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Examining the Conflict Between User Experience and Software Development in Industry

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M.S. DEGREE THESIS

The M.S. Degree Thesis of *Marissa K. Wilson* has been examined and approved by the thesis committee as satisfactory for the thesis requirement for the M.S. degree in Software Engineering.

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EXAMINING THE CONFLICT BETWEEN USER EXPERIENCE AND SOFTWARE DEVELOPMENT IN INDUSTRY

By

Marissa K. Wilson

A thesis submitted in partial fulfillment of the requirements for the degree of M.S in Software Engineering, in the B. Thomas Golisano College of Computing And Information Sciences, Rochester Institute of Technology.

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Abstract

In this age the modern consumer expects a software product to be profusely technically functional with an elegant and intuitive user interface. To accomplish this goal, it has become necessary for software development teams and user experience teams to collaborate on software projects. These two complementary teams often come from different backgrounds, with different technical knowledge, processes, management structures, and deadlines. As these teams continue to collaborate more and more the chance of encountering a conflict also increases. In this research we examine the conflict that can occur between software development and user experience teams and the possible effects on the product quality. This is done by surveying software developers and user experience designers from industry. We collected responses from volunteer participants using an online questionnaire. We examine factors that may make teams more prone to conflict as well as the effect conflict can have on a project. Based on our results we make some suggestions of practices that may lower the likelihood of conflict occurring, and ameliorate conflict that has already occurred.

Contents

Chapter 1

Introduction

1.1 Background

Computer software has become a multi-billion dollar industry. Software products have become large and complex as their user base has grown. A software product can no longer be produced by a handful of people. Rather, each product now requires multiple teams, often spanning many disciplines in order to create a finished product. Two teams which often work together to create a successful project are Software Developers ("developers") and User Experience Designers ("designers"). Such collaboration requires teamwork, ongoing reliable communication, capable leadership, and invested team members in order to create a high quality product. With so many factors involved in cross team collaboration it can be easy for one or more components to break down and possibly have a lasting effect on the end product.

Software quality can suffer when teams fail to work together effectively; often this can manifest as communication problems. It has been previously shown that the amount of communication is directly related to the number of bugs injected into a software system [1]. It also has been shown that social conflict and task conflict have an effect on satisfaction levels of employees and as a result software quality [2].

The 2015 Chaos Report studied 50,000 projects from software companies around the world.

The results show that, of the projects undertaken, only 29% are successful. 52% of projects experience blocking challenges, and 19% fail entirely. When broken down by process, Agile is far more successful than the Waterfall process. 39% of Agile projects succeeded, 52% faced some sort of blocking challenge, and only 9% fail. Compared to Waterfall where only 11% succeeded, 60% faced a blocking challenge, and 29% failed entirely[3].

More and more companies seem to be switching to the Agile methodology. The Agile methodology is a method of project management, used especially for software development, that is characterized by the division of tasks into short phases of work and frequent reassessment and adaptation of plans [4].

The Agile Alliance laid out 12 principles important for Agile development:

1 Customer satisfaction by early and continuous delivery of valuable software.

2 Welcome changing requirements, even in late development.

3 Deliver working software frequently (weeks rather than months)

4 Close, daily cooperation between business people and developers

5 Projects are built around motivated individuals, who should be trusted

6 Face-to-face conversation is the best form of communication (co-location)

7 Working software is the primary measure of progress

8 Sustainable development, able to maintain a constant pace

9 Continuous attention to technical excellence and good design

10 Simplicity—the art of maximizing the amount of work not done—is essential

11 Best architectures, requirements, and designs emerge from self-organizing teams

12 Regularly, the team reflects on how to become more effective, and adjusts accordingly [5]

1.2 The Need for User Experience Design

A robust and powerful program is only of any value to the consumer if the end user is able to use it. Software costs more to maintain than it does to develop [6].

Of the total maintenance costs, 80% were not related to technical bugs but rather to user problems with the system [7]. Among the problems users experienced, 64% were usability issues [8]. This indicates the proper user experience is necessary for the success of a software product.

Often more than half of the codebase for a project is the implementation of the user interface[9]. With such a need for a well designed user interface it becomes important that the User Experience Design (hereafter referred to as "designer") team and the Software Development (hereafter referred to as "developer") teams be able to work together cohesively.

When conflict occurs between these two teams they may become opposing teams. In this research we will always refer to them as complementary teams, or refer to one as the other's complement, as it better represents how each team needs the other to create the best product.

Chapter 2

Related Work

In this chapter we will review some of the relevant research in the fields of software development and user experience. This will highlight the relationships of communication, conflict, and quality and show the need for further research. At the end we will outline what contributions our research will add to the field.

In 2009 Abreu[1] studied the relationship between software developer communication frequency and the rate of bug introduction. This study examined 5 years of data from the bug database, version archive, and mailing list of the JDT sub-project; a set of core plug-ins for the Eclipse development environment. The researchers identified bugs by comparing the entries on bugzilla, an online defect tracking system, with the commit history from the project's version control system to determine which commits injected bugs. The researchers compared the dates of commits that injected bugs with the emails extracted from the archive.

Abreu found that bug introduction peaked around the software's release dates, though there are many peaks between releases as well. To ensure the peaks coincide with communication the researchers applied a statistical method called "cross-correlation." The correlation was computed using a time lag of up to ten weeks. This was intended to account for delay in noticing bugs and the possibility of developers discussing important changes far ahead of

implementation.

Abreu showed a statistically significant positive correlation between the communication frequency and the number of bugs injected into the software. According to Abreu, this suggests that developers tend to talk more frequently at times when a high number of bugs is introduced to the software. This could be developers seeking help with features they do not understand, or warning developers of changes that they have made.

Abreu shows a clear correlation between communication and quality, though the results may seem contrary to what would be expected. Abreu states that "Healthy communication is likely to result in good quality software." This may be what is expected, but research has shown that too much communication may negatively affect a team. A different study, by Partashkova-Volzdoska[10], found that communication frequency within a team has a curvilinear effect on team performance. That is to say, too much or too little communication has a negative impact while the right amount has a positive impact.

Partashkova-Volzdoska[10]surveyed 60 cross-functional project teams from 25 corporate and government organizations. Some of these teams were co-located and others were not. The teams that participated were chosen by working with liaisons from each firm. The liaisons also handled distributing and returning the questionnaires.

The survey asked about project efficiency, team cohesion, goal achievement, task significance, team size, and colocation. All were measured by Likert scales, although only the project leaders were asked about project efficiency. The results were analysed using regression on the control variables and six communication variables. When both the regression models are significant, a curvilinear relationship appears.

The communication methods studied were face-to-face, telephone, and email. Of these methods, email and face-to-face communication were curvilinearly associated with performance but telephone communication was not. Email was shown to have the most consistent curvilinear relationship across all the metrics measured. The researchers theorize this may be from an

information overload, and time spent searching past emails to find information. Partashkova-Volzdoska also found that high amounts of face-to-face communication is likely to result in the achievement of business goals but does not affect team efficiency or team cohesion.

When considering co-location Partashkova-Volzdoska showed that email is the only communication method that increased in usage with distance teams. It would be anticipated that when team members are not co-located more communication would be required, but the fact that only email increased is surprising. A study by Hart-Davidson also examined co-located and non-co-located teams and studies similar communication methods.

The Hart-Davidson[11] study was carried out on a student population completing a masters level capstone class in Human Computer Interaction. For this study all communication events for a team were recorded and analyzed. Hart-Davidson's goal was to visualize communication processes and patterns so that teams may improve upon them during a project. The author also attempts to identify what patterns of communication a successful team exhibits.

This study included both on campus and off campus students, one team was entirely co-located and the other entirely not co-located. Team members were asked to keep a digital record of communication events. These entries included the number of team members participating, communication method, and purpose of the communication event. After data was gathered and analyzed three participants were interviewed to confirm the researchers' findings.

Hart-Davidson created a communication mapping system to determine when teams were working cohesively. The mappings were a timeline of communication events that would branch each time less or more participants became involved in the communication. According to the timelines created, one team started off very cohesive then became less so as the project went on. Meanwhile the other team started off disjointed but finished with high cohesion. This was correctly reflected in the communication mapping and confirmed by the student interviews.

Not surprisingly, the team that was not co-located required more communication than the co-located team to complete the same goals. The number of communication events for the

non-co-located team was more than double that of the co-located team. Analysis showed the increased events were mainly concerning task work and interpersonal communication.

A study by Acuna[2] also used a student population. This study sought to analyze the relationships between personality, team process, task characteristics, product quality, and satisfaction in software development teams using a series of surveys. Of these, personality characteristics, team characteristics, team process, and satisfaction were evaluated using surveys containing Likert scales. Product quality was determined by the professor that graded the project.

Acuna found that personality traits, for the most part, did not affect the outcome of the project. The notable exception was extroversion, it was the only personality factor studied that produced a statistically significant effect on software product quality. Acuna goes on to state that "extroversion should be considered as a valid predictor of software quality for developing software following an agile methodology." Notably, Acuna also found that satisfaction and cohesion drop the greater the amount of task conflict among team members.

Javed[12] also published a study looking at team satisfaction. Javed investigated the factors related to team communication that have a significant influence on job satisfaction. Javed used a survey sent to 150 developers in industry in Pakistan; this survey focused on inter-organization communication. Communication types were broken down into the categories formal, informal, vertical, and horizontal communication. 23 variables were considered when examining the communication events. Of these 23, 4 were found to be significant. All four positively contributed to team satisfaction, no variables were found to negatively affect team satisfaction. The 4 variables were working environment, quality of work, performance appraisals, and clarity of information provided.

As seen in Acuna's work, satisfaction can have an impact on the amount of conflict. And high amounts of satisfaction were correlated with positive software quality. It may then follow that communication, conflict, and quality may all be interrelated.

Lastly we look at Jerome[13], who reviewed the state of research in 2008 of software devel-

opment and human computer interaction, a broader category of which UX is a part. The researchers then created a study to see how much of the current research was being applied in industry. Their study focused on people working in Human Computer Interaction and Software engineering in industry. In particular, Jerome studied HCI and SE that work alongside each other on projects.

To gather participants Jerome used the mailing lists of professional organizations such as the British HCI Group and the International Software Engineering Research Network, as well as college alumni mailing lists such as the Carnegie Mellon HCI and SE lists. A pair of surveys were electronically distributed targeting each of the specified disciplines. The majority of the questions were multiple choice, though many had a text field for "other" as well. Questions also asked about the timeline of inter-team involvement, product life cycles, and frequency of inter-team interactions.

The results Jerome finds are surprising. Very little of the current research was seen reflected in industry. According to Jerome there is a lack of understanding between the disciplines. Jerome states, "Software engineers' and HCI practitioners' misconceptions about each others' fields further exacerbate the problems created by misalignments between SE processes and HCI methods."

The two teams view their interactions very differently in the software development life cycle. The study showed that the two teams tend to begin their interactions too late in the software development life cycle; "too late to fix the most fundamental usability problems." Cross functional teams, it seems, did not work together cohesively.

The survey asked at what point during a project teams began their collaboration, this question is reused in our survey. 29% of software engineers reported communication began in the development phase, 33% in the testing or release phases, and 24% report never communicating; only 1 person reported beginning communication in the specification phase. 78% of HCI practitioners reported communication beginning during the testing or release phases, and only 3% during the specification phase. 70% of HCI practitioners reported usability methods

were applied when the software was "already in production"; one response stating "In extreme cases, products sometimes need to be re-architected to improve consistency or usability." When commenting about compromises between SE and HCI one professional said "None. [Software engineering] always wins."

68% of software engineers responded that key software decisions were made solely by SE without consulting HCI. Decisions such as languages and frameworks used can have an impact on features that impact the interface design. 91% of HCI practitioners believed software engineers were making design crucial decisions without input from their HCI counterpart. Several responses claimed time constraints were the cause of this.

This finding is alarming when considered with the amount of formal education in HCI that was reported. Only 20% of HCI practitioners reported having formal education in their field, the vast majority were self taught. Less than 10% of the software engineers surveyed reported having any formal training in HCI. This means that software developers are making HCI decisions without the correct training to do so properly. Additionally, the lack of formal education is surprising given the number of participants gathered from academic mailing lists.

When asked about methods or channels of communication with their complement team 33% of software engineers reported using ad hoc communication and 38% reported not maintaining communication at all. The results from the HCI practitioners were similar, with 52% using ad hoc communication and 22% not maintaining contact with their complement team.

HCI practitioners have the perception they have frequent contact with the software engineers; 40% reporting "very frequently" and 43% reporting "occasionally" communicating with their counterpart. Software engineers on the other hand believe they have little to no contact with HCI, 30% reporting "occasionally", 20% reporting "rarely" and 30% reporting "never".

Jerome has shown that a shared process is crucial for efficient and productive interaction between the two teams. The researchers also found that communication between the teams has gaps. The responses show that the lack of communication between the two teams can

result in usability issues and interface redesigns late in development, impacting the quality of the product.

Jerome concludes from these findings that HCI is being considered too late in the life cycle to truly be cost and time efficient. The conclusion from this research is that too little collaboration is occurring too late with these teams. Jerome states that there "are major gaps of communication between HCI and SE groups within software development organizations."

In this study we attempt to build upon the above research. Acuna showed that conflict lowers satisfaction, and Javed shows that satisfaction influences quality. We attempt in our research to ascertain if conflict has an effect on quality. Partashkova-Volzdoska shows that communication impacts team cohesion, and Acuna shows that communication impacts quality. Jerome and Kazman show that understanding the complement discipline as well as communication with the complement team have an impact on quality. Our research builds upon this research to study the relationships of communication, conflict, and quality on projects worked on by cross-discipline teams.

Chapter 3

Research Questions

In an attempt to grasp the causes and effects of inter-team conflict between development and design teams we have created the following research questions.

1. What team wide decisions are linked to more inter-team conflict?
   - 1.1 Are teams that experience more inter-team conflict using a particular software process?
   - 1.2 Are teams that experience more inter-team conflict using a specific communication method?
   - 1.3 Do teams experience less inter-team conflict if more members from each team interact?
2. What are the impacts of inter-team conflict?
   - 2.1 Does inter-team conflict have a positive or negative impact on the software product?
   - 2.2 Does inter-team conflict have a positive or negative impact on interpersonal relations?

Chapter 4

Research

4.1 Methods

The research for this study was conducted on voluntary participants. To answer the research questions stated above, hard metrics as well as personal opinions were taken into account to form both quantitative and qualitative data respectively. Ideally, in person interviews would be used to gather this data. For reasons that are discussed below, this was not possible. A pair of online questionnaires was used instead.

4.2 Population

As shown in the related work, it is common for research to be performed using a student population. A student population allows for a stable population that is easy to track, likely to cooperate, and rather easy to find. Additionally, it is easier to control certain variables when using a student population; such as project, time frame, and team size.

However, in this research it was important that the participants have real world experience collaborating with members of their complementary team and on projects with real world implications.

Student projects may attempt to emulate the rigor of an industry project, however when issues arise in a student project the implications are less severe. A missed deadline for a student project may lead to a lower grade or a student repeating a class. While in an industry setting a missed deadline may lead to unsatisfied customers, exceeded budgets, poor reviews, and possibly even employment termination.

Additionally, in a student setting there is rarely a dedicated user experience team handling the design portion of the project. The team may make design decisions as a whole, a single student may take over the design portion, or usability concerns may not be within the scope of the project. As industry projects have a greater need for intuitive well designed interfaces, a design team or dedicated designer will often be used.

The best way to measure conflict as it would occur between developers and designers would be using participants who have had experience working with the other on professional projects. For this reason the student population was excluded from this study.

The criteria necessary to participate in this research was to be a current employee with in the software development or in the user experience design industry and to have worked alongside the complementary team on a project within the past year.

Participants were gathered in a number of ways. Initially contact was made with liaisons from software companies. The liaisons included Human Resource personnel as well as developers and designers. For these companies the liaisons chose employees that matched the above criteria to participate in the research.

This strategy had mixed success. Some of the liaison chose participants that did not match the research criteria, which lead to a number of responses being disqualified. However most liaisons selected the correct participants and even assisted in ensuring the surveys were completed and returned on time. For one company that participated, the liaison also screened the responses to ensure no company secrets were included.

We expected a mix of qualitative and quantitative results from this research. Quantitative results would be required for categorizing responses. This included information such as company size, team size, and respondent seniority. However many interesting findings came from the candid responses in the form of stories and comments from the open ended qualitative questions.

Ideally a series of interviews would have been used to gather data. This would have allowed the researcher to gather the same quantitative data and allow more in depth qualitative data by having the ability to seek more in depth answers. Interviews would have allowed the respondents an open forum to share stories and allow the interviewer to ask follow up questions on the information the respondent provided.

Unfortunately, due to the nature of the population, interviews were out of the realm of possibility. It would have been impractical for a company to allow a researcher to interview its employees. Interviews would have taken a significant amount of time on the part of the company and there may be the fear of product specific information being shared.

It was for these reasons this research was conducted through a pair of online surveys. When speaking with company representatives early in this research several companies stated that a short online questionnaire would be the best the most amenable method for gathering data.

Two separate versions of the survey were created and sent to participants. Each survey was specific to the discipline of the respondent. Some parts of the survey were the same, or shared common elements, but the developers and designers each had a section of questions specific to their domain.

The majority of participants received an online survey which included skip logic. This skip logic would show or skip questions based on a respondent's answers. This allowed one survey link to be used for all participants while allowing two surveys were being given.

One company requested the ability to screen the survey and their employee responses. For this company the same surveys were prepared as word documents with pseudo skip logic written

under each question. As these surveys are the same as the internet surveys, just divided and with the skip logic visible, they have been included as appendices 1 and 2.

4.2.1 Survey

The survey was designed to answer the research questions using aspects of surveys from previous literature. As some previous sources [10], [11] have noted, communication has been shown to be important in group effectiveness. As such communication methods and effectiveness make up questions 15-21 on the developer survey and questions 13-19 on the designer survey.

The communication methods selected are "Email/IM", "In Person/Meetings", and "Phone". These communication methods were adapted from those used by Patrashkova [10]. Our study combines instant messaging with email to form a digital communication category, while Patrashkova's categories only included email. In instances where it may be applicable in the survey an "other" option was added; in this case, if there were communication methods that the chosen categories did not encompass. The option of "Through a liaison" was added as well, as that was how the researchers were required to interface with the participants, however this option was never selected by any participant and as such is excluded from the remainder of this research.

In two of the questions, 16 and 21 on the developer survey and 14 and 20 on the designer survey, participants were asked to provide a self assessment of communication quality. This considered both communication within their own team as well as their inter-team communication; communication between their complementary team and their own. It has previously been shown that horizontal communication, communication between coworkers or peers, has a statistical correlation with the quality of work produced [12].

It has been shown in previous research that many of the problems that arise between these two teams in the workplace can be linked back to problems with requirements. Requirements that are volatile, not well explained, or simply are not provided until too late in the process [14]. To address this we added two questions, 17 and 18 on the developer survey and 15 and 16

on the designer survey, that considered the timeline of requirement gathering and how these requirements were communicated.

Previous research has shown that conflict in the workplace can be broken down into two types; social conflict and task conflict [2]. We define "task conflict" as conflicts that occur involving previously completed work, assigned work, or discussion of work. "Social conflict" is defined as conflict that occurs between two or more team members that is not related to the task at hand. These two types of conflict make up questions 25–30 on the developer survey and 24–31 on the designer survey.

Questions 31–36 on the developer survey and 32–37 on the designer survey assessed the participants perceived quality of the product and the social effects of working with their complement team.

While the other questions in the survey were multiple choice or Likert scales; questions 31-36 on the developer survey and 32-37 on the designer survey included open ended questions that allowed for a narrative. It was from these questions that respondents provided stories and real life experiences.

4.2.2 Results

A complete table of the developer results can be seen as Appendix 3 and designers as Appendix 4. The survey received 18 total responses. 3 of these responses had to be discarded for being incomplete or not meeting the qualifications of the survey. Of the remaining 15 responses, 8 were from developers and 7 were from designers. Of these, 6 people reported experiencing conflict with their complementary team, 3 were developers and 3 were designers.

4.2.3 Size

Size of company was gathered in question 1. Those surveyed provided the name of their company and the researcher matched this with the number of employees the company reported having. 40% of respondents were from small sized companies, with 100 or fewer employees.

46.6% came from medium companies with between 100 and 3,500 employees; and 13.3% were from large companies with 3,501 or more employees.

83.3% of respondents worked for medium to large size companies. Team size was asked in question 10 on both surveys. The results show that those who experienced conflict reported their teams to be medium sized, ranging from 7 to 12 for developers and 5 to 8 for designers.

Question 11 on both surveys asked the number of people a respondent interfaced with on their complementary team. The designers as a whole report working with a higher number of developers during a project, ranging from 1 to 12 developers. While the developers report working with only 1 to 3 designers on a project. No obvious trends can be seen with those that experienced or did not experience conflict in regards to team size or the number of peers collaborated with.

4.2.4 Co-location

Co-location was indicated as a possible influencing factor from [10] and as such was added to both surveys as questions 6–8. 28.5% of designers and 12.5% of developers indicated that the complement team they worked with was not co-located. Of those that indicated they experienced conflict, 16.6% were not co-located. Co-location appears to be high in industry, both in conflict and non conflict responses. As a result, co-location, or the lack thereof, does not appear to have any influence on the likelihood of conflict.

4.2.5 Seniority

Question 2 asked the number of years an employee has been with their company to determine seniority. The majority of respondents reported having been with their company for one year or less. 83.3% of those that experienced conflict had been with their company for one year or less. The other 16.6% were at the opposite end of the spectrum, having been with the company for 9 or more years. This may indicate that conflict is more likely to occur with employees with less tenure. However, the responses from the open ended questions do not imply anything that seems seniority related.

4.3 Communication Methods

4.3.1 Communication

Many questions from the survey were about communication within the team and between the teams; as previous research has shown that this may be the most influential factor in predicting conflict. [2, 13, 10]

Questions 15–21 on the developer survey and 13–19 on the designer survey asked about communication. On the developer survey questions 15 and 18–20, and on the designer survey questions 13 and 16–19, asked about communication methods. Questions 16 and 21 on the developer survey and 13 and 20 on the designer survey asked about communication quality.

Table 2.1 shows the responses for the three methods of communication that were considered. For communicating within a team, 53.3% of participants communicated in person or in meetings. The other 46.6% of participants communicated mostly through digital means, email or instant messenger. When broken down by discipline it can be seen that developers more frequently communicated digitally, 62.5%, rather than in person, 37.5%. The designers however had a different trend; 71.4% communicated in person while 28.5% communicated digitally. When looking only at those who had experienced conflict in the past the results split evenly, 50/50 for digital and in person communication.

When communicating with the complement team we see a different trend, 73.3% of total responses indicated that communication was carried out in person. This trend holds true when looking at each discipline as well, with 75% of developers and 71.4% of designers communicating in person.

The third row of Table 2.1 asks which form of communication the respondent prefers. A resounding 80% of responses indicated that they prefer to communicate in person, while 6% prefer digital means and 6% prefer phone; 6% indicated that none of these forms were adequate. It is interesting to note that while 6% report they prefer phone communication 0% indicated they use it.

Table 4.1: Team Communication Quality

Attribute	Total	Developers	Designers	Conflict bearing
Team communication could improve				
We could improve a lot	13.3%	12.5%	14.3%	16.6%
We could improve a little	60%	62.5%	57.2%	83.3%
We communicate well	26.6%	25%	28.5%	0%
Communicate well with complimentary team				
Yes	73.3%	75%	71.4%	66.6%
No	26.6%	25%	28.5%	33.3%

Next, the respondents were asked how well they felt they communicated within their own teams as well as with the complementary teams. These results can be seen in Table 2.2. The majority of respondents felt that the communication within their team could be improved to some degree. 60% of people felt they could improve a little and 13.3% felt they needed a larger improvement. Only 26.6% of respondents felt they communicated well as is.

This is interesting when compared with communication with the complementary teams where 73.3% said they felt they communicated well enough already. Focusing on the conflict responses; 0% felt they communicated well enough within their team, however 66.6% felt they communicated well enough with the complementary team. It seems possible that the respondents are more in tune to communication quality within their own team; that communication between complementary teams could also stand to be improved but is not recognized by the individuals. This is revisited in the open ended portion of the survey.

4.4 Conflict

Conflict was reported in 40% of respondents. 33% reported that the conflict affected their ability to complete their work. 100% of conflicts reported were task conflicts. No respondents reported experiencing an interpersonal conflict, though the open ended responses show there were lasting interpersonal effects from experiencing conflict. One designer responded "It makes it harder to work with (the developers) day to day. They tend to assume any feedback will lead to conflict and occasionally redesign my work without consulting UX at all."

One impact of conflict mentioned in Jerome /citeJerome:2005 was minor and major redesigns of the user experience. For this question, 29 on the designer survey, we received an even spread; 33% required no redesign, 33% required a small redesign, and 33% required a major redesign. When asked which party was to blame 83.3% indicated that both parties were at fault, 16.6% indicated they alone were to blame. Given the rather bitter feelings that surround this issue, as shown in later questions, the self-blaming response here was surprising.

4.4.1 Resolution

The self-blaming respondent lists the cause of the conflict as a lack of technical knowledge on their part; specifically designs may not possible with the technologies the development team is using. In this situation, the conflict was resolved by "cram sessions", however the respondent also indicates that the company is considering hiring an additional program manager to mediate conflicts such as these. This designer also indicates misaligned schedules as a conflict point; when the development team is given a design that is not yet finished then becomes resistant to make changes to the design. This problem is noted in one of the developer responses as well, listing designers as pushing changes after implementation has begun.

Almost every participant reported the conflict resolution to be similar; discussion and mediation. 66% of participants reported that the conflict left negative opinions of the complementary team. Such comments as "Presumptions form for (the) next project" and "There are a few more unkind opinions on both sides".

4.4.2 Perceived Quality

The respondents were asked if their interaction with the complementary team increased or decreased the quality of the product. Table 2.3 shows their responses. The majority feel that the interaction leads to a higher quality product. In the open ended questions the developers really noted an appreciation for the designers. "Our sites and our mobile apps were improved significantly" one said. Another stated "UX team has definitely helped ensure we hit more accessibility points."

Table 4.2: Perceived Product Quality as a Result of Including Complementary Team

Attribute	Total	Developers	Designers	Conflict bearing
Product Improvement as result of complimentary team				
Increased	60%	62.5%	57%	50%
Slight increase	13%	25%	0%	16.6%
No effect	6%	0%	14%	16.6%
Slight decrease	13%	0%	28.5%	16.6%
Decreased	6%	12.5%	0%	0%

Chapter 5

Discussion

5.1 Discussion

In this section we attempt to answer the research questions using the data that we gathered and make some recommendations based on our findings.

5.1.1 Research Question 1

What team wide decisions are linked to more inter-team conflict?

Answered by questions 14–21 on the developer survey and 13–19 on the designer survey.

5.1.1.1 Process

Are teams that experience more inter-team conflict using a particular software process?

Answered by questions 13 and 14 on the developer survey and 15 and 16 on the designer survey.

All of the developers that experienced conflict were on teams following Agile methodologies. Agile methodologies include responding quickly to change, communicating best face to face,

and working daily with their business partners[5]. While Agile development may seem user-oriented it has come under criticism. Agile works best for a team when the project is light in user experience needs and when there is less of a need for a strong graphical user interface. Interfaces and user experience are largely overlooked by the Agile process, none of the 12 main principles address inter-team cooperation. In reference to User Experience in Agile development Alistair Cockburn has said, "(This) is not a weak point, it is an absence"[15].

While the Agile process is preferred for the development team, there are some changes to it that need to be made in order for it to work well when working across teams. Extra effort should be placed on communicating across teams to bridge the communication gap. The second principle, Welcome changing requirements, even in late development, should be applied more on teams that interface with designers.

An important aspect of Agile is to pick and choose only the principles that apply to for a given project. These 12 principles were laid out by the Agile Alliance when they created the Agile Manifesto in 2001 [5]. The second principle (welcome changing requirements, even in late development) and the fourth principle (close, daily cooperation between business people and developers) would aid cross-team functionality. These principles do not seem to be applied to the process development teams are using in industry. Daily in person discussions with the complementary team may go a long way in preventing task conflicts from becoming unwieldy.

The ninth principle (continuous attention to technical excellence and good design) and the twelfth principle (regularly, the team reflects on how to become more effective, and adjusts accordingly) also seem to be missing from industry processes but may alleviate much of the conflict that appears to be occurring late in the process.

5.1.1.2 Communication Method

Are teams that experience more inter-team conflict using a specific communication method?

Answered by questions 15 and 18–20 on the developer survey and 13 and 16–19 on the designer

survey.

As seen in the Results section in Chapter 2, the most common communication style is in person or meetings. The exception to this are the development teams, which perform more in team communication using email or instant messenger. Not only is in person communication the most prevalent current practice, it is also listed as the most preferred form of communication across both fields. This indicates that in person communication is likely ideal for avoiding conflict in projects; but rather the issue may lie in communication quality or frequency. This aligns with principle six of the Agile methodology, face-to-face conversation is the best form of communication[5].

When those who experienced conflict were asked of the quality of the in team communication, 16.6% indicated the team could improve a lot, 83.3% indicated they could improve a little. 0% believed they communicated well enough as it was. When working closely with a team of people over time it becomes easier to determine when communication is or is not working. In contrast, when asked if they communicated well enough with the complementary team 66% said yes, 33% said no. The contrast between these questions is very interesting. If communication within the team, with people that they know and are accustomed to communicating with, could be improved it seems unlikely that communication with the complementary team, people that they are not as accustomed to communicating with, does not need any improvement. This is point is driven home by one of the developers who indicated the conflict was resolved only by "Many many discussions." and the use of a mediator.

Additionally, it is mentioned several times within the open ended questions that disagreements arise during meetings with the complementary team. Several respondents have said the issue was alleviated by having an additional manager or a "tie breaker" for instances such as these. One response indicated their company was currently looking to hire a second program manager specifically to act as a mediator between the teams. This indicates that providing a program manager with a cross-discipline background may help prevent conflict from occurring. The mixed background would provide insight into both the technical limitations from the developer

perspective as well as an understanding of the important usability and design aspects from the designer perspective.

5.1.1.3 Collaboration

Do teams experience less inter-team conflict if more members from each team interact?

Answered by questions 11 and 12 on both surveys.

All of the developers that experienced conflict worked on medium to large teams and only interfaced with 1 or 2 designers. The designers also came from medium teams but interfaced with 3 to 5 developers. The teams that had the best experiences, according to the open ended questions, worked 1 on 1 with their complementary team daily. Another designer that had a very positive experienced worked on a team of 12 designers that interfaced with 12 developers.

The research here indicates that the number of people interacting on each side does affect the likelihood of conflict. It would appear that the best experiences occur when each side has a complementary team member that they are able to partner with for discussion or problems and changes that occur. This could be a topic for more research in the future.

5.1.2 Research Question 2

What are the impacts of inter-team conflict?

Answered by questions 30-32 and 34 on the developer survey and 32-34 and 35 on the designer survey.

5.1.2.1 Product impacts

Does inter-team conflict have a positive or negative impact on the software product?

Answered by questions 30,31, and 34 on the developer survey and 32 and 35 on the designer survey.

Of those that experienced conflict, 50% believed working with the complementary team increased the quality of the product. That means that the other 50% believed the interaction only slightly improved, had no effect, or decreased the quality of the product. One developer noted that the conflict lead to scheduling problems, as there was no clear deadline for the design to be completed and implementation to begin. One of the designers indicated a point of tension as the beginning of the design's implementation and the developers become resistant to changing the design. Both of these issues could be solved with a more clear understanding of schedule and a better application of the second principle of agile (welcome changing requirements, even in late development.)[5]

There were technical problems on both sides. One developer notes that a designer on their project had gone into the codebase themselves to change variable names, this problem was discovered later when it impacted the functionality of the code. Similarly, a designer commented that the developers they worked with began to implement design changes without ever discussing them with the design team; it was believed the developers did this to avoid possible conflict that could arise from suggesting changes. Multiple designers indicated the conflict they experienced required them to redesign a portion of the project, either a small change or a major redesign. This sort of redesigns, especially late in the process, add heavily to schedule and budget concerns.

5.1.2.2 Interpersonal impacts

Does inter-team conflict have a positive or negative impact on interpersonal relations?

Answered by questions 32 on the developer survey and 33 on the designer survey.

Several participants have noted interpersonal effects as a result of their project collaboration. One designer indicated that the conflict has made it more difficult to work with the development team day-to-day. On both sides we see responses such as "more than a few unkindly opinions" and "presumptions form for (the) next project"; one designer even said that this

interaction is "a conflict of interest."

Chapter 6

Threats to Validity and Limitations

The validity of this research has been limited by the low number of responses the survey was able to gather. Despite working with several companies over an extended period of time the total number of responses was still under 20. More responses would have made the conclusions drawn more solid in their foundations.

The researcher that conducted this study had entered with a bias that conflict would have a negative impact on quality and this is apparent in the surveys that were used. The concern that this bias came across in the research is understandable but does not seem to have skewed the results. A weakness of this research would be the bias the researcher approached the topic with. The findings show the opposite, that conflict between the complementary teams improved the quality of the end product.

Another threat to the validity of these findings would be the lack of formal definition of "quality" within the surveys. Many questions centered around quality, be it product quality or communication quality, all of these questions failed to provide to the respondent a standard or metric of what quality should be considered. Respondents were left to determine their own definition of quality, which may lead to some having a higher or lower standard than another.

The communication categories were high level, especially in the digital category. The categories

were chosen following previous work but there are many more online collaboration tools that could have been included. This is a limitation of this research and remains open for further investigation in the future.

Those surveyed were asked how long they were at their current company but were not asked how long they had been in their industry. Given the current mobility in the job market, it's possible someone has been working in the industry for a long time but at their current company for only a short while. It is also possible for a person to have transitioned departments within the same company, thus changing industries. This additional vertex could answer some additional interesting questions such as "Does a person who moves horizontally in a company positively or negatively affect inter-team conflict?" and "Does a person with more years in the industry influence amount of conflict?" These questions will need to be saved for future work.

Chapter 7

Future Work

This research provides multiple avenues for future research, as detailed below.

In the future, the Agile process and its use with multi discipline inter-team interactions could be explored much more in-depth. This becomes ever more relevant as the use of Agile development is on the rise in industry. Both the effects of using the Agile process and experimenting with ways of tweaking the process could lead to additional insights on quality.

The researcher would like to investigate the use of a neutral cross-discipline party to work with both teams, this has the possibility of enhancing quality while avoiding conflict.The use of a neutral party came up in several of the responses and may be a practical solution. More research into this would be required. Many of the issues and misunderstandings which occur that cause conflict may be resolved or avoided entirely with this approach.

Additional research could be carried out on the incidence of conflict and the size of collaboration between teams. The range in the number of developers and designers that interacted within this survey leaves many questions to be answered. Does conflict occur more when fewer members participate in cross-team communication? Does quality decrease when too few teammates interact? This research hints that conflict is less likely to occur the closer the interaction between teams but more research is needed.

Additionally, this survey could be repeated in the future with more in depth open ended answers. More in depth qualitative data could be gathered by pursuing interviews with partnering companies. Alternatively, if open source projects were used instead of industry experience the research could do a deep dive into communication transcripts as has been done in other research [1]. Emails, calendar invites, online collaboration invites, and chat transcripts could be considered to determine the frequency of communication and collaboration. Communications could be screened for mentions of conflict.

Chapter 8

Conclusion

Conflict appears to be common in industry when software developers and user experience designers work together on projects. This study has shown that conflict has been experienced by 40% of cross-functional teams when collaborating on a product. These conflicts can result in negative impacts to interpersonal relationships but have a positive effect on the quality of the product being produced. Teams that experience conflict are forced to work through the problem or face the failure of the project.

This study has found that while the form of communication meeting in person is common across teams that it is unlikely the cause of the conflict. Far more likely is the quality of the communication, both within the team and between teams. Similarly, the number of people that interact between teams seems to indicate the likelihood of conflict as well; with more people interacting leading to a lower rate of conflict, although more research into this is needed.

Additionally, while Agile development has become prevalent in the field of software development, the principles applied largely ignores the needs of user experience or inter-team communication. For this practice to be successfully used for inter-team projects, changes must be made to better address user experience. Special attention should be paid to principles two, four, nine, and twelve.

Factors such as co-location, amount of time at the company, and the team size seem to have less of an impact on the likelihood of conflict than the factors mentioned above.

All of these components can increase the chances of experiencing conflict during inter-team collaboration. Taking steps such as providing a neutral manager to mediate between the teams, clearly representing schedule deadlines, and adjusting processes to fit the needs of each project can prevent conflict from hindering the progress.

.0.1 Appendix 1 - Developer Survey

Participation in this survey is completely voluntary. There will be no penalty or loss of benefits for those wishing not to participate. Participants are able to end the survey if they wish at any time. If the participant chooses to withdraw from the survey any information that has already been filled out will be discarded.

This survey is being conducted by a graduate student from the Rochester Institute of Technology as part of a Master's thesis examining the causes and effects of conflict that often occurs between Software Developers ("Developers") and User Experience Designers ("Designers") in an industry setting.

As Development and Design teams are often required to collaborate on projects in the industry setting, there is a benefit to determining the factors that lead to or cause conflicts between these two teams. Previous research has shown that these conflicts lead to lower product quality, schedule slippage, and increased budget for the project. By determining how to avoid inter-team conflict the teams involved and the project as a whole benefits.

The survey takes approximately 20 – 30 minutes to complete. It will ask basic questions about your role and team. There will also be questions about personal interactions with a Developer or Designer team you have worked with covering areas such as types of communication used, any perceived conflicts, and perceived product quality.

There are only minimal risks of fatigue or discomfort to those participating in this study.

IF there are any questions or to report an adverse event as a result of the survey please contact the lead researcher Marissa Wilson at mkw4262@rit.edu.

If there are any questions about participants' rights or to report an adverse event as result of the survey please contact the Human Subjects Research Office Associate Director Heather Foti at hmfsrs@rit.edu.

For multiple choice questions please **bold** your choice.
For short answer questions please expand as much as you feel you need to.

1) What company are you affiliated with? **Note: This is for classification purposes and will only be seen by the research team.*

2) How many years have you been with your company?

3) What is your job title?

4) Are you on a Software Development or User Experience Design team?
    a) Software Development – *Software development teams deal mainly with the code base. Their duties include, but are not limited to; detailing use cases, designing system architecture, implementation of code, testing of code, preparing software releases, and maintaining code.*
    b) User Experience – *User experience teams deal mainly with the interface the user sees. Their duties include, but are not limited to; determining usability, design and creation of screen layouts and graphics, typography decisions, color choices, and other aspects that the user interfaces with.*

5) Are you currently, or in the past year have you worked with a user experience design team on a project?
    a) Yes
    b) No
    If no *you do not qualify for this survey. Thank you for your participation!*

6) Is the design team you worked with/are working with located on the same campus as your team?
    a) Yes
    b) No
    If yes *move on to question 9*
    If no *move on to question 7*

7) Is the design team located within the same time zone?
    a) Yes
    b) No

8) Is the design team contracted by your company?
    a) Yes
    b) No
    c) Not sure

9) What percentage of your projects at work involve you working with the design team? *Please place an "X" in the appropriate box.*

0	25	50	75	100

10) How many people are on your team?

11) How many people did you actively work with on the design team?

12) Roughly how many months did you work with the design team?

13) What software process does your team use? **Select all that apply*
    a) Waterfall
    b) Prototype
    c) Iterative
    d) Agile
    e) Spiral
    f) I don't know
    g) Other (*Please specify)*

14) How many weeks are each iteration for your team?

15) What is the main form of communication within your team?
    a) Email/IM
    b) Phone
    c) In person/Meetings
    d) Other *(Please specify)*

16) Do you feel that your team communicates well or could communication be improved?
    a) We communicate well
    b) We could improve a little
    c) We could improve a lot

17) At what stage in the process did you begin working with the design team?
    a) Requirements gathering/analysis
    b) Software Design
    c) Implementation
    d) Integration
    e) Deployment
    f) Don't know/Don't remember
    g) Other *(Please specify)*

18) How were the requirements delivered to the design team?
    a) Email/IM
    b) Phone
    c) In person/Meeting
    d) Through a liaison

19) What was the main method of communicating with the design team?
    a) Email/IM
    b) Phone
    c) In person/Meetings
    d) Through a liaison

20) In your opinion, which interaction should be primary between the two teams to yield the best product?
    a) Email/IM
    b) Phone
    c) In person/Meetings
    d) Through a liaison

21) Do you feel that your team communicated well enough with the design team?
    a) Yes
    b) No

22) Did you experience any conflict or friction when working with the design team?
    a) Yes
    b) No
    If no *move on to question 34*

23) At what stage of the process did the conflict or friction begin?
    a) Requirements gathering/analysis
    b) Software design
    c) Implementation
    d) Testing
    e) Deployment
    f) Don't know/Don't remember
    g) Other *(Please specify)*

24) Was the conflict connected to a lack of communication?
    a) Yes
    b) No

25) Which type of conflict did you experience? **Select all that apply*
    a) Task conflict – *Disagreements about the tasks being performed, such as conflict of ideas or disagreement about content or tasks*
    b) Social conflict – *Interpersonal incompatibilities or tension, such as personal or relationship clashes within the group setting*
    c) Both
    ***If both** move to question 26*
    ***If social** move to question 26, then to 31*
    ***If task** move to question 27*

26) Did the social conflict occur in the office environment, in an email, or outside of the office?
    a) Email
    b) Office environment
    c) Outside the office

27) Was the task conflict on your end or the designers end?
    a) My end
    b) Designers end
    c) Both

28) Was the task conflict a usability or design issue?
    a) Usability
    b) Design
    c) Both
    d) Neither

29) What caused the task conflict?

30) Did the task conflict affect your ability to complete your work?
    a) Yes
    b) No

31) Did the conflict have a lasting result on the product?
    a) Yes
    b) No

32) How did this affect your ability to work with the design team?

33) How was the conflict resolved?

34) In your opinion did your interaction with the design team increase or decrease the overall quality of the software?
Please place an "X" in the appropriate box.

Decrease		No effect		Increase

35) Are there any specific product improvements or problems that occurred that you would like to highlight?

36) Are there any other thoughts, stories, or comments you would like to add?

37) If you would like to be notified of the final results of the paper please include an email address below.

.0.2 Appendix 2 - Designer Survey

Participation in this survey is completely voluntary. There will be no penalty or loss of benefits for those wishing not to participate. Participants are able to end the survey if they wish at any time. If the participant chooses to withdraw from the survey any information that has already been filled out will be discarded.

This survey is being conducted by a graduate student from the Rochester Institute of Technology as part of a Master's thesis examining the causes and effects of conflict that often occurs between Software Developers ("Developers") and User Experience Designers ("Designers") in an industry setting.

As Development and Design teams are often required to collaborate on projects in the industry setting, there is a benefit to determining the factors that lead to or cause conflicts between these two teams. Previous research has shown that these conflicts lead to lower product quality, schedule slippage, and increased budget for the project. By determining how to avoid inter-team conflict the teams involved and the project as a whole benefits.

The survey takes approximately 20 – 30 minutes to complete. It will ask basic questions about your role and team. There will also be questions about personal interactions with a Developer or Designer team you have worked with covering areas such as types of communication used, any perceived conflicts, and perceived product quality.

There are only minimal risks of fatigue or discomfort to those participating in this study.

IF there are any questions or to report an adverse event as a result of the survey please contact the lead researcher Marissa Wilson at mkw4262@rit.edu.

If there are any questions about participants' rights or to report an adverse event as result of the survey please contact the Human Subjects Research Office Associate Director Heather Foti at hmfsrs@rit.edu.

For multiple choice questions please **bold** your choice.
For short answer questions please expand as much as you feel you need to.

1) What company are you affiliated with? **Note: This is for classification purposes and will only be seen by the research team.*

2) How many years have you been with your company?

3) What is your job title?

4) Are you on a Software Development or User Experience Design team?
    a) Software Development – *Software development teams deal mainly with the code base. Their duties include, but are not limited to; detailing use cases, designing system architecture, implementation of code, testing of code, preparing software releases, and maintaining code.*
    b) User Experience – *User experience teams deal mainly with the interface the user sees. Their duties include, but are not limited to; determining usability, design and creation of screen layouts and graphics, typography decisions, color choices, and other aspects that the user interfaces with.*

5) Are you currently, or in the past year have you worked with a software development team on a project?
    a) Yes
    b) No
    If no *you do not qualify for this survey. Thank you for your participation!*

6) Is the development team you worked with/are working with located on the same campus as your team?
    a) Yes
    b) No
    If yes *move on to question 9*
    If no *move on to question 7*

7) Is the development team located within the same time zone?
    a) Yes
    b) No

8) Is your team contracted by another company for this project?
    a) Yes
    b) No

9) What percentage of your projects at work involve you working with the development team?
Please place an "X" in the appropriate box.

0	25	50	75	100

10) How many people are on your team?

11) How many people did you actively work with on the development team?

12) Roughly how many months did you work with the development team?

13) What is the main form of communication within your team?
    a) Email/IM
    b) Phone
    c) In person/Meetings
    d) Other *(Please specify)*

14) Do you feel that your team communicates well or could communication be improved?
    a) We communicate well
    b) We could improve a little
    c) We could improve a lot

15) At what stage in the process did you begin working with the development team?
    a) Information gathering
    b) Thumbnailing
    c) Wireframing
    d) Prototyping
    e) Critique
    f) Design revisions
    g) Design delivery
    h) Other *(Please specify)*

16) How were the requirements gathered from the development team?
    a) Email/IM
    b) Phone
    c) In person/Meeting
    d) Through a liaison

17) What was the main method of communicating with the development team?
    a) Email/IM
    b) Phone
    c) In person/Meetings
    d) Through a liaison

18) How frequently did you interface with the development team?
    a) Daily
    b) 2 or 3 times a week
    c) Weekly
    d) 2 or 3 times a month
    e) Monthly
    f) Every few months

19) In your opinion, which should be the primary form of communication between the two teams to yield the best product?
    a) Email/IM
    b) Phone
    c) In person/Meetings
    d) Through a liaison
    e) Other *(please specify)*

20) Do you feel that your team communicated well enough with the development team?
    a) Yes
    b) No

21) Did you experience any conflict or friction when working with the development team?
    a) Yes
    b) No
    ***If no** move on to question 35*

22) At what stage of the process did the conflict or friction begin?
    a) Information gathering
    b) Thumbnailing
    c) Wireframing
    d) Prototyping
    e) Critique
    f) Design revisions
    g) Design delivery
    h) Other *(Please specify)*

23) Was the conflict connected to a lack of communication?
    a) Yes
    b) No

24) Which type of conflict did you experience? **Select all that apply*
    a) Task conflict – *Disagreements about the tasks being performed, such as conflict of ideas or disagreement about content or tasks*
    b) Social conflict – *Interpersonal incompatibilities or tension, such as personal or relationship clashes within the group setting*
    c) Both
    ***If both** move to question 25*
    ***If social** move to question 25, then to 32*
    ***If task** move to question 26*

25) Did the social conflict occur in the office environment, in an email, or outside of the office?
    a) Email
    b) Office environment
    c) Outside the office

26) Did the task conflict affect your ability to complete your work?
    a) Yes
    b) No

27) Was the task conflict on your end or the developers' end?
    a) My end
    b) Developers' end
    c) Both

28) Was the task conflict a usability or design issue?
    a) Usability
    b) Design
    c) Both
    d) Neither
    ***If neither** move to question 31*

29) Did the conflict require you to make a redesign?
    a) Yes
    b) No

30) Was it a major redesign or a small change?
    a) Major redesign
    b) Small change

31) What caused the task conflict?

32) Did the conflict have a lasting result on the product?
   a) Yes
   b) No

33) How did this affect your ability to work with the development team?

34) How was the conflict resolved?

35) In your opinion did your interaction with the development team increase or decrease the overall quality of the software?
Please place an "X" in the appropriate box.

Decrease		No effect		Increase

36) Are there any specific product improvements or problems that occurred that you would like to highlight?

37) Are there any other thoughts, stories, or comments you would like to add?

38) If you would like to be notified of the final results of the paper please include an email address below.

.0.3 Appendix 3 - Developer Responses

ID	Dev 1	Dev 2	Dev 3	Dev 4	Dev 5	Dev 6	Dev 7	Dev 8
Company Size	Small	Small	Small	Large	Large	Small	Medium	Medium
How many years have you been with your company?	1	0.5	3	0.5	1	5	1	2
What is your job title?	Senior Developer	Software Developer	Web Developer	Software Engineer	Front End Developer	Software Architect	Software Engineer	Software Developer
Are you on a Software Development or User Experience Design team?	Software Development	Software Development	Software Development	Software Development	Software Development	Software Development	Software Development	Software Development
Are you currently, or in the past year have you worked with a user experience design team on a project?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Is the design team you worked with/ are working with located on the same campus as your team?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Is the design team located within the same time zone?								No
Is the design team contracted by your company?								Yes

ID	Dev 1	Dev 2	Dev 3	Dev 4	Dev 5	Dev 6	Dev 7	Dev 8
What percentage of your projects at work involve you working with the design team?	50	75	100	100	100	100	100	100
How many people are on your team?	7	3	6	7	12	1	5	5
How many people did you actively work with on the design team?	2	1	2	3	2	1	1	2
Roughly how many months did you work with the design team?	8	4	2	Since joining team, and it will continue for remainder of current project	Varies GREATLY depending on project, anywhere from 1 week to 4 months	70	5	1
What software process does your team use?	Agile	"Startup" – an ad-hoc, evolving combination of iterative iterative/agile practices	Waterfall	Agile	Agile	Iterative, Agile	I don't know	Prototype
How many weeks are each iteration for your team?	2	4	1	2	2	8 to 16	2	3-Feb
What is the main form of communication within your team?	Email/IM	In person/ Meetings	Email/IM	In person/ Meetings	Email/IM	In person/ Meetings	Email/IM	Email/IM

ID	Dev 1	Dev 2	Dev 3	Dev 4	Dev 5	Dev 6	Dev 7	Dev 8
Do you feel that your team communicates well or could communication be improved?	We could improve a little	We communicate well	We could improve a lot	We could improve a little	We could improve a little	We communicate well	We could improve a little	We could improve a little
At what stage in the process did you begin working with the design team?	Requirements gathering/ analysis	Requirements gathering/ analysis	Requirements gathering/ analysis	Requirements gathering/ analysis	Requirements gathering/ analysis	Requirements gathering/ analysis	Requirements gathering/ analysis	Requirements gathering/ analysis
How were the requirements delivered to the design team?	Email/IM	In person/ Meeting	Email/IM	In person/ Meeting	In person/ Meeting	In person/ Meeting	In person/ Meeting	In person/ Meeting
What was the main method of communication with the design team?	Email/IM	In person/ Meeting	Email/IM	In person/ Meeting	In person/ Meeting	In person/ Meeting	In person/ Meeting	In person/ Meeting
In your opinion, which interaction should be primary between the two teams to yield the best product?	Email/IM	In person/ Meeting	In person/ Meeting	In person/ Meeting	In person/ Meeting	In person/ Meeting	In person/ Meeting	In person/ Meeting

ID	Dev 1	Dev 2	Dev 3	Dev 4	Dev 5	Dev 6	Dev 7	Dev 8
Do you feel that your team communicated well enough with the design team?	Yes	Yes	Yes	No	Yes	Yes	Yes	No
Did you experience any conflict or friction when working with the design team?	Yes	No	No	Yes	Yes	No	No	
At what stage of the process did the conflict or friction begin?	Requirements gathering/ analysis			Requirements gathering/ analysis	Implementation			
Was the conflict connected to a lack of communication ?	No			No	No			
Which type of conflict did you experience?	Task conflict			Task conflict	Task conflict			
Did the social conflict occur in the office environment, in an email, or outside of the office?								
Was the task conflict on your end or the designers end?	Both			Both	Both			

ID	Dev 1	Dev 2	Dev 3	Dev 4	Dev 5	Dev 6	Dev 7	Dev 8
Was the task conflict a usability or design issue?	Usability			Usability	Both			
What caused the task conflict?	Different approaches, I guess. Also, the teams were unbalanced, the UX team lacked any semblance of seniority.			Individual opinions on how the task should be accomplished that continue through every step of the task even after an agreement has been made. Note - this is only for the worst case scenarios. Most tasks go fairly well.	Design changes coming through after implementation has begun; this was more a result of a short deadline and poor planning prior to project kickoff, thus putting both designer and developer in a difficult situation. One can't truly start until the other is finalized but sometimes with short deadlines that isn't an option.			
Did the task conflict affect your ability to complete your work?	No			Yes	Yes			
Did the conflict have a lasting result on the product?	No			Yes	No			

ID	Dev 1	Dev 2	Dev 3	Dev 4	Dev 5	Dev 6	Dev 7	Dev 8
How did this affect your ability to work with the design team?	We're doing ok			I don't get to make many of the decision, so not much on my end has changed. I'm sure there are a few more unkindly opinions on both sides though.	It slowed everything down and put me in a position in which I had to redo the same things multiple times.			
How was the conflict resolved?	We talked about it. Defined our priorities a bit better (for next time), and agreed that one of us (a dev) would be the ultimate tiebreaker.			Many many discussions. Always the concern that the conflict will arise again when someone's ready to go against the agreement.	Just pushed through it, nothing specific but just a general understanding that we can't change the deadline and we need to get it done. The real resolution doesn't typically come during the current problem but surfaces in following projects; in other words, acting on what we learned.			
In your opinion did your interaction with the design team increase or decrease the overall quality of the software?	75	100	0	100	100	75	100	100

ID	Dev 1	Dev 2	Dev 3	Dev 4	Dev 5	Dev 6	Dev 7	Dev 8
Are there any specific product improvements or problems that occurred that you would like to highlight?	The mobile versions of our sites, and our mobile apps were improved significantly. UX really shines when there's limited screen estate.	We're still nailing down how our design team (the one designer we have, who we hired three or four months ago) should interact with how we build our product. The current thinking is to get her involved as early as possible (up to and including high-level product roadmapping), which seems to be working well.	The design team would sometimes change the id's and names of fields and then crash the code essentially. Other times they just didn't listen and didn't do as asked.	UX team has definitely helped ensure we hit more accessibility points across our framework.	Specific deliverable dates and requirements need to be defined at the very onset; all design mocks should be final (excepting last minute changes from stakeholders) prior to development.	It is much easier to envision, design and model systems when the user experience and interface requirements and ideas are taken into effect. Reduced end of iteration development changes by quite a bit.	Without assistance from the UX team, we would have based our design primarily on the existing UI without consideration for how useful it is. The UX team's outside perspective was very useful in starting the design from a clean slate. They were very helpful in conducting user interviews and distilling the results into a prototype.	
Are there any other thoughts, stories, or comments you would like to add?			Nope.			Small, cross-discipline teams of design and development are very useful in putting together a cohesive product, especially when they have a set of agreed upon standards by which they can compromise and work around.		

.0.4 Appendix 4 - Designer Responses

ID	Des 1	Des 2	Des 3	Des 4	Des 5	Des 6	Des 7
Company Size	Medium	Medium	Small	Medium	Medium	Medium	Small
How many years have you been with your company?	9	1	2	1	4	1	7
What is your job title?	UX Designer	Graphic Designer	User Experience Designer	Front End Developer	Sr. Graphic Designer	UX Designer	Web and Publications Manager
Are you on a Software Development or User Experience Design team?	User Experience	User Experience	User Experience	User Experience	User Experience	User Experience	User Experience
Are you now, or have you in the past worked with a software development team on a project?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Is the development team you have worked with/are working with located on the same campus as your team?	Yes	Yes	Yes	No	Yes	No	Yes
Is the development team in the same time zone?				No		No	
Is your team contracted by another company for this project?				No		No	
What percentage of your projects at work involve you working with the development team?	75	75	75	100	75	100	75

ID	Des 1	Des 2	Des 3	Des 4	Des 5	Des 6	Des 7
How many people are on your team?	8	6	12	10+	15	5	1
How many people did you actively work with on the development team?	4	5	12	8	3	2 to 3	1
Roughly how many months did you work with the development team?	5	n/a we are part of the same larger team so always	Depends on the project	18	1	6	Ongoing daily
What is the main form of communication within your team?	In person/ Meetings	In person/ Meetings	In person/ Meetings	Email/IM	In person/ Meetings	Email/IM	In person/ Meetings
Do you feel your team communicates well or could communication be improved?	We could improve a little	We could improve a little	We communicate well	We could improve a little	We could improve a little	We could improve a lot	We communicate well
At what stage in the process did you begin working with the development team?	Design revisions	Design revisions	Wireframing	Prototyping	Design delivery	Information gathering	Other (please specify) All the time from start to finish
How were requirements gathered from the development team?	In person/ Meetings	In person/ Meetings	In person/ Meetings	Email/IM	In person/ Meetings	Email/IM	In person/ Meetings
What was the main method of communicating with the development team?	In person/ Meetings	In person/ Meetings	In person/ Meetings	Email/IM	In person/ Meetings	Email/IM	In person/ Meetings
How frequently did you interface with the development team?	Weekly	Daily	Daily	Daily	2 or 3 times a week	Daily	Daily

ID	Des 1	Des 2	Des 3	Des 4	Des 5	Des 6	Des 7
In your opinion, which should be the primary form of communication between the two teams to yield the best product?	In person/ Meeting	In person/ Meeting	In person/ Meeting	Other (please specify) No one type is sufficient. It requires a mix including formal documentation.	In person/ Meeting	Phone	In person/ Meeting
Do you feel your team communicated well enough with the development team?	Yes	Yes	Yes	Yes	No	No	Yes
Did you experience any conflict or friction when working with the development team?	Yes	Yes	No	No	No	Yes	No
At what stage in the process did you begin experiencing conflict	Critique	Design delivery				Design revisions	
Was the conflict connected to a lack of communication?	No	No				No	
Which type of conflict did you experience?	Task Conflict	Task Conflict				Task Conflict	
Did the social conflict occur in the office environment, in an email, or outside of the office?							
Did the task conflict affect your ability to complete your work?	No	No				Yes	

ID	Des 1	Des 2	Des 3	Des 4	Des 5	Des 6	Des 7
Was the task conflict on your end or the developer's end?	Both	My end				Both	
Was the task conflict a usability or design issue?	Usability	Design				Both	
Did the conflict require you to make a redesign?	Yes	No				Yes	
Was it a major redesign or a small change?	Small change					Major redesign	

ID	Des 1	Des 2	Des 3	Des 4	Des 5	Des 6	Des 7
What caused the task conflict?	couple of developers coming together and forming a greater view.	most task conflicts we face are a lack of technical understand on us the diesgners in order to understand the backend demands of a design. The other major issue that we often face is developers will start development before the design is done and changes to the design then become frustrating to them.				On multiple occasions, the developer leading the team "rethought" core decisions on what the product was and how it would work very late in the product. His changes of heart started during the design revision process and has continued well after launch. Many of the changes have been prompted by the development team being unwilling to put in time to build the original designs. The developers have frequently rejected design work, asking for it to be redesigned to be easier and less time consuming for them to build, regardless of the impact on the usability of the design.	
Did the conflict have a lasting result on the product?	No	No				Yes	

ID	Des 1	Des 2	Des 3	Des 4	Des 5	Des 6	Des 7
How has this affected your ability to work with the development team?	not affected, but presumptions form for next project	we are addressing how an additional PM can help act as a moderator in some issues				It makes it harder to work with them day to day. They tend to assume any feedback will lead to a conflict, and occasionally redesign my work without consulting UX at all.	
How was this conflict resolved?	mutually discussing it out, by knowledge sharing, research sharing (had to)	cram sessions				I had to go over their heads to their boss, who stated clearly that the UX designer's time was more scarce than development time.	
In your opinion did your interactions with the development team increase or decrease the overall quality of the product?	100	50	100	25	100	25	100

ID	Des 1	Des 2	Des 3	Des 4	Des 5	Des 6	Des 7
Are there any specific product improvements or problems that occurred that you would like to highlight?	no	no		I am a Front-end Developer: a growing class of developers that intrinsically work with both design and back-end code development. I don't make specific design choices for either side but orchestrate the marriage of the two in the middle. I own the HTML structure and CSS which allows the output of both camps to be published and consumed. As such, this survey really didn't address my experience or problems: translating left and right brain stuff into a common language. Both brain types have a hard time understanding the motivations and impetus for the other's output. Both struggle with how the other limits the possible outcomes.			

ID	Des 1	Des 2	Des 3	Des 4	Des 5	Des 6	Des 7
Are there any other thoughts, stories, or comments that you would like to add?	when the dev team comes with technological constraints, becomes difficult to handle. changing design coz of tech reasons is last thing i would want my team to do.	As far as communication styles earlier, I wanted to select two, we do lots of in person but have remote members and so heavily depend on skype video calls. Our team is also mixed we have dev and design on one team, we try to act as a whole body. No team that I have worked on in roles as UX, Production, Graphic and Web design have I been far removed from developers, 90% of the time I'm in the same room which has helped vastly		see previous		My feeling after this experience is that a designer working directly for a developer is often a conflict of interest.	I work in a very small department on campus, so it is just myself and the developer as the "team". I handle the design aspect, while he handles the programming. We work really well together to collaborate on all projects. Of course, it's easier to work 1:1 because there are less opinions that come w/ large teams.

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