttir et al. (2012) also suggested involving developers in UX designers' meetings before sprints for developers to have a common understanding of the product and the UX as a team member.

Besides, developers treating UX as a technical skill is also a mindset which should be fixed. UX designers' skills are not always as measurable as developers' skills. UX is not only about following design process and delivering design artifacts, it is a way of thinking and it combines analyzing, decision-making, and problem-solving skills that need time and practice to learn and absorb. The results show that only by learning UX concepts does not really help with the collaboration. Among five developer participants, two of them learned UX in their undergraduate classes. Although they have better understanding of UX than other developer participants, they did not achieve a more successful collaboration. Sometimes, they were even more critical on UX designers' attitude and work. It might result from the gap between learning and practicing. Although the developer participants stated that they "learned" UX design, they did not have the experiences of practicing UX projects in real world situations. Therefore, they did not meet the difficulties on how to fulfill UX in the real cases and make the best interests for users in reality. This might be the reason that they become critical since they did not realize the "real" challenge of being a UX designer and considered UX as a technical skill that can be acquired by learning the concepts. I believe requiring developer students collaborating with UX designers can also help with this issue. Seeing how UX play a role in software development and make impacts on the product can help them better understand the core value of UX.

5.1.4 Implications for Developer Education

The results of this research study show that the developer participants didn't have collaboration experience across disciplines when they were learning engineering knowledge and working on development projects as students. Lacking collaboration experience might result in developer students underestimate the importance of collaboration with designers to build a product since they thought they could develop a product on their own as what they do in class development projects. It also enhances the gap between class development projects and industry collaboration environments. Nowadays in most tech companies, UX design has become a must concern of the products. Collaborating with UX designers is inevitable for developers in their work. Therefore, educating developer students to have this mindset and gain collaboration experience in school is essential and has the possibilities to improve their collaboration between UX designers in work environments.

According to the Computer Science Curricula 2013 published by ACM and IEEE, understanding UX view of software development, methods of interface construction, and techniques for different design process are included in the curricula for HCI students. It is a good sign that HCI students are required to gain knowledge on UX design but not all developers are coming from HCI education background. Besides, although it is important for developer students to understand UX, the results of this research study imply that showing empathy and respect for UX designers and UX values is also critical to a successful collaboration between developers and UX designers. Different mindsets between UX designers and developers and misunderstanding and ignorance of UX and UX designers are analyzed as the causes of collaboration difficulties between developers and UX designers. Thus, I suggest that developer education requires students to gain experience on collaborating with UX designers when working on their projects. I believe

it can help with developer students understand the value of collaboration and gain real experience on collaboration with UX designers before they go to the industry.

5.1.5 Implications for UX Communities

Achieving seamless collaborations between developers has always been an essential goal for UX designers. Based on this demand, there are many collaboration tools existing and used for designer-developer collaboration. For example, Zeplin, mentioned by a lot of participants, is a collaboration tool that they benefited a lot from. This tool helps reduce the confusion between UI design and front-end development and the friction of the hand-off process. In the results it shows that the collaboration tools were widely used among the developers and UX designers and indeed made the collaboration easier. The issue of bridging the gap between UI design and front-end development which in the past suffered the UX designers and developers a lot has been improved a lot.

Although developers can correctly implement the design with less frustrations and efforts with the help of collaboration tools such as Zeplin. According to the results of this research study, UX designer participants were facing a higher-level difficulty in collaboration – to share and transfer the design knowledge. The process of delivering design artifacts and prototypes and have them implemented by developers accurately has become mature and requires less efforts in the collaboration. In terms of sharing research insights and design rationale, there still exists a lot of frictions between UX designers and developers. UX designer participants mentioned the challenges of sharing user research insights and communicating design rationale with developers. Developer participants also complained on not understanding the design rationale of the design

they were asked to implement and not learning enough knowledge on what UX designers found from their research.

According to the findings, I suggest that the communities pay more attention on this issue. Besides asking more time for UX designers and developers to talk and communicate with each other, which was regarded too idealistic in work environments, the communities can work on making the design knowledge sharing and transferring more methodical and efficient. For example, designing a tool that helps sharing and transferring design knowledge within the team, or propose a systematical way to present the design knowledge based on developers' need.

5.1.6 Implications for Agile Communities

Agile software development has been a very popular approach for software development in recent years. However, some of the characteristics of Agile have caused the collaboration difficulties along with the change of roles and the evolution of software development. Many studies discussed on the collaboration issues occurs in Agile environments. This research study also shows that Agile is not the most ideal environment for having UX designers get involved. With the irresistible trend that UX design becomes a core part of software development, it is time to face up to the problem that how we can better fulfill UX vision in Agile. Based on the excellent nature and popularity of Agile, I suggest proposing a revised approach by collaborating with UX communities. The goal is to make the revised Agile better involved UX designers and have UX designers make the best of their expertise in order to have software practitioners create better products together.

5.2 Credibility and Trustworthiness

When conducting the interviews, I was aware of the potential bias I might have since I have been UX designers for two years recently. But I tried to interview the participants from a neutral standpoint. For interview questions, I avoided leading questions and kept the interviews open-ended. For the data collected in the interviews, they are verbatim transcripts of the interviews instead of notes on researcher's feelings I listened to the voice recordings and transcribed the recordings by myself. I printed out the transcripts and read them carefully for many times to make myself very familiar with the collected data.

When completed interview transcripts, I applied respondent validation by confirming with the participants that the transcripts corresponded with their perceptions and opinions. By doing this, I could reduce the possibility of misinterpreting the meaning of what participants say and identify the biases of from my perspectives and observations (Maxwell, 2013) to clarify the results represented the participants' viewpoints.

Besides the data collected from the interviews, I also referenced some online resources and research studies for triangulation. The online resources include YouTube videos, conference recordings, online forums, and blog posts. The resources also described similar issues appeared in the interviews.

5.3 Limitations

Due to the timeframe for this research study, I have to recruit participants, schedule and conduct interviews, analyze data, and summarize the results in one semester. The participants are all currently working in tech companies who are very busy and have limited time and willingness for participating in a graduate student's thesis study. As a result, the recruitment was quite

challenging for both recruiting and interview scheduling. I tried my best to recruit participants from diverse backgrounds and experiences. However, it was hard to ask people outside my personal network to participate with low incentive.

The participants being relatively inexperienced is another limitation of this research study. Due to the limitation of the recruiting process, most of the participants that I recruited does not have rich work experience in the industry and self-proclaimed themselves as entry level to mid-level UX designers or developers. As a result, I was not able to know how experienced practitioners reporting their collaboration with each other.

The other limitation is that how UX designers and developer report collaborating with each other was not discussed as much as it should be. I was supposed to acquire rich detailed information related to participants' collaboration workflows in order to gain sights on how different workflows might affect the collaboration experience. During the interviews, participants regarded their collaboration workflows quite general and did not addressed much on this topic. Lacking awareness on this during the interviews, I was not able to answer this question thoroughly in the results. This also causes the refining of research questions. "How do UX designers and developers in the U.S. report collaborating with each other?" was one of the research questions for the study, but due to the limitation, it is removed from the research questions.

5.4 Conclusion

The goal of the research is to understand the collaboration difficulties between UX designers and developers in Agile environments. The results provide insights for both UX designers and developers to achieve better collaboration environments. Ten participants were interviewed,

including five UX designers and five web developers. Four themes came out from the data analysis: UX designers integrating in Agile environments, factors related to organizational context, different mindsets between UX designers and developers, and misunderstanding and ignorance of UX and UX designers. With the results, I pointed out some critical issues on collaboration between UX designers and developers in Agile environments and discussed the root causes and possible solutions. Also, I proposed some implications for the developer education, UX design, and Agile communities. For future work, I plan to study more on how the educations UX designers and developers received affect the collaboration with each other. Since from the interviews it shows that UX designers tend to have more cross-disciplinary collaboration experience since they started to learn UX. Oppositely, education on developers focused on establishing their engineering expertise, and missed the point of learning to collaborate with different roles to fulfill the ultimate goal of the product.

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APPENDIX A. INTERVIEW PROTOCOL (FOR DEVELOPERS)

I Background questions

- What is your education background?
- What is your professional experience?
- What are the responsibilities for your current job?
- What is your workflow in a project as a developer?
- What goals you want to fulfill as a developer in the team?

II General collaboration questions

- Describe to me about your team. (number, roles, collaboration)
- From your point of view, what is UX design?
- How do you know about UX design?
- In your opinion, What is the value you think for having UX designer(s) in your team?
- How many UX designers are in your team? Are you familiar with UX designers' responsibilities? Can you describe what are the responsibilities for the UX designer(s) you currently collaborate with?
- How do you feel about working in Agile environments?
- How do you feel about having UX designers involved in Agile environments?
- How are decisions about the product made in your team? Who are the participants in decision making? Would these make sense to you?
- How do you feel about the balance for different roles in the team?

III Specific collaboration questions

Collaboration modes

- Tell me about the whole process of a typical project in your team. At what stage developers are involved? At what stage UX designers are involved?
- What are the overlapping work responsibilities between UX designers and developers in your team?

- During the design process, when did you participate? (e.g. Research, ideation, wireframing, prototyping, mockup)
- In what format(s), you are able to reach the design artifacts? (e.g. casual talk, formal presentation by a designer, group meeting, documentations)
- What are the collaboration medium used in your team between UX designers and developers? (e.g. face-to-face meeting, communication software, collaborative document)
How do you feel about it?
- Do your team use any tools to support collaboration between UX designers and developers? How do you feel about the tools?

Decision making in collaboration

- Tell me about the decision-making process in your team.
- Tell me about an experience that developers made compromises? Why do you think it end up with developers making compromises?
- Tell me about an experience that UX designers make compromises? Why do you think it end up with UX designers making compromises?
- Tell me about an experience that you are persuaded by a designer.

Collaboration experiences

- Can you describe a scenario you collaborate with UX designer?
- Tell me about a designer you worked well with. Why do you think you worked well with him/her?
- Tell me about a designer that you felt most challenging to work with. Why do you feel challenging? What corrective strategies you used?
- Do you have any experience that your workflow was affected by the designer/design process? How did it happen? What do you feel about it?
- Do you have any experience that your development work was changed by new design decisions? How did it happen? What do you feel about it?

Personal feelings

- How do you feel about collaborating with UX designers and collaborating with developers?
- From your point of view, what can UX designer(s) in your team do to improve the collaboration? Or make it more efficient?
- Please define a good UX designer and a bad UX designer from a developer's perspective.

APPENDIX B. INTERVIEW PROTOCOL (FOR DESIGNERS)

I Background questions

- What is your education background?
- What is your professional experience?
- What is your company about, product about? (for the collaboration experience)
- What are the responsibilities for your current job?
- What is the design process of a product/feature? from scratch to complete
- When do developer get involved?
- What is your workflow in a project as a UX designer?
- What goals you want to fulfill as a UX designer in the team?

II General collaboration questions

- Describe to me about your team. (number, roles, collaboration)
- What are developers in your team's understanding in UX?
- How much do they understand about your work?
- How much do you understand about their work?
- How do you feel about working in Agile environments?
- How do you feel about UX designers integrating into Agile environments?
- Do you understand coding?
- Have you ever adapted your process in order to collaborate with developers?
- How are decisions about the product made in your team? Who are the participants in decision making? Would these make sense to you?
- How do you feel about the balance for different roles in the team?

III Specific collaboration questions

Collaboration mode

- Tell me about the whole process of a typical project in your team. At what stage developers are involved? At what stage UX designers are involved?

- What are the overlapping work responsibilities between UX designers and developers in your team?
- Have you ever adapted your process in order to collaborate with developers?
- In what format(s), you deliver the design artifacts to developers? (e.g. casual talk, formal presentation by a designer, group meeting, documentations)
- What are the collaboration medium used in your team between UX designers and developers? (e.g. face-to-face meeting, communication software, collaborative document)
How do you feel about it?
- Do your team use any tools to support collaboration between UX designers and developers? How do you feel about the tools?

Decision making in collaboration

- Tell me about the decision-making process in your team.
- Tell me about an experience that developers made compromises? Why do you think it end up with developers making compromises?
- Tell me about an experience that UX designers make compromises? Why do you think it end up with UX designers making compromises?
- Tell me about an experience that you are persuaded by a developer.

Collaboration experiences

- Can you describe a scenario you collaborate with developer?
- How do developers in your team think about UX design?
- How do you consider technical feasibilities?
- How much do you know about coding?
- Tell me about a developer you worked well with. Why do you think you worked well with him/her?
- Tell me about a developer that you felt most challenging to work with. Why do you feel challenging? What corrective strategies you used?
- Do you have any experience that your workflow was affected by the development process? How did it happen? What do you feel about it?

Personal feelings

- How do you feel about collaborating with UX designers and collaborating with developers?
- From your point of view, what can developer(s) in your team do to improve the collaboration? Or make it more efficient?
- Please define a good developer and a bad developer from a UX designer's perspective.

APPENDIX C. PRE-INTERVIEW DEMOGRAPHICS SURVEY

For Developers

- Email address
- Name
- LinkedIn profile (used for interview contact only)
- Where did you hear about this participant recruitment?
- Are you 18 or older? Yes/No
- In which country you are currently working in?
- What is your job title?
- Have you ever worked in Agile environments? Yes/No
- Do you have experience collaborating with UX designer(s)? Yes/No
- Could you briefly describe your collaboration experience with UX designer(s)?

For UX Designers

- Email address
- Name
- LinkedIn profile (used for interview contact only)
- Where did you hear about this participant recruitment?
- Are you 18 or older? Yes/No
- In which country you are currently working in?
- What is your job title?
- Have you ever worked in Agile environments? Yes/No
- Do you have experience collaborating with developer(s)? Yes/No
- Could you briefly describe your collaboration experience with developer(s)?

APPENDIX D. RESEARCH PARTICIPANT INFORMATION SHEET AND CONSENT

RESEARCH PARTICIPANT INFORMATION SHEET

Understanding the Collaboration between UX Designers and Developers

Principal Investigator: Mihaela Vorvoreanu, Associate Professor

Student: Yun-Han Huang

Department of Computer Graphics Technology, Purdue University

What is the purpose of this study?

This research study is trying to understand the collaboration between UX designers and developers.

What will I do if I choose to be in this study?

If you choose to be in this study, you will participate in a research interview. The researcher will ask you a series of questions about your education, professional, and collaboration experience.

How long will I be in the study?

The research interview will last about 30-60 minutes.

What are the possible risks or discomforts?

There are no risks or discomforts beyond those encountered in everyday life. Breach of confidentiality is a risk and the safeguards used to minimize this risk can be found in the confidentiality section.

Are there any potential benefits?

There are no benefits to you as an individual, but there are potential benefits to UX design students and practitioners and the related teams and companies.

Will I receive payment or other incentive?

you will have the chance to win a \$100 Amazon gift card by participating the interview.

If you feel you have been injured due to participation in this study, please contact Dr. Mihaela Vorvoreanu, Mihaela@purdue.edu , 765-496-7709. Purdue University will not provide medical treatment or financial compensation if you are injured or become ill as a result of participating in this research project. This does not waive any of your legal rights nor release any claim you might have based on negligence.

Will information about me and my participation be kept confidential?

Yes. No one other than the researcher interviewing you will know that you participated in this research.

We will ask for your permission to record the interview. Data will be de-identified and a code will be used to connect the data to the participants. Once the results are validated with participants, the identification file will be destroyed – no later than May 1, 2020. Data will be stored on secured cloud storage accounts that are password protected. Only investigators and study personnel will have access to the data.

Video recordings will be transcribed. Both video recordings and transcripts will be destroyed by May 1, 2020. We will create aggregate reports of the data that will be published in academic papers and conferences, but will not publish statements that can be traced directly to you.

What are my rights if I take part in this study?

Your participation in this study is voluntary. You may choose not to participate or, if you agree to participate, you can withdraw your participation at any time without penalty or loss of benefits to which you are otherwise entitled.

Who can I contact if I have questions about the study?

If you have questions, comments or concerns about this research project, you can talk to one of the researchers. Please contact Dr. Mihaela Vorvoreanu, Mihaela@purdue.edu, (765)-496-7709.

If you have questions about your rights while taking part in the study or have concerns about the treatment of research participants, please call the Human Research Protection Program at (765) 494-5942, email (irb@purdue.edu) or write to:

Human Research Protection Program - Purdue University
Ernest C. Young Hall, Room 1032
155 S. Grant St.,
West Lafayette, IN 47907-2114