Problem statement

Beginning my cultural probe, I had to pick my participants carefully so I could get a large amount of quality information. My goal was to find out how people are splitting bills with their friends and how I can improve that process with my bill-splitting application. We needed participants that were frequently eating out, going out, and splitting various bills with others to gather enough data in two weeks. We chose three male friends of ours from UW-Madison that consistently eat out, go out for drinks on the weekend, and split bills with their roommates or friends. To my benefit, each of the three participants had discussed with one of us previously how frustrating splitting a bar tab or restaurant bill was currently. All three participants owned iPhones, two used a popular payment service Venmo, and all three desperately wanted to make splitting bills an easier process.

Cultural Probe Design

The design of my cultural probe was intended to be as easy and un-intrusive as possible. We knew I needed to have my participants think about how they were splitting their purchases/bills right away and it couldn't be a long process. The form asked a few basic questions such as the location/business where the bill split occurred, how many people were involved, the method involved if a receipt was taken, and most importantly the frustrations that arose with the particular bill split. Only one of the questions was particularly open-ended, namely the frustrations my participant had, but all the other questions gave us the info I needed to see why and where those frustrations occurred. Importantly, this simplicity cut down on the time my participants had to spend on my form, which increased their response rate. To control quality, I knew it was important that my participants didn't feel that my form was a chore, so I advised them to only fill it out if they had time and felt they could give us a proper response. We could have missed out on quality data if my participants didn't feel like filling out the form, but I cut down on the amount of "bad" data that could've been submitted if participants weren't interested in the process.

Data Analysis

Collecting all of my data in one place, specifically, an excel spreadsheet, was an easy process due to my probe's design. Once I had all of my data in an excel spreadsheet it was easy to start seeing patterns of frustrations that arose in various situations. Right off the bat, I looked for frustrations that arose for all three participants, which would signal a recurring problem. We immediately saw frustrations that arose due to different preferred payment methods, sales tax issues, remembering cash repayments, and counting individual items from a

receipt. These major issues represent the breakdowns that occur in my participant's current splitting methods. We had some of these problems I had anticipated, but one frustration I didn't consider was the difficulty of applying sales tax correctly to fairly split a bill. This is a prime example of an issue that would surely arise in my implementation had I not gathered data to alert us to this problem before I went to design my solution.

After looking at recurring problems that all my users experienced, I looked for edge cases where little insights could be gleaned from a specific user's situation. Looking at my "info" questions was particularly helpful here. We learned about a few payment methods I hadn't considered that could make my solution more inclusive and centralized. For example, one user had friends who wanted to use Chase Pay or PayPal while my user had Venmo. This led to incompatibility and they resorted to using cash, which satisfied no one. Little issues like this were categorized as important additions to major features that could push users to fully adopt my application.

Lastly, before moving on to building my affinity diagrams and models I sat down with my participants to go over their data. We asked them to clarify some of their frustrations so that I could edit them to make them clearer. We talked about my solution ideas and received positive responses when I integrated their frustrations into usable solutions. It was important to them that my original idea was solid, but also that I specifically solved the issues that arose during their testing. These discussions allowed us to create my user stories based on my own participant's experiences. With their data and input, I focused on the recurring issues across all of my user's testing and took their own experiences as a model for my stories.

Work Models

Having all of my data in an excel spreadsheet was useful, but to pare down all that info into what I thought was most relevant required an affinity diagram. We categorized my affinity diagram by "issues" regarding receipts, payment methods, people/location, as well as flow ideas for my solution. This allowed us to better structure my user data and add my comments so I could easily build relevant models.

The physical model is just one representation of where users can use my solution to splitting bills. Users can use my bill-splitting app anywhere they go with friends for example restaurants, bars, grocery stores, gas stations, or even petting zoos. Most commonly people will use it where the business won't allow

multiple receipts so users are forced to find some way to later split their joint purchases.

Through the flow model, I can see how users communicate with each other, discussing the best method of splitting bills. While analyzing the data from my diary studies I found this was where users were most frustrated. When large groups of friends are forced to pay with one receipt, things can get very complicated if not everyone has the same form of payment service. All of my users found themselves in this situation multiple times so trying to pay people back with cash resulted in a long and difficult process. Some people had to go to ATMs to get cash where there were fees involved, others only had large bills which required breaking down, and in all cases, no one was able to pay the exact amount, someone always ended up overpaying. On the other hand when my users went out with people whom all had Venmo the process and communication of splitting the bill were painless because everyone can pay exactly what they oI down to the cent quickly and easily.

Design Ideas

Focusing on the main frustrations participants experienced I found three opportunities to improve their bill-splitting process in my app. First, I would allow users to take a picture of the receipt that will use text recognition to itemize the receipt. This will allow a better interface for users to decipher the receipt for splitting and payments. Once the receipt is itemized, the receipt can be shared among the people who are splitting the bill, allowing each user to pick their items on the bill. This simple change takes the pressure off the one person who typically has to split the bill and itemize it and allows the group to do it collectively. Lastly, once users have picked their items on the bill, sales tax will be applied to their purchases and users will then be able to pay back the original purchaser with one of the multiple supported payment methods. Allowing support for multiple payment methods will fix the recurring problem of payment incompatibility from previous bill-splitting methods I observed.