



WPI

Leveraging Product Analytics to Streamline Application Flows and Triple User Retention for Perr, a File-sharing Application

Major Qualifying Project

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Abstract

This Major Qualifying Project focuses on enhancing user engagement and retention for Perr, a specialized file-sharing application. By employing a cyclical framework that refines the onboarding process, highlights Perr's unique selling proposition, and integrates continuous user feedback, the project aims to improve the application's usability and functionality. The effectiveness of these strategies is evaluated through user studies and analytics, leading to an increase in user retention rates. Insights from this project demonstrate the critical role of targeted user experience enhancements in fostering application engagement and sustainability.

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Chapter 1. Introduction

A file-sharing application is a software application designed for smartphones that allows users to easily transfer and share different types of files such as photos, videos, documents, and more. The files can usually be shared with other users or within the user's own devices. These applications may use wireless technologies like Wi-Fi, Bluetooth, or mobile data to enable sharing between smartphones. Users can send files directly to one another without the need for physical connections like cables or external hardware. Thus, phone-transfer file-sharing applications offer better accessibility and enhanced cross-device compatibility for the users. These advantages are crucial in the modern-day era, where file sharing has become a necessity, especially in the realm of business. In 2023, for example, over 5 million companies worldwide were identified as active users of file-sharing applications (6sense, 2023). Most of those were not exclusively mobile-based file sharing applications: Google Workspace and Google Drive held around 85% of the market share, and they are considered collaboration and cloud storage tools, respectively. Nevertheless, the major reason why people are using a platform like Google Drive is because they seek easier device accessibility, better compatibility, and better functionality (Statista, 2019). In other words, the primary driver behind the adoption of these platforms is precisely the attributes that phone-transfer file-sharing applications aim to provide. Hence, it is imperative to closely monitor and keep up with the developments in phone file-sharing applications.

Some current applications in the phone file-sharing application market include Dr.Fone by Wondershare and iCareFone by Tenorshare. When examining Dr.Fone by Wondershare, it stands out for its visually appealing user interface and its wide range of functionalities, such as phone-to-phone and phone-to-PC transfers, as well as iOS-to-Android compatibility (Wondershare, n.d.). However, it has the drawback of heavily relying on a USB cable connection to a computer. Even in the case of Dr.Fone's wireless transfer capability, which they offer, they still require the transfer process to be done through a computer. This can be a hassle, since it requires an extra device when a person just wants to transfer files between two phones. Another application in the market is iCareFone by Tenorshare, and it offers the advantage of easily backing up and restoring iPhones on the same or different devices (Tenorshare, n.d.). However, it is important to note that for wireless transfers it requires a connection to the same Wi-Fi network. Additionally, phone-to-PC transfers demand users to manually copy a link and type it into a computer, which can be time-consuming. Both Wondershare and Tenorshare offer useful phone-transfer file-sharing applications with their own respecting advantages and disadvantages.

In addition, some freeware, cross-platform, centralized instant messaging and voice-over-IP platforms can also deliver similar services. Some examples of these include WhatsApp and Discord. WhatsApp is primarily a messaging app that allows users to send text messages, make voice and video calls, and share multimedia content like photos and videos. Its key advantage is its widespread adoption, making it an excellent choice for personal and group communication. Discord, on the other hand, is designed for creating and managing online communities. It focuses on voice, video, and text communication within those communities and offers features like channels, roles, and integrations. In the realm of messaging applications like WhatsApp and Discord, the issue of efficient and high-volume file sharing, particularly between one's own devices, is still not sufficiently addressed. Users frequently encounter hurdles because these platforms do not inherently support seamless file sharing across users' personal devices. To deal with this problem, individuals are forced to go through inconvenient workarounds, such as creating additional accounts or separate servers. This creates unnecessary complexities just to allow a straightforward transfer of files from one personal device to another. This complex process is completely different from the streamlined and hassle-free experience that a dedicated file-sharing application, like Perr, offers to its users.

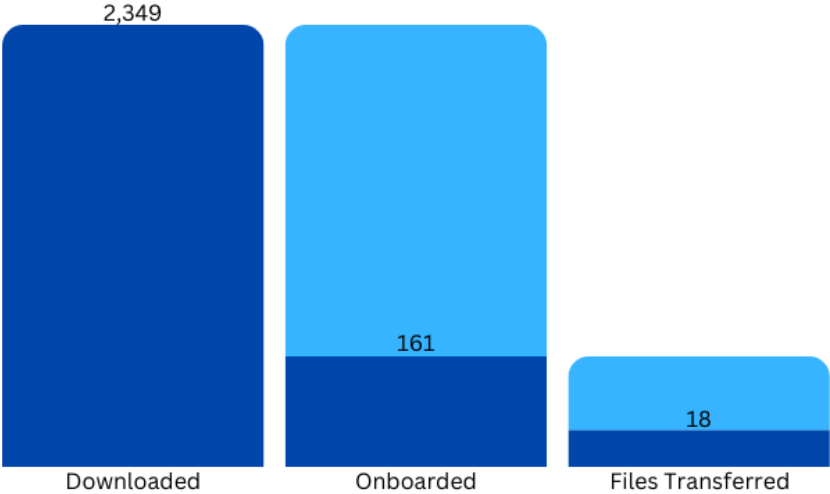
Perr is a specialized file-sharing application designed for seamless and secure file transfers across multiple devices, offering several advantages like quick and efficient transfers, instant access to shared

files, effortless sharing with unauthenticated devices, support for various file types, easy signing in for trusted devices, and multi-platform compatibility across different operating systems. Unlike applications such as Discord and WhatsApp, Perr has a distinct advantage in terms of file sharing between a user's own devices. With Perr, there is no need to create a separate server or account to transfer files from one device to another; this can be done seamlessly within the application. Moreover, Perr surpasses its counterparts in terms of file-sharing capacity, allowing uploads of up to 10GB, whereas Discord only supports up to 25MB and WhatsApp permits up to 2GB (Circelli, 2023; WhatsApp, 2022). In addition, Perr simplifies the file transfer process by eliminating the need for USB cables or a third device, a requirement in applications like Dr.Fone. Perr enables wireless file sharing, and unlike iCareFone, it doesn't require its users to be on the same wireless network or to go through the hassle of entering a long URL. On Perr, all it takes to initiate a file transfer is scanning a QR code, ensuring a quick and hassle-free experience.

The domain problem our group's project centers on lies within the context of improving user engagement and application comprehension during the onboarding process of Perr. This is demonstrated in Figure 1, where it is shown that only 6.85% of users reach the end of the application's onboarding process. The downward trend then continues, since out of the users who reached the end of onboarding, only 11.18% manage to successfully upload some files - which is an essential functionality of the application. Thus, out of 2,349 users who first opened Perr, only 18 can be considered fully onboarded.

Figure 1

Perr's Onboarding Dropoff Rate



Perr's unique selling point lies in its intense focus on its niche, deviating markedly from applications such as Discord and WhatsApp, which offer file sharing as a secondary feature to their primary messaging focus. However, the challenge arises from this same uniqueness of Perr, in that its user flow is not immediately familiar to those accustomed to those multi-purpose but familiar applications. The issue our project addresses is the significant dropoff rate of new users who, even after completing the app's onboarding process, which not everyone does, struggle to fully comprehend Perr's functionality and value proposition, leading to underutilization and withdrawal. This gap between application comprehension and functionality has proven to be detrimental to opportunities for engagement, retention, and growth, thus making it critical that the onboarding process fully informs and engages users. The significance of this problem is rather apparent with Perr, where the dropoff rates significantly supersede

the industry average. According to the mobile app analytics and engagement company, Localytics, an application can expect a dropoff rate of about 21% after users' single use due to unfamiliarity with the application's value (Localytics, 2018). In contrast, Perr had grappled with significantly greater losses in retention, fueled by a poorly executed initial design, which had extraordinarily amplified the criticality of effectively addressing its onboarding problem.

In its nascent stages, Perr was in desperate need of a revamp of its onboarding procedures and advertising strategies to address the issue of low retention rates, as their existing approach had not yielded the desired results. One of the more significant reasons was the limited insight derived from the data they had collected and analyzed. The data they used could only offer a binary evaluation of the onboarding flow's effectiveness, and simply told them if their current flows were optimal or not. While it was able to confirm the suboptimality of their flows at the time, it did not provide the specific information needed to pinpoint the aspects of the onboarding process that had to be redesigned. Essentially, the existing methods acknowledged a problem but failed in guiding the path toward a solution.

To address the above issues, we formulated and abided by a cyclical framework that (1) refined the onboarding process, (2) explicitly highlighted the unique selling proposition, and (3) integrated user feedback to enhance user experience on Perr. The first item is an enriched onboarding process that will avoid bombardment of information all at once. It instead followed a 'learn-as-you-go' concept where users could understand different features through interactive tutorials. In-app messaging and guided steps were implemented to assist the users throughout this learning process, while gamification elements helped to make the learning more engaging and fun. We believe this gradual education method enhanced overall user comprehension of the application, while additionally improving the quantity and volume of improved usage. Second item was the emphasis on the uniqueness of Perr. We believe that communication plays a key role in user engagement. Thus, the benefits of using Perr across multiple devices will be explicitly communicated to the users. Informative walkthrough videos and in-app messages were built to leverage and emphasize the unique selling proposition of Perr - its optimum use for file transfer among a user's own devices. In retrospect, this markedly increased user's engagement by actualizing the benefits of the application and enabling users to visualize those improvements clearly. Lastly, user feedback was frequently gathered and integrated into the application to continually improve user experience. We aim to understand and address the pain points faced by the users through interviews and feedback forms. By doing so, we can ensure that our onboarding process and user interface continue to evolve to meet users' needs and preferences.

To evaluate the outcomes of our framework for Perr, we used metric evaluation, interviews, and user studies analysis. Firstly, we tracked key metrics such as number of downloads, number of users who passed onboarding, and users who successfully transferred files, and thus fully utilized the application. We compared those metrics before and after the implementation of our solutions. Any significant improvements compared to historical data stand as indicators of the effectiveness of our approach. Metric evaluation was done through Mixpanel – a data analytics platform used by Perr to provide insights into assimilation of users and their journeys through the app.

Additionally, we have actively gathered feedback through user studies, gaining insights into users' perspectives. This feedback will help us understand whether our proposed approach enhances user understanding and usability of the application. To provide a more comprehensive assessment, experiments were designed in which users engage with our approach. From there, quantitative and qualitative analyses of user performance were performed, taking factors into account such as speed, error rates, and perceived difficulty. For example, we measured the time, in seconds, it took for users to transfer a file for the quantitative element of speed. Qualitatively, we asked users, "How easy was it to transfer a file from one device to another?" Those analyses were complemented by user feedback gathered during those tests, providing valuable insights into the superior approach.

Having laid out our process for Perr's user experience enhancement, the subsequent chapters will delve into the practical aspects of its implementation. Chapter 2 will go into an in-depth analysis of existing phone-transfer and file-sharing applications, highlighting their limitations and identifying the gaps that remain unaddressed in the field. In Chapter 3, the proposed framework, introduced in Chapter 1, will be explained in detail, accompanied by diagrams illustrating its structure and an explanation of the data collection and preprocessing methods. Chapter 4 will go over data collection, describing what data and how we collected data for this project. Chapter 5 will introduce and compare the current and refined onboarding processes, illustrating why the refined process is superior. In Chapter 6, the focus will be on promoting a deeper understanding of the product to potential users by detailing Perr's unique selling proposition. Chapter 7 will cover how we integrated user studies and gave way to continuous improvement through feedback. Chapter 8 will discuss the findings to measure the performance and success of the "Perr" framework, including metrics and user studies. The results will be presented using various data visualization tools. Chapter 9 will offer insights into the lessons learned during the project, including new skills, knowledge, and tools acquired during its development. Lastly, in Chapter 10, we declare the conclusion of our project by summarizing our final findings and then looking into the future.

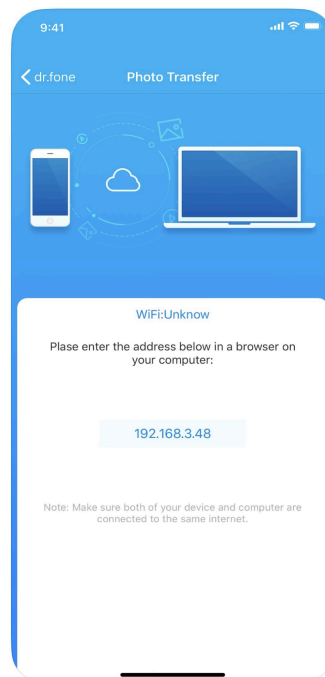
Chapter 2. Literature Review

In this chapter, we systematically examined each of the file-sharing applications introduced earlier. That involved initially presenting the fundamental features and providing a general overview of each application's functionality. Following this, we delved into the application assessment, describing the respective strengths and drawbacks of each option. The previously mentioned applications are Dr.Fone, iCareFone, WhatsApp, and Discord

Dr.Fone by Wondershare in the Apple App Store describes itself as a “toolkit for all mobile issues like data recovery, repair system, transfer data, backup and restore files, and so on.” The application does not have any onboarding and immediately places a user on the home page. From there, a user has an option to backup his contacts, WiFi transfer pictures and videos, and Transfer other types of files. After trying to WiFi transfer a photo, the app prompts you to type-in an address on the receiving PC. From there, a user is able to select photos or videos to transfer from the phone. The screen for this process can be seen in Figure 2 below. Dr.Fone distinguishes itself with an aesthetically pleasing user interface and a broad spectrum of features, encompassing phone-to-phone and phone-to-PC transfers, along with iOS-to-Android compatibility (Wondershare, n.d.). However, the application also had some notable limitations. For one, it only supported the transfer of photos and videos. Their option to transfer other types of files seemed to necessitate a purchase and potentially a wired connection, as described on their website (Wondershare, n.d.). An additional inconvenience is the requirement to manually input an address on the computer. While the process is reasonably simple, typing in information for a straightforward photo transfer can be somewhat bothersome.

Figure 2

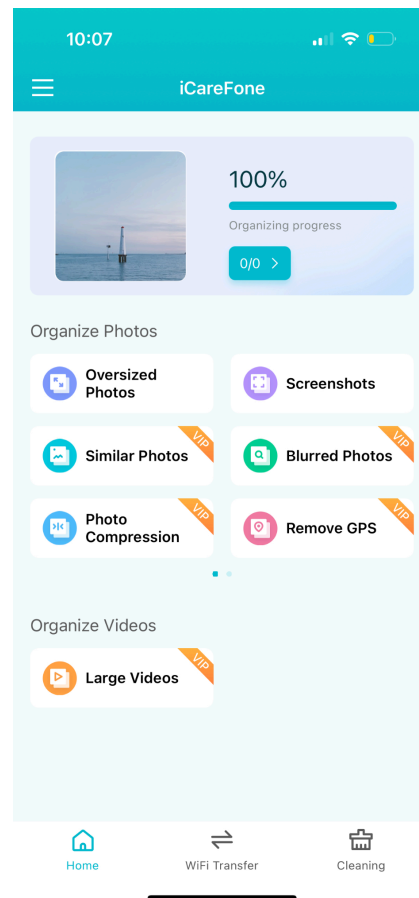
Dr.Fone Photo Sharing



iCareFone by Tenorshare is another player in the market, positioned as a photo organizing tool tailored for Apple devices according to the Apple App Store. Upon initial launch, the application did not have onboarding or guides. Notable features include the user-friendly iPhone backup and restore functions across the same or different devices (Tenorshare, n.d.). It is important to highlight that wireless transfers with iCareFone necessitate a connection to the same Wi-Fi network. Moreover, for phone-to-PC transfers, users must manually copy a link and input it into a computer, potentially adding a time-consuming step. The application appears to be more geared towards phone-to-computer transfers, with limited support for phone-to-phone transfers. A significant point of consideration is that the transfer functionality is accessible only after purchasing a subscription. Figure 3 indicates a focus on photo management rather than file transfer, with the caveat that many features are behind a paywall, which may be perceived as a drawback.

Figure 3

iCareFone Home Screen

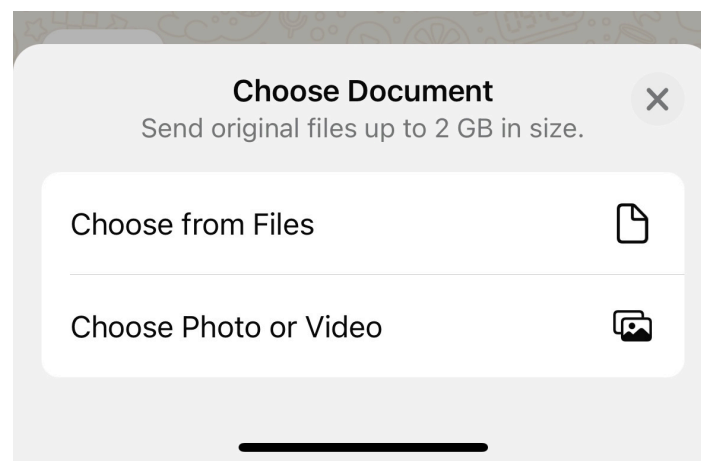


WhatsApp is another application that we looked at, even though file-sharing is not its primary functionality. WhatsApp stands out as a messaging application known for its extensive communication features. Users can engage in text conversations, make voice and video calls, and share multimedia content like photos and videos. Its widespread adoption makes it a preferred choice for both individual and group communication. However, concerning its file-sharing capabilities, WhatsApp does have some

limitations. Users can share various file types, including documents, images, videos, and audio files on WhatsApp. Nevertheless, there are constraints, such as limitations on the maximum file size for document sharing, as seen in Figure 4. It also may not seamlessly handle the transfer of very large files. The file-sharing functionality in WhatsApp is more tailored toward multimedia content and documents rather than offering a dedicated and comprehensive solution for general file sharing across personal devices. Additionally, sharing within a user's own devices becomes problematic, since a user would either need a second phone number or would need to send files to other people just for personal use. While WhatsApp excels in communication, particularly for messaging and multimedia sharing, users may find it less optimal for efficient file sharing across their devices, especially when compared to specialized file-sharing applications.

Figure 4

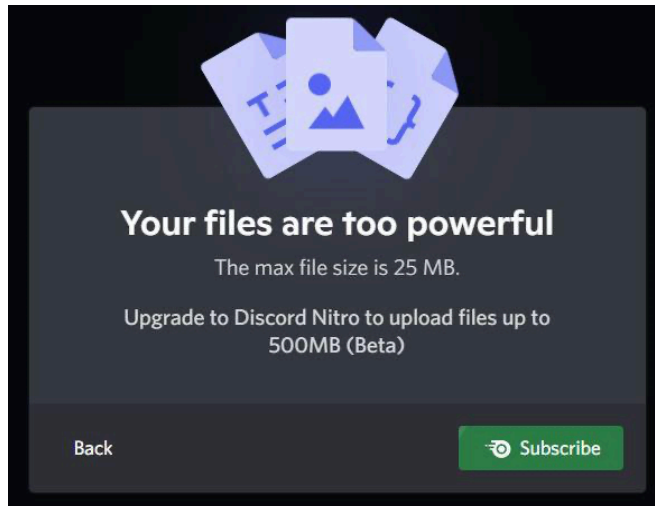
WhatsApp Sharing Limit



Discord is the last application with file-sharing functionality that we went over. Discord is designed as a versatile platform for creating and managing online communities, with a focus on voice, video, and text communication within these communities. It offers a range of features such as channels, roles, and integrations, making it a popular choice for video gamers and various interest-based communities. However, when it comes to file-sharing capabilities, Discord has its own set of features. Discord allows users to share various file types, including documents, images, videos, and audio files, within the context of its community structure. Users can upload files directly to channels or share them in private messages. While Discord is effective for communication and collaboration within communities, its file-sharing capabilities may have limitations compared to dedicated file-sharing applications. Just like with WhatsApp, it has file size limits (seen in Figure 5) and also does not support transfer between users' personal devices without bothersome workarounds. Similar to WhatsApp, Discord might not provide the streamlined and comprehensive solution for general file sharing between personal devices.

Figure 5

Discord File Size Warning

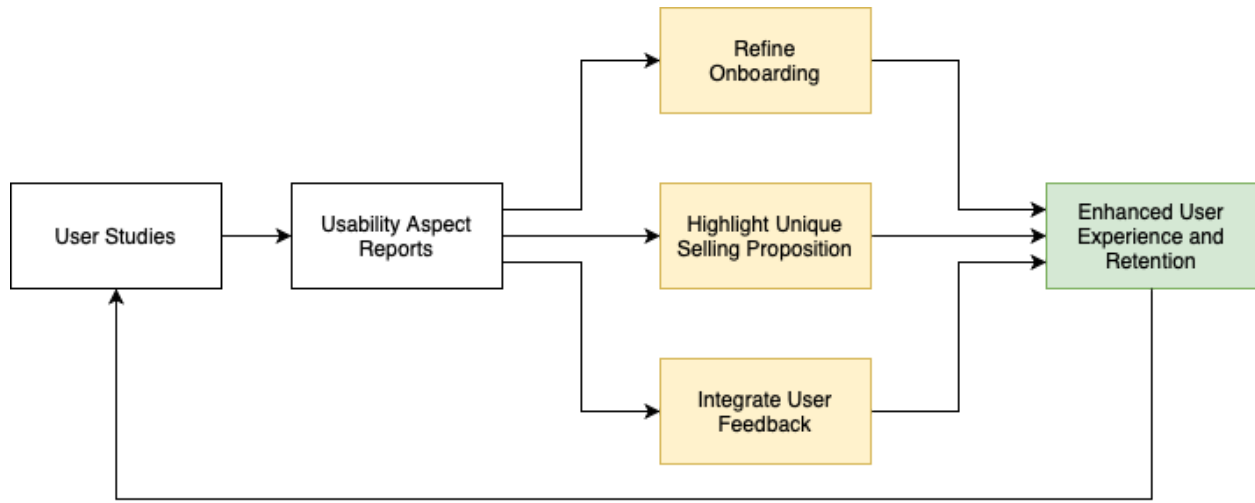


Chapter 3. Framework

In this chapter, we will describe each step in our proposed framework that can be seen in Figure 6. Our goal was to enhance user experience and retention, which is colored in green on the chart. To accomplish that, our framework (1) focused on refining the onboarding process, (2) explicitly highlighted the unique selling proposition, and (3) integrated user feedback to enhance user experience on Perr.

Figure 6

The Framework



The insights and data obtained from user studies served as the foundation for creating usability aspect reports (UARs). These reports summarize the issues identified during the user studies. The primary objective of UARs is to systematically structure our observations from the user studies, providing a streamlined approach for addressing the three key tasks within our framework.

The first such task was to refine the onboarding process. In response to the UARs, we devised a gradual "learn-as-you-go" onboarding process. The purpose of this phased onboarding approach was to mitigate initial user overwhelm, reducing confusion and enhancing information retention. During this phase, we presented our proposed modifications to Perr's onboarding process. Following the implementation of these changes, we conducted additional user studies to assess whether our recommendations had positively influenced users' understanding of the application.

The second key task we aimed to resolve from the UARs was gaining insights into effective approaches for highlighting Perr's unique selling proposition. In this phase, we created visual elements such as mockups and in-app tooltips to enhance users' comprehension of Perr's uniqueness. Similar to the gradual onboarding process, we proposed these enhancements to Perr. Following their implementation, we revisited user studies to evaluate the effectiveness of these measures in improving users' understanding of Perr's unique selling proposition.

The last task was to integrate user feedback. The user studies played a crucial role in garnering valuable suggestions for enhancing the application. Through these studies, we actively collected qualitative feedback from users, specifically focusing on their experiences with the application. This user input was valuable in uncovering potential bugs and identifying areas for improvement within the application. By leveraging the insights provided by users, we were able to pinpoint specific issues and

gather constructive suggestions, forming a foundation for refining and optimizing the application based on real-user experiences.

Collectively, these tasks aligned with the overarching objective of the project: to enhance user experience and retention. By implementing a refined onboarding process, we alleviated user overwhelm, ultimately leading to an improved user experience. The emphasis on highlighting Perr's unique selling proposition through visual enhancements aided in enhancing user comprehension and retention. Lastly, the integration of user feedback fostered a continuous improvement cycle, ensuring that Perr remains responsive to user needs and preferences. Through accomplishing these tasks, we strive to continuously enhance Perr's usability, ultimately contributing to our goal of delivering a superior user experience.

Chapter 4. Data Collection

User studies, detailed in the provided template in Appendix A, serve as interviews with users to gather feedback on the application. The objective was to collect both quantitative and qualitative insights from interviewees. Our user studies comprised two groups: long-term and short-term participants. Long-term participants provided ongoing feedback throughout the project, offering valuable insights into their reactions to application updates. This group focused on how existing users perceived the improvements. Conversely, short-term user studies assessed the performance of individuals encountering the app for the first time. In total, we had 3 rounds of user studies.

The user studies comprised three rounds throughout the duration of the project: the first with 8 long-term participants, the second with 8 short-term participants, and the third again with the initial long-term participants. This structured approach allowed us to gather feedback from users who were familiar with the app both before and after updates. Additionally, we sought insights from users experiencing the app for the first time, assessing its performance post-update compared to the initial experience of long-term participants. The demographic of the participants can be seen in Table 1.

Table 1

Participant Demography

USER STUDY PARTICIPANTS					
Identifier	Major	Year	Identifier	Major	Year
JC11700ST	Mechanical	3	CE21845ST	CS	4
LT11730ST	Environmental	4	EW11715ST	ECE	4
BK11800ST	Civil	1	AC11745LT	Civil	3
BA21715ST	Mechanical	4	NM11845LT	Mechanical	3
CW21730ST	Biochemistry	3	MH11830LT	Biochemistry	2
SD21745ST	Civil	3	ZC11815LT	Mechanical	4
JE21800ST	Aerospace	3	ER21700LT	ECE	3
JR21815ST	Aerospace	4	RS21830LT	Physics	4
JA02359ST	CS	3	CS02359ST	Biomedical	3
ST02359ST	Mechanical	4			

Note: Customer demographics were compiled for each user study participant, noting their status as undergraduate college students along with how far along they are in their academic careers and their selected majors. Participants were selected with prejudice to exclude technically-inclined majors (with exceptions to serve as an edge case) such as computer science, data science, and robotics.

Bridging the gap between the detailed analysis provided by our user studies and the broader context of application success, we place special emphasis on the selection of our study participants. The key to measuring the success of any consumer-facing application, especially when it comes to robust file transfer services such as Perr, boils down to gathering a diverse pool of participants who can be observed without previous instruction as they navigate through its functionality. To ensure diversity, and to

maximize our capability of testing the app's intuitiveness for those not versed in technology, we came to the decision that our participants were not to, for the most part, have a computationally inclined major (with the exception of those whose academic progress does not currently extend to advanced courses or application-focused development and assessment)*. To that end, the demography of our current long term testing pool extends to the following academic focuses: mechanical engineering (2), biochemistry (1), physics (1), civil engineering (1), and electrical and chemical engineering (1). Long term participants were recruited through direct communication with a mind towards reachability for future research, and short term participants will be recruited through extensive screening and multiple modes of outreach, including the use of graphics on various screens throughout the campus of Worcester Polytechnic Institute, advertisement over email, and social media propagation. Short term user studies, as well as the initial wave of long-term administration, were designed to accommodate multimodal record collection where audio data, screen recordings, and timestamp records were consolidated for each user to determine the difficulty with which our users were able to complete specific tasks within Perr. After conducting screening and administering user studies, our participants were instructed to fill out a feedback form designed to gather quantitative feedback through the use of Likert scales for statistical analysis, and qualitative feedback to be forwarded to Perr management for internal use.

Audio data, while not used directly in the analytic process, is collected with the purpose of corroborating time recordings for each step undertaken in the process of conducting user studies. This enables us to come to determinations as to why participants may experience difficulties in navigating through Perr, and whether that may stem from inefficiencies or flaws in the application framework, or alternatively resting in users' technical proficiency.

Post-study survey data allowed us to measure external factors that might have played into the ability of our users to successfully navigate the app, such as technical proficiency implied through academic background and major, as well as gauging specific elements of the offerings of Perr in terms of user interface and experience. Subjectively, we were able to extrapolate how easy user study participants found it to navigate the app and determine the degree to which onboarding needed to be altered to accommodate the variety of backgrounds we targeted in our study recruitment process. On top of that, we also took care to evaluate the collective opinion of our users on how broad Perr's utility was outside of our user studies, and how it measured up to competitors such as Google Drive, WhatsApp, Discord, AirDrop, and other file sharing solutions they had already attested to their familiarity with.

The first round of user studies involved long-term participants, totaling nine individuals. The primary aim was to identify and summarize potential issues with Perr. These interviews laid the groundwork for the creation of usability aspect reports, facilitating structured analysis and problem-solving. Subsequent rounds, namely the second and third, formed part of an ongoing feedback collection and evaluation strategy. This approach aims to continuously gather user data to drive iterative improvement efforts.

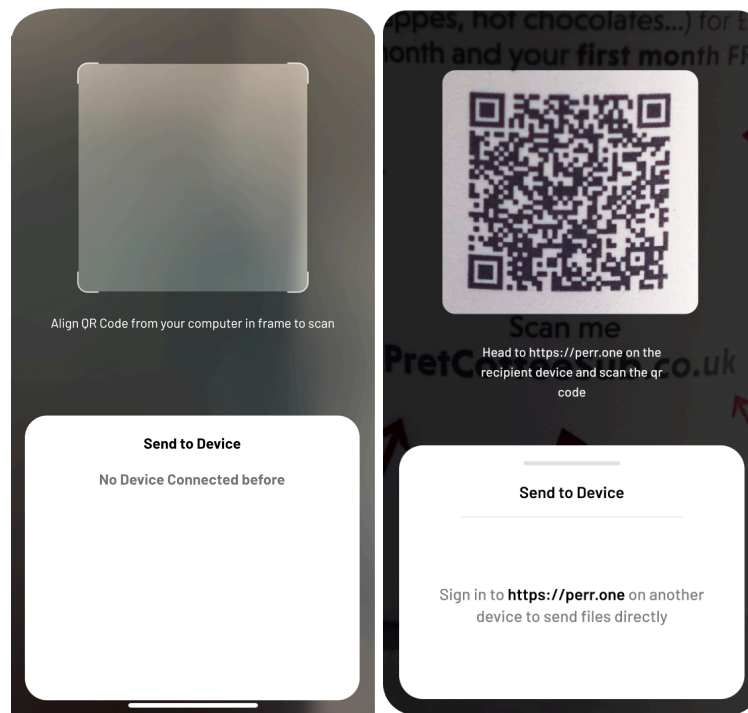
Our first round of user studies led us to discover an assortment of bugs and hiccups within Perr's interface, articulated in the Usability Aspect Reports (UARs). Usability Aspect Reports serve as a comprehensive record of issues identified through our user studies. Using the notes and feedback collected from the users, we created fifteen UARs that aim to summarize the issues in an organized manner. Each UAR is assigned a unique ID, title, and severity level ranging from Low to Medium and High. Severity indicates the perceived importance of addressing these issues, considering their potential impact on user experience and retention. In addition, each UAR delves into a detailed description of the problem, its impact on user experience and retention, and our recommendations for improvement. Collaboratively with Perr, we prioritized these UARs based on their significance to the company, severity levels, and the feasibility of implementing effective solutions. In this chapter, we will specifically focus on going over the top 5 priority UARs, shedding light on their critical aspects and proposed solutions. A

full accounting of UARs can be found under Appendix B, with the prioritized ranking at the bottom of that Appendix.

A first priority UAR touched on the problem of clarity of destination website's instructions. We found that all users were confused about where to go on their laptops or PCs, as there are no clear instructions to navigate to "https://perr.one" for receiving files. This confusion created a significant barrier to completing file transfers, leading to user frustration and potential abandonment of the app. Thus, our suggestion was to provide explicit instructions within the app before starting a transfer. This had been aimed to address confusion and enhance the overall user experience. On the left of Figure 7, one can see what Perr's QR code screen currently looks like. The screen on the right is our fix to the problem. This specific UAR can be found in Appendix B with the ID of UAR-006.

Figure 7

Explicit Instructions on the QR Code Screen



A second priority problem revolves around the unintuitive nature of the domain "perr.one," causing a lack of user recognition and poor visibility in search engine results. This hinders users from easily finding the necessary web page for completing file transfers, potentially leading to user abandonments. To address this, we recommended to secure a more intuitive domain name that explicitly indicates its status as a web address. Additionally, investing in Search Engine Optimization (SEO) strategies is advised to enhance the visibility of the "perr.one" website in search engine results. Having a simpler domain can also be helpful with the UAR-006 mentioned previously, as users might be able to intuitively find the destination website by looking it up online. We believe these recommendations would allow us to overcome the identified issue, ensuring better user recognition and improved discoverability. However, due to time constraints and lack of availability on the more popular domains, this UAR was not resolved. Nevertheless, it was determined that the fix mentioned previously, that explicitly instructs a user to go to "perr.one", should be sufficient to at least partially deal with the problem of finding the site. This UAR can be found in Appendix B with the ID of UAR-007.

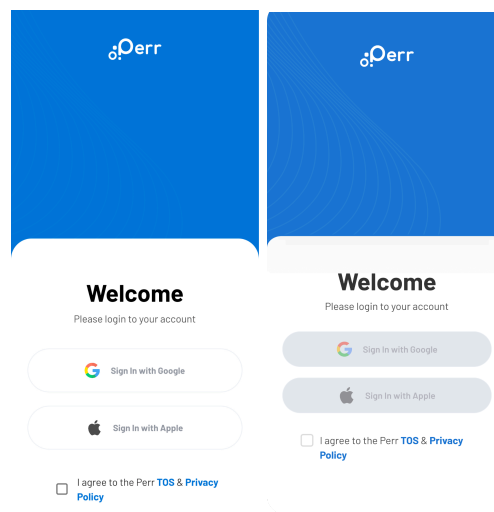
A third priority is an issue of users frequently skipping the initial onboarding screens, potentially missing crucial information about app features and usage. This behavior can result in confusion during subsequent app use, as users may lack awareness of essential functionalities. For example, users might struggle to navigate through the app effectively, hindering a seamless and intuitive experience. To address this issue, we advised to remove the initial onboarding screens altogether. Instead, essential instructions were integrated into the UI at relevant points, providing users with contextual guidance. Additionally, adopting a progressive onboarding approach, where features are introduced as needed, ensures that users receive information in a more digestible and timely manner. The UAR for this can be found in Appendix B, UAR-001.

A fourth priority is a problem of existing tooltips on Perr. Current tooltip tutorials lack details and fail to guide users properly. Users might pay less attention to tooltips, considering them generic and uninformative. This can lead to a lower understanding of the app's functionality, diminishing the overall user experience. Our suggestion was to personalize the tooltip greeting based on user information or simplifying it to a generic "Hello" if user names are unknown. This can make the tooltips more engaging. Additionally, we improved the content and design of tooltips, enhancing their informativeness, ensuring users grasp the app's features more effectively. This is UAR-003, which can be found in Appendix B.

A fifth priority UAR is users not noticing the requirement to read and accept the Terms of Service (TOS) and Privacy Policy during the registration process. The inconspicuous presentation of TOS and Privacy Policy checkbox acts as a barrier to app adoption. As seen on the left screen of Figure 8, it might be hard to understand that one has to check a box before being able to proceed. As a result, users may experience frustration and dropout rates during sign-up, potentially leading to a negative first impression. To fix this problem, we suggested relocating the TOS and Privacy Policy checkbox to a more prominent position, like above the sign-in options. Additionally, incorporating highlighting or pop-ups to draw attention to the acceptance requirement while more obviously graying out sign-in options (as seen on the right screen of Figure 8) until TOS and Privacy Policy acceptance significantly enhanced user awareness and compliance. The UAR for this can be found in Appendix B, UAR-002.

Figure 8

Perr's TOS and Privacy Policy Location

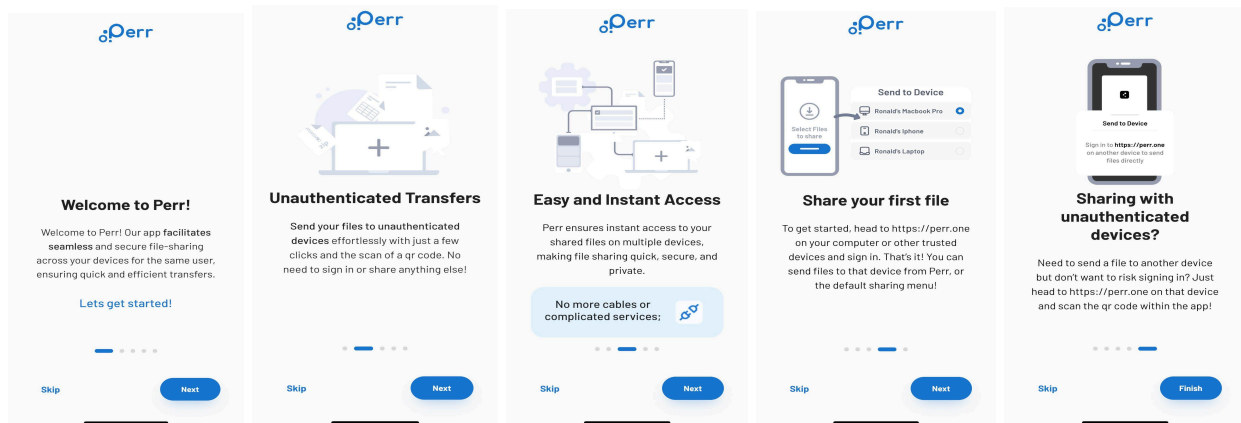


Chapter 5. Refined Onboarding Process

The previous onboarding process, in which we provided the user with essential information to allow them to navigate the Perr application with greater ease, has been shown through user analytics to be deeply flawed and hosts significant pitfalls in the delivery of information. Several principles of psychology and human-computer interaction dictate that the succinctness of information presented and the format in which that information is shown have a strong influence on the ability for users to retain that information.

Figure 9

Perr Onboarding - Iteration 0



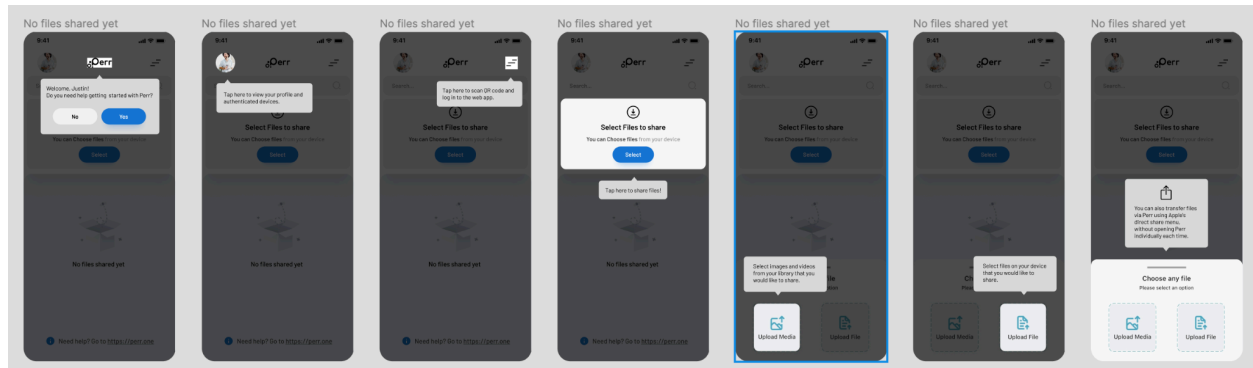
Note: First iteration of the onboarding process for Perr’s mobile application, in chronological order of presentation.

The onboarding screens shown in Figure 9 were displayed only upon first downloading Perr onto one’s mobile device, and outlined both the purpose of the application and potential use cases along with selling points. Of course, it can be argued and agreed that all five of these screens presented critical information for the user to be able to undertake tasks and intents within the application. Our analytic data, on the other hand, suggests that the vast majority of users opt to skip through these screens rather than absorbing said information, even in the absence of a skip button where they decide to click the “Next” button in rapid succession with the intention of reaching the main screen of the app. For mobile and web applications without a significant degree of complexity or depth, this does not pose a problem. However, Perr’s initial state at the start of our research period hosted neither simplicity nor intuition from the get-go.

We came to the conclusion that Perr’s onboarding process needed to be significantly improved. The layer of improvement we suggested is based on the notion that increased level of interactivity improves overall cognitive information processing (Xu et. al, 2016). In summary, if a user perceives onboarding steps as intrinsic to the main application, they will likely be more receptive to the information being presented. To that end, we implemented a progressive onboarding process, which enabled through the use of tooltips and other prompt indicators to find use in more of Perr’s features.

Figure 10

Progressive Onboarding



Note: Current iteration of onboarding process for Perr's mobile application, in chronological order of presentation.

As shown in Figure 10, the onboarding screens were removed in favor of tooltips that will allow for greater brevity in the presentation of information as the user needs it, rather than forcing users to click through screens they have been conditioned to believe do not require thoughtful review. This is bolstered by user study results, wherein we found almost all of our respondents decided to either skim or outright neglect to read the information presented in the initial screens. That modification was additionally applied to permission prompting, where users were instead prompted for permissions as they make use of features that require them, rather than being prompted for all permissions necessary upon installing the application.

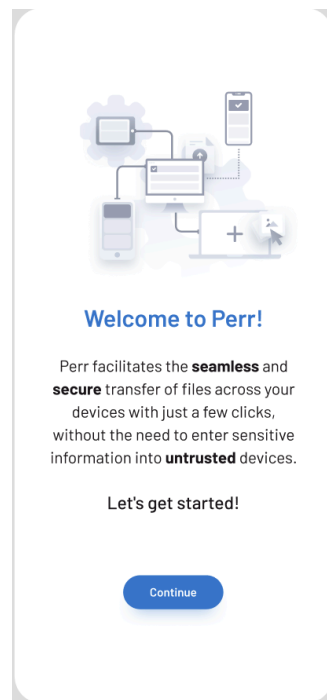
Chapter 6. Unique Selling Proposition

In seeking to reinforce product comprehension among Perr users, we focused on distinguishing the unique attributes that set Perr apart from its market competitors. Our initiative centered around crafting an engaging and informative single onboarding screen, designed to serve as a captivating 'hook' for the user.

The challenge with any application lies not only in its structural build but equally in its presentation. As primary researchers on user engagement, we acknowledge that modern-day users are overwhelmed with many screens competing for their attention. By limiting the onboarding process to a solitary, impactful slide, we mitigated the risk of overwhelming them, while simultaneously ensuring the unique selling proposition (USP) of Perr was effectively spotlighted. The modified slide can be seen in Figure 11.

Figure 11

Unique Selling Proposition Onboarding Screen



The isolated onboarding screen uses a strategic blend of graphics and text, carefully designed to capture the essence of Perr's effortless file-sharing capabilities across personal devices. This message emphasizes the prime benefits of the application—efficiency, convenience, and flexibility—appealing to users seeking a frictionless file transfer experience.

Furthermore, to supplement this focused onboarding screen, we designed a sequence of interactive tutorials. However, these tutorials are not just directions; they are a hands-on familiarization process, prompting users to delve deeper into the special functionalities of Perr. Through this sort of learning journey, users experience the literal 'feel' of the application, further consolidating their comprehension of its unique selling points. The interactive tutorials were carefully designed to mimic real usage scenarios, leading to potential 'aha!' moments as users realize the benefits in their routine tasks. For

example, the tutorial might guide users through transferring a large file, not transferable by WhatsApp, from their phone to their laptop—a simple task that emphasized the convenience and speed of Perr over conventional methods.

Transcending mere functional understanding, we singled out Perr's USP with an embedded philosophy—unsurpassed ease and speed should be the norm for personal file transfer, not a luxury. We demystified the advanced technology underpinning Perr, translating it into accessible, everyday solutions that speak to the heart of our users' needs.

In line with this, our framework sense-checked every design element to ensure that it communicated the USP with unwavering clarity—a seamless interface that echoes the 'it just works' principle. The clean, minimalist design was judiciously punctuated with tooltips and pop-ups that illuminate Perr's capabilities without intimidating new adopters.

The culmination of these collective strategies has promised a paradigm shift in user experience on Perr, establishing it as not just another app but a pivotal utility in the digital lexicon of our users. Our conviction lies in the simple truth that a product well-understood is a product well-used, and Perr, through this redefined onboarding and promotion process, has become the byword for personal file sharing.

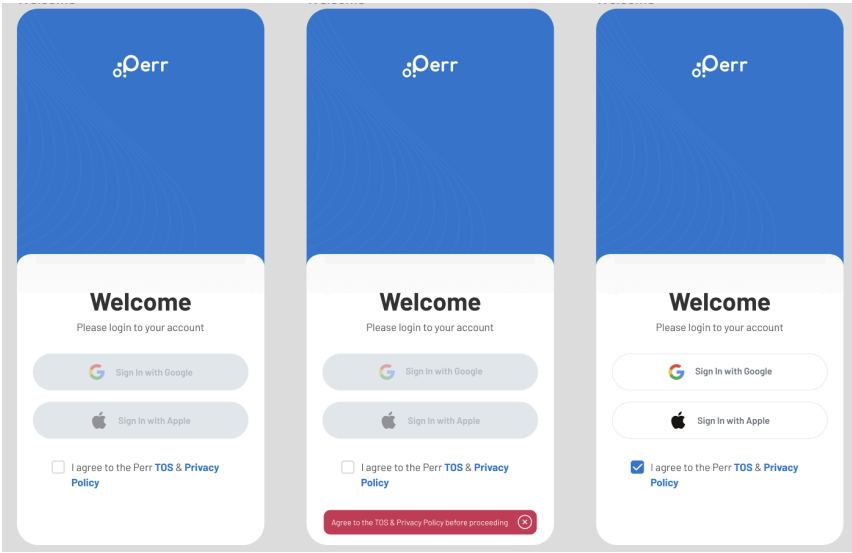
Chapter 7. Integrated User Feedback

Integrating user feedback is crucial for an application's success as it provides invaluable insights into user experiences, preferences, and pain points. In our pursuit of optimizing Perr's user experience, we introduced a way to integrate user feedback to enhance user experience on Perr: an iterative user study process.

The iterative user study process is a structured process that emphasizes the importance of continuous improvement. This method involves conducting user studies in rounds to assess the current state of the application, gathering valuable feedback, implementing suggested changes, and then validating the effectiveness of those modifications through subsequent studies. For instance, in Figure 12, the benefits of integrating user feedback are evident. As previously detailed in Figure 8, user feedback revealed issues with the previous TOS and Privacy screen, notably confusion and difficulty navigating. Users pointed out that they were getting stuck and had trouble discerning where to click to proceed through the screen. Among the suggestions received, one was to gray out the buttons before agreeing to the TOS and Privacy Policy, a modification we promptly made. After that, a suggestion that was not initially captured in the UARs was made. It was to incorporate a warning prompt when users attempted to click the sign-in buttons without first agreeing. As illustrated in Figure 12, this recommendation was addressed by implementing a red pop-up sign positioned at the bottom of the screen. This example shows how we were able to not only fix the issues, but also to integrate user feedback to make the flow even better. By instilling a process like this, Perr systematically enhanced its application based on real user insights, ensuring that the evolving needs and preferences of its user base are met.

Figure 12

Improved TOS and Privacy Policy Flow



The user study process serves as a dynamic feedback loop, allowing Perr to not only identify areas for improvement but also validate the impact of implemented changes. This systematic approach aligns with the goal of refining the onboarding process and user interface over time. By incorporating this methodology, Perr can foster a culture of adaptability and responsiveness to user feedback, positioning itself as a user-centric platform committed to delivering an optimal experience.

Using the structured approach of continuous improvement through user studies, Perr can position itself at the forefront of user-driven evolution. This commitment to excellence ensures that Perr's developers maintain a line of communication with users, enabling them to swiftly address concerns, implement enhancements, and create a tailored experience that resonates with the diverse needs of their user base. This user-centric focus aligns with our broader goal of fostering a dynamic and responsive application environment.

Chapter 8. Experimental Results and Discussion

The optimization of the file-sharing application Perr has been a multifaceted task, reflecting the inherent complexity of user-interface design and the intricate expectations of modern users when it comes to digital interactions. The variety and depth of issues identified through the initial wave of user studies have provided a rich basis for enhancing the overall usability and functionality of Perr.

Aggregated data for the first wave of user studies, as far as elapsed time per designated action goes, has been collected for each step and is shown in Table 2:

Table 2

User Study (November Wave) - Time Elapsed Per Step

Identifier	Step 1	Step 2	Step 3	Step 4	Step 5	Total
MH11830LT	48.65	84.28	192.29	31.37	N/A	356.59
JA02359ST	24.28	37.38	71.52	48.88	144.45	326.51
NM11845LT	42.64	109.48	109.38	23.39	N/A	284.89
ST02359ST	60.02	139.90	315.38	66.00	N/A	581.30
ZC11815LT	30.39	61.06	67.62	48.12	N/A	207.19
RS21830LT	N/A	300.56	N/A	88.34	N/A	388.90
AC11745LT	40.56	40.41	186.09	99.75	N/A	366.81
ER21700LT	28.12	12.10	143.31	128.52	N/A	312.05
CS02359ST	50.27	35.48	143.05	18.00	N/A	246.80

Note: Elapsed time for each step taken during the user studies. All times are recorded in seconds.

Based on the above data, and considering a variety of external factors, we can come to a few conclusions about both the collective technical proficiency of our users and the intuitive components of Perr.

For post-study feedback, we were able to gather responses from seven of our nine respondents. To discourage neutrality in responses, we instituted a 6-point Likert scale to gauge agreement towards statements phrased to maximize our takeaways from each study participant's experience with Perr during the testing process. Feedback from the November wave is shown below in Table 3:

Table 3*Feedback Questionnaire Results (November Wave)*

User	Would continue using?	Ease of Upload	Ease of Navigation	Ease of Onboarding
CS02359ST	6	4	3	3
JA02359ST	3	5	5	5
MH11830LT	4	4	2	4
ZC11815LT	4	3	1	2
ST02359ST	5	4	3	6
AC11745LT	5	6	5	6
NM11845LT	6	6	6	6

Note: Feedback gathered immediately following administration of user study. Responses measured from 1-6, with 1 representing strong disagreement and 6 representing strong agreement with the pertinent statement. Qualitative feedback excluded for brevity, but highlights a steep learning curve for beginner users of Perr.

Based on these results, and particularly in conjunction with qualitative feedback gathered, it seems that unsupervised data collection for post-study feedback did not initially result in fully honest accounting of user experience. We suspect this is due to lack of anonymity in surveying our respondents, although remediative measures are yet to be devised for this particular discrepancy. Current response rates suggest a likely tradeoff between honest accounting and anonymity with response rates. For future short-term participant pools, we propose to solve this problem by including the link to an additional form to where we will relocate any prompting for identifying information such as name and email from our current feedback form. This solution should hopefully address any concerns for respondents primarily motivated by monetary incentive to participate, and will allow us to guarantee response rates for that specific demographic of participants while also potentially encouraging honesty in responses by removing the link between names and corresponding feedback.

Through the completion of Perr's user study process following its latest updates, we were able to gather extensive findings which are highlighted in the section below. The culmination of these findings, encapsulated within the fifteen Usability Aspect Reports (UARs) generated back in November, have highlighted critical areas for improvement ranging from onboarding flows and privacy policy visibility to more nuanced issues like upload speeds and file visibility on websites. The next sections will highlight exactly how we targeted solutions to the problems mentioned in our UARs, and the aggregated data for the second wave of user studies, as far as elapsed time per action goes, has been collected and is shown in Table 4. The full report on the user studies can be found in Appendix C.

Table 4*User Study (February Wave) - Time Elapsed Per Step*

Delegations »	S/T Exclusive	ALL	ALL	ALL	S/T Exclusive	ALL	ALL	S/T Exclusive
	STEPS					✓	TYPE	METHOD_ EXT
Identifier	→UAC0_ANY	AUTH	ONBOARDING	→UAC0_PERR	→UAC1_PERR			
JC11700ST	96	96	40	36	15	1	S/T	WhatsApp
EW11715ST	99	75	83	52.91	0	1	S/T	Gmail
LT11730ST	33	30	111	20	0	1	S/T	AirDrop
AC11745LT	0	64	40	40	255	0	L/T	N/A
BK11800ST	95	24	42	18	0	1	S/T	Gmail
ZC11815LT	0	34	39	36	0	1	L/T	N/A
MH11830LT	0	19	64	28	0	1	L/T	N/A
NM11845LT	0	40	46	38	0	1	L/T	N/A
ER21700LT	0	17	45	9	0	1	L/T	N/A
BA21715ST	255	13	26	28	17	1	S/T	WhatsApp
CW21730ST	180	22	31	107	11	1	S/T	AirDrop
SD21745ST	25	28	38	31	9	1	S/T	AirDrop
JE21800ST	116	16	20	37	0	1	S/T	Outlook
JR21815ST	61	36	36	57	9	1	S/T	Email
RS21830LT	0	14	11	72	23	1	L/T	N/A
CE21845ST	58	22	43	40	29	1	S/T	AirDrop

Note: Elapsed time for each step taken during the user studies. All times are recorded in seconds.

Table 5*Long Term Users - Feedback Questionnaire Results*

Identifier	Wave 1 Comparison			General			
	Ease of Upload	Ease of Onboarding	Navigating the App	Would continue using?	Ease of Upload	Ease of Navigation	Ease of Onboarding
AC11745LT	4	4	4	3	5	5	5
NM11845LT	5	5	5	6	6	6	6
MH11830LT	4	3	4	3	3	5	6
ZC11815LT	5	4	3	4	6	5	6
ER21700LT	5	4	4	6	6	5	5
RS21830LT	4	4	4	4	4	5	5

Following the administration of each user study, as shown in Table 5, we gathered feedback to subjectively gauge the quality of each user's experience with Perr. Responses measured from 1-6 for general questions, with 1 representing strong disagreement and 6 representing strong agreement with the pertinent statement. Answers to Wave 1 Comparison questions are measured from 1-5, with a response of 1 indicating that the user found a particular step much harder from their previous usage of the app to current administration and a response of 6 indicating that the same task was executed far more easily in the new update. Qualitative feedback excluded for brevity, but highlights the vast improvements made in the app's new iteration. The same process was also followed for short term user study participants, as shown in Table 6, with comparison questions excluded due to lack of reference frame for previous usage of Perr.

Table 6*Short Term Users - Feedback Questionnaire Results*

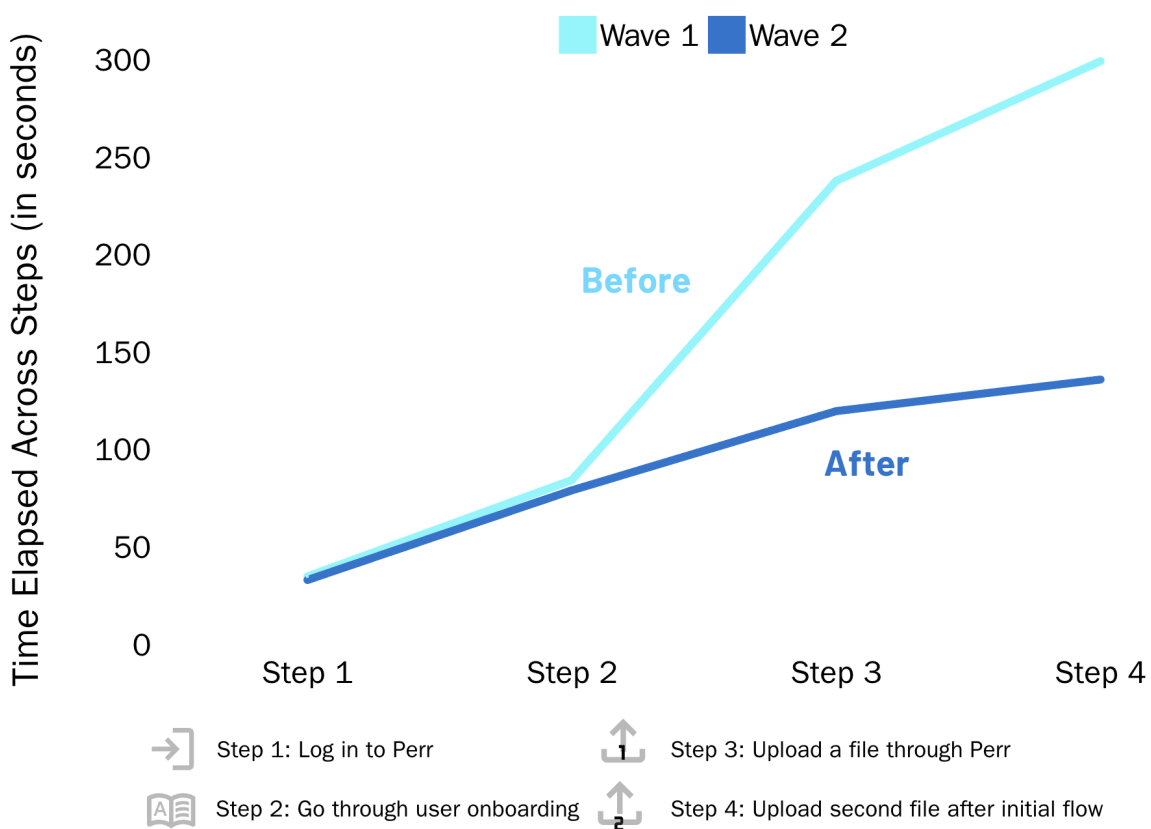
Identifier	Would continue using?	Ease of Upload	Ease of Navigation	Ease of Onboarding
JC11700ST	6	6	6	3
LT11730ST	6	6	6	6
BK11800ST	6	6	5	5
BA21715ST	5	6	6	6
CW21730ST	1	6	5	5
SD21745ST	4	6	6	6
JE21800ST	5	6	6	6
JR21815ST	5	6	5	4
CE21845ST	5	5	5	4
EW11715ST	6	6	5	6

Note: Feedback gathered immediately following administration of user study. Responses measured from 1-6, with 1 representing strong disagreement and 6 representing strong agreement with the pertinent statement.

After conducting both waves of user studies, before and after app updates have been conceptualized and implemented, we took the liberty of documenting the journey taken by our users through the app by recording the sum of the times that elapsed as they took each action designated in the study instructions, as shown in Figure 13.

Figure 13

Upload Flow Optimization Across Application Iterations



One of the principal findings from the usability studies was the ineffectiveness of the initial onboarding screens (UAR-001). Users often bypassed these screens, missing critical information which, in turn, led to confusion in later stages of the app's use. The recommendation to integrate essential instructions contextually within the app interface and use progressive onboarding aligns with current best practices in UX design, where user learning is integrated seamlessly with app interaction, reducing initial barriers to usage.

Several UARs focused on improving user engagement through better tutorial clarity (UAR-003), direct share feature discoverability (UAR-005), and clear instructions for recipient devices (UAR-006). The lack of engaging tooltips and awareness concerning certain features emphasized the need for a more

intuitive, educational approach within the app. Personalizing tooltips and highlighting core features through educational banners can significantly impact user satisfaction and app efficacy, and our solution targeting the lack of useful information presented to users eventually came to fruition. Unfortunately, user study results have proven highly indicative of the shortcomings of our approach, though they have also shown that those shortcomings stemmed from implementation flaws such as the inability to click into highlighted areas during tooltip presentation - which should ultimately prove to be an easy fix through developer intervention.

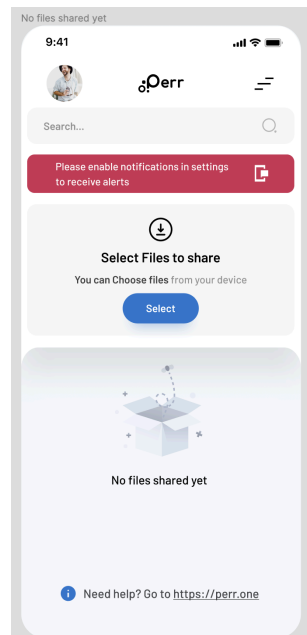
The initial version of the application was hindered in its potential in part by the inconspicuousness of the Terms & Conditions/Privacy Policy checkbox (UAR-002). Because of that, Perr's retention rate suffered as users found themselves frustrated beyond a tolerable threshold before even logging into the app. To address this, we were able to increase the prominence of visual indicators towards the importance of accepting the Terms & Conditions/Privacy Policy and render its nature as a barrier to entry nonexistent.

The uploaded speed optimizations suggested in UAR-010 and the correction of non-functional desktop notifications (UAR-011) address critical areas impacting user perception of the app's efficiency and reliability. Slow upload speeds and the absence of expected notifications create friction in the user experience, detracting from the perceived quality of the service. Addressing these issues was deemed essential for enhancing user satisfaction and trust in the application, and the cumulative results of our second wave of user studies appear to indicate overall satisfaction in speed improvements, especially relative to existing market solutions for file transfer applications outside of Perr. Notably, we had multiple users liken our file transfer process to AirDrop, even going so far as to say "this is easier than AirDrop" and "Perr offers all the benefits of an Apple ecosystem without any of the drawbacks." This is a massive contraindication to the results gleaned from our first wave of user studies, exemplifying the breadth and depth of improvements made through our suggestions in the most recent update.

Issues around permission denial (UAR-013) and the erroneous missing permissions prompt (UAR-014) reflect a wider challenge within app development regarding user privacy and consent. The recommendations for clearer communication around the necessity of certain permissions highlight the need for transparency and user education in fostering trust and understanding.

Figure 14

Non-intrusive Permission Prompting



As shown above in Figure 14, we have incorporated a non-intrusive approach to notifying the user of permission denial issues that would prevent them from fully harnessing the potential of Perr as a quintessential file transfer service. Not only that, but we also lend increased prominence to both the banner to enable notifications and the prompt to go to <https://perr.one> to route file transfers by incorporating them into the main dashboard. Preliminary reports from our second wave of user studies seem to be indicative of substantial improvements in users' elapsed time going through the file upload process, and quantitative measurements of this improvement will be fully included upon completion of the current wave of user studies.

Our framework has significantly improved Perr's efficiencies as reflected in a marked improvement in user retention. We observed a 2408% increase in user retention rates following the implementation of our refined onboarding process and highlight of Perr's unique selling proposition. This dramatic boost is attributable to our improved onboarding flows that greatly reduced the friction during initial user engagements. Users found the application more navigable and less intimidating, which substantially decreased initial drop-off rates.

This substantial increase in user retention has led to a reduction in marketing costs by \$181 per retained user. This reduction is linked directly to the increased efficiency of the onboarding process and the strategic highlighting of the application's unique features which effectively maintained user interest and reduced the need for extensive remarketing.

Our findings provide substantial evidence of our framework's effectiveness in optimizing both user retention rates and marketing expenditure, which are crucial metrics for the sustainability and growth of the application. The financial and operational improvements evidenced through these metrics will be integral in guiding further strategic decisions for Perr. They prove that a focus on user-centered design and functionality refinement directly correlates to significant gains in both user satisfaction and cost efficiency.

Chapter 9. Lessons Learned

As our project cycled through development and evaluation phases, many insights became apparent. One of the important takeaways was the significant impact of user studies—not just as a side activity but as a core task in our project's methodology. These studies became instrumental in demonstrating the challenges faced by our users, guiding us to more targeted interventions. Without the ability to acquire potential users and gather their feedback through direct observation, we would have been unable to understand how a user may operate within the limitations and workflows of Perr. We quickly recognized the importance of unbiased feedback from our user studies. Ensuring participants understood the importance of honest feedback was vital—our project depended on genuine user experiences without users worrying about our opinion on their feedback. Another lesson was that the number of people correlated with the time needed to assimilate feedback and make changes. This lesson came to light with the takeaway that the more individuals involved, the greater the potential breadth of insights, but at the cost of extended timelines in processing and acting upon that feedback.

As we went through the stages of this project, conducting user studies played a pivotal role in honing the user experience offered within Perr. Initially, we focused on hands-on tasks within the app, observing user interactions to glean insights into usability and potential pain points. Post-task interviews were conducted to solicit feedback, but the process benefitted from a more structured questionnaire for standardized responses. Moreover, incorporating a think-aloud protocol during tasks and diversifying the user pool enhanced the depth and representation of insights. Moving forward, an agile feedback collection process, with iterative user testing at different development stages, ensured refinement aligned with evolving user needs. Additionally, integrating usability metrics, such as task completion rates, provided quantitative benchmarks to complement qualitative insights. This dual-pronged approach fortified the reliability of our findings, empowering us to make data-driven decisions and shape Perr into a more intuitive and user-friendly platform.

Our utilization of Mixpanel emerged as a linchpin in refining our analytical approach. Specifically, delving into Mixpanel's event-tracking capabilities proved instrumental. This feature facilitated a granular examination of user interactions with Perr, offering insights into feature engagement and user journeys. Furthermore, Mixpanel's retention analysis became a cornerstone in gauging the loss rate of users over time. This functionality enabled us to identify patterns of user retention or churn, shedding light on aspects of Perr that resonated with our audience and areas warranting improvement. The cohort analysis feature, too, played a pivotal role in segmenting user groups, allowing us to tailor our strategies based on distinct user behaviors. In hindsight, exploring Mixpanel's funnel analysis could have expedited our retrospective understanding of user conversion paths. If leveraged earlier, this feature would have pinpointed potential bottlenecks in the user journey, streamlining our optimization efforts.

Integrating Mixpanel with A/B testing tools also promised a more comprehensive view of feature efficacy and user preferences. A proactive approach to feature utilization was paramount, especially in real-time event tracking. This ensured that our analytical investigations remained agile and responsive to evolving user behaviors. As we charted the course ahead, a deeper exploration of Mixpanel's feature repertoire was poised to enhance the efficiency and precision of our analytic endeavors, propelling Perr toward a more refined and user-centric iteration.

Furthermore, our endeavors to enhance the design of Perr's mobile application were significantly fortified by a robust understanding of human-computer interaction (HCI) principles. Applying usability principles, we meticulously evaluated the app's interface to ensure it aligned seamlessly with users' mental models and expectations. This approach, rooted in HCI, facilitated the creation of an intuitive and user-friendly interface, minimizing cognitive load and streamlining user interactions. As a collaborative design tool, Figma seamlessly integrated into our HCI-driven design process. Its real-time collaboration

features allowed our design team to work synchronously, fostering efficient communication and rapid iterations. The interactive prototypes created in Figma were invaluable assets during usability testing, enabling us to simulate user interactions and gather feedback on design elements. This iterative approach, enriched by Figma's functionalities, ensured that each modification was guided by HCI principles and validated through practical user testing.

Moreover, incorporating feedback loops and iterative design cycles, core tenets of HCI, became integral to our improvement process. We gleaned valuable insights into user behaviors and preferences by conducting usability testing at various stages. This iterative approach, enriched by Figma's functionalities, allowed us to refine the application's design iteratively, ensuring that each modification was informed by empirical data and aligned with established HCI best practices. The principles of human-computer interaction, coupled with the collaborative capabilities of Figma, thus served as a guiding compass, directing our efforts towards a mobile application that meets functional requirements and prioritizes the user experience.

Chapter 10. Conclusion

Reflecting on our journey of refining and enhancing Perr's user experience, it is evident that the interventions aimed at improving usability and retention marked a transformative step towards elevating user engagement and satisfaction through a cyclical framework of feedback and modifications. This framework has not only demonstrated its value during this project but also stands as a durable strategy for continuous improvement, guiding Perr's team as they adapt to technological advancements and shifting user expectations.

Looking to the future, the framework provides a robust blueprint for ongoing development. Continual adoption of this cycle—amplifying user-centric features, refining onboarding processes, and integrating user feedback—will ensure that Perr remains adaptive and relevant. Additionally, emerging technologies such as artificial intelligence and machine learning offer potential enhancements for personalized experiences and predictive functionalities, which could further refine user interaction and back-end analytics.

The path forward for Perr involves leveraging these technologies and insights to not only enhance the application's current features but also to innovate proactively. By maintaining this responsive and evolutionary approach, Perr can continue to improve user experience significantly, ensuring that the application adapts effectively to both emerging trends and user feedback.

Perhaps, in the great sandglass of time, it's the grains sifted through hands of experience that measure the worth of an endeavor. As we turn the ledgers of our saga with Perr, recounting the chapters, we inscribe the lessons learned — in ink compounded of sweat, of eureka, of human interface.

Appendix

Appendix A

User Study Interview Templates

Introduction

This user study is designed to evaluate the functionality and basic operations of the Perr app, a peer-to-peer file-sharing app that allows users to transfer files between two devices without the need for authentication or compatibility. Your open and honest feedback will help us improve the app and make it more user-friendly, and for additional incentive towards completion of this user study, your participation will be rewarded with a \$15 Dunkin Donuts gift card.

Instructions

We have provided you with a laptop to aid in your completion of the study, and you will need to download the Perr app on your phone in order to transfer files to the laptop. However, before downloading the Perr app, we have a couple of preliminary steps for you to follow. Note that all steps will be timed, and the elapsed time taken during each step will be recorded to drive insight and analytics.

- Step 0: ASK PERMISSION TO SCREEN AND AUDIO RECORD
- Step 1: Transfer a photo from phone to your computer (any method)
- Step 2: Share a link from phone to your computer (any method, if using Google Photos or similarly oriented service)
- Step 3: Send a photo to an unauthenticated laptop (any method)

Direction: Download Perr and log into the app.

- Step 4: Using Perr, transfer a photo from phone to laptop (using Perr)
- Step 5: Send a photo to an unauthenticated laptop (using Perr)
- Step 6: Send link from phone to your laptop (Using Perr)

Now that you've completed that process, we can address any gaps in understanding. Once concerns are addressed, please repeat the steps laid out regarding the use of Perr.

* If you do not have your own computer, we invite you to make use of available school hardware.

Questions

- Q1: Had there been instruction on Perr, would you have done better?
 - If you had not known to already go to perr.one, would you have been able to easily ascertain that? If not, what would you need to make the process more intuitive?
- Q2: Do you normally find yourself inclined to either quickly skim or even through onboarding processes when you download any given app?
- Q3: Describe features of Perr; at what point in the process would it be best to present you with information related to feature usage?
- Q4: Do you think you would benefit from the ability to have the app remember your device as trusted for future use?
- Q5: Was it obvious following the moment you signed into the app that you could transfer files through the share menu as well as within the app?

- Q6: Should we remove the option to share media within the app? Namely, would you prefer to have the option to share directly within the app as well or would you rather only have the share menu?
- Q7: Do you see enabling sharing between incompatible devices as a liable use case?

Additional Information

Please provide any additional information that you think may be helpful, such as:

- Your experience with other file-sharing apps
- The types of devices that you used to transfer files
- The sizes of the files that you transferred
- Any specific features that you would like to see in the Perr app

Appendix B

Usability Aspect Reports

Usability Aspect Report 1: Onboarding Flow Effectiveness

Issue ID: UAR-001

Issue Title: Ineffectiveness of Initial Onboarding Screens

Severity: Medium

Description: Users frequently skip the initial onboarding screens, likely missing important information about app features and usage.

Impact: This behavior can lead to confusion during subsequent app use, as essential functionalities might not be clear to the users.

Recommendations:

- Remove the initial onboarding screens.
 - Integrate essential instructions into the UI contextually at relevant points of interaction.
 - Use progressive onboarding by introducing features as they are needed.
-

Usability Aspect Report 2: Terms & Conditions/Privacy Policy Visibility

Issue ID: UAR-002

Issue Title: Invisibility of TOS/Privacy Policy Acceptance Requirement

Severity: Medium

Description: Users do not notice the requirement to read and accept the TOS/Privacy policy, causing them to be held up during the registration process.

Impact: The current presentation of the TOS/Privacy Policy serves as a barrier to app adoption, increasing user frustration and dropout rates during sign-up.

Recommendations:

- Relocate the TOS/Privacy policy checkbox to a more prominent position.
 - Use highlighting or a pop-up to draw attention to the acceptance requirement.
 - Grey out the login options until the TOS and Privacy Policy are accepted.
-

Usability Aspect Report 3: Tooltip Tutorial Clarity

Issue ID: UAR-003

Issue Title: Confusing Tooltip Wording and Engagement

Severity: Medium

Description: Tooltip tutorials lack details and fail to guide users properly.

Impact: Users may pay less attention to tooltips because they seem generic and uninformative, leading to a lower understanding of the app's functionality.

Recommendations:

- Personalize the tooltip greeting based on user information, or simplify it to a generic "Hello" if username is unknown.
- Improve the content and design of tooltips to make them more engaging and informative.

Usability Aspect Report 4: Post-Transfer Engagement on Trusted Devices

Issue ID: UAR-004

Issue Title: Lack of Prompt for User to Sign in on Trusted Device After Transfer

Severity: Low

Description: Users are not prompted to sign in or register a trusted device upon completing a file transfer to it, missing an opportunity to streamline future transfers.

Impact: Lack of this feature may decrease the perceived convenience and repeat usage of the app on known devices.

Recommendations:

- Introduce a banner or a pop-up after a file transfer that suggests signing in or naming the device to facilitate future transfers (if the device is trusted).

Usability Aspect Report 5: Discoverability of Direct Share Feature

Issue ID: UAR-005

Issue Title: Low Awareness and Discoverability of Direct Share/Share Menu Feature

Severity: Medium

Description: Users are not aware of the direct share feature and how it can be used outside of the app, limiting efficient app usage.

Impact: Users may underutilize the app's share menu features, missing one of its core advantages for file-sharing.

Recommendations:

- Display a temporary educational banner on the main screen that explains the direct share feature.
- Include tutorials or hints the first few times a user accesses the sharing functionality within the app.

Usability Aspect Report 6: Clarity of Destination Website Instructions

Issue ID: UAR-006

Issue Title: Lack of Clear Instructions for Recipient Devices

Severity: High

Description: Users are confused about where to go on their laptops or PCs, as there are no clear instructions to navigate to "https://perr.one" for receiving files.

Impact: This confusion creates a significant barrier to completing file transfers, leading to user frustration and probable/incipient abandonment of the app.

Recommendations:

- Provide explicit instructions within the app before starting a transfer, directing users to the correct URL on the recipient device.
- Include a step-by-step overlay or walkthrough for new users that guides them through the file transfer process, including the recipient's actions.

Usability Aspect Report 7: Domain Name and SEO

Issue ID: UAR-007

Issue Title: Unintuitive Domain Name and Poor Search Engine Visibility

Severity: High

Description: The domain "perr.one" is not easily recognized as a URL by users, and the website is not visible in search engine results.

Impact: This can prevent users from finding the required web page to complete the file transfer, leading to possible abandonments.

Recommendations:

- Secure a more intuitive domain name that clearly indicates it is a web address.
- Invest in SEO strategies to improve the visibility of the "perr.one" website in search engine results.

Usability Aspect Report 8: Inconsistent Thumbnails After Upload

Issue ID: UAR-008

Issue Title: Non-Loading Thumbnails Post-Upload

Severity: Medium

Description: Some users experience thumbnails not loading after uploading files, leading to uncertainty about the success of the transfer.

Impact: This lack of visual confirmation can lead to confusion and repeated attempts at uploading, resulting in user frustration and wasted time.

Recommendations:

- Ensure consistent and prompt loading of thumbnails after file transfer.

Usability Aspect Report 9: Timeline Accessibility

Issue ID: UAR-009

Issue Title: Disappearing Timeline on Desktop Interface

Severity: Medium

Description: The timeline occasionally disappears on desktop interfaces, possibly due to authentication errors.

Impact: This affects the reliability and usability of the desktop application, as a consistent history of transactions is integral to file-sharing apps.

Recommendations:

- Conduct thorough testing to identify the cause of the disappearing timeline and fix the underlying issue.
- Ensure that the file transfer log remains visible and accessible at all times on the desktop interface.

Usability Aspect Report 10: Upload Speed Optimization

Issue ID: UAR-010

Issue Title: Slow Upload Speeds

Severity: Medium

Description: Users experience slower-than-expected upload speeds when transferring files, impacting the overall efficiency of the app.

Impact: Slow file transfers can frustrate users, particularly those who frequently share large files or are in time-sensitive situations.

Recommendations:

- Review and optimize file transfer protocols and server performance.
- Communicate expected upload times to manage user expectations and provide feedback on transfer progress.

Usability Aspect Report 11: Desktop Notifications Functionality

Issue ID: UAR-011

Issue Title: Non-Functional Desktop Notifications

Severity: Medium

Description: Users do not receive expected desktop notifications, which may lead to missed updates on file transfers and shared content.

Impact: The user may not be promptly informed about file transfer completions or incoming files, reducing the app's usability.

Recommendations:

- Debug and resolve issues preventing desktop notifications from appearing.
- Clearly inform users on how to enable or troubleshoot notifications within the app settings.

Usability Aspect Report 12: Document Removal Control

Issue ID: UAR-012

Issue Title: Malfunctioning 'X' Button for Document Removal

Severity: Low

Description: The 'X' button, designed to remove selected documents/photos from the transfer queue, is not functioning, leading to potential user error and inefficiency.

Impact: Users are unable to remove mistaken selections, potentially uploading unwanted files, resulting in user dissatisfaction and potential privacy concerns.

Recommendations:

- Correct the functionality of the 'X' button to ensure users can edit their file selection before transferring.

Usability Aspect Report 13: Permission Denial

Issue ID: UAR-013

Issue Title: Denial of permission due to a lack of understanding of the application

Severity: Low

Description: Users are denying camera, notification, etc. permissions as they fail to understand why such permissions are required.

Recommendations:

- Clearly communicate why each permission is required before prompting the user for access.

Usability Aspect Report 14: Erroneous Missing Permissions Prompt

Issue ID: UAR-014

Issue Title: Erroneous Appearance of Permissions Disabled Prompt

Severity: Low

Description: If a user denies notifications, camera permissions, etc., they will randomly receive notifications directing them to settings to enable the permission. This erroneous notification does not explain why permission is required, leading to confusion and frustration.

Recommendations:

- Clearly communicate why each permission is required before prompting the user for access. Even more important after the user has denied permission.
- Only re-prompt the user for permission when they attempt to use a feature that requires previously-denied permissions.
- Display a banner on the homepage if notifications are disabled explaining what notifications the user will receive and prompting them to enable them.

Usability Aspect Report 15: File Visibility on Website

Issue ID: UAR-015

Issue Title: Necessity to Scroll to View Files on Website

Severity: Medium

Description: Users are required to scroll down on the web page to view transferred files, as they are not immediately visible in the viewport upon completion.

Impact: This can prevent users from readily accessing their files, impacting the perceived efficiency and user-friendliness of the service.

Recommendations:

- Adjust the website layout to ensure that recently transferred files appear within the immediate viewable area of the page after transfer.
- Consider implementing a floating button or notification to navigate to the transferred files section for greater visibility.

Priority:

1. UAR-006
2. UAR-007
3. UAR-001
4. UAR-003
5. UAR-002
6. UAR-009
7. UAR-015
8. UAR-004
9. UAR-005
10. UAR-008
11. UAR-007
12. UAR-011
13. UAR-012
14. UAR-013
15. UAR-014

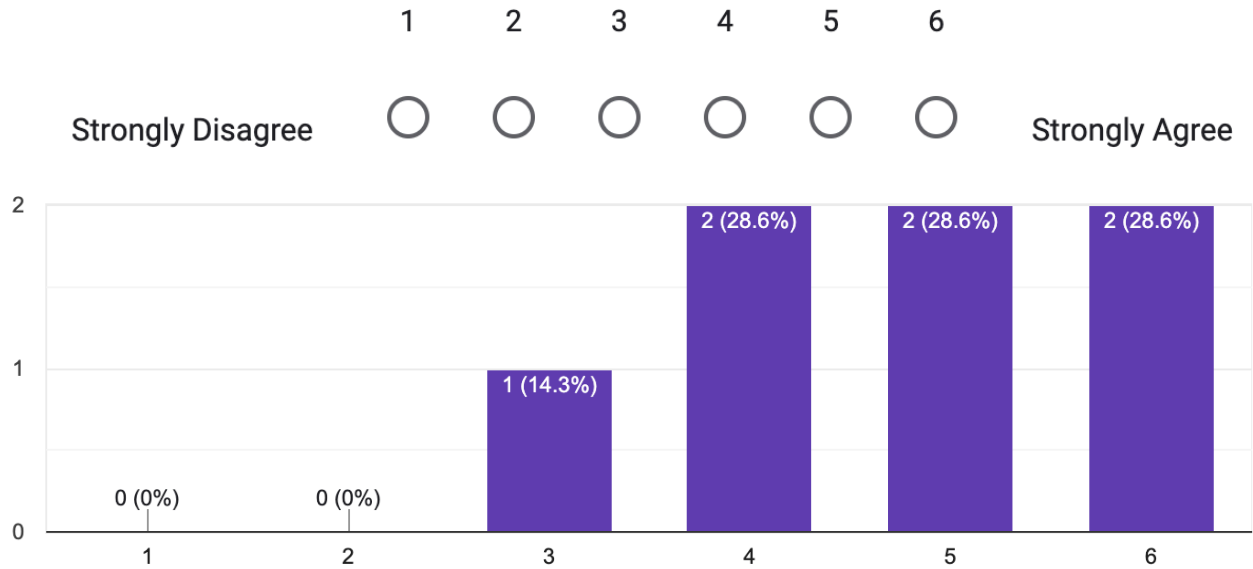
Appendix C

Post-User Study Evaluation Full Results Report

November Wave - Questions and Results

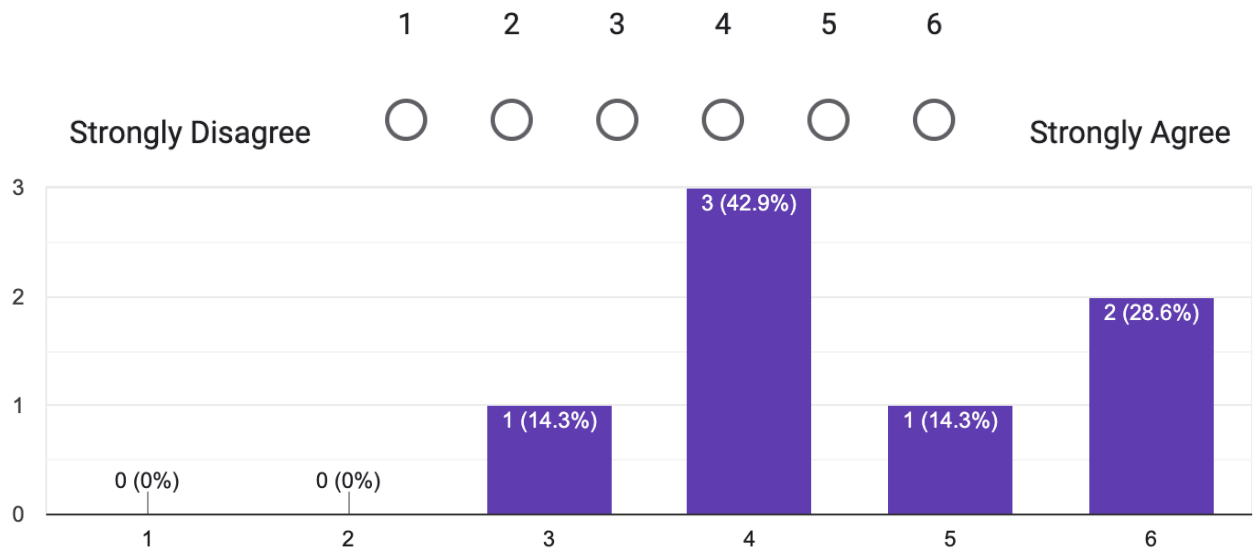
Question 1

You feel you would use Perr for personal, academic, or professional purposes outside of this user study.



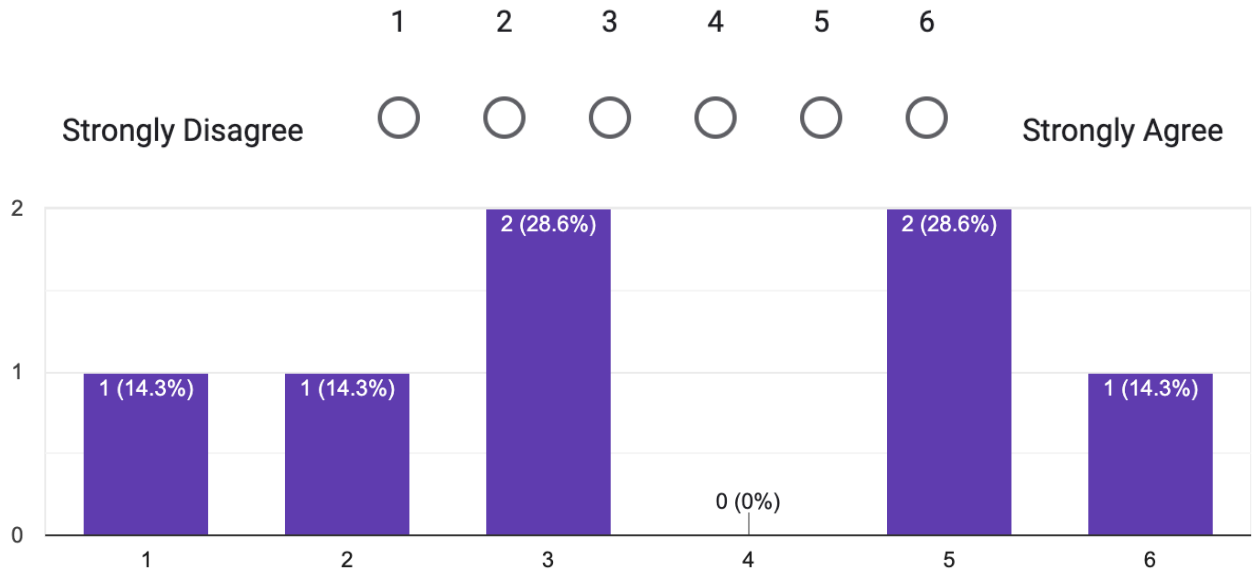
Question 2

You found the process of uploading a file from your phone to your laptop via Perr convenient.



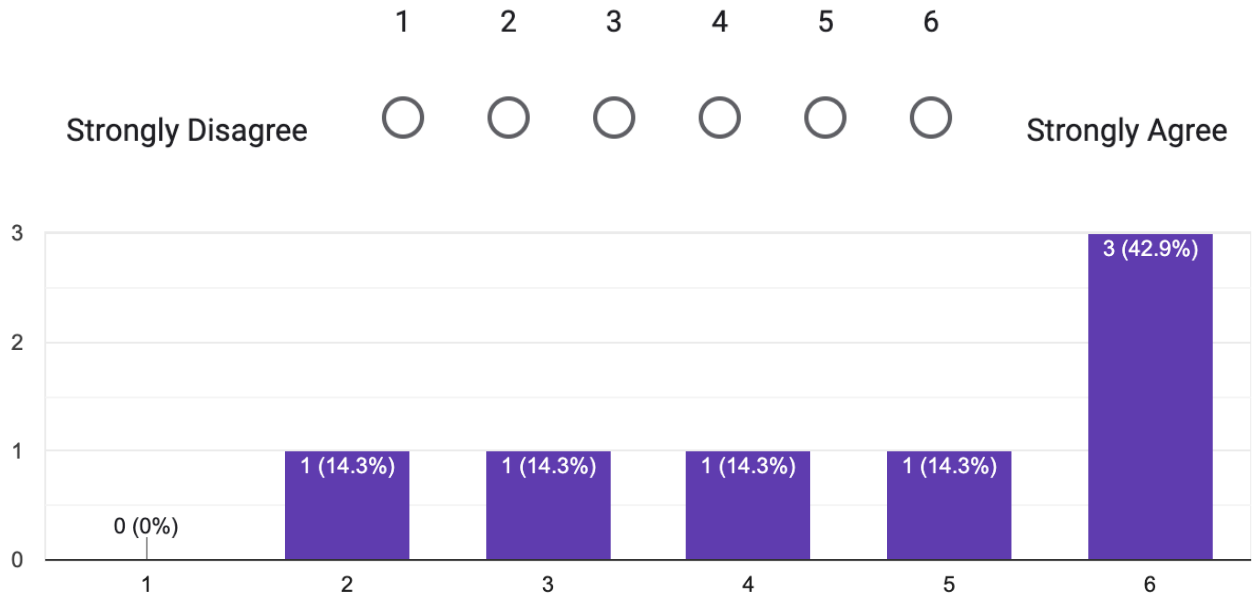
Question 3

Perr's user interface was easy to navigate, and left little room for confusion.



Question 4

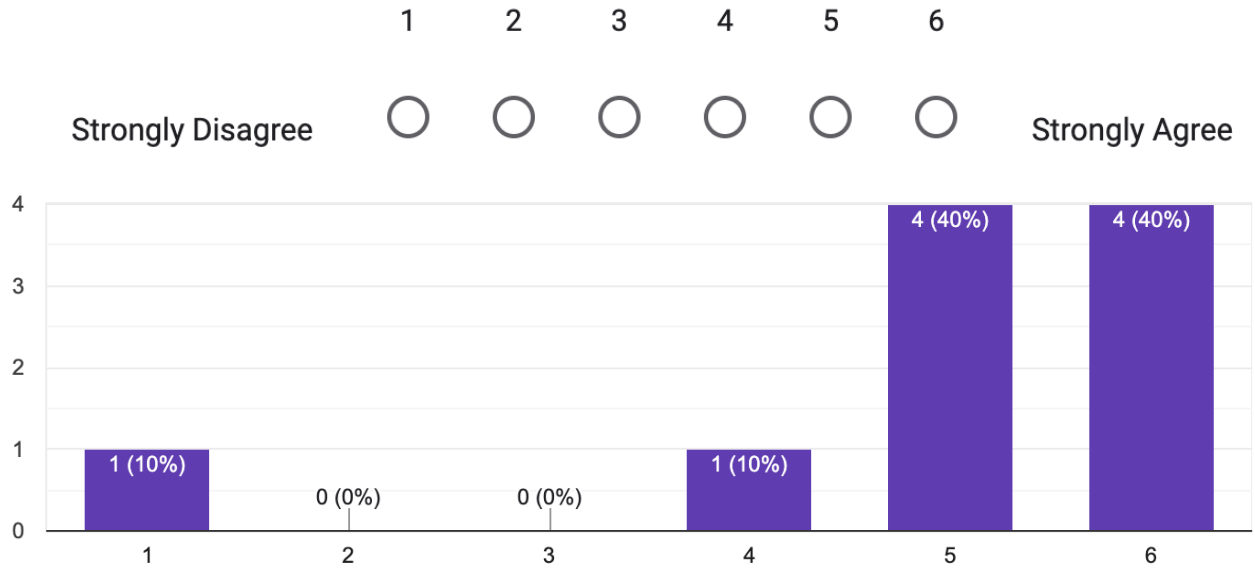
You did not experience significant difficulty during onboarding.



February Wave - Questions and Results (Short-Term)

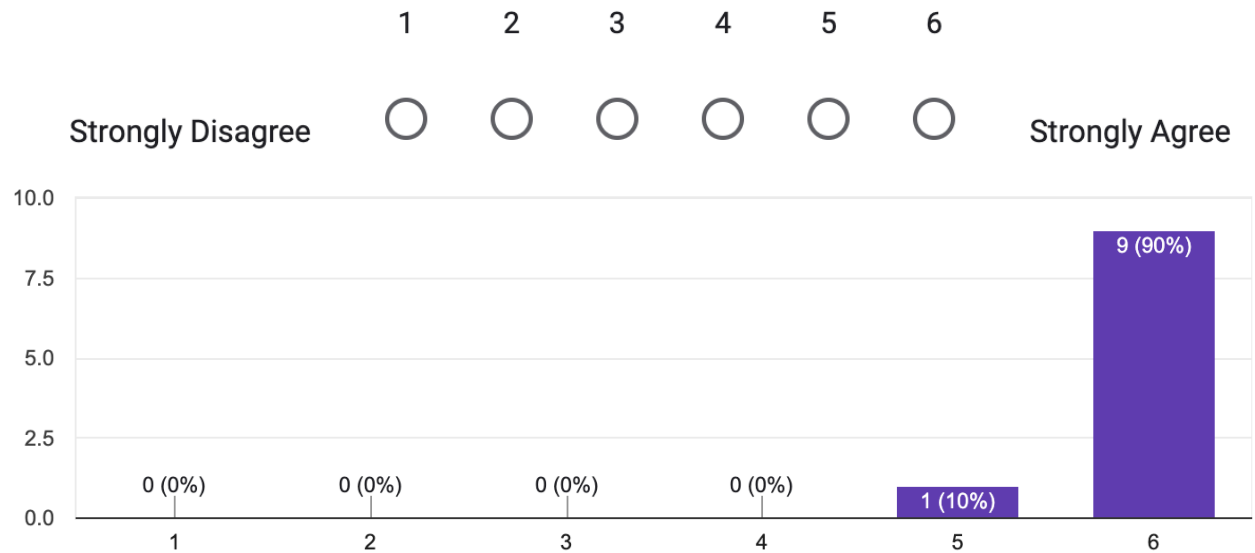
Question 1

You feel you would use Perr for personal, academic, or professional purposes outside of this user study.



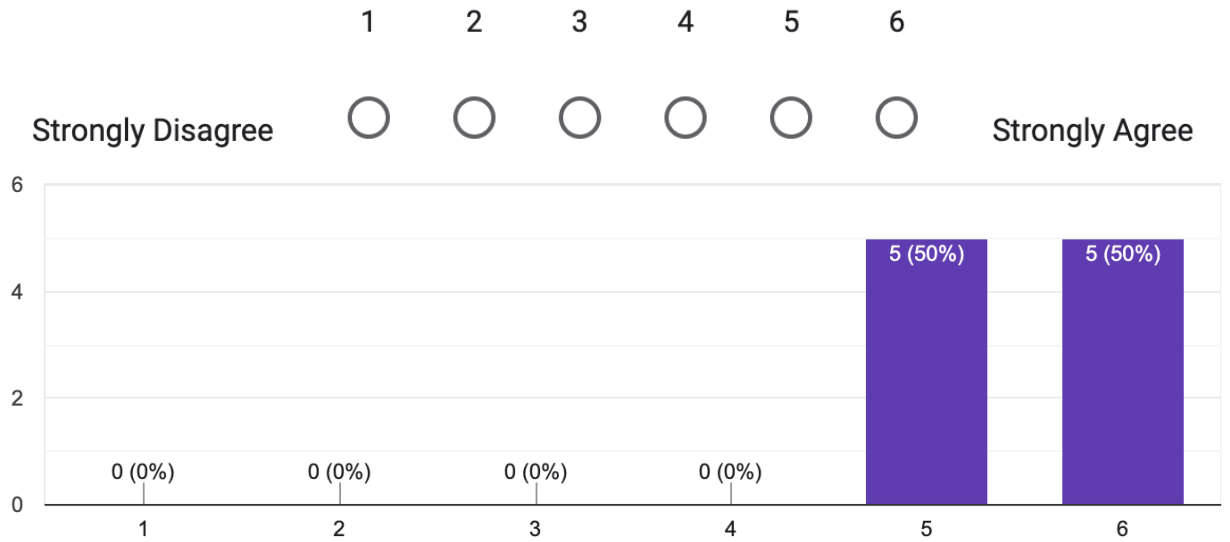
Question 2

You found the process of uploading a file from your phone to your laptop via Perr convenient.



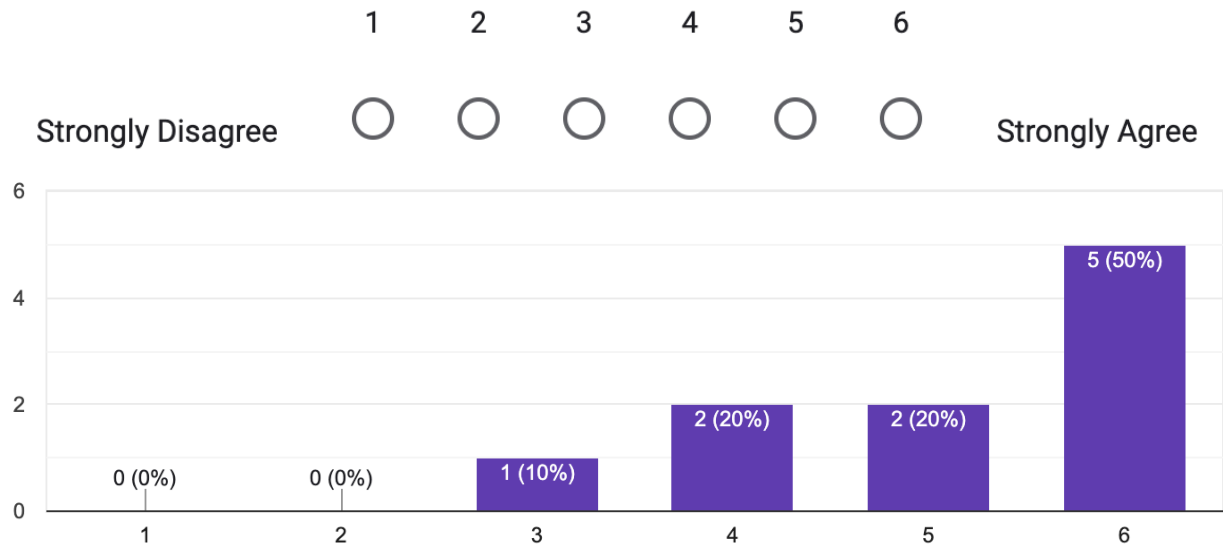
Question 3

Perr's user interface was easy to navigate, and left little room for confusion.



Question 4

You did not experience significant difficulty during onboarding.

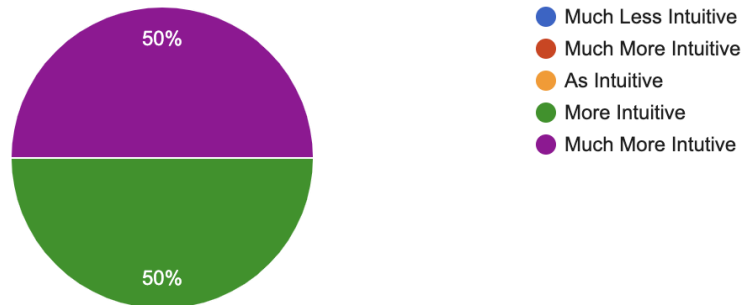


February Wave - Comparative Results (Long-Term)

Question 1

How easy was the process of uploading a file this time around?

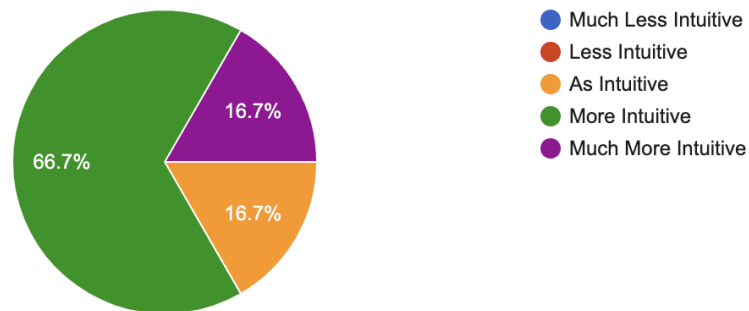
6 responses



Question 2

Did you find the initial onboarding process more intuitive than last time?

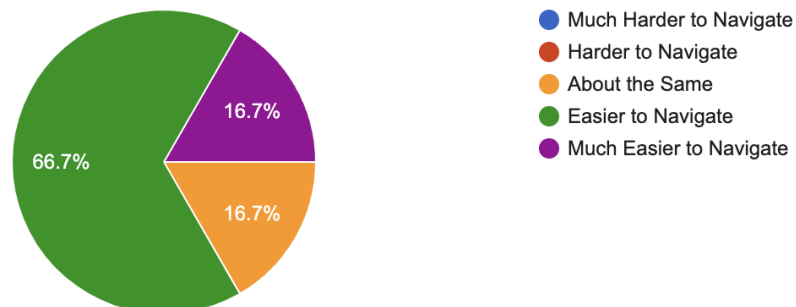
6 responses



Question 3

How easy was it to navigate this version of the app compared to last time?

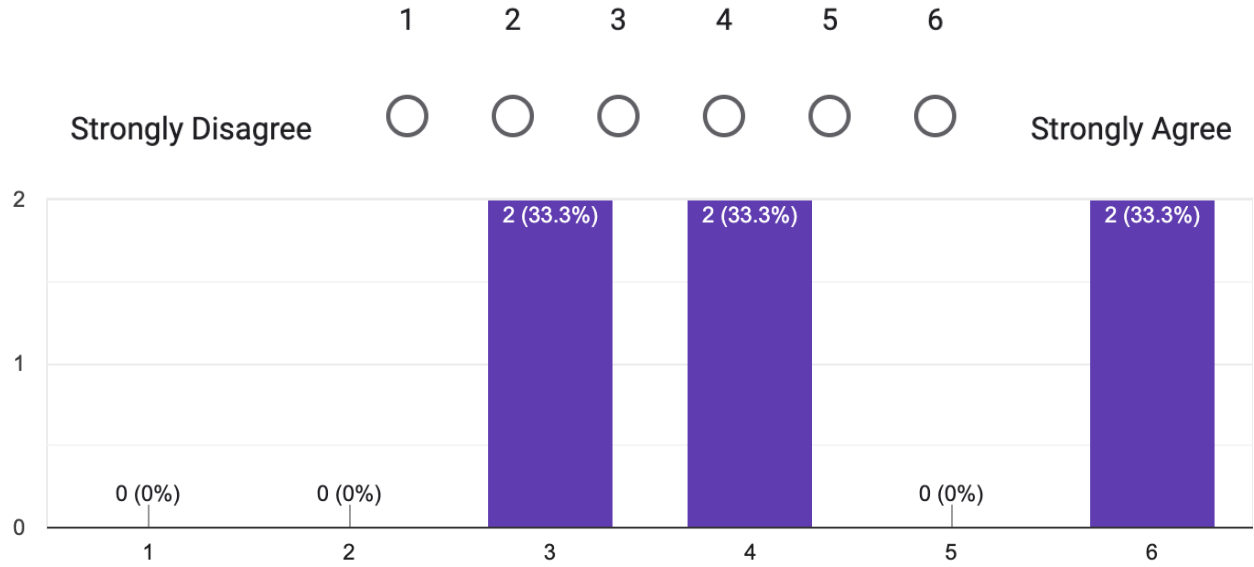
6 responses



February Wave - Questions and Results (Long-Term)

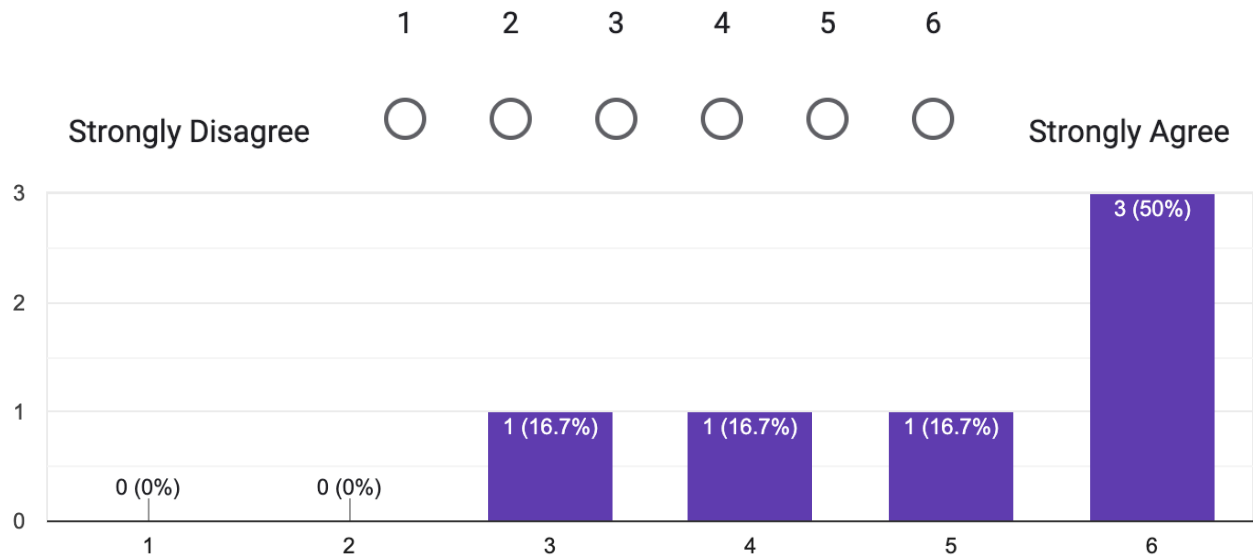
Question 1

You feel you would use Perr for personal, academic, or professional purposes outside of this user study.



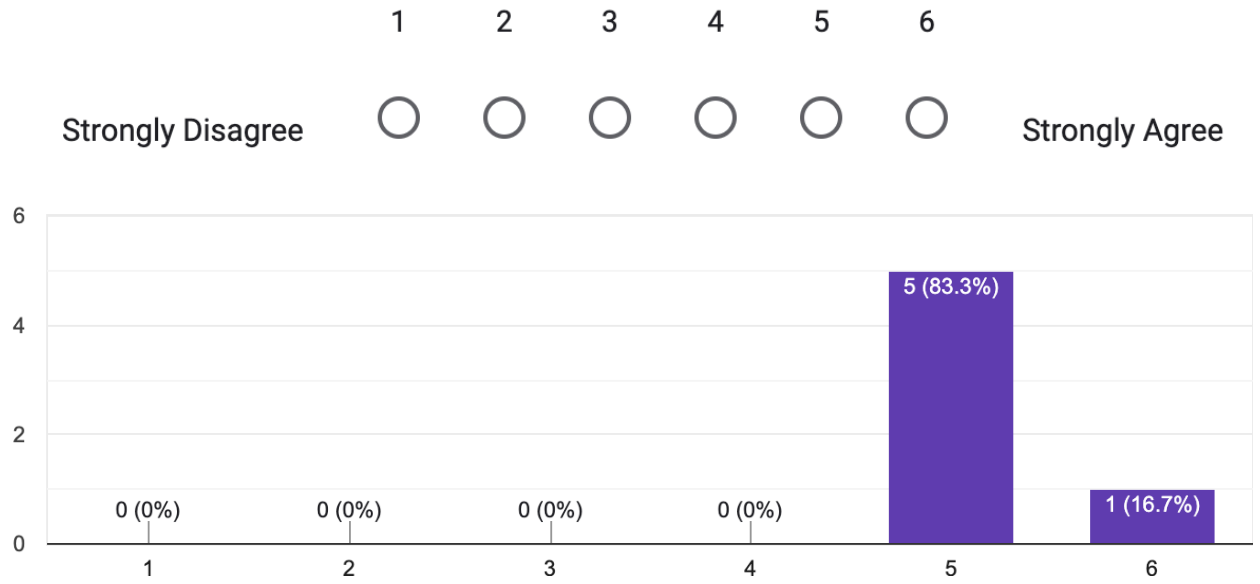
Question 2

You found the process of uploading a file from your phone to your laptop via Perr convenient.



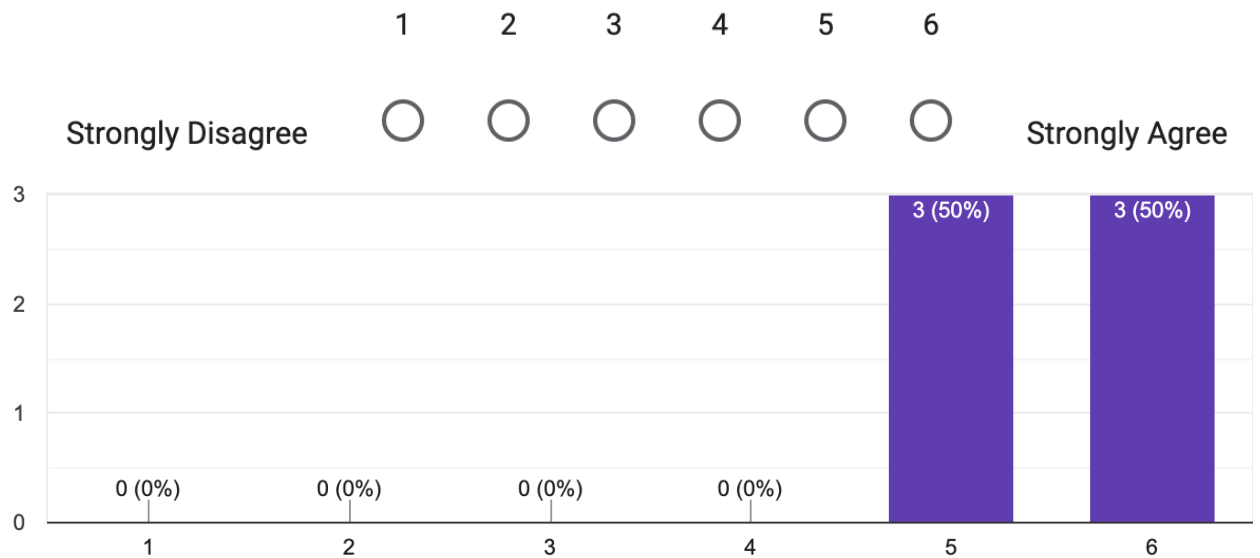
Question 3

Perr's user interface was easy to navigate, and left little room for confusion.



Question 4

You did not experience significant difficulty during onboarding.



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