IRB SERVICE DESIGN

Purdue University

CGT 411 - Dr. Nathan Hartman

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Table of Contents

Appendices:

I. EXECUTIVE SUMMARY

The Purdue Institutional Review Board worked in collaboration with a CGT411 capstone group to identify the current satisfaction of their users. This led to data collection in the form of surveys and interviews. From this data, a general dissatisfaction was identified for users. To address these concerns, the development of personas and user journey maps were implemented. These are tools within service design to identify user's needs, goals, motivations and current journey using a product or service. These tools were handed off to the Purdue Institutional Review Board, along with a generalized list of recommendations on key areas to address for improving their users experiences.

II. INTRODUCTION & BACKGROUND

Throughout the Spring 2017 semester, Team Affinity has been working in collaboration with the Purdue Institutional Review Board (IRB), and their Administrator, Nancy Hathaway. The team was approached with the opportunity to collaborate with the IRB to aid in improving their service and customer experience by applying service and user experience design skills and best practices.

After an initial kickoff meeting with Nancy Hathaway, the team was able to assess the complexity that the IRB process encompasses. The IRB expressed interest in gaining a better understanding of their users, which are Principal Investigators (PI) and to understand their journey and satisfaction throughout their interaction with the IRB. The need for this understanding was due to a large amount of rejected submitted protocols and an expressed dissatisfaction from users. Refer to Figure 1 to see a flow diagram of the Principal Investigator's typical approval process for a submitted protocol.

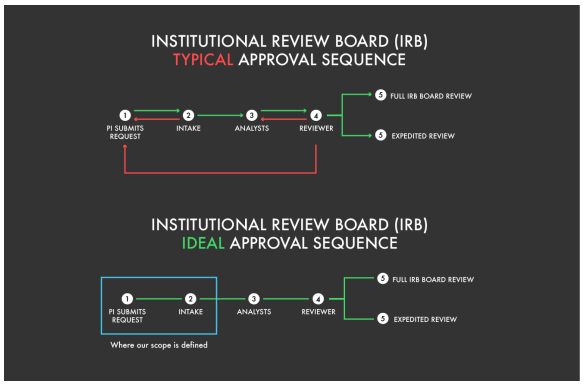


***Figure 1**: Comparing the typical and ideal approval sequence of Principal Investigator's submitting their protocol to the Institutional Review Board.*

This led to the formation of the team's problem statement, which is: *"During the Institutional Review Board (IRB) approval process, there are numerous protocols rejected due to complexity in the submission workflow."* After identifying a scope and problem statement, it was necessary to identify what to learn about the

Principal Investigators (users) to proceed with completing the project within its scope. Three research questions were then set into place: *What are the Principal Investigator's touch points (steps in the process) in the submission process? What are the Principal Investigator's emotions and feelings during the submission process? What are the Principal Investigator's perceptions and expectations of the Institutional Review Board (IRB)?*

The answers to these research questions can be found during the qualitative data collection process of the project plan. Before that, there must be a firm understanding of the core concepts of service design and how they play into the scope of this project. For an in-depth summary of the secondary research performed for this project, please refer to the end of this report for an annotated bibliography outlining sources of literature. Service design can best be summarized as "a human-centered approach that focuses on customer experience and the quality of service encounter as the key value for success" (Mūnich, 2016).

Service design embodies many tools that aid stakeholders in making improvements to their service or product. Two of those tools include: personas and user/customer journey maps. Both of these tools are built using a mixture of quantitative and qualitative data to identify the key needs, motivations and frustrations of users.

II. DATA COLLECTION

To build personas and user/customer journey maps, it is necessary to gather an adequate amount of qualitative and quantitative data. The qualitative data will be used to provide narrative and understanding of the user's needs and motivations, with the quantitative data being used to back those reasonings and behaviors.

Two methods were used to gather data from Principal Investigators throughout the data collection period of the project plan: qualtrics survey distribution and in-person interviews.

METHOD 1: QUALTRICS SURVEY

A qualtrics survey was developed with a mixture of open and closed ended questions to examine multiple areas of satisfaction and understanding of the users.

Qualitative Questions:

- *How many different protocols have you submitted to the Purdue IRB in the past academic year? [value input]*
- *What kind of approval have you submitted for? [multiple checkbox selection]*
- *Have you ever had to revise a submission is the past academic year? [Y/N]*
- *What is an estimate on how much time you spend on the submission process for one study? [value input]*
    - *How much of that time is productive/well-used? [value input]*
    - *How much do you feel is wasted? [value input]*
- *How satisfied are you currently with the IRB approval process? [1-5 likert scale]*

Quantitative Questions:

- *Could you please explain what you had to revise?*
- *Could you please explain the reasons behind this rating? [in conjunction with satisfaction rating]*
- *Run us through your understanding of the IRB approval process?*
- **Additional Comments*

The survey was developed with the purpose to provide a foundation of responses to gauge the user's satisfaction levels, understanding of the Institutional Review Board's process and any additional qualitative feedback. After the survey was developed and ready to be distributed, two approaches were taken to the distribute in an effective manner.

The first approach included gathering a count of active protocols (submissions) to the Purdue Institutional Review Board. IRB Administrator Nancy Hathaway provided this document, which was categorized by submission amount via each department at Purdue and additional satellite campuses. From that, departments

with high amounts of submission to the IRB were selected for contact. This resulted in forty total departments. The Department Head for each selected department was contacted via email by Dr. Mihaela Vorvoreanu, Associate Professor at Purdue University. The Department Heads then forwarded the email accordingly throughout their department to relevant Principal Investigators.

The second approach was similar in form to the previous approach, involving survey distribution via email. Each college at Purdue University includes an Associate Dean for Research. Nine total Associate Deans for Research were gathered and contacted to distribute the survey by Dr. Nathan Hartman, Professor of Advanced Manufacturing and Associate Head of Computer Graphics Technology.

METHOD 2: IN-PERSON INTERVIEWS

Within the Qualtrics survey that was distributed throughout Purdue University's Principal Investigators was an option to provide contact information for a follow-up interview. After a two week period which the survey was open for completion, nine total submissions consisted of willing participants for an in-person interview. These nine participants included two graduate students at Purdue University (both in the Computer Graphics Technology program), and seven faculty members ranging from assistant professors to professors with twenty years of experience.

The interviews ranged between thirty minutes to one hour in duration and were conducted by two team members together. The interview process included using Post-It notes to outline specific steps of the Principal Investigator's journey interacting with the Purdue IRB.

III. ANALYSIS & INSIGHTS

SURVEY RESULTS:

Key Insights:

- **Majority of users are being requested to revise their protocols.**
- **Noticeable improvement due to Nancy Hathaway and her staff.**
- **Many revisions include small wording and language changes.**
- **Majority of users are half of their time spent preparing for protocol submission is *wasted* and *unproductive.***

After the two week period in which the Qualtrics survey was open for completion, there was a result of thirty-nine total surveys. The survey allowed for optional insertion of demographic information. 89.29% of those who submitted surveys provided demographic information, with over half (57.69%) being female and the lower half remaining being male (42.31%). The most common age group among survey participants was between 30 and 39 years old, with 60% of the participants being 40 or older, and the remaining being under 30.

The wide range of experience as a Purdue University employee (measured in academic years) was between 1.5 years to 40 years. This is a very important metric to understand and gauge the wide variety in experience and age of the Principal Investigators submitting to the Purdue IRB.

One of the most crucial quantitative gatherings from the survey included satisfaction levels of the Principal Investigators, and accompanying qualitative reasonings. Figure 2 represents the results for satisfaction levels.

***Figure 2**: The range of satisfaction levels from Qualtrics survey results.*

It is important to note that there are zero participants claiming a satisfaction level of "highly satisfied". Those that have reported "satisfied" have gone on to elaborate the noticeable improvements seen in the Purdue Institutional Review Board in the past academic year. There is also notable praise for the changes made by current IRB Administrator and project sponsor Nancy Hathaway, and her staff.

With the project scope focused on the Principal Investigator's journey and steps during their protocol approval process, it is important to address the revision process with the IRB. Once a Principal Investigator submits their protocol to the IRB, it undergoes a series of phases until it is improved. Often, it is sent back to the Principal Investigator with requested revisions from the IRB (refer back to Figure

1 to see a visualization of this process). The survey asked participants whether or not they have been requested to revise in the past academic year, which resulted in 86% of the participants required to revise. This is a large percentage of users that must go back into their protocol to make revisions and changes, which is creating the complexity and bottleneck we see in the submission and approval process.

Salient Quotes:

"This wasted time costs delays in funding, delay in work being done, and delay in student graduation."

"The process is confusing, lengthy, antiquated (why are will filling out docs and pdfs?) and frustrating."

"I have seen an improvement in the process and am satisfied with my most recent experiences."

INTERVIEW RESULTS:

Key Insights:

- **There is a lack of transparency during the "waiting" period to initially hear back from the IRB.**
- **General sense of frustration gathering forms and interacting with the CoeusLite interface.**
- **In comparison to other institutions, faculty claim the Purdue IRB is behind.**

From the survey, five professors and two graduate students were willing to meet for a more in-depth interview. The interviews lasted between thirty minutes to an hour. Interview questions were structured around each individual survey response of the seven users. Due to each survey being conducted in coordination with that specific user's survey results, there were a wide variety of qualitative findings from the interviews. These findings led to the overall content that would be used to create the tools during the methodology phase: personas and a user/customer journey map.

Many interviews started in a similar fashion, with the interviewee elaborating on their specific process for gathering the necessary materials and documents to begin their research plan. This ranged from identifying research plans and problem statements, to assessing funding and recruitment methods, to simple outlines of project execution plans. Unfortunately, the interviews typically did not progress as originally planned. The interviewees at this point began to tangent into personal beliefs and outlooks toward the Purdue IRB, and comparisons of other institutions IRBs.

Although it was more difficult to address specific touch points for the Principal Investigators, the team was able to build the rationale and reasoning behind the IRB needed to address current user experience issues. After diagnosing the notes and recordings of the individual interviews, it was time to compile all of the data collected from both the interviews and surveys and begin analysis.

Salient Quotes:

"They are asking for things that reveal they don't understand the risk level of the research."

"There is a big issue with multi-institutional research."

"I could be more empathetic if they provided me with their status on backlog. I understand that everyone gets busy."

"If you're a graduate student and you're doing this for your thesis, this is a huge barrier."

"If the faculty are not pursuing research because of the IRB, that is NOT a good thing."

ANALYSIS METHOD: AFFINITY DIAGRAMMING

Once there was a large amount of data collected, both qualitative and quantitative, it was necessary to categorize and sort the data into logical groups. Through the use of Post-It notes, a large open space like a whiteboard or wall, and a group of people, the process of **affinity diagramming** can take place. Affinity diagramming is all about bundling and grouping information, and this can be one of the most valuable methods for design thinking and working with a lot of mixed data. (Dam & Siang 2017)

The affinity diagram was grouped into general phases with accompanying emotions. Along with the phases, were two subgroups that helped identify areas that the IRB could improve on: Thoughts/Feelings of the user and Feedback. Overall, the following groupings (phases) and their accompanying data were identified: *Discovery*, *Documentation, Submission, Actual Review, Revision, Resubmit and Approval.* Figure 3 below shows the affinity diagram in its entirety, spanning out over a large width in size.

Figure 3: The affinity diagram in its entirety after being grouped.

These groupings helped identify the general sections, or phases, that the user's journey would entail. They each had distinguishable touch points and emotions that made them unique and individual. A general outline for each phase and their touch points includes:

Discovery: The Principal Investigator is preparing their own documents for their research. They are crafting a research plan and identifying key components to their research like funding, recruitment and duration. Most users are *looking forward* to their research, and are feeling *organized* about their materials.

"I want to complete science that is meaningful and be an effective mentor to my students."

"I begin creating my own documentation when starting research to help stay organized."

Documentation: The protocol submission requires many documents and forms that the IRB and accompanying compliances provide. These forms are not always clear and concise, and at times, can be hard to identify the correct forms for specific research studies. This is the point when the user's experience and satisfaction level starts to become *negative*. There are large amounts of *confusion* and *uncertainty* about which forms to pursue, and how to stay organized.

"I don't even know what most of these forms are."

"This takes more time than it should."

Submission: The user will be uploading their protocol and any accompanying documents to the CoeusLite interface, which will then be submitted to the IRB. This is the period in time when the Principal Investigator is actually clicking submit to send off their protocol, and are no longer preparing documents. The users are *anxious* at the point, and very *frustrated* and *annoyed* with the poorly designed user interface that CoeusLite embodies.

"Wasted time costs delays in funding, delay in work being done, and delay in student graduation."

"The Coeus Interface is horrendous."

Actual Review: At this point the IRB is reviewing the submitted protocol for a first round. The user is *uncertain* at this period in time, because much time has passed and they are still awaiting approval.

"Everyone is busy, I'd like to know that they are backlogged three weeks so I can keep refining my materials."

"You just sit and wait forever."

Revision: The IRB has returned the protocol to the Principal Investigator with requested revisions. It is important to note that this is not guaranteed to happen, but based on the data collected it is the most common and promising path. [86% of survey results noted revisions in the past academic year, and 100% of interviewees expressed having requested revisions in their time with the Purdue IRB].

During the revision grouping, there were many instances of *anger* and *frustration* with the IRB. The user is now *scrambling* around to the gather necessary documents for revision, and making changes to their protocol.

Resubmission: This step shares many similarities to the original submission phase,

but the emotions are elevated due to the time spent in the process.

"They are asking for things that reveal that they don't understand the risk level of the research."

"It would be helpful to have amendments be reviewed based on their level of risk, not the overall risk of the study."

Approval: This is the point in which the user (Principal Investigator) has received final approval from the IRB, with no more requested revisions. At this point, the user is *satisfied*, but *exhausted* from the amount of time they have spent in this process.

After the identification of these groupings, and understanding the data that placed them into their logical groupings, it was within the scope of time to begin developing the personas and journey map deliverable.

"The IRB has improved its practices and, as a result, processing is now quicker than in the past."

"Since Dr. Hathaway joined as administrator one year ago, I have been more optimistic."

IV. DELIVERABLES

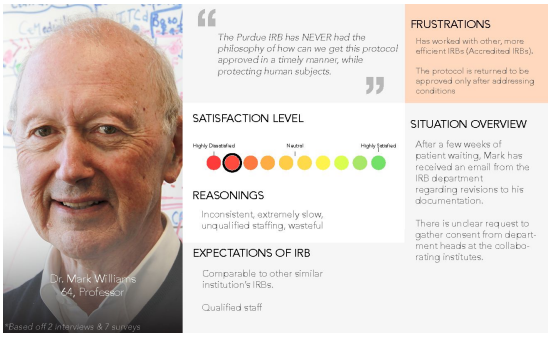
PERSONA DEVELOPMENT:

The Purdue IRB needed a way to understand their users, and identify their needs and motivations. Personas were one tool that was identified during the creation of the problem statement, scope and final deliverable that could aid the Purdue IRB in accomplishing this task. Personas can best be summarized as personifications of user's models that engage empathy of the design and development of user's goals (Cooper, 2014). In other words, personas are a means for the stakeholder, in this scenario, the Purdue IRB, to understand their users and have realistic "model users" to design their service around.

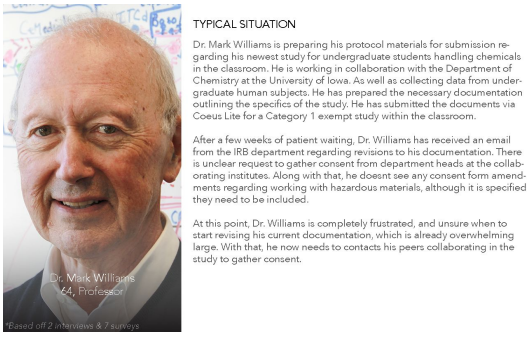
With the data collected, personas can begin to be developed. Three total personas were developed, with one being a primary persona and the remaining two being secondary personas. A primary persona is the target user, who design decisions should be based around. Secondary personas will not be dissatisfied with any of the design decisions tailored around the primary persona. The primary persona embodies the most common and important set of users for a product or service, so it is ideal to design with them in mind.

The first persona developed (primary persona), was Dr. Mark Williams. Figure 4 below shows the three page overview of Dr. Williams and his characteristics and behaviors.

PRIMARY PERSONA [Refer to Appendix II for larger scale image]:



The cover page for the personas includes a notable quote. Dr. Williams' quote is centered around the Purdue IRB's lack of approval protocols in a timely manner. His satisfaction level shows a nearly highly dissatisfied rating. His reasonings include: the inconsistency in revisions, unqualified staff and the slow approval. He expects the Purdue IRB to be comparable to the IRBs of other accreditable institutions.



A typical situation is presented for the user, with Dr. Williams' being centered around a long awaited protocol process, only to have his protocol requested for revision. He is unclear on the procedures he needs to take to get consent from multi-institutional research.

It is important to show that the more experienced users with the IRB have a fairly in-depth understanding of how the Purdue IRB's approval sequence works. This plays into the fact that the user is looking for a speedy approval. Although, since they understand the way that the IRB works, they become even more frustrated in the end.

Identifying these key behaviors and characteristics of the majority user group ties in directly to the formation of the user/customer journey map which will be designed and developed later in the project plan. After creating this primary persona, the development of secondary personas began by identifying the sub-groups of users who interact with the IRB often. These users are not as common as the group of users represented by the primary persona, but they still need to be in mind during service re-design, as they utilize the service on a standard basis.

SECONDARY PERSONAS [Refer to Appendix III for larger scale image]:

The first secondary persona developed was Ji Lee Kyung, an assistant professor at Purdue University. Figure 5 below is an overview of Ji Lee.

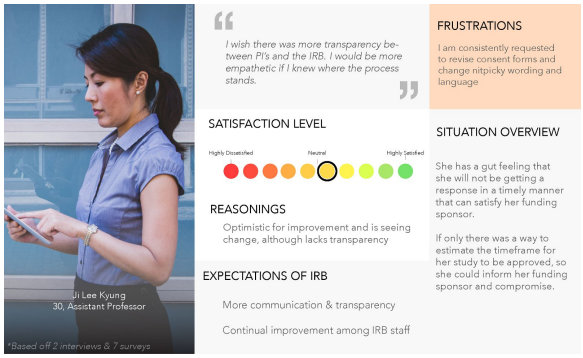


Figure 5: *Ji Lee Kyung, secondary persona*

Overall Satisfaction Level: 6/10 [Neutral Satisfaction] due to seeing an improvement in the Purdue IRB within the past academic year. Although, there still seems to be a lack of transparency during the waiting process.

Significant Quote: "I wish there was more transparency between PIs and the IRB. I would be more empathetic if I knew where the process stands."

Expectations of the IRB: More communication and transparency; Continual improvement

Frustrations: Ji Lee is frustrated with the nitpicky wording and language changes often requested during the revision process.

The next secondary persona is based on the data collected from graduate students who are working with the Purdue IRB during their thesis. Common issues found during data analysis outline that the IRB could potentially halt a graduate student from graduating on time or completing their thesis on time due to the long duration approval process. Figure 6 below shows Stephanie Robinson, a graduate student at Purdue University.

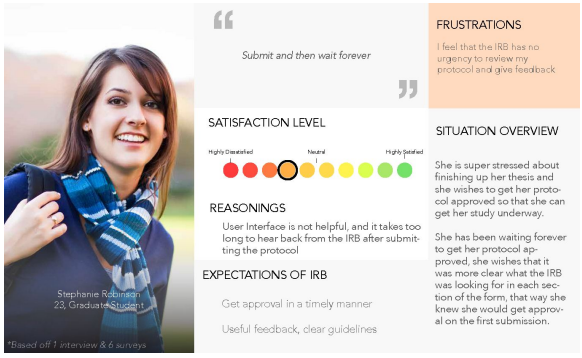


Figure 6: *Stephanie Robinson, secondary persona*

Overall Satisfaction Level: 4/10 [Dissatisfied] due to the CoeusLite interface and not being able to easily navigate within it, as well as a long period of uncertainty before hearing back about approval or revisions from the Purdue IRB.

Significant Quote: "Submit and then wait forever."

Expectations of the IRB: Stephanie's expectations include receiving approval in a timely manner. This is especially important for the user group that she is representing, as they may be working on a thesis to graduate on time. There is also unclear feedback and

no general guidelines from the Purdue IRB when receiving the revision requests.

Frustrations: She feels as if there is no general urgency from the Purdue IRB to review her protocol and give her approval. *This is a huge gap, which will later be acknowledged and addressed in the user/customer journey map. It is essential in service design that the user and the stakeholder have similar expectations and perceptions of the service being provided.*

USER JOURNEY MAP DEVELOPMENT:

After creating the personas, the team was ready to start developing the user journey map that will represent the personas' feelings and actions throughout the duration of an IRB submission process. Before the team designed and developed our final user journey map, research was necessary to identify the various aspects to include in a user journey map. The team collected and analyzed several examples to use for inspiration and ideation.

Next, the team conducted multiple whiteboarding sessions to sketch and form the final journey map deliverable (Figure 7). Using the primary persona as the target focus, different aspects of the journey map were identified during these sessions (touchpoints, phases, emotions, quotes, descriptions, etc.)

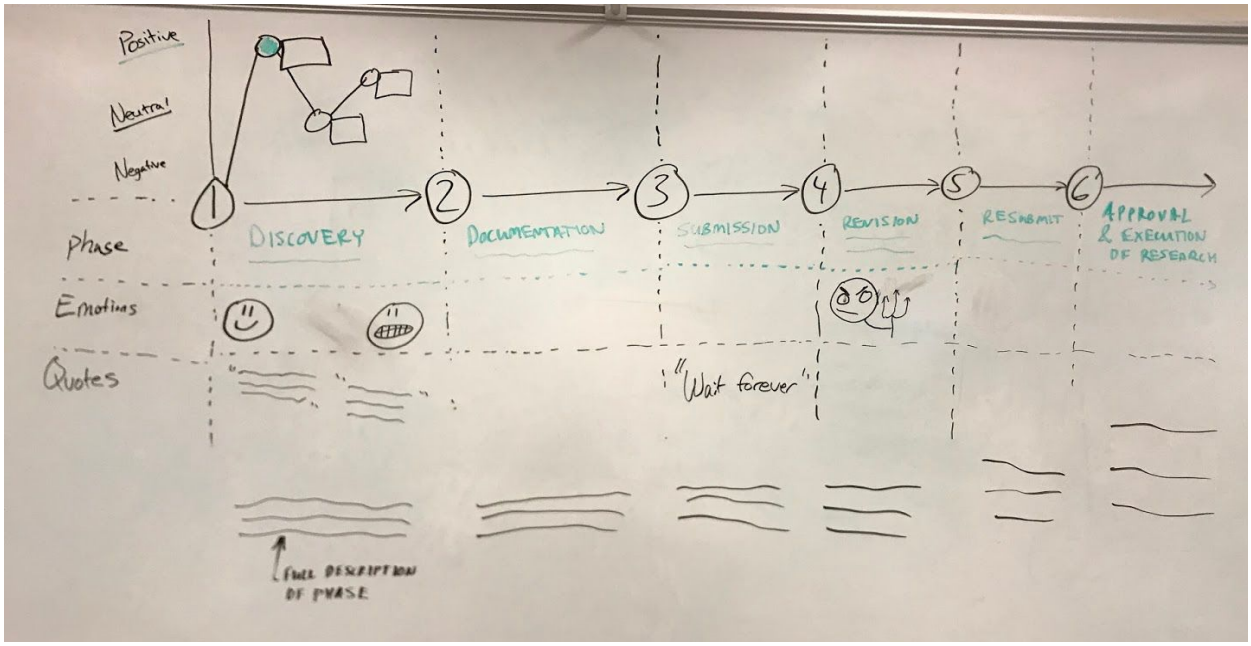


Figure 7: *Whiteboarding and planning for user/customer journey map.*

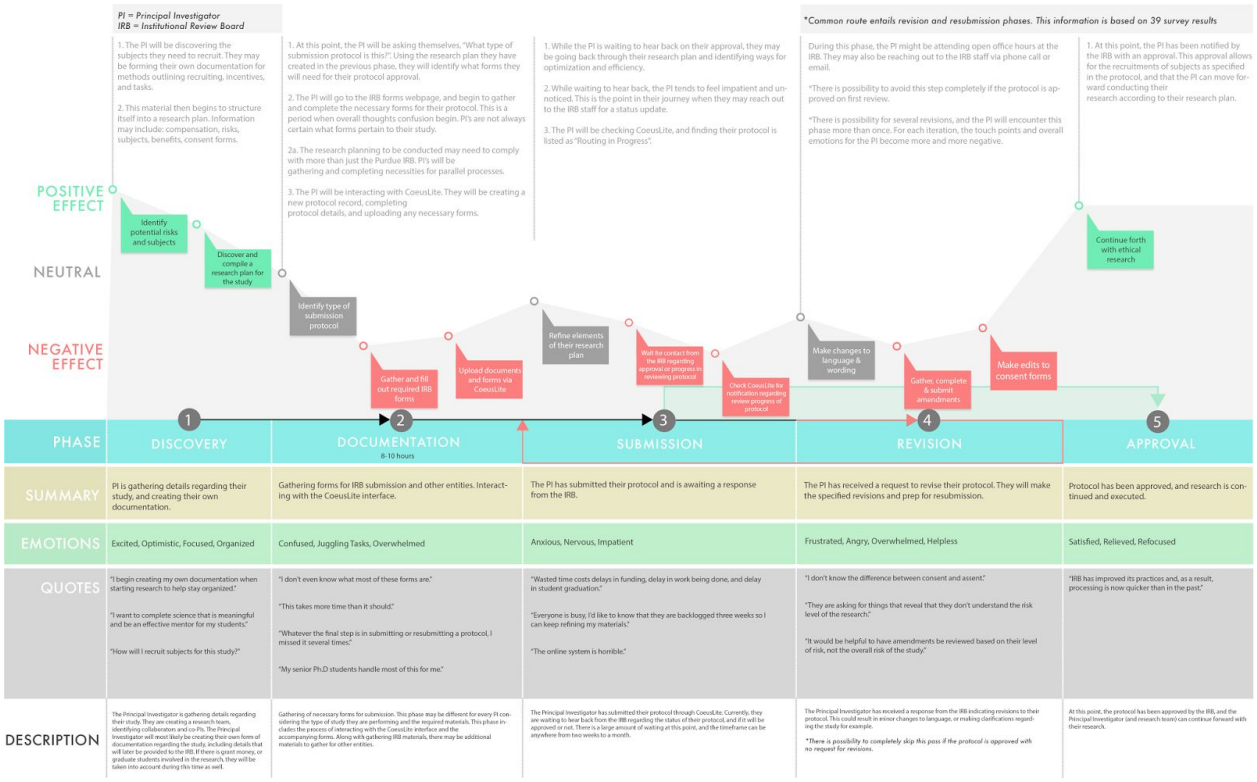


Figure 8: *First version of the user/customer journey map*

After the team constructed a clear idea as to the necessary aspects to include in the user journey map, Adobe Illustrator was utilized to create a high fidelity product. Figure 8 shows the team's rough draft of the user journey map. The team members sought feedback from their sponsor, Nancy Hathaway, and their advisor, Dr. Vorvoreanu. Both were extremely helpful in their suggestions and feedback. Nancy added content and suggestions regarding the content of the journey map, ensuring that all of the necessary information was included.

Dr. Vorvoreanu added feedback regarding the design and layout of the map. Though the color scheme presented was cool and pleasant, Dr. Vorvoreanu suggested that the color scheme represent more urgent colors. In addition, she suggested to stress the negative touch points to a higher degree, so that the users can easily see the level of impact the submission process places on the principal investigators. After addressing their feedback, the team completed the high fidelity prototype, shown in Figure 9 [Refer to Appendix IV for larger scale image]:

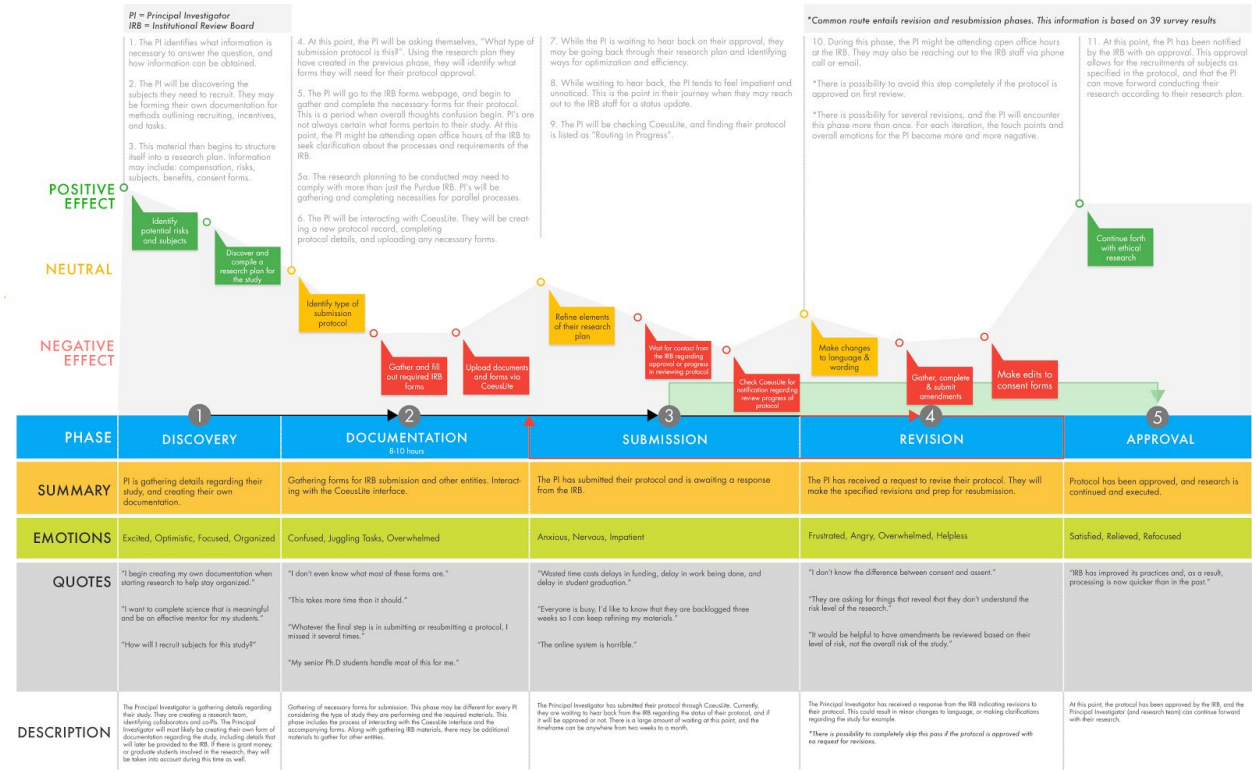


Figure 9: *Final version of the user/customer journey map [Appendix IV]*
View at: ***http://web.ics.purdue.edu/~wmoffat/team-affinity/journey-map.pdf***

The final version of the user journey map displays a few themes represented in the IRB submission process. First, there exists many negative touch points, specifically during the submission and revision phase. At that point, PIs are extremely frustrated and annoyed about the fact that their protocols have yet to be approved. Next, our user journey map shows that many steps and touch points are required during the submission process. Receiving approval for their research is not easy with the IRB, as many requirements must be fulfilled beforehand. Finally, the map shows room for improvement. With several touch points identified, the IRB staff members have the opportunity to address the concerns, feelings, needs, and wants of the principal investigators with hope that the process will be of more ease for everyone involved.

V. CONCLUSION

After developing these service design tools and handing them off to the Purdue Institutional Review Board, it was essential for a list of suggestions and/or recommendations to be included to put the tools to use. These recommendations are based are the data collected and analyzed, and that will make for a meaningful service redesign for users of the Purdue IRB's service. These changes will address the frustrations, needs, motivations and end goals of the primary persona, and still address and acknowledge the needs of any other user group (secondary personas).

A general outline of the *recommendations* list is as follows:

Re-Ordering of Revision Documentation: When a Principal Investigator is contacted for requested revisions, the document including the revisions is currently in an inefficient format. As it currently stands, the steps on how to interact with the CoeusLite interface are first, and below (on the second page) are the actual revision requests. With that, the requested revisions are outlined via a bulleted list. It would be beneficial to bold, or highlight the actual "questions" or "revisions" that are requested of the Principal Investigator. Along with this, moving these to the top of the document would make more sense in the order of operations, as the user is going to be making the revisions before interacting with the system again.

General Changes to Language and Wording: Currently, for graduate students interacting with the IRB for the first time, there is a large amount of language that is not intuitive or distinguishable to an inexperienced user. This can lead to even more confusion and uncertainty, in an already confusing process for the users to gather the correct forms. The IRB should normalize their language and wording to a general audience, adhering to a larger user group.

Transparency of Wait-time/Backlog: Typically, the IRB will get in touch with Principal Investigators within a two week span of receiving the protocol. Although, this is not always the case, and there is currently no form of "status" for the Principal Investigator to refer to during their wait time. As show in the user journey map, and data collected from users, the uncertainty and ambiguity of the wait period is very anxiety inducing and frustrating for the users. Identifying the average wait time for a response and informing the user would increase transparency and drive empathy between the user (Principal Investigator) and stakeholder (Purdue IRB), as shown in the secondary persona of Ji Lee Kyung.

Boilerplate Examples: Once a Principal Investigator has received their revision requests, there is uncertainty as to tackling the proposed requests. It would be substantial for the users to be presented a template or general guideline example of how to address these changes.

In conclusion, the Purdue Institutional Review Board has been given a set of tools that can aid them in their continual improvement of their service. These tools are based around the core concepts and principles of user experience design and service design. The personas were developed to engage empathy between the Purdue IRB and their users (Principal Investigators), as well as a way for the IRB to identify their motivations, needs and end goals. The journey map is a step-by-step outline of the path the user takes in interacting with the IRB and their service. It addresses gaps and discrepancies between the two subjects, as well as gauges the user's emotional state and impact throughout the journey. Finally, the recommendations are based off the data findings and analysis that went into the design and development of the previously mentioned tools. Finally, Team Affinity would like to thank Nancy Hathaway, Dr. Hartman and Dr. Vorvoreanu of Purdue University for their assistance and support throughout the semester.

VI. DISCUSSION

This project led to many discoveries of how the variety of Principal Investigators go about their research process and how they interact with the Purdue Institutional Review Board. The current research has set a foundation that would be easily built upon. Many different approaches can be taken to aid the Purdue IRB in providing a constant improvement and insight on their service.

An effective method to identify the severity of this "unproductive, wasted" time that Principal Investigators are referring to would be to quantify the monetary loss of time and work. With the amount of time wasted using the current interface, CoeusLite, what is the monetary amount that Purdue is losing when this time could be used for more productive measures? Would it be plausible to evaluate the money lost per half hour spent using CoeusLite? (With an average of 50% of time claiming to be "wasted" from survey results). Considering the amount of time "wasted" using Coeus is a subjective matter, would it make sense taking the time to research this?

The Purdue IRB has been given the tools to make improvements in their service and uncover necessary gaps in their interaction with their users. After making these improvements, it would be in the IRB's best interest to run an evaluation to identify user satisfaction level.

PROJECT LEGACY:

At this point, the Purdue IRB now has the tools to make subjective changes to their service, and redesign with the Principal Investigator (user) in mind. With a set of applicable tools and a refined list of recommendations with rationale, the IRB can make the changes they see fit to improve their user/customer experience.

In the near future, it would be ideal for a new group of Purdue University students to re-iterate the data collection and analysis that was done throughout this semester to evaluate progress and improvement with the IRB. Are the user's satisfaction levels increasing? Are there new, unforeseen frustrations and concerns joining the table? Did the past frustrations and reasonings for dissatisfaction get addressed with these new changes?

These are all relevant questions that are important for the Purdue IRB to address in the coming semesters. Unfortunately, due to a timeframe there was not an opportunity to address these refinements before the semester's end, so it is hopeful that the IRB can recruit a team to evaluate the progress.

VII. ANNOTATED BIBLIOGRAPHY

Taylor, H. A., Currie, P., Kass, N. E., Aylor, H.O.A.T., Urrie, P.E.C., & Ass, N.A.E.K. (2008). A Study to Evaluate the Effect of Investigator Attendance on the Efficiency of IRB Review, *1*(1), 1–5

2. "...given that inefficiency is frequently cited as a cause for criticism of the IRB process, it is appropriate to examine interventions potentially relevant to efficiency in and of itself."

2. "All of the IRBs are constituted to review any protocol submitted, include an average of eight members each, and are assigned protocols to review on a random basis."

2. "JHMI has no standard policy regarding PI attendance at IRB meetings; rather, an IRB's policy regarding the presence of the PI at reviews is at the discretion of the individual IRB chair."

2. "This sampling methodology allowed for two types of comparisons: a historical comparison within one IRB, and a cross-sectional comparison between two IRB's that invite PIs to meetings versus two that do not."

3. "There were three primary outcome measures related to efficiency of review: time to approval, volume of correspondence, and number of convened IRB reviews before approval."

3. "For the complete sample of 125 protocol, the mean time from date of submission to date of approval was 75 calendar days (median = 64 days). On average there were 5.6 pieces of correspondence (both letters and e-mail messages) between the IRB and PI per protocol. The average protocol was reviewed at 1.8 IRB meetings prior to approval."

3. "...average time from submission to approval was considerably longer when the PI did not attend (mean = 114 days) than when the PI did attend (mean = 70 days; p = 0.012)."

4. "...institutions throughout the country are spending millions of dollars to enhance their human subjects protection programs. It would be important to know if these funds could be spent more wisely without compromising the quality of research reviews."

Sauro, J., & Lewis, J. R. (2012). Quantifying the User Experience (Vol. 11). Jeff Sauro and James R. Lewis. https://doi.org/http://dx.doi.org/10.1016/B978-0-12-384968-7.00002-3

9. "User research is the systematic study of the goals, needs, and capabilities of users so as to specify design, construction, or improvement of tools to benefit how users work and live. "

9. "...defined usability as the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use."

11. "The most important thing in user research, whether the data are qualitative or quantitative, is that the sample of users you measure represents the population about which you intend to make statements."

12. "It is possible to define criteria for partial task success, but we prefer the simpler binary measure because it lends itself better for statistical analysis."

13. "The usual method for measuring the frequency of occurrence of a problem is to divide the number of occurrences within participants by the number of participants."

15. "For numerical analysis, the classic five-choice Likert response options can be converted into numbers from 1 to 5."

16. "...comments, and most open-ended data can be turned into categories, quantified and subjected to statistical analysis"

187. "The primary measures of standardized questionnaire quality are reliability (consistency of measurement) and validity (measurement of the intended attribute). "

188. "A neutral point allows respondents who honestly have no definite attitude with regard to the content of the item to indicate this. An even number of steps forces respondents to express a positive or negative attitude (although they always have the choice to refuse to respond to the item)."

188. "...Likert-type agreement item, respondents indicate the extent to which they agree or disagree with a statement such as '*I thought the system was easy to use'*."

216. "Post-study questionnaires are important instruments in the usability practitioner's toolbox, but they assess satisfaction at a relatively high level. This can be a strength when comparing

general satisfaction with competitors or different versions of a product, but it is a weakness when seeking more detailed diagnoses of problem areas in a user interface."

220. "Albert and Dixon (2003) described the use of ERs [Expectation Ratings] in usability testing. Basically, ERs address the relationship between how easy or difficult a participant found a task to be after performing it relative to how they perceived it before beginning the task."

Edgar, Harold, and David J. Rothman. "The Institutional Review Board and Beyond: Future Challenges to the Ethics of Human Experimentation." ***The Milbank Quarterly*** **73.4 (1995): 489-505. Web.**

489. “IRBs have transformed the conduct of research projects involving human subjects. Unquestionably, their very existence has tempered the inevitable propensity of researchers to pursue investigations without dispassionately weighing the risks they are asking others to assume or fully informing their subjects of them.”

490. “The IRB’s central charges are, first, to review whether the benefits of the proposed research outweigh the risks, and to make certain that the investigators have explained all the relevant issues so as to secure the subject’s informed consent.”

492. “The key decision makers on the IRB are colleagues who must live with any disappointed applicants whose protocols they have rejected. Furthermore, most IRB committee members are themselves researchers and the standards they set for others will come back to bite them too.”

492. “An IRB decision to disapprove research may not legally be overturned by the institution… An IRB can effectively terminate a researcher’s career at a particular institution by rejecting his protocols or by insisting on such close supervision that it becomes impossible for him to carry out investigations.”

493. “Despite the amount of time that IRBs devote to examining the language of the consent form, they are not required to investigate whether the consent language they hammer out either is actually used on the floor or serves to educate the patient about the nature of the research he or she has consented to.”

498. “The designers of the IRB system expected that the subjects themselves were likely to be suspicious about human experimentation, adopting a cautious, self-protective stand against involvement.”

498. “Money for research has become very scarce, and researchers have no confidence that there will always be another grant if this one is delayed.”

499. “The IRB presumption that a well-crafted consent form was a meaningful protection has weakened: subjects may well be simply too eager to obtain what they see as the most advanced and potentially therapeutic intervention”

Münch, M. (2016). Service Design - Design is Not Just for Products. ***The Interaction Design Foundation.*** **Retrieved from https://www.interaction-design.org/literature/article/service-design-design-is-not-just-for-products**

- "It examines all activities, infrastructure, communication, people and materials components involved in the service to improve both quality of service and interactions between the provider of the service and its customers."
- "The Service Designer can visualise, express and choreograph what other people can't see, envisage solutions that do not yet exist."
- "Service Design provides a systematic and creative approach to meeting customers' rising expectations of choice and quality."
- "Service Design is a **human-centered approach** that focuses on **customer experience** and the quality of service encounter as the key value for success."
- "Service Design is a holistic approach, which considers in an integrated way strategic, system, process and touchpoint design decisions. "
- "Service Design is a systematic and iterative process that integrates **user-oriented**, **team-based,** interdisciplinary approaches and methods, in ever-learning cycles."
- "Design tools are used to create the blueprint of the service and the nature and characteristics of the interactions that fall within it."
- "These tools include (but are not limited to) development of service scenarios and use cases."
- "Blueprints can be any useful form of diagram which elicits the services' scope. Storyboards are often the preferred tool but there is no requirement for this and designers should choose the tool which suits them and the project best."
- "The tools for analysis can involve social studies, ethnographic studies, anthropology, etc. these areas offer an incredible number of tools and care should be taken to select the right tool for the service design project."

Farrell, S. (2017). UX Research Cheat Sheet. ***Nielsen/Norman Group.*** **Retrieved from https://www.nngroup.com/articles/ux-research-cheat-sheet/**

- "Do user research at whatever stage you're in right now. The earlier the research, the more impact the findings will have on your product, and by definition, the earliest you can do something on your current project (absent a time machine) is today."
- "Good things to do during discovery: Conduct field studies and interview users: Go where users are, watch, ask and listen. Observe people in context interacting with the system or solving the problems you're trying to provide solutions for. "
- "The discovery stage is when you try to illuminate what you don't know and better understand what people need. It's especially important to do discovery activities before making a new product or feature, so you can find out whether it makes sense to do the project at all."
- "An important goal at this stage is to validate and discard assumptions, and then bring the data and insights to the team."
- "Exploration methods are for understanding the problem space and design scope and addressing user needs appropriately. Use research to build user personas and write user stories."
- "Obtain feedback on early-stage task flows by walking through designs with stakeholders and subject-matter experts."
- "**Involve stakeholders.** Don't just ask for opinions; get people onboard and contributing, even in small ways. Share your findings, invite them to observe and take notes during research sessions."
- "**Determine UX metrics.** Find ways to measure how well the system is working for its users."
- "**Include diverse users.** People can be very different culturally and physically. They also have a range of abilities and language skills. Personas are not enough to prevent serious problems, so be sure your testing includes as wide a variety of people as you can."
- "Discovery stage...An important goal at this stage is to validate and discard assumptions, and then bring the data and insights to the team."

Nielsen, L. (2013). Personas - User Focused Design. Human-Computer Interaction Series. **https://doi.org/10.1007/978-1-4471-4084-9**

2. "The descriptions of personas are used by designers, developers, project participants, and others to get ideas for design of products, IT systems, and services. The descriptions help project participants to identify with users and think of these instead of themselves. And they provide all participants in a project with the same understanding of who the users are."

9. "...in many IT projects, the programmers and graphic designers will not have access to knowledge about the users. This is something that the persona method attempts to rectify, and the condition is that personas and scenarios must be part of all steps in the project work, from feasibility studies to project development and design onto marketing."

10. "*Collection of data.* In the first step, you collect as much knowledge about the users as possible. Data can come from many different sources, even from pre-existing knowledge in the organisation."

10. "*You describe the personas.* The purpose of working with personas is to be able to create solutions based on the needs of the users. The means is to prepare persona descriptions that express enough understanding and empathy for the readers to understand the users."

11. "...*prepare scenarios*...personas have no value in themselves. Not until the moment where a persona is part of a scenario -- the story about how the persona uses a future product -- does it have real value."

25. "Collecting data is taking a small slice of the world in order to create an understanding of the entire world. Fundamentally, there are two approaches to dealing with data: the positivism approach that understands the world as objective and quantifiable -- in this case, quantitative methods are used -- and the interpretive approach that understands the world to be populated by people who individually have subjective interests."

Kaplan, K. (2016). When and How to Create Customer Journey Maps. Retrieved from https://www.nngroup.com/articles/customer-journey-mapping/

- "A customer journey map is a visualization of the process that a person goes through in order to accomplish a goal. It's used for understanding and addressing customer **needs and pain points**."
- "Journey mapping creates a holistic view of customer experience, and it's this process of bringing together and visualizing disparate data points that can engage otherwise disinterested stakeholders from across groups and spur collaborative conversation and change."
- "Assign ownership of key touchpoints to internal departments."
- "...help teams focus in on specific personas or customers, whether that means understanding differences or similarities across the journeys of multiple personas, prioritizing a high-value persona..."
- "If you are aware through analytics or other quantitative data that something specific is happening...journey mapping can help you find out why."
- "As a guideline, when creating a basic journey map, use one point of view per map in order to provide a strong, clear narrative."
- "...a journey map's narrative is what the user is doing, thinking, and feeling during the journey. These data points should be based on qualitative research"
- "The entire point of the journey-mapping process is to uncover gaps in the user experience (which are particularly common in omnichannel journeys), and then take action to optimize the experience."
- "...assign ownership for different parts of the journey map, so that it's clear who's in charge of what aspect of the customer journey."
- "While quantitative data can help support or validate (or aid in convincing stakeholders who may view qualitative data as 'fuzzy'), quantitative data alone cannot build a story."
- "...invite stakeholders from various groups to be a part of compiling the data and building the map."
- "...two journey maps could look completely different, yet both be perfectly suitable for the context in which they were designed."

Degelia, C. (2016). Service Blueprints - Communicating the Design of Services. Retrieved from https://www.interaction-design.org/literature/article/service-blueprints-communicating-the-design-of-services

- "A service blueprint is, in essence, an extension of a customer journey map. A customer journey map specifies all the interactions that a customer will have with an organization throughout their customer lifecycle - the service blueprint goes a bit deeper and looks at all the interactions both physical and digital that support those customer interactions and add a little more detail to the mix."
- "By understanding the original service in detail - it's possible to identify and eliminate or ameliorate pain points."
- "There are many services which have become so ingrained in corporate culture that they are no longer understood by anyone. Blueprints can reveal silos and areas of opacity in existing processes."
- "When there are many actors (customers, suppliers, consultants, employees, teams, etc.) it can be very useful to have a blueprint to help manage the complexity of a situation."
- "It can be useful to show the time taken at any step of the process. Knowing the time can help you understand whether the service is efficient and meeting **customer expectations.**"
- "...give some thought to the emotions that a customer is dealing with at the point of interaction."
- "Not all services deal with distressed customers but those that do should give some thought to the emotions that a customer is dealing with at the point of interaction."
- "Service blueprints are a great way of fully understanding the process related to a service. They enable you to map all the interactions related with delivering a service and to determine quality and time KPIs for those interactions."
- "In a world where the line between product and service is becoming increasingly blurred it only makes sense for a UX designer to learn how to deliver and use service blueprints in their work."

Cooper, Alan. "Ch. 3. Modeling Users: Personas and Goals." About Face: The Essentials of Interaction Design. 2014. 61-99.

62. "...personas are *composite archetypes* based on *behavior patterns* uncovered during the course of our research, which we formalize for the purpose of informing the product design."

62. "The best way to successfully accommodate a variety of users is to design for specific types of individuals with specific needs."

64 "...prioritize these individuals so that the needs of the most important users are met without compromising our ability to meet the needs of secondary users."

64. "**Communicate** with stakeholders, developers, and other designers. Personas provide a common language for discussing design decisions and also help keep the design centered on users at every step in the process."

65. "Self-referential design occurs when designers or developers project their own goals, motivations, skills, and mental models onto a product's design."

66. "One of the reasons personas are so successful as user models is that they are personifications: They engage the *empathy* of the design and development around the user's goals. Empathy is critical for the designers, who will be making their decisions about design frameworks and details based on the persona's cognitive *and* emotional dimensions, as typified by the persona's goals."

67. "...personas must be context-specific: They should focus on the behaviors and goals related to the specific domain of a particular product."

68. "Personas do not seek to establish an average user, they express *exemplary* or definitive behaviors within these identified ranges."

68. "It is critical that personas capture these motivations in the form of *goals*. The goals we enumerate for our personas are shorthand for motivation that not only point to specific usage patterns but also provide a reason why those behaviors exist."

70. "...focusing on user roles rather than on more complex behavior patterns can oversimplify important distinctions and similarities between users."

71. “The main difference between market segments and design personas is that the former are based on demographics, distribution channels, and purchasing behavior, whereas the latter are based on usage behavior and goals.“

72. “If personas provide the context for sets of observed behaviors, goals are the drivers behind those behaviors.”

76. “Experience goals express how someone wants to feel, while using a product, or the quality of his or her interaction with the product.”

77. “End goals represent the user’s motivation for performing the *tasks* associated with using a specific product.”

77. “Life goals represent the user’s personal aspirations that typically go beyond the context of the product being designed. These goals represent deep drives and motivations that help explain *why* the user is trying to accomplish the end goals he seeks to accomplish.”

78. “...understanding personas is more about understanding motivations and goals than it is about understanding specific tasks, or demographics.”

83. “Once you’ve grouped your interviewees by role, list the distinct aspects of observed behavior for each role as a set of behavior variables. Demographic variables such as age or geographic location may sometimes seem to affect behavior.”

84. “A set of subjects who cluster in six to eight different variables will likely represent a significant behavior pattern that will form the basis of a persona.”

87. “Each persona should vary from all the others in at least one significant behavior.”

88. “A primary persona will not be satisfied by a design targeted at any other persona in the set. However, if the primary persona is the target, all other personas will not, at least, be dissatisfied.”

89. “A *secondary persona* is mostly satisfied with the primary persona’s interface. However, it has specific additional needs that can be accommodated without upsetting the product’s ability to serve the primary persona.”

Kalbach, J. (2016). Mapping experiences: a guide to creating value through journeys, blueprints & diagrams.

- "...typical organization schemes are chronological, hierarchical, spatial, or a network. The choice of organizational scheme has an impact on the layout of your diagram. Some methods prescribe the layout *a priori*. Mental model diagrams, for instance are organized hierarchically into towers. Or, a formal service blueprint will have a table-like form by default."
- "...not all aspects of an experience are sequential. Some events are ongoing, some may have a variable order, and others may have different subflows."
- "The majority of information to describe experiences is qualitative - rich descriptions of the *why* and the *how,* rather than quantitative data about *how many*."
- "Decide what aspects to show to describe the experience. Core elements include actions, thoughts, and feelings. Consider ways to make the description as rich as possible. For instance, include direct quotes from customers from research."
- "Show touchpoints. Include interfaces between the individual and service for each phase. Think about their context of use. Remember, a touchpoint takes place within a given set of circumstances. Be sure that the information in the map surrounding the list of interfaces provides the context for those touchpoints."
- "Including quantitative content - information that reflects an amount or magnitude, usually represented by numbers - adds validity to your diagram."
- "Bars typically show relative quantities. Absolute values can be included in text, but it's not common to have an axis with values as with a bar chart. Vertical bars are easier to compare than horizontal bars in most diagram forms..."
- "USE SIZE TO INDICATE QUANTITY: It's also possible to show quantity with the size of a shape...Working with size to show quantity may have an impact on your overall layout, particularly if the differences between the sizes is great."
- "*Simplify.* Avoid frivolous and decorative graphics. Strive for efficiency in display. *Amplify.* Keep the goals of project and expectations of the sponsors in mind. The design should intensify the overall message. *Clarify.* Strive to be as clear as possible. *Unify.* The information should form a cohesive whole. Maintain consistency in the display of information for a well-rounded appearance."

- "Show relationships with lines. Lines are a principal means of showing visual alignment. They have four primary functions in alignment diagrams: dividing, containing, connecting, and showing paths."
- "Color is more than just decoration. It helps create a sense of priority and facilitates overall understanding. Two key uses of color in alignment diagrams are color coding facets of information and showing background regions..."
- "Use color to create *backgrounds* within the diagram. This avoids unnecessary use of lines. For instance, the phases of a journey may each have a different color to distinguish them. You can accomplish dividing and containing by using values of a single color, rather than introducing new colors."
- "In general, it's difficult to represent emotions. However, facial expressions can be successfully shown with an icon, as a type of emoticon."
- "Not all information in a diagram is of equal importance. Create a visual hierarchy to direct how the eye perceives the experience you're mapping."
- "Create visual depth by layering information. Make some elements stand out more than others. You can achieve layering by using different sized texts, through the use of color, or by applying background shading."
- "AVOID CHARTJUNK: "Chartjunk" is a term coined by information design guru Edward Tufte. This refers to anything unnecessary in an information display. Don't assume you are enhancing information with added graphics and lines. Make every mark count."

Dam, R. F., & Siang, T. Y. (n.d.). Affinity Diagrams – Learn How to Cluster and Bundle Ideas and Facts. Retrieved April 25, 2017, from https://www.interaction-design.org/literature/article/affinity-diagrams-learn-how-to-cluster-and-bundle-ideas-and-facts

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- "The Affinity Diagram is a method which can help you gather large amounts of data and organise them into groups or themes based on their relationships. The affinity process is great for grouping data gathered during research or ideas generated during Brainstorms."
- "Affinity Diagrams can help you bundle and cluster large bodies of information, facts, ethnographic research, ideas from brainstorms, user opinions, user needs, insights, design issues, etc."
- "The term **saturate** relates to the method in which everyone covers or saturates the **space** with images and notes, in order to create a wall of information, to inform, and start **grouping** the following problem-defining process."
- "You the draw connections between these individual elements to join the dots and develop new and deeper insights. They will help define the problems and develop potential ideas for solutions. In other words, you go from analysis to synthesis."
- "This method will help you name, rank and understand relations between groups of information."
- "Name the clusters to help you create an information structure and discover themes."
- "Sometimes it makes sense to create connections with other clusters using lines or other devices between individual bits of data or clusters of data."
- "Take the next post-it and ask, 'Is this similar to the first one or is it different?' Then, you will place it in the first group or into its own group."
- "Seeing the data coming to life and moving data on post-its around on the wall helps the design team to immerse themselves in not only their own findings from field work and research, but sharing and communicating the findings with other team members in order to get a broader scope of the problem space being investigated."

APPENDIX I: BACKGROUND RESEARCH

Institutional Review Boards (IRB) are committees developed to provide approval and monitoring for research involving human subjects. Many large institutions contain an internal IRB department, including public universities such as Purdue University. The IRB approval process includes many steps, beginning with Principal Investigator (PI) submission. Most research currently published on IRB processes have been focused on review board meetings and the effect of automation. While these are pressing matters that should be addressed, many PI proposals are rejected at initial submission to intake evaluation. With the proposed outcome being a user journey map in the perspective of a Principal Investigator at initial submission, research has been tailored to service design, or "customer relations building".

To begin identifying possible ways to improve a service, it is certain that a foundation of knowledge revolving around how that service works is in place. This could range from business ethics to how day-to-day processes run throughout. With a scope built around Principal Investigators as an end-user, with the IRB itself as a stakeholder (along with the Principal Investigator), it is important to know how the two interact, specifically outside of electronic forms of communication (i.e. phone, email and video).

According to Taylor, Currie and Kass (2008), there are three primary outcome measures related to the efficiency of review (in regards to a full board review): time to approval, volume of correspondence, and number of IRB reviews before proposal approval. Institutional Review Board's have been known to invite Principal Investigators to their full board reviews. Taylor, Currie and Kass's research shows that the average time from submission to approval was considerably larger when the PI did not attend the review. This information acts as evidence to the idea that transparency between the Institutional Review Board and its Principal Investigators plays a vital role in the efficiency of the approval process. While this evidence supports a strong standpoint regarding full review, many submissions are set for exempt or expedited review. To create optimization and efficiency in the submission process, there needs to be a transparent

layer in place. A user journey map can create the transparency between stakeholders and end users, who in this case are Principal Investigators submitting for review.

Certain foundations of research must be set in place before the drafting process of a user journey map can actually begin. There must be an understanding of how to quantify the actions and satisfaction level of the specified user to help visualize a storytelling element. Along with quantifying the user's journey, there must be a strong understanding in the process of designing an overall service for a user (or in a more specific case, a customer). In the case of a customer's experiences with a specific business, customer relations and the psychology behind service needs to be understood.

Münich, M (2016) defines service design as a human-centered approach that focuses on customer experience and the quality of service encounter as the key value of success. Building an experience around a user's journey can be a complex situation that involves many different steps and metrics, some of which can be difficult to define at the beginning stages. Susan Farrell of the Nielsen/Norman Group (2017) recommends beginning with some of these UX methods during the discovery phase and early process: field study/user interview, stakeholder interview and requirements gathering.

Through these early phases, interviews and surveying were key methods in gathering insights on what exactly the problem at hand is. One metric that is necessary to investigate very early in the discovery process is satisfaction ratings. When surveying users, it is essential to understand their perceived attitude toward what problem you have defined. One method of gathering satisfaction metrics is the Likert response scale. A Likert scale works on a one to five point scale, ranging from highly dissatisfied (one) to highly satisfied (five) with a neutral option in the middle (three). A neutral point allows respondents who honestly have no definitive attitude with regard to the problem to indicate their choice. An even number of steps forces respondents to express a positive or negative attitude response (although there is always the choice to not respond at all). (Sauro, Lewis 2012)

With the quantitative data and qualitative data that is gathered during the early methods, one can move into the next design phase, which is "explore". During this stage you attempt to explore what you don't quite know yet. Using discovery activities, you can make sense of the

depth and need for the project you are about to tackle. (Farrell, 2017) This phase includes persona building, which is one of the main aspects of a user/customer journey map. A persona helps project participants and stakeholders identify users and think of these "personas" rather than themselves. They are created as a mechanism to develop empathy for the users. (Nielsen, 2013)

To begin creating a persona, one must collect the necessary data. With aforementioned data collection techniques and other methods, one can begin to compile and build this data into a primary user (of whatever system it is you are refining/creating). Personas can be prioritized by primary, secondary and supplemental types. Your primary persona is one whom's needs can positively affect all personas when met. A key aspect to personas are their descriptions and scenarios. Up until the scenario is created, the persona itself serves no real value. The scenario can be defined as the story about how the persona uses the product/service you are refining/creating. (Nielsen, 2013)

The purpose of crafting a use case scenario for your persona is to identify the pain points and touch points in their journey. These pain points become the main guideline for a user/customer journey map. Once the pain points have been identified, it is necessary to assign ownership of the key touch points to specific stakeholders according to Kaplan of the Nielsen Norman Group (Kaplan, 2016).

Alan Cooper outlines the essential design decisions to be made when crafting a persona. (Cooper, 2014) He states that in order to communicate effectively with stakeholders and end users, there must be a common language provided that will keep the design focused on users throughout every step in the process. One of the key purposes of the persona is to engage empathy around the end users. In the specific scenario between Institutional Review Boards and their Principal Investigators, the analysts need to empathize with the Principal Investigator's **end goal** to have their research approved, so they can continue forward.

End goals represent the user's motivations for performing the tasks associated with using a specific product or service. (Cooper, 2014) Adding end goals to a persona helps stakeholders understand the personas motivations and building a better understanding of the end user rather than just demographic or quantitative information. Along with end goals are life goals, which

represent the user's personal aspirations. These are deeper set goals that explain why exactly the user is trying to accomplish their perceived task in the first place. A prime example of this in relation to a Principal Investigator would be to have their research published. Whereas an end goal may be to have their submission approved within two weeks. End goals relate specifically in context to the service/product being used, while a life goal is more deeper to the user's motivations.

As mentioned previously in this report, data collection during through surveys and interviews can gather quantitative and qualitative data that show things are happening with users. Creating a user journey map can help identify why that "thing" is happening. Similar to that of the persona, it is a guideline to use one point of view (which would ideally be your primary persona) to provide a strong and concise narrative to your journey map. (Kaplan, 2016).

It is important that those utilizing the journey map can digest the information being presented, along with the narrative it is trying to tell. This makes the overall design process and organization of the journey map crucial to its success. According to Kalbach, typical organization schemes are either chronological, hierarchical, spatial or a network. The choice of organizational scheme makes a crucial impact on the layout of the journey map. (Kaplan, 2016) Identifying touch points will drive the sequential narrative of the diagram. Although, no all aspects of a user journey are sequential. There can be ongoing, and variable orders. This leads to the creation of subflows and using qualitative descriptions to show why the user is taking this journey rather than another, and so forth.

Some key aspects to identify when drafting the design of the diagram include: sizing, spacing, color, and visual elements. First, let's discuss why sizing and spacing is important, and how it can drive the overall interpretation of the diagram/map. The more simple the overall design, the more efficiency can be driven in the display. It allows for amplification of the goals and expectations the end user has (in this situation, the journey map would follow the narrative of the primary persona). Kaplan explains using size to indicate quantity is impactful and great for displaying differences in data. (Kaplan, 2016)

Color is essential to help prioritize elements in a design, and communicate what needs to be understood in a concept. Using color to create backgrounds within a diagram can place

emphasis on desired information. Using background shading, you can create visual depth for layering information. Kaplan recommends using colors to distinguish different phases in the journey map, and dividing information by using values/shades of one single color rather than introducing more colors.

The reason to stray away from including multiple colors and elements in a journey diagram, is to eliminate what Edward Tufte has coined as “chartjunk”. Chartjunk can be defined as anything unnecessary in an information display. When using visual elements and keeping Tufte’s term in mind, it is valid to say graphics can *hurt* a design diagram. They can mislead those interpreting the diagram to focus on the graphics themselves, rather than the narrative they are trying to elaborate.

Showing quantitative data on a journey map will help its validity among stakeholders. According to Degelia, showing the duration of time taken at each step, or touch point, and relating it to the end user’s perceived time can help stakeholders understanding if the service is efficient and meeting customer expectations. (Degelia, 2016). As previously stated in this report, one quantitative measure that needs to be gathered for a user journey map is satisfaction level of end users. This can then translate into a general emotion gauge throughout the journey at specific points. Gathering end user’s emotions at specific touch points will help drive the journey, and using the measurement of satisfaction to validate those emotions throughout can help those interpreting the diagram gain perspective.

Overall, user/customer journey maps can be very complex, informative and design oriented diagrams to be used as tools to better a product or service. The quantitative and qualitative data that is gathered during the research and analysis phases of the design should drive the overall concept and layout for the journey map. Choosing what elements to use, what layout to present, and what touch points to convey should be decided based solely on what the end goals of the chosen primary persona correlate with. With these tactics in mind, a beneficial and distinguishable journey map can be created. In relation to the Institutional Review Board its accompanying Principal Investigators, a journey map can be used to engage empathy in the analysts and help them better understand the PI’s end goals and motivations. Along with the

understanding of their goals, it can create a visual representation of quantitative information to validate the end user's behaviors and motivations throughout the entirety of the process.

APPENDIX II: PRIMARY PERSONA

The Purdue IRB has NEVER had the philosophy of how can we get this protocol approved in a timely manner, while protecting human subjects.

SATISFACTION LEVEL

Highly Dissatisfied — Neutral — Highly Satisfied

REASONINGS

Inconsistent, extremely slow, unqualified staffing, wasteful

EXPECTATIONS OF IRB

Comparable to other similar institution's IRBs.

Qualified staff

FRUSTRATIONS

Has worked with other, more efficient IRBs (Accredited IRBs).

The protocol is returned to be approved only after addressing conditions

SITUATION OVERVIEW

After a few weeks of patient waiting, Mark has received an email from the IRB department regarding revisions to his documentation.

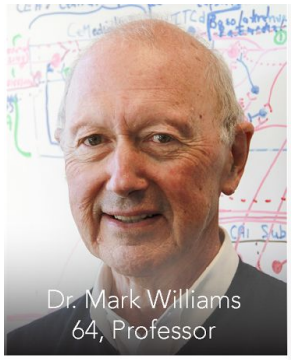
There is unclear request to gather consent from department heads at the collaborating institutes.

TYPICAL SITUATION

Dr. Mark Williams is preparing his protocol materials for submission regarding his newest study for undergraduate students handling chemicals in the classroom. He is working in collaboration with the Department of Chemistry at the University of Iowa. As well as collecting data from undergraduate human subjects. He has prepared the necessary documentation outlining the specifics of the study. He has submitted the documents via Coeus Lite for a Category 1 exempt study within the classroom.

After a few weeks of patient waiting, Dr. Williams has received an email from the IRB department regarding revisions to his documentation. There is unclear request to gather consent from department heads at the collaborating institutes. Along with that, he doesnt see any consent form amendments regarding working with hazardous materials, although it is specified they need to be included.

At this point, Dr. Williams is completely frustrated, and unsure when to start revising his current documentation, which is already overwhelming large. With that, he now needs to contacts his peers collaborating in the study to gather consent.



GOALS

To successfully and efficiently conduct research

To mentor graduate students to perform meaningful and ethical research

UNDERSTANDING OF IRB APPROVAL SEQUENCE

1) Submit protocol

2) Analysts reviews protocol

a) If problems exist, analyst returns to the Principal Investigator with comments or requests.

b) Principal Investigator resubmits as needed.

c) If the protocol is clear, consistent with policies, and demonstrates that any risks are outweighed by benefits to society and/or subjects, then protocol is recommended for approval.

3) Appointed chair lightly reviews protocol and analysts comments and then approves.

4) Expedited approvals normally expire after 1 year

NEEDS

The protocol needs to be approved within two weeks.

YEARS AT PURDUE

15+

YEARS OF IRB EXPERIENCE

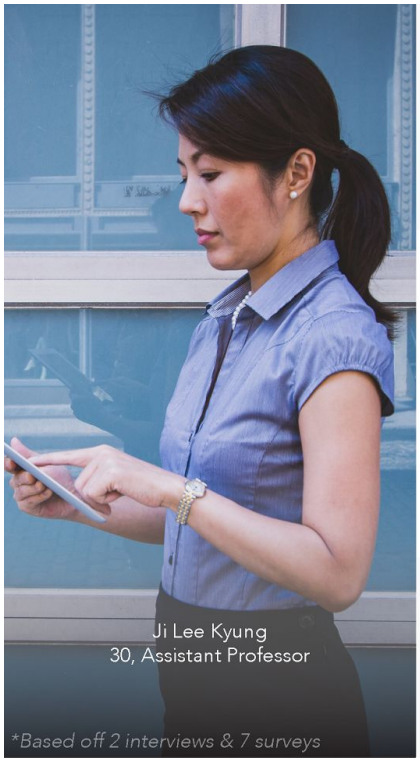
25+

Has worked with multiple IRB institutions in collaborative research

Worked with an accredited IRB in previous institution

Has partnered with graduate students working with the IRB for their first time

APPENDIX II: SECONDARY PERSONAS



I wish there was more transparency between PI's and the IRB. I would be more empathetic if I knew where the process stands.

SATISFACTION LEVEL

Highly Dissatisfied — Neutral — Highly Satisfied

REASONINGS

Optimistic for improvement and is seeing change, although lacks transparency

EXPECTATIONS OF IRB

More communication & transparency

Continual improvement among IRB staff

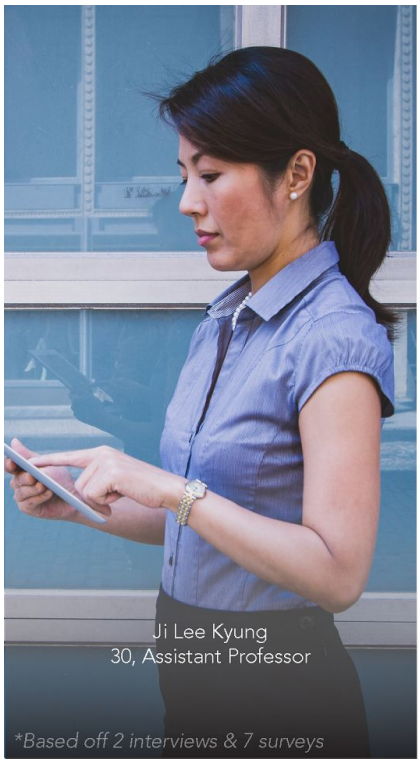
FRUSTRATIONS

I am consistently requested to revise consent forms and change nitpicky wording and language

SITUATION OVERVIEW

She has a gut feeling that she will not be getting a response in a timely manner that can satisfy her funding sponsor.

If only there was a way to estimate the timeframe for her study to be approved, so she could inform her funding sponsor and compromise.



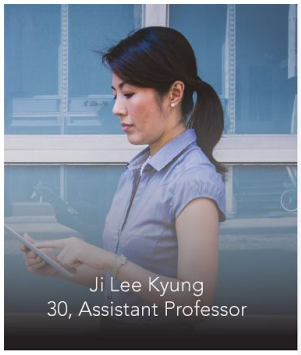
TYPICAL SITUATION

Ji Lee is in her office working on her desktop computer during her break in between teaching classes. She checks her inbox to find an email from her research sponsor regarding funding. They are setting a time frame for her to have her research study approved within the next 17 days, or they will pull her funding and begin to search for researchers at another institution.

After reading this, she becomes very nervous, as she has not heard back from the IRB in the past week since submitting her proposal. In her previous experiences, she has not received a response in less than two weeks. With that, she typically has to revise some of her materials, and include amendments.

She has a gut feeling that she will not be getting a response in a timely manner that can satisfy her funding sponsor. If only there was a way to estimate the timeframe for her study to be approved, so she could inform her funding sponsor and compromise. She is very invested in this study, as she has already spent numerous hours preparing the proposal materials. She would not want to lose the opportunity to perform this research due to a time constraint.

Typical Approval Type: Exempt



Ji Lee Kyung
30, Assistant Professor

GOALS

To further her career in academia, and achieve tenure status

To gather meaningful and insightful findings from her research to publish and present

UNDERSTANDING OF IRB APPROVAL SEQUENCE

I submit a protocol and wait approximately two weeks for a response which usually includes a revision request.

From this point, I take the necessary steps to make the specified revisions, and resubmit for approval. Sometimes it is something simple, other times it is not.

If I am confused or needing clarification, I go to open office hours at the IRB department.

Once resubmitted, the analysts review it and let me know if it has been approved, and I move forward with the study.

ESTIMATED TIME PREPARING SUBMISSION

~ 10 HOURS

Well Used: ~5 hours
Wasted: ~5 hours

NEEDS

Provided examples & guidance for expedited approval.

YEARS AT PURDUE

4

YEARS OF IRB EXPERIENCE

~7

Has seen an improvement in the IRB's overall processes since her starting at Purdue

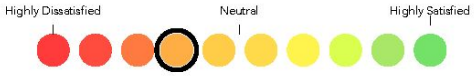
Has found inconsistency in what the IRB request for revisions

Stephanie Robinson
23, Graduate Student

*Based off 1 interview & 6 surveys

"*Submit and then wait forever*"

SATISFACTION LEVEL



REASONINGS

User Interface is not helpful, and it takes too long to hear back from the IRB after submitting the protocol

EXPECTATIONS OF IRB

Get approval in a timely manner

Useful feedback, clear guidelines

FRUSTRATIONS

I feel that the IRB has no urgency to review my protocol and give feedback

SITUATION OVERVIEW

She is super stressed about finishing up her thesis and she wishes to get her protocol approved so that she can get her study underway.

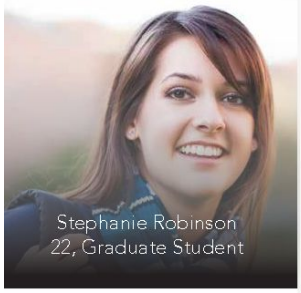
She has been waiting forever to get her protocol approved, she wishes that it was more clear what the IRB was looking for in each section of the form, that way she knew she would get approval on the first submission.

TYPICAL SITUATION

Stephanie Robinson is just finishing up meeting with her graduate advisor. They are discussing the materials necessary for her thesis study. She has submitted her protocol to the Institutional Review Board, and got back a request for revision today. Her advisor has pointed her in the direction of some online sources to follow regarding revisions. However, she is still very confused in the language of the documents, and why the IRB needs the requested revisions.

She has found online, that the IRB holds open office hours to get help and guidance regarding submission protocols. She attends the open office hours, but finds that the information she gathers is not very resourceful. She is very overwhelmed, and feels scattered and hectic because of all she has on her plate. She is competing in the job market with her peers and fellow graduate students. She needs to have the approval for her protocol within the next month to stay on track to have her thesis completed to graduate.

Typical Approval Type: Expedited



GOALS

To complete her thesis on time

To receive her Master's degree and find a meaningful job

UNDERSTANDING OF IRB APPROVAL SEQUENCE

Write up documents

Select appropriate type of IRB request

Submit

Get back possible revisions

Resubmit

Wait for result

ESTIMATED TIME PREPARING SUBMISSION

~ 6 HOURS

Well Used: ~3 hours

Wasted: ~3 hours

NEEDS

Receiving approval within a meaningful time frame

YEARS AT PURDUE

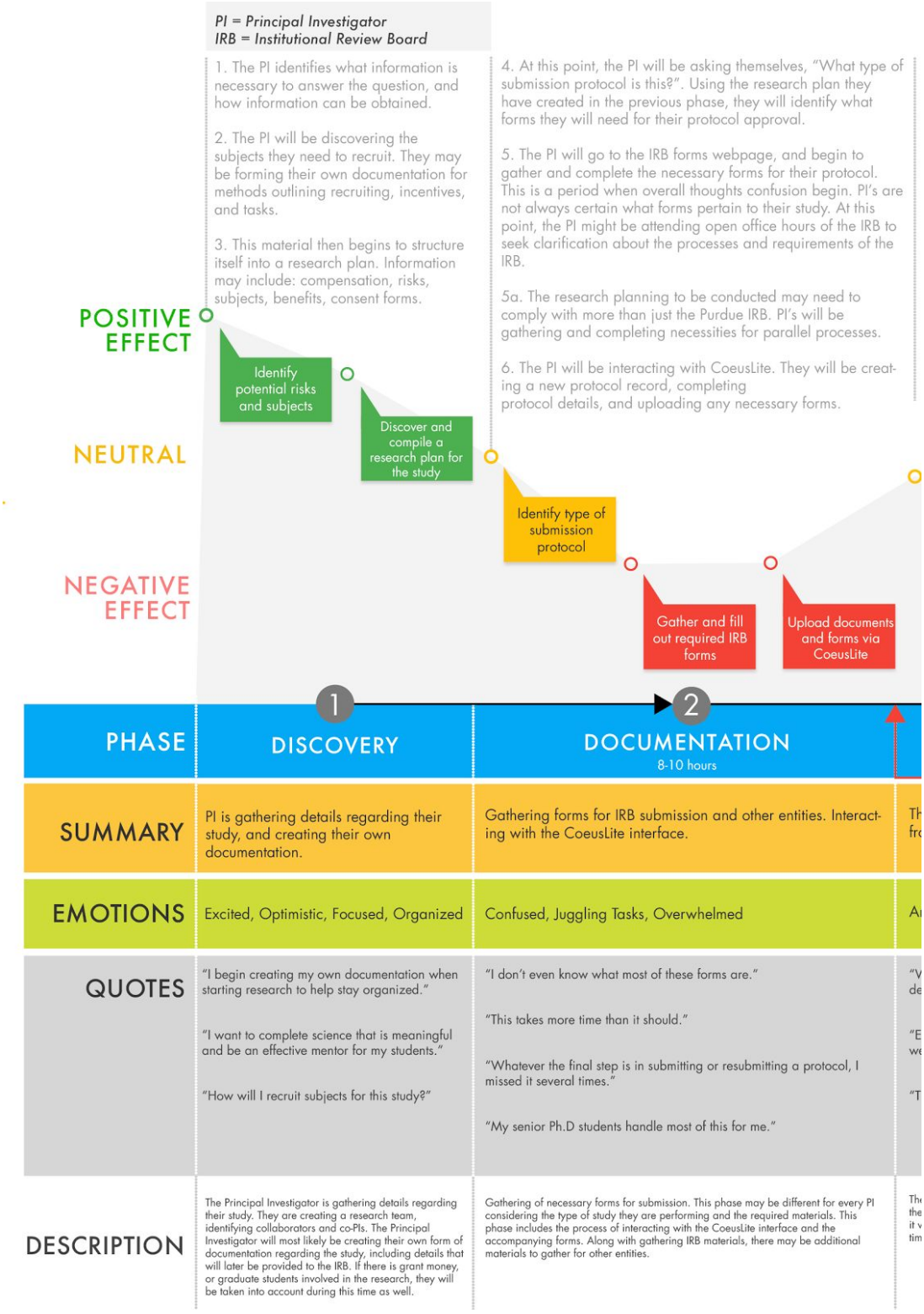
2 *(as graduate student)*

YEARS OF IRB EXPERIENCE

< 1

Is new to the IRB approval process and following their protocal and human rights protection methods

APPENDIX IV: USER JOURNEY MAP



**Common route entails revision and resubmission phases. This information is based on 39 survey results*

7. While the PI is waiting to hear back on their approval, they may be going back through their research plan and identifying ways for optimization and efficiency.

8. While waiting to hear back, the PI tends to feel impatient and unnoticed. This is the point in their journey when they may reach out to the IRB staff for a status update.

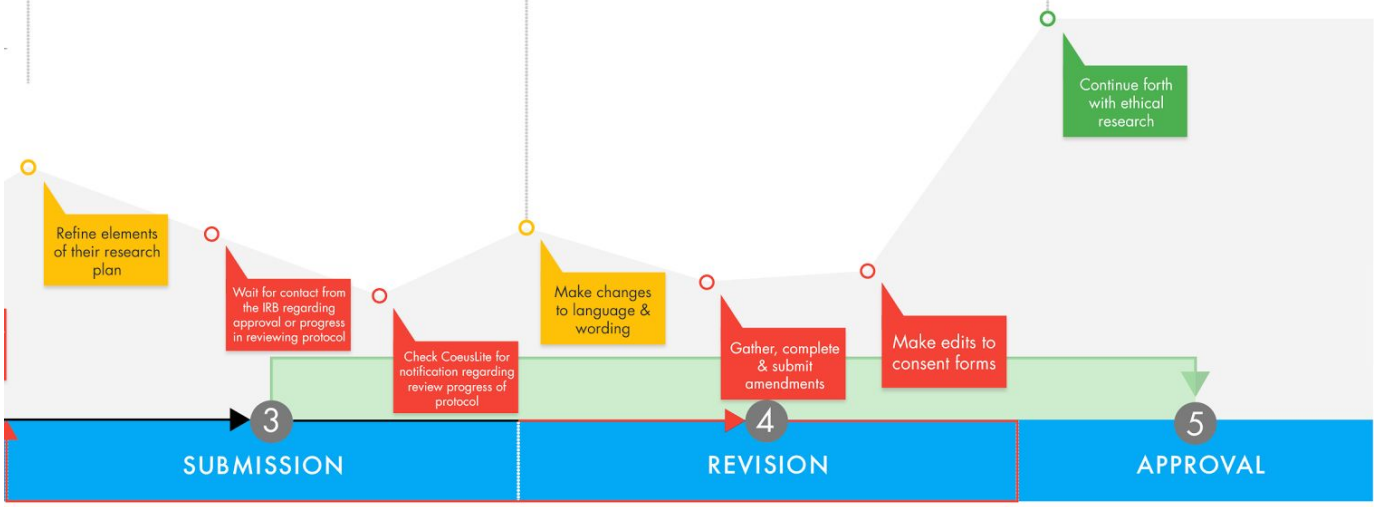
9. The PI will be checking CoeusLite, and finding their protocol is listed as "Routing in Progress".

10. During this phase, the PI might be attending open office hours at the IRB. They may also be reaching out to the IRB staff via phone call or email.

*There is possibility to avoid this step completely if the protocol is approved on first review.

*There is possibility for several revisions, and the PI will encounter this phase more than once. For each iteration, the touch points and overall emotions for the PI become more and more negative.

11. At this point, the PI has been notified by the IRB with an approval. This approval allows for the recruitments of subjects as specified in the protocol, and that the PI can move forward conducting their research according to their research plan.



SUBMISSION	REVISION	APPROVAL
The PI has submitted their protocol and is awaiting a response from the IRB.	The PI has received a request to revise their protocol. They will make the specified revisions and prep for resubmission.	Protocol has been approved, and research is continued and executed.
Anxious, Nervous, Impatient	Frustrated, Angry, Overwhelmed, Helpless	Satisfied, Relieved, Refocused
"Wasted time costs delays in funding, delay in work being done, and delay in student graduation." "Everyone is busy, I'd like to know that they are backlogged three weeks so I can keep refining my materials." "The online system is horrible."	"I don't know the difference between consent and assent." "They are asking for things that reveal that they don't understand the risk level of the research." "It would be helpful to have amendments be reviewed based on their level of risk, not the overall risk of the study."	"IRB has improved its practices and, as a result, processing is now quicker than in the past."
The Principal Investigator has submitted their protocol through CoeusLite. Currently, they are waiting to hear back from the IRB regarding the status of their protocol, and if it will be approved or not. There is a large amount of waiting at this point, and the timeframe can be anywhere from two weeks to a month.	The Principal Investigator has received a response from the IRB indicating revisions to their protocol. This could result in minor changes to language, or making clarifications regarding the study for example. **There is possibility to completely skip this pass if the protocol is approved with no request for revisions.*	At this point, the protocol has been approved by the IRB, and the Principal Investigator (and research team) can continue forward with their research.

PI = Principal Investigator
IRB = Institutional Review Board

**Common route entails revision and resubmission phases. This information is based on 39 survey results*

1. The PI identifies what information is necessary to answer the question, and how information can be obtained.

2. The PI will be discovering the subjects they need to recruit. They may be forming their own documentation for methods outlining recruiting, incentives, and tasks.

3. This material then begins to structure itself into a research plan. Information may include: compensation, risks, subjects, benefits, consent forms.

4. At this point, the PI will be asking themselves, "What type of submission protocol is this?". Using the research plan they have created in the previous phase, they will identify what forms they will need for their protocol approval.

5. The PI will go to the IRB forms webpage, and begin to gather and complete the necessary forms for their protocol. This is a period when overall thoughts confusion begin. PI's are not always certain what forms pertain to their study. At this point, the PI might be attending open office hours of the IRB to seek clarification about the processes and requirements of the IRB.

5a. The research planning to be conducted may need to comply with more than just the Purdue IRB. PI's will be gathering and completing necessities for parallel processes.

6. The PI will be interacting with CoeusLite. They will be creating a new protocol record, completing protocol details, and uploading any necessary forms.

7. While the PI is waiting to hear back on their approval, they may be going back through their research plan and identifying ways for optimization and efficiency.

8. While waiting to hear back, the PI tends to feel impatient and unnoticed. This is the point in their journey when they may reach out to the IRB staff for a status update.

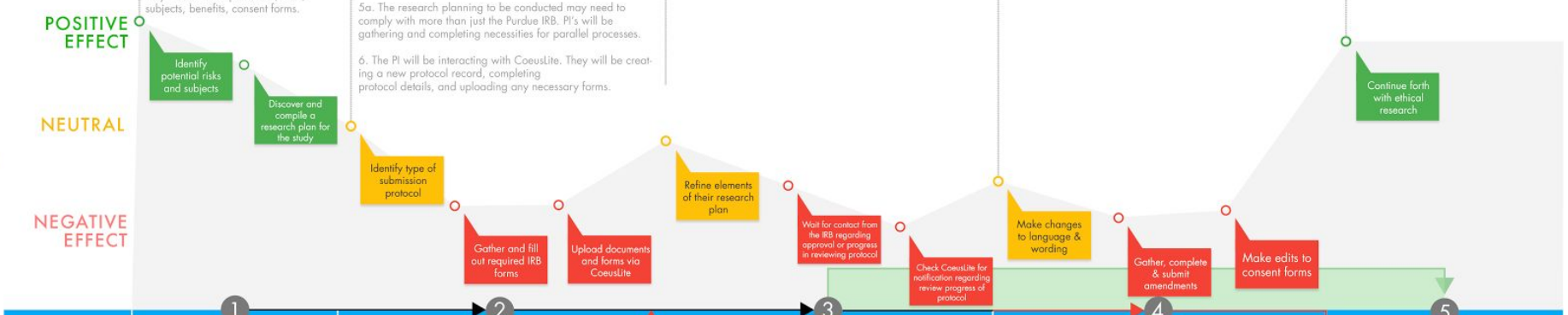
9. The PI will be checking CoeusLite, and finding their protocol is listed as "Routing in Progress".

10. During this phase, the PI might be attending open office hours at the IRB. They may also be reaching out to the IRB staff via phone call or email.

*There is possibility to avoid this step completely if the protocol is approved on first review.

*There is possibility for several revisions, and the PI will encounter this phase more than once. For each iteration, the touch points and overall emotions for the PI become more and more negative.

11. At this point, the PI has been notified by the IRB with an approval. This approval allows for the recruitments of subjects as specified in the protocol, and that the PI can move forward conducting their research according to their research plan.



PHASE	DISCOVERY	DOCUMENTATION 8-10 hours	SUBMISSION	REVISION	APPROVAL
SUMMARY	PI is gathering details regarding their study, and creating their own documentation.	Gathering forms for IRB submission and other entities. Interacting with the CoeusLite interface.	The PI has submitted their protocol and is awaiting a response from the IRB.	The PI has received a request to revise their protocol. They will make the specified revisions and prep for resubmission.	Protocol has been approved, and research is continued and executed.
EMOTIONS	Excited, Optimistic, Focused, Organized	Confused, Juggling Tasks, Overwhelmed	Anxious, Nervous, Impatient	Frustrated, Angry, Overwhelmed, Helpless	Satisfied, Relieved, Refocused
QUOTES	"I begin creating my own documentation when starting research to help stay organized." "I want to complete science that is meaningful and be an effective mentor for my students." "How will I recruit subjects for this study?"	"I don't even know what most of these forms are." "This takes more time than it should." "Whatever the final step is in submitting or resubmitting a protocol, I missed it several times." "My senior Ph.D students handle most of this for me."	"Wasted time costs delays in funding, delay in work being done, and delay in student graduation." "Everyone is busy, I'd like to know that they are backlogged three weeks so I can keep refining my materials." "The online system is horrible."	"I don't know the difference between consent and assent." "They are asking for things that reveal that they don't understand the risk level of the research." "It would be helpful to have amendments be reviewed based on their level of risk, not the overall risk of the study."	"IRB has improved its practices and, as a result, processing is now quicker than in the past."
DESCRIPTION	The Principal Investigator is gathering details regarding their study. They are creating a research team, identifying collaborators and co-PIs. The Principal Investigator will most likely be creating their own form of documentation regarding the study, including details that will later be provided to the IRB. If there is grant money, or graduate students involved in the research, they will be taken into account during this time as well.	Gathering of necessary forms for submission. This phase may be different for every PI considering the type of study they are performing and the required materials. This phase includes the process of interacting with the CoeusLite interface and the accompanying forms. Along with gathering IRB materials, there may be additional materials to gather for other entities.	The Principal Investigator has submitted their protocol through CoeusLite. Currently, they are waiting to hear back from the IRB regarding the status of their protocol, and if it will be approved or not. There is a large amount of waiting at this point, and the timeframe can be anywhere from two weeks to a month.	The Principal Investigator has received a response from the IRB indicating revisions to their protocol. This could result in minor changes to language, or making clarifications regarding the study for example. **There is possibility to completely skip this pass if the protocol is approved with no request for revisions.*	At this point, the protocol has been approved by the IRB, and the Principal Investigator (and research team) can continue forward with their research.