

A Study of Bill Sharing among Roommates

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Executive Summary

As mobile payments become more commonplace, bill sharing among roommates has become more convenient via mobile platforms. While these online and mobile tools have enabled users to make peer-to-peer payments, managing rental and utility bills with these tools is difficult. The challenges in this space include (a) facilitating rental payments between multiple tenants and property management, and (b) streamlining utility service payments between roommates.

We conducted four observations and 12 interviews to better understand the dynamics of bill sharing among roommates. Each participant, ranging from 22 to 28 years of age, was currently living with one or more person in a shared space at the time of the observation or interview. The participants were observed and interviewed either in their home or workplace.

In November 2016 we conducted an online survey of 35 participants currently living with at least one roommate to understand their feelings about living with roommates; reasons why they chose to live with them; how and what bills are shared; and the impact of trust and transparency on the bill sharing process.

We categorized our findings from our observations, interviews and surveys, into four theme topics: (1) similar sequence patterns; (2) communication and conflicts; (3) communication preferences; and (4) payment flexibility. Each is expanded below:

1. **Sequence pattern.** Participants followed a similar sequence in order to pay shared bills through a mobile system. The sequence was broken down into three steps: preparation, execution and confirmation of payments.
2. **Communication Conflicts.** Participants expressed frustrations focused on the communication between/among roommates and dividing bills evenly. We also found that participants had roommate conflicts in two main areas: lifestyle and payment process.
3. **Communication Preferences.** Participants who reported having a positive (trusting) relationship with roommates preferred in-person communication. Those with a negative (non-trusting) relationship preferred to communicate via text/email.
4. **Payment Flexibility-** Participants used multiple payment systems in order to manage accounts and pay their bills. Participants from the interviews suggested that they would prefer a more streamlined system in order to manage all accounts.

Based on our findings, we believed that a mobile-based solution would have a positive impact on users' bill sharing process by providing: (1) a streamlined method for managing multiple accounts; (2) access to accounts for all roommates, regardless of account holder; (3) custom payment reminders to combat forgetfulness; (4) monthly and annual spending reports that can be used to evaluate living costs; (5) payment confirmation that alerts all users of a transaction to promote trust and transparency; and (6) individual and group messaging capabilities for easier communication.

The envisioned application would provide easy access to shared accounts such as cable, gas/electric, water, and Internet. It would also allow for payment between/among individual roommates along with direct payments to the mentioned accounts. Additionally, it would track payments in social feed format, which can be seen by everyone within the group. This envisioned application would be a “one-stop-shop” for all shared payments and accounts, promoting a sense of trust between roommates.

Introduction

According to the 2012 U.S. Census, 32% of adults live with one or more roommate [1]. This number is expected to increase as debt rises because living with roommates offers a more economical choice [1]. However, living with roommates requires sharing responsibilities and ensuring that those responsibilities are met. Management of shared responsibilities can be tedious and time consuming and result in conflict among/between roommates. In many shared living arrangements, costs such as rent, electricity, cable, internet, gas, and air conditioning are divided among roommates. The ability to track payments among roommates requires trust and diligence to ensure payments are on time. In our experience, the standard payment method among renters and management is through a paper/check systems. Each renter per apartment is responsible for getting his/her payment in on time, along with the payments for other utilities (from various companies that provide the services).

The increased availability of online/mobile tools has made it more convenient to pay bills. However, this often requires juggling multiple tools (sometimes on multiple platforms) to manage multiple separate accounts. There is currently no technology-based way to streamline all of a renter's payments in a roommate scenario. Competitors in this arena include:

- Platforms such as Splitwise and Venmo that allow users to track everyday payments between friends, request payments, and transfer funds. Each payment/request must be input individually and there is no option to communicate via multiple users.
- Utility service platforms such as ComEd, Comcast, and AT&T allow users to pay service bills online or through mobile applications. This requires that each user have the account information in order to gain access the payment methods.
- Payment systems such as RentPayment and Cozy Services, which allow direct payment to the landlord/property management once all parties, are enrolled into the systems. These services do not allow for multiple tenants on one account; each tenant must set up an individual account for the same-shared location.

In this project, we asked “How can we facilitate shared bill paying by roommates through a technology-based solution?” In this study, we used observations, interviews and survey data in order to understand how roommates can manage shared payments.

Methods

In the next sections we present our methods for our observations, interviews and surveys.

Observation Methods

We present our participants, data collection and analysis methods for our observations in the next section.

Participants. Our team observed four participants, three were based in Chicago with the other one in Houston, their ages ranges between 23-25. We recruited all participants through our personal networks of family and friends. Two participants lived with three roommates, one participant lived with two roommates, and the other had one roommate. To minimize bias, we only recruited those who lived with friends/acquaintances -- no family, marital, or romantic relationships were included. We also chose participants who had re-occurring monthly bills. All of the participants were asked to demonstrate their process of preparing, executing, and confirming payment of their monthly bills through Venmo, all four participants had at least 1-year experience using Venmo to share their bills; Ashley uses Venmo as her preferred form of paying rent.

No.	Name	M/F	Age	Location	Sharing Items	Roommates
1	Kewei	M	25	Chicago	Utility, Electricity, Cable, others (paper towels, oil, flavoring, etc.)	1
2	Mike	M	24	Houston	Electricity, Cable, others (paper towels, soap, etc.)	3
3	Ashley	F	23	Chicago	Cable, Gas, Electricity	3
4	Linda	F	25	Chicago	Rent, Gas, Cable/Internet, Electricity	2

Table 1 – Observation participants

All of the participants reviewed and signed the Informed Consent Form ([Appendix 2](#)) prior to our observations.

Data Collection Methods. Each team member conducted one observation, with four observations in total. The observations with Kewei and Linda took place at their respective homes in Chicago, Illinois. The observation with Mike and Ashley took place at their respective workplaces. Observation sessions ranged between 20-30 minutes.

We began the observations with a brief introduction about the project, and then reviewed the informed consent form. Prior to the observations, we asked about their living conditions with roommates and what methods do they use to share bills, their responses were recorded via a Google Form. Then we asked the participants to demonstrate their process of preparing, executing, and confirming payment of their monthly bills through Venmo. We asked follow-up questions after they completed the tasks, see [Appendix 1](#).

During the observations, we watched how people split their bills, how they used online tools to transfer money, and other unexpected actions. We took notes of what we saw and sometimes asked questions for clarification. Once the observations were done, we uploaded our notes to a Google Drive folder and shared the data within our group.

Data Analysis Methods. During the analysis phase, we used AEIOU to frame our field notes. Members noted the activities (A), environments (E), interactions (I), objectives (O), and users (U) from their observations, and shared with the team.

We then used Stormboard to create an affinity diagram to look for common themes. Using the AEIOU framework, we grouped observations and created common themes for people's bill-sharing activities.

Interview Methods

We present our participants, data collection and analysis methods for our interviews in the next section.

Participants. Our team interviewed twelve participants, their ages ranged between 23-28. We recruited all participants through our personal networks of family and friends. Four participants lived with one roommate, six participants lived with two roommates, one participant lived with four roommates, and one participant lived with five roommates. Three participants were based in Houston, and all the others are based in Chicago. All of the participants were asked a series of questions regarding their living situation, bill splitting and bill sharing conflicts. These participants were chosen separately, none lived together.

No.	Name	M/F	Age	Location	Sharing Items	Roommates
1	Ami	F	24	Houston	Mortgage, water, gas, electricity, internet	5
2	Hayley	F	25	Houston	Rent, water, gas, electricity, internet, home items	2
3	Julie	F	24	Houston	Rent, water, gas, electricity, internet, Netflix	4
4	Emily	F	26	Chicago	Internet, electricity	1
5	Stephanie	F	23	Chicago	Internet, electricity, gas	2
6	Ken	M	28	Chicago	Internet, gas	2
7	Marcus	M	26	Chicago	Internet, electricity, gas	1
8	Joe	M	27	Chicago	Rent, internet, electricity, groceries	1
9	Candice	F	23	Chicago	Internet, electricity, gas, water	2
10	Ran	F	22	Chicago	Rent, internet, electricity, utility	2

11	Yunshan	F	23	Chicago	Rent, internet, electricity, utility	1
12	Dan	F	23	Chicago	Rent, internet, electricity, utility	2

Table 2 – Interview participants

All of the participants reviewed and signed the Informed Consent Form ([Appendix 2](#)) prior to our interviews.

Data Collection Methods. We conducted all our interviews in person; each team member interviewed three participants, with twelve interviews in total.

We began the interviews with a brief introduction about the project, and then reviewed the informed consent form. We then asked about their current living conditions, relationships with their roommates, number of roommates, preferred communication methods. Then, we moved on to general issues about bill splitting. We asked about how they split and pay their bills, how they managed their accounts, the time spent on bill sharing issues, the methods they used to share bills, and their opinions on how to improve the bill sharing methods. We also asked for their opinions on how to improve their bill paying process. See [Appendix 5](#).

We next asked them how they dealt with the situations when their roommates forgot to pay the bills and how they dealt with the confusion when splitting bills.

We also asked specific questions if the participant raised interesting points that we didn't cover in the interview protocol. Each member took notes during the interview and recorded the audios with the participants' consent. Each interview took about 15 minutes.

Data Analysis Methods. After the interview, each member transcribed his/her interviews in Google doc independently. As a group, we then went through the twelve interviews one by one, and performed inductive coding on each of them. Then we organized the coded findings into major categories.

After reviewing the interview transcriptions and coding key categories, we identified 11 spectrums of characteristics and behaviors in our participants.

We then placed each interview participant onto the spectrum according to their responses, see [Appendix 6](#). These spectrums were used to create the initial draft of the user personas.

Survey Methods

We present our participants, data collection and analysis methods for our survey in the next section.

Participants. We recruited participants through the CDM/CDMM participant pool, social media websites such as Facebook, and our own network of friends, family and acquaintances. We received a total of 35 responses, 11 of which were from the DePaul participant pool. To complete the survey, participants had to meet three requirements:

- Currently living with at least one roommate
- 18 years of age or older

- Roommates cannot be spouse or family

Participants were presented with an introduction to the survey, which explained our research question and hypothesis. They were then asked to accept by proceeding to the next page. Participants were able to opt out of the survey at any time.

Below are the demographics of the respondents:

- About 71% of participants were female and 29% were male.

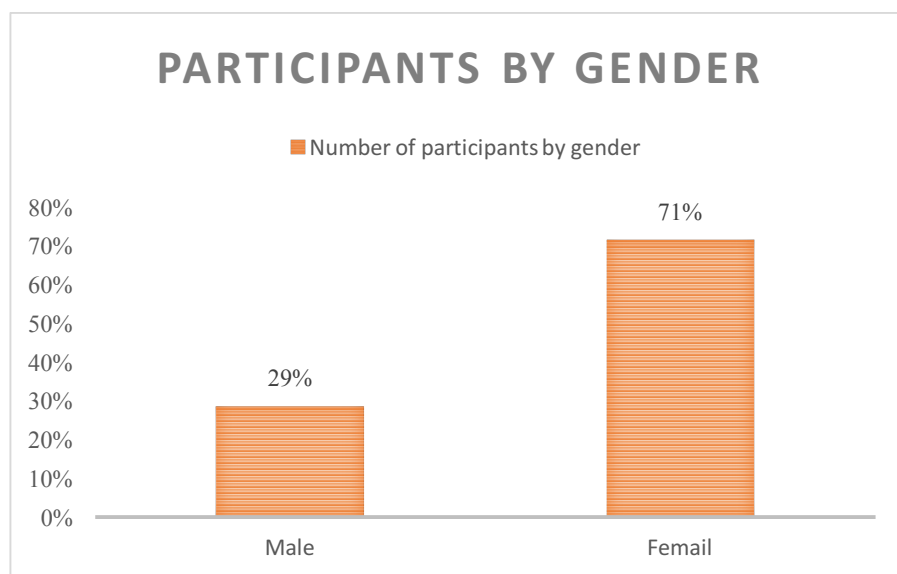


Figure 1 – Participants by gender

- Out of the 35 participants, 29% were between 18-24 years old and 71% were between 25-34 years old.

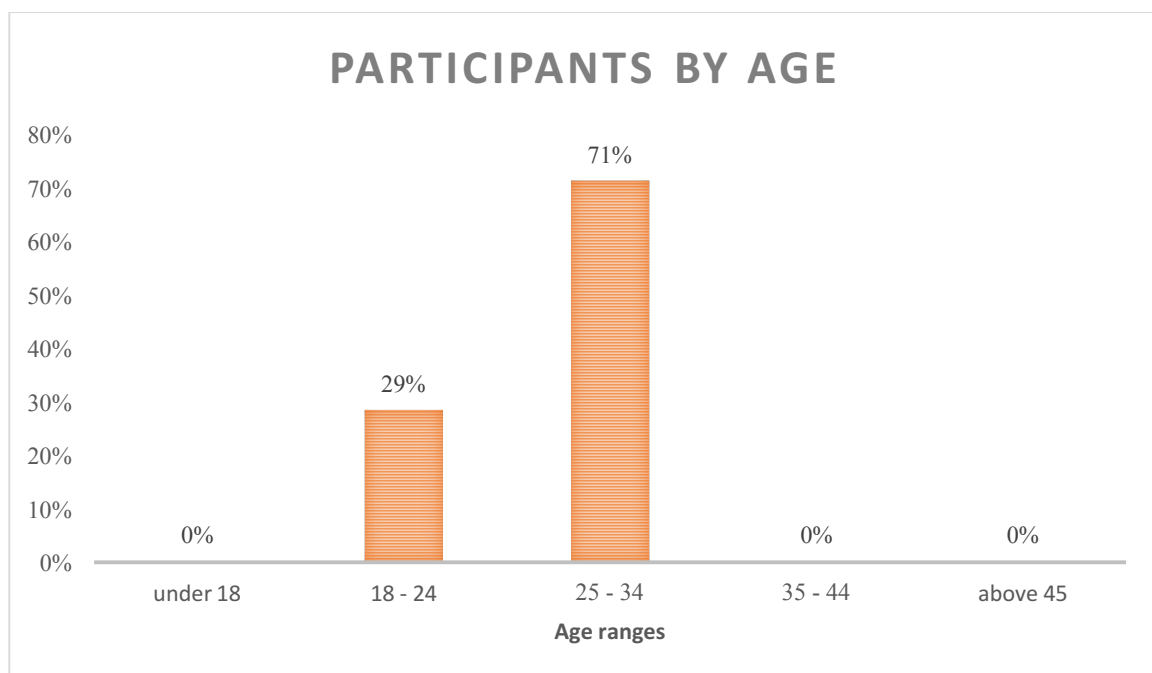


Figure 2 – Participants by age

- Approximately 43% of participants lived with 1 roommate, 40% of participants lived with 2 roommates, 11% of participants lived with 3 roommates and 3% lived with 4 roommates. The remaining 3% of participants lived with 5 or more roommates.

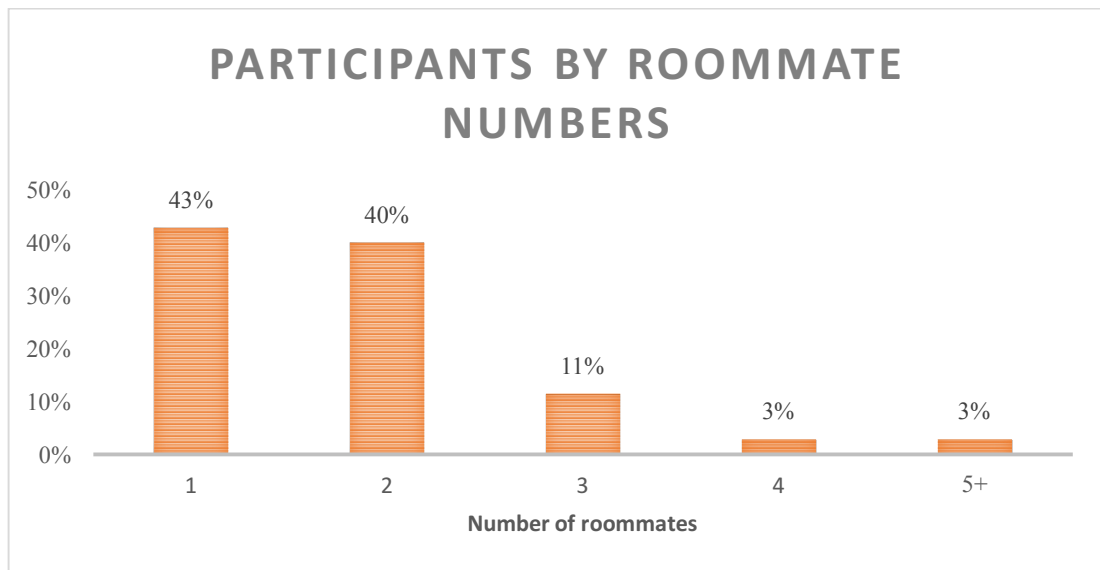


Figure 3 – Participants by roommate numbers

- When asked what bills are shared among the roommates, participants were given multiple choices. Among the choices, rent, electricity, Internet, and gas were the most shared bills at 94%, 83%, 77%, and 74% respectively. About 54% of respondents shared the water bill, 51% shared the cable bill, 31% shared the trash bill and the remaining 14% shared the cost of food.

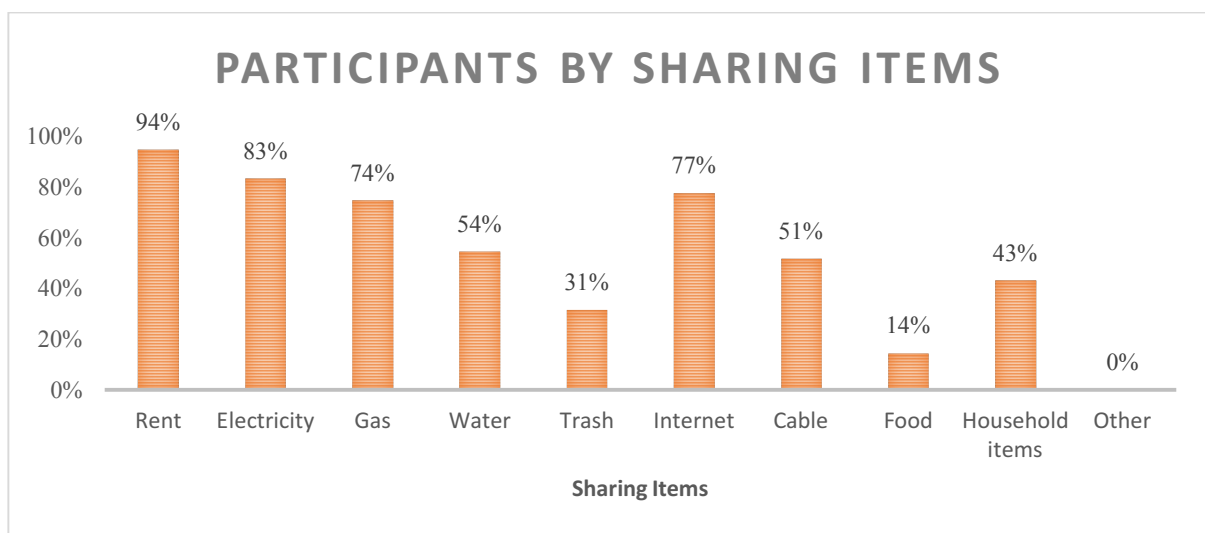


Figure 4 – Participants by sharing items

- Participants were asked if they track shared bills. Approximately 63% of participants stated they track their shared bills, 26% only track bills sometimes and 11% did not track any bills.

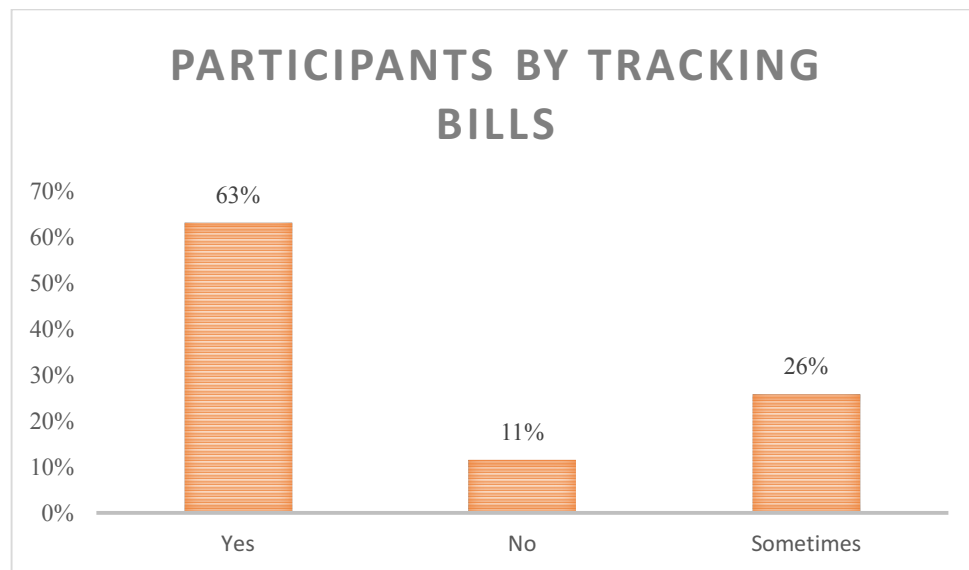


Figure 5 – Participants by who tracks their monthly bills

Data Collection Methods. We used Qualtrics to conduct our survey. Our survey contained 36 questions in total including 4 open-ended questions. Participants spent between 15 – 20 minutes to complete the survey.

In the survey, we asked these questions:

- *Screening questions.* We wanted to ensure that all our participants were above 18 years' old, currently living with other people who were not his/her spouse or family. If participants demonstrated he/she was not eligible for the survey, system would notify him/her and end the survey.
- *Relationship with the roommates.* We asked how participants found their roommates, how long have they known each other prior to living together, and how they described their feelings towards their roommates.
- *Personal opinions on living with others.* We asked participants why they chose to live with roommates and what they value when sharing a living space.
- *Payment process.* We asked about their preferred methods of communication, bill types, preferred payment methods and the time spent on paying shared bills.
- *Account management.* We asked the participants how they share account responsibilities, how they handled discrepancies in the sharing process, and how they tracked their bills.
- *Demographics.* We collected data on participants' gender, age range, roommate numbers.

Data Analysis Methods. We used Microsoft Excel to analyze the data that we collected from our survey. We began by creating spreadsheets for the different questions: relationship with the roommates, personal opinions on living with others, payment process, account management, and demographics. We sorted the raw data from our survey into these spreadsheets and generated charts to illustrate the participant's responses.

We used SPSS to test our two hypotheses:

- *Trust affects the transparency of bill sharing among roommates.* Understanding the need for transparency was assessed by asking which of the following statements the participant most agreed with: 1) No need for transparency – “I don't have to see the

bills every month, I prefer not to be the primary account holder or have access to accounts”; 2) Need for some transparency -- “I prefer to have access to all accounts, without being the primary account holder”; 3) Need for some transparency – “I prefer to split the primary account responsibilities between all my roommates”; 4) Need for transparency – “I prefer to be the only primary account holder in the household”. Next, level of trust was evaluated through the question Q14 “How much do you trust your roommate(s)”. ([Appendix 9](#))

- *Relationship between roommates affects their method of communication.* For Q15 “What is your preferred method of communication between/among your roommate(s) regarding bills”, We consolidated the preferred communication methods to two categories, analog and digital. Next, emotions toward the participant’s roommate(s) was evaluated through Q10 “Which of the following emotions most accurately describes your feelings toward your roommate(s)” ([Appendix 9](#))

Findings

In this section we will elaborate on findings that we discovered in our observations, interviews, and survey results. The data gathered in this section is tailored to specific themes that are related to our research question.

Observations Findings

In this section we will describe the themes that emerged from our findings. This section is divided into five parts: preparation, execution, confirmation, sequence model and expressed frustration.

Preparation. Preparation is the process that users went through to prepare to use the Venmo application to pay and manage bills.

All four participants waited for some form of communication with their roommates before opening the Venmo application. This typically came in the form of a text message or in person conversation with other roommates. This interaction worked as a catalyst, prompting users to make a payment.

Mike and Kewei started by calculating their monthly payments. Kewei opened Excel and used the application to track, manage, and calculate the amount they owed. He then shared this information with other roommates before opening the Venmo application. Mike used a third party application called Splitwise [3]. This application helped Mike manage and calculate his rent payment. The other two participants, Ashley and Linda, let their roommates delegate payments. They then waited for their roommates to request the money from them.

All four participants used Venmo on their mobile phones as opposed to the desktop application; all four users were more likely to access Venmo through their mobile phones (e.g., rather than tablet devices).

Execution. In this category, we describe our observations of the act of paying for bills using Venmo. Which is shown in the image below.

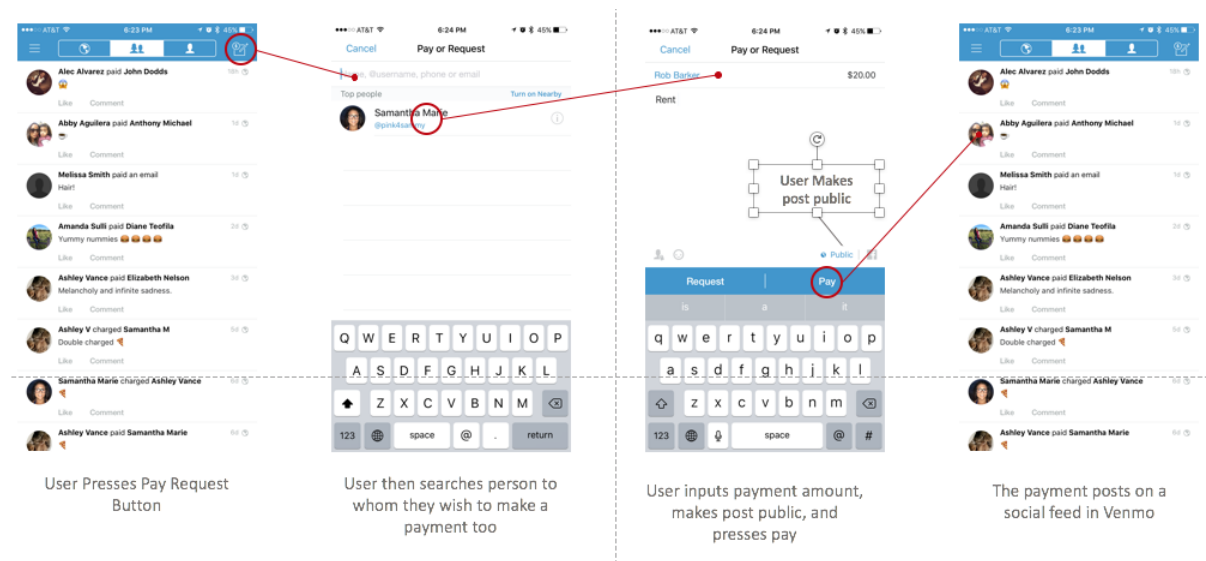


Figure 6 – Venmo Payment Process

Ashley, Kewei, and Linda started the process of paying in the same way. They opened the Venmo application and clicked on the “pay” or “request” button in the top right corner. The three users also used the search bar to look up the individuals they intended on sending payments to. Once this process is complete, the three users input the payment amount and named the payment “bill payment”.

Ashley and Linda allowed their payments to post publically to the Venmo live feed. Ashley used the live feed as a way of sharing a “funny” message, engaging in the social aspects of the application.

None of the users enrolled in automatic monthly payments; i.e. entered payments manually.

Mike was the only user to use a completely different method of payment. He did this by using an application called Splitwise, which linked to Venmo. Once the user reaches the payment process step, they tap on the “Venmo” button and complete the payment process.

Confirmation. The confirmation process is the moment in which users end the payment process.

Kewei was the only user to verbally confirm the completion of the payment process with his roommates. Linda and Ashley waited for a confirmation on behalf of Venmo to let them know the process was complete. Both Ashley and Linda also used the live feed as a way to confirm the completion of the payment process between roommates.

Mike awaited the receipt of a confirmation text messaged from the application Splitwise; this is how he knew the payment process was complete.

Sequence Model. The sequence model (Figure 7) describes the average user path we observed. This path describes the user flow for an individual using Venmo to make a rent payment. This model is built from the common steps shared by the four individuals. We removed the use of third party applications like Splitwise in the user flow, because only one participant used it.

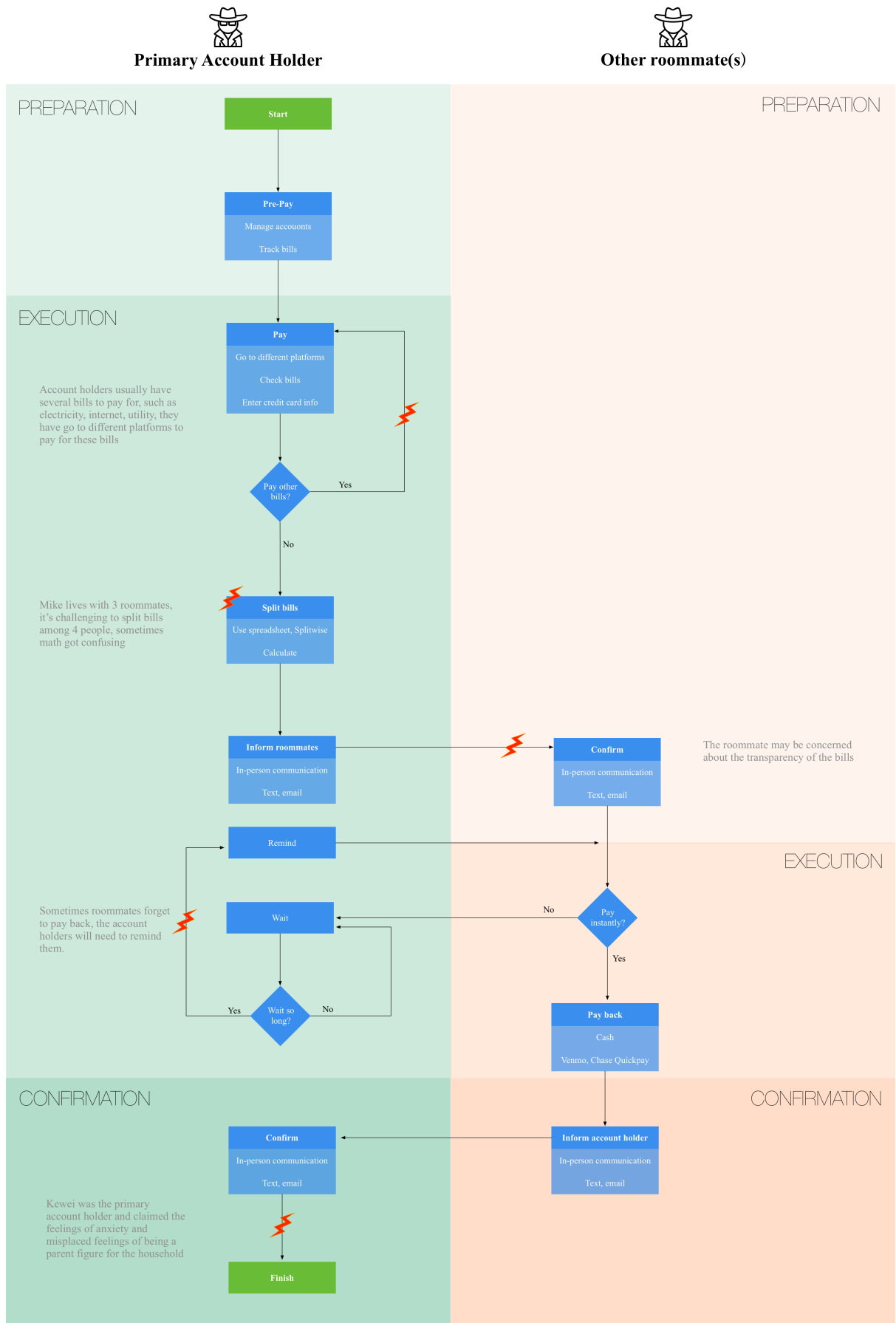


Figure 7 – Sequence Model

Frustrations. Our participants voiced frustrations about their current bill sharing methods; i.e., the use of Venmo. Mike, who was using both Splitwise and Venmo expressed that his two female roommates didn't quite "get" how to use Splitwise, while Venmo was very easy to use. He also told us that it was challenging to split bills among four roommates, and how sometimes the math got confusing.

We also found that Venmo charges users 3% if you are using the app with a Credit Card. Mike also discussed the security risk of hooking up an app like Venmo to a Debit Card, which is why he paid the 3%.

Another area of frustration was when Kewei took on the full responsibility or burden of paying and managing all the bills. This caused feelings of anxiety and misplaced feelings of being a parent figure for the household. These feelings could lead to bad household relationships.

Interview Findings

In this section we will describe the findings that emerged from our interview reports. This section is divided into five themes:

- Number of roommates do not affect probability for conflict
- Negative relationships between roommates can affect the level of trust during the payment process.
- Preferred methods of communication during the bill paying process
- Payment process and execution
- Banking and management

Number of Roommates and Conflicts. Approximately 50% of our interview participants lived with two roommates. This group included Candice, Ran, Dan, Hayley, Stephanie, and Ken. The other 40% of the participants lived with one roommate. The remaining 10% lived with five roommates. We assumed that a larger roommate population would increase the possibility of conflict. We found no association between the number of roommates and a higher number of conflicts.

Conflicts between roommates fell into two categories: (1) lifestyle and (2) payment process conflicts.

Lifestyle conflicts were issues between/among roommates and their lifestyle choices. Those choices might affect roommate relationships within a shared space. Candice mentioned issues with her roommates "guests" and recreational practices: *"Because we have a small apartment and there is three of us. We are always in each other's way. My other roommate leaves her weed everywhere... and in the silverware drawer so everything smells."*

Payment conflicts were rooted in distrust of how expenses are handled and split. Both Candace, Yunshan, Julie, Joe, and Ken expressed concern with payments that are not under their control (i.e. cable bill under another roommates account). Joe expressed how he handled these type of conflicts with past roommates when he told us, *"As I recall, it was over a... it was a weird situation where we had to pay an electric bill. It was over charged for some reason. As opposed to saying who overpaid here or who overpaid there.... I just said*

[whatever] and paid it all myself (laughs)". Talking about this confrontation left Joe visibly upset. Issues of this nature can impact the bill paying process, leading to trust issues.

Negative Relationships Between Roommates and the Level of Trust. Candice, Julie, and Yunshan developed negative relationships toward their roommates. They also expressed distrust with their payment process. Candice stated *"I don't have any visibility into the bills and I don't know if we are getting charged for anything like a late payment or something."* and Yunshan said *"I put 100% trust in her. But there was a time I looked at her record and found something that was not what I expected. So I talked to her and she said "Oh, yeah, maybe there was a mistake", and then she corrected it"*. But after that incident, he told us that he checked the bills himself to make sure everything was on the right track.

Both Candice and Yunshan didn't know their roommates prior to moving in with them. They met their roommates on sites such as Craigslist. We felt that there was a possible correlation between distrust and level of friendship between roommates.

About 70% of our interviewees expressed having a positive or neutral relationship with their roommates. Ken said he "liked" his roommates and that their payment process is "fine". Ken lives with two roommates. One of his roommates is a close friend from law school, and the other is a distant acquaintance. Ken believes that trusting his roommates is imperative to the payment process, telling us, *"It makes it easier as long as you trust the person isn't lying about ... how much the heat is or something."*

Joe also stated having a "good" relationship with his roommate. Their friendship reached back to middle school. Joe's roommate is a secondary account holder on all the utilities. Joe said *"Stan is on all three accounts as a secondary, so we can both call or take care of the bills by paying them online. If I die he can take care of it (laughs)"*. Joe shares his accounts with his roommate because he "trusts" him. Ken and Joe are examples of how prior relations can positively affect the level of trust in the payment process.

Preferred Methods of Communication During the Bill Paying Process.

Approximately 70% of all interviewees stated they believe that the best form of communication between roommates is through text/email. Marcus, Joe, and Hayley mentioned that they prefer verbal communication between roommates. For example, Joe stated *"We are pretty open about everything, so it's like if we need something we just talk about it, you know?"* and Hayley, when asked how she communicates with her roommates said *"Mostly find them in person"*.

Ken, Candice, Emily, Ami, Dan, and Yunshan mentioned having complicated schedules that often conflict with those of their roommates. When asked about preferred channels of communication, Emily said *"Almost always through texting since I'm never really there"*. Many participants rely on texting. This is because they don't see their roommates. This lack of contact is often attributed to busy schedules. Candice and her roommates also use texting as their primary form of contact, *"depends on what we are talking about... If it's something important... it's usually via text. It's usually during the day and we are not all together"* We believe there is an association between digital communication and scheduling differences. Complicated schedules lead to a less face-to-face communication among roommates.

Approximately 70% of our interviewees used digital communication to make contact. Yunshan only used digital communication when discussing the bills and household

expresses. He preferred face-to-face contact when discussing other living issues. Julie expressed her preference for face-to-face contact. She likes *“having people to talk to”*. Both Julie and Yunshan preferred group texts when discussing bills.

Payment Process and Execution. Approximately 80% of those interviewed preferred using digital payment options like Paypal and Venmo. Ran, Julie, Yunshan, Hayley, Candice, Marcus, Dan, and Ami were included in this group. Candice said *“It’s easy... it takes two seconds. You literally go on and type in the amount and hit pay. You don’t have to login in and confirm your bank account all the time”*. People who made digital payments discussed the ease of use; digital payments helped to reduce complications that come with handling cash and checks. About half, 40% of interviewees, hoped for an application that better managed all their payments automatically.

Joe and Emily preferred cash payments as opposed to digital. Joe believed that his living situation required cash because his roommate did not “adapt” to technology very well. Joe mentioned a payment application that would *“Make everything automated”*. Joe doesn’t want to talk to anyone, he would rather have the payments done for him. When asked “What improvements can be made to your payment process?”, Emily believed that the use of Cash Quick Pay would make this process much more efficient. Emily also said *“I don’t really have checks. Like, no one does that anymore”*. We believe that roommates unwillingness to adopt new technologies is one of the major challenges for products like the one we are considering in this project.

Banking and Transparency. Most (80%) of those interviewed requested more transparency in the payment process. Candace said *“I think it would be cool if all the bills could be automatically uploaded somehow. Then the app sent you a reminder. Instead of having to pay one person it was almost like this shared account but it’s being used like a shared bank account”*. Instead of one or more individual managing all of the bills. This would reduce of the amount of stress of managing multiple accounts as well as increase trust among roommates.

Roommates who hold strong and trusting relationships also requested more transparency. Ami lives with five of her friends/co-workers. Ami’s perfect application would *“be more transparent about how much each bill actually costs”*. We believe that a majority of users would like to be more involved in the billing process and have a better understanding of their costs. Transparency was only practiced by one interviewee, Joe, whose roommate was a secondary account holder on all the utilities. This eased any doubts about the payments between the two.

All interviewees would like to manage accounts and payments through mobile applications.

Survey Findings

We categorized our survey findings into three groups: (1) Relationship with roommates, (2) Payment process, and (3) Trust, Transparency, & Account management.

Relationship with Roommates. We started by asking our survey participants about their relationships with their roommates. Most (83%) of respondents lived with 1-2 roommates. About 11% lived with three roommates, and 6% lived with more than three roommates.

When asked about why they choose to live with others, 50% of respondents “strongly agreed” that they lived with roommates to save money and 40% agreed to living with roommates because it is “practical.”

Approximately 23 respondents (66%) said that their current roommates were friends. Four respondents lived with strangers, and 5 lived with classmates (Figure 8). About a third (10 respondents - 29%) knew their roommate that they had lived with the longest for less than three months prior to living together; about a quarter (8 respondents - 23%) knew their roommate that they had lived with the longest for three years or more (Figure 9). Almost all (91%) of our respondents knew each other prior to moving in.

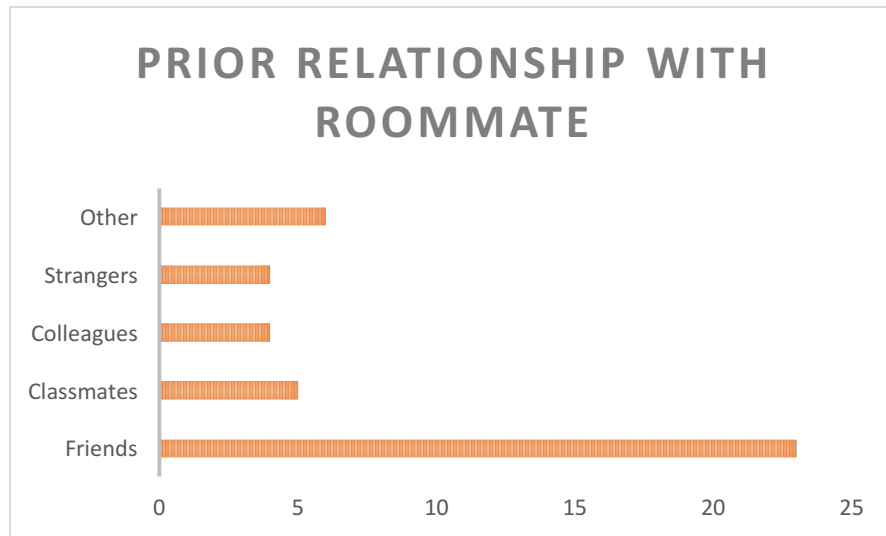


Figure 8 – How did you find your current roommate(s)?

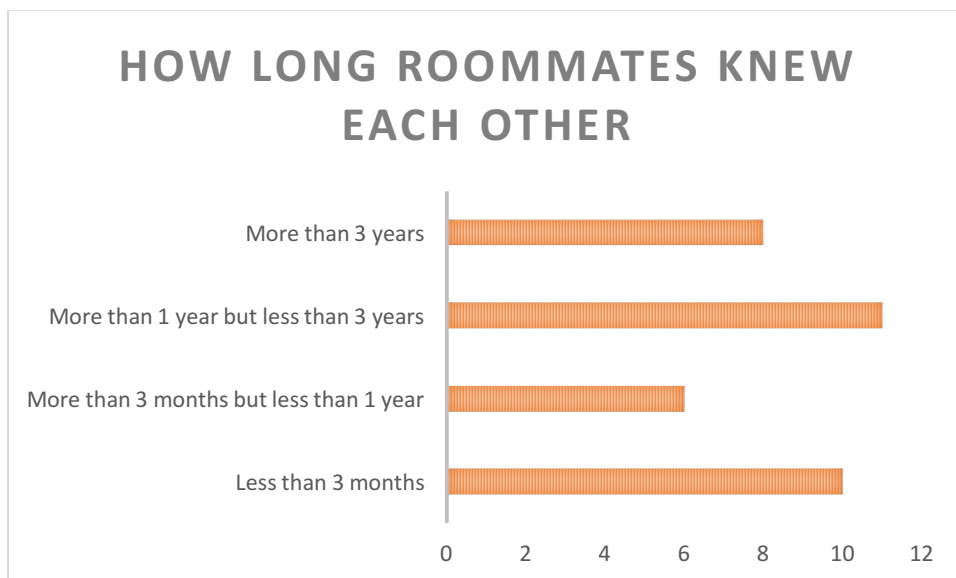


Figure 9 – How long did you know the roommate you’ve lived the longest with prior to living together

About 94% of participants expressed positive relationships with their roommates, whether that was slightly positive, moderately positive, or extremely positive. One participant had neither a positive or negative relationships and one participant had a moderately negative relationship (figure 10). Participants provided feedback when asked “Please tell why you feel

this way about your roommates?” The feedback was overwhelmingly positive individuals said “*He's reliable, friendly, and helpful*” and “*We enjoy their company and knew them before becoming roommates.*” Not all of our responses were positive “*Personal Conflict over certain issues*” and “*She leaves dishes in the sink and has an asshole cat*” also came up. Personal conflict and lifestyle were a few of the issues that arose during our interviews.

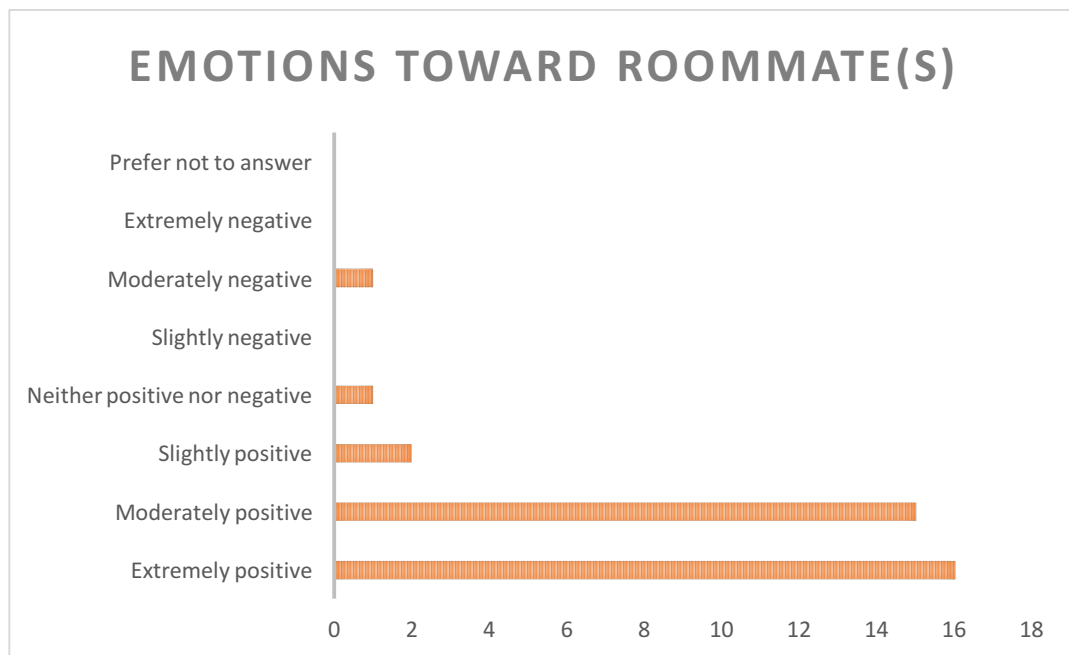


Figure 10 – Which of the following emotions most accurately describes your feelings toward your roommate(s)?

We ran two Kruskal-Wallis tests, our first test was to understand the relationship between emotions toward roommate(s) and communication preference. Our non-directional hypothesis is that the relationship between roommates affects their method of communication.

We investigated the impact of the emotions toward the participant’s roommate(s) on their communication preference about the shared bill paying processes. we combined (1) analog methods (In-person + over the phone) and (2) digital methods (text + email) for our two independent variables. See Table 3. Our independent variable was emotional feelings, rated on a 5-point likert scale from very negative to very positive, and our dependent variable was communication type (digital vs. analog). Differences were significant, $H(2) = 10.060, p = .002$ with a mean rank of 12.75 for those who preferred in person communication and a mean rank of 22.42 for those who preferred digital communication. Most of the participants who have extremely positive emotions toward their roommate(s) preferred in person communication over digital communication (texting, email, etc). See [Appendix 9](#) for SPSS data.

Independent Variable (Preferred Communication Method)	Survey Answer	N
Analog (1)	In person	16
	On the phone	
Digital (2)	Text message	19
	Email	
	Group message app	
	Other (All write in answers were digital forms of communication)	

Table 3 – Survey answers about communication method

Payment Process. Through our interviews and observations, we have explored the payment process and how it's affected by external factors. We focused a portion of our survey on payment process itself. We wanted to determine if the findings we gathered in our interviews were accurate to a larger population. Our survey results were consistent with our previous findings. While 57% of participants do not use tools (Venmo, PayPal, etc.) to split payments among roommates, 43% of participants are currently using tools to manage the payment process.

Among the participants who do use payment tools (check all that apply) about 67% use Venmo, 33% use Chase quick pay, 20% use PayPal, and 27% checked other. Respondents that checked "other" reported using Split wise, Square Cash, and Rent portals offered by their property managers (table 12). This is also consistent with our interview findings. Many of our participant's mention using Venmo as a primary tool in splitting rent and utilities.

When asked "How frequently do you use the following payment methods to pay bills?" Mobile and desktop applications made up of 46% of the "always use" category in our priority matrix. Cash, check, and direct deposit made up 32% of that same category. Users are more likely to use Mobile and desktop banking applications to handle personal finances as opposed to using the same type of tools in shared billing situations.

Trust, Transparency, & Account Management. Most (95%) of respondents trust their roommates a lot or a great deal. There is obviously an association between the 95% level of trust and 85% of participants expressing positive relationships with roommates. When asked "*which of the following statements do you agree with*", about half (43%) of participants

agreed with “I prefer to split the primary account responsibilities between all of my roommate(s) (see Table 4).

Answer	Percentage	Count
I don't have to see the bills every month; I prefer not to be the primary account holder or have access to accounts.	26%	9
I prefer to have access to all accounts, without being the primary account holder.	11%	4
I prefer to split the primary account responsibilities between all of my roommate(s).	43%	15
I prefer to be the only primary account holder in the household.	17%	6
Other	3%	1
Total	100%	35

Table 4 – Account Management

When asked about the last time they had issues in the bill paying process, multiple participants listed “*forgetfulness*” as an issue. One participant said “*We had a disagreement over whether I had given her cash for the previous month's internet bill*”. Most of these issues were resolved through communication. Most (63%) of participants track their monthly bills. Of those tracking their bills 68% use spreadsheets and 39% used applications like Wanderlust, Mint, and Splitwise.

About half (48%) of participants believed that tracking their bills impacted their financial decisions to some degree. Participants believed that bill tracking helped them realize how much they were spending and that it helped them budget. One participant said “*Be aware of turning off the lights and stuff.*” This individual used bill-tracking systems as way to track cost trend within their utilities. When we asked if automated bill reports would be helpful only 3% felt it would be useless; the remaining felt it would be extremely useful (37%) or moderately useful (51%).

We investigated if there were differences in the level of trust between roommates from people’s varying needs for transparency in their shared bill paying processes. Our independent variable was level of trust, and our dependent variable was the needs of transparency (no need for transparency, need some transparency, need for transparency). We performed a Kruskal-Wallis test, and discovered the differences were not significant, $H^2(2) =$

4.35, $p = .11$ with a mean rank of 18.10 for “*no need for transparency*”, 20.00 for “*need some transparency*”, and 11.50 for “*need for transparency*”. See [Appendix 9](#) for SPSS data.

Independent Variable (Need for Transparency)	Survey Answer	N
No need for transparency (1)	I don't have to see the bills every month, I prefer not to be the primary account holder or have access to accounts.	10
Need for some transparency (2)	I prefer to have access to all accounts, without being the primary account holder. I prefer to split the primary account responsibilities between all of my roommate(s).	19
Need for transparency (3)	I prefer to be the only primary account holder in the household.	6

Table 5 – Survey Answers About Transparency

Models

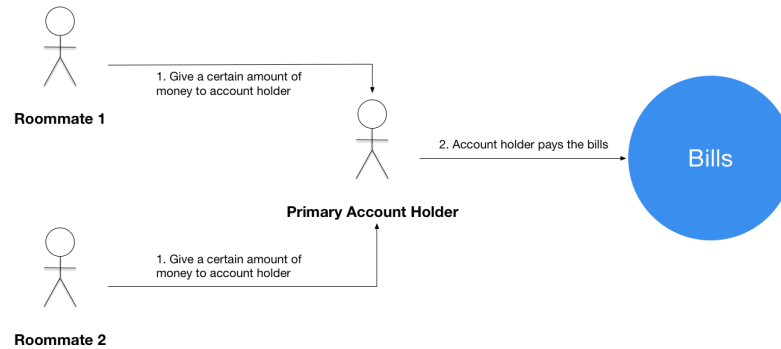
Our three models were derived from findings. We created user spectrums ([Appendix 7](#)) to segment our personas.

SINGLE ACCOUNT HOLDER + FLAT RATE

Representatives: Candice, Ami, Dan, Julie

Key Characteristics:

- Often used when there're more than 3 people in the apartment. (S5)
- Because there're more people in the group, they're more likely to encounter time conflicts, making it difficult to meet in person. (S3)
- The bills are not transparent.
- Due to non-transparency, more lifestyle conflicts, and lack of communication, this group is more likely to have negative relationship. (S9, S10)



Quotes

- *"Because we have a small apartment and there is three of us, we are always in each other's way. My other roommate leaves her weed everywhere... and in the silverware drawer so everything smells"* — Candice
- *"The best way is text so that everyone gets the same information"* — Ami
- *"Another situation that was confusing in the past was having many different people responsible for what (paid parking spot, rent, utilities) and they were all managed by different people in the house so you pay each of them different amounts"* — Ami
- *"I like our currently way to share bills, there's no trouble and it's straightforward"* — Dan

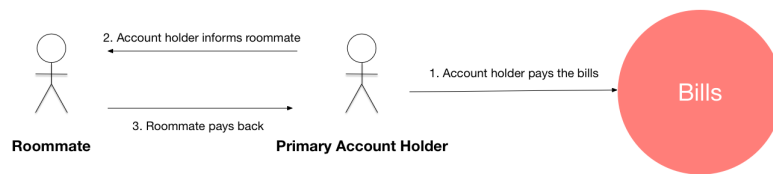
Figure 11 – Persona 1

SINGLE ACCOUNT HOLDER + EQUALLY SPLIT BILLS

Representatives: Yunshan, Marcus, Ken

Key Characteristics:

- The account holder will probably organize their payment behaviors (e.g., planned payment date, track bills) because he is responsible for almost everything. (S6, S8)
- Bills are not transparent at all, and the amount of payment are more likely to be manipulated by the account holder
- Fairly efficient, but primary account holder has too much to do, e.g., manage account, track bills, split bills, etc.
- Relationship between roommates may vary, depending on the morality level of account holder and trust level among all the roommates. (S9, S10)



Quotes

- *"So keeping a record of our bills was her job and I just needed to pay. I put 100% trust on her. But there was a time I looked at her record and found something that was not what I expected."* — Yunshan
- *"I use excel... google excel. I write down how much money is owed for each person. I also put the due date of the bill."* — Marcus
- *"On the 14th of the month, I can check my credit card statement and then populate the spreadsheet."* — Marcus
- *"I wish I would have done this method where one person does everything in the past honestly. It makes it easier as long as you trust the person isn't lying about like... how much the heat is or something."* — Ken

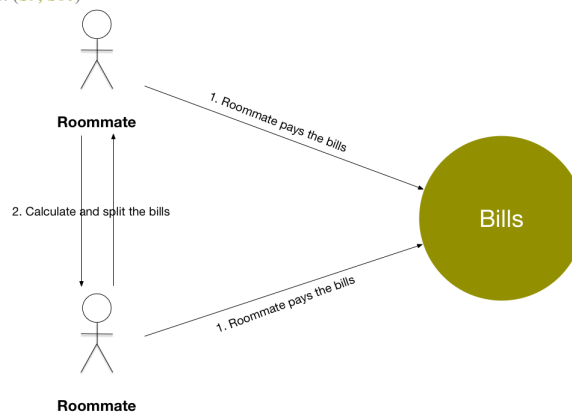
Figure 12 – Persona 2

MUTUALLY SHARED ACCOUNTS + EQUALLY SPLIT BILLS

Representatives: Stephanie, Joe

Key Characteristics:

- Prefer to use physical payments. Partly because some of them are not quite adapted to technology, partly because they don't quite mind the payment method. (S4, S7)
- All roommates get access to bill accounts, everybody pay for bills.
- Totally transparent.
- Have the most positive relationship. (S9, S10)



Quotes

- “We kind of just cover things for each other, like we don't like... split it down the middle or anything or like...keep track. If she like gets the milk one trip I'll make sure to get whatever we need next time. We're both pretty laid back about it.” — Stephanie
- “Stin is on all three accounts as a secondary, so we can both call or take care of the bills by paying them online. If I die he can take care of it (laugh).” — Joe

Figure 13 – Persona 3

Discussion and Conclusions

Shared living arrangements with those that are not a spouse or family member has steadily increased over the last several years [1]. This is in part due to an increase in the cost of living that is not balanced by an equal increase in income [2]. In our experience, shared living can be stressful, especially if roommates are not paying their fair share of the bills. We believe that a more effective shared bill paying mechanism is an area for discovery to reduce conflict among roommates.

Our observation, interview, and survey participants shared payments for rent, utilities, general household products, and food. During our observations, all participants used the Mobile Application, Venmo, to facilitate payments. Some also used external applications, such as Spreadsheets and Splitwise (another Mobile Application) to help manage the tasks involved in shared bill paying. Our interviewees and survey participants used a variety of tools for bill paying. These included Venmo, PayPal, Chase QuickPay, cash, checks, and spreadsheets. This suggested there is a need for flexibility in payment methodology. Providing this level of flexibility would require partnering with companies like Chase and PayPal (who also owns Venmo) to implement these payment methods into a seamless solution.

Our observations, interviews, and surveys led to several implications for design. Through our interviews we discovered much more about the relationships between roommates and what affect that has on the shared bill paying process. Those with a positive (i.e. trusting) relationship preferred in person communication, while those with negative (non-trusting) relationships preferred text message or email communication. This discovery was supported in our surveys. This dichotomy leads us to believe certain features such as automated reminders and due date alerts would be helpful to reduce confrontation regardless of the trust level; however, communication features should be customizable to adjust for differing levels of trust.

Additionally, our observations supported that there was a need for automation in the shared bill paying process. Our interviewees displayed a spectrum of preference for automation, in which some preferred manual methods of payment. Our interviewees also indicated differing opinions about tracking or recording monthly bills. Some were very diligent about keeping tidy records, while others never felt the need to do so. We believed a higher level of trust would be fostered with greater transparency of the bill paying process; i.e., one primary account holder versus shared account responsibility. However, we did not find statistical significance among the level of trust and need for transparency. The majority of survey participants expressed that an automated report of their bills and their monthly, quarterly, and annual trends for evaluation would be extremely useful. Through the survey we also discovered that tracking bills impacted participant's financial decisions. This further emphasizes the need for accurate and automated tracking and trending of their bills in a final solution.

Security was also briefly discussed in our interviews. Many respondents were not interested in security features, but we believe that any application dealing with personal finances requires a high level of security.

Limitations and Future Work

One limitation for the observation and interview studies was that we recruited through our personal networks and our friends were not demographically diverse. For example, all observation and interview participants were 22-28; survey participants, which were from a more diverse pool were still somewhat limited in age range (18-34 years old). Living situations also vary geographically, additional evaluation could be done in more suburban and rural areas. In the future, we could also explore different living arrangements i.e., significant others living together, and the landlord to tenant relationship.

Other application features we plan to explore are social media integration and impact of bill costs on financial decisions. It is likely that level of trust would impact who would be interested in sharing this kind of information socially. Additionally, it would be interesting to better understand the relationship between one's bill paying process and their overall financial decisions. Furthermore, we should investigate how significant an impact automated reports and trending data of bill costs has on someone's overall financial decisions.

After investigating the problem space of shared bill paying among roommates through observations, interviews, and surveys, we would like to prototype some initial solutions and working with participants through iterative design.

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3. "Splitwise." What Is Splitwise? Web. 02 Oct. 2016.
4. "Venmo." Venmo How It Works. Web. 02 Oct. 2016.

Appendix 1: Observation Plan

1. Introduction:

Hi, I'm _____, thank you for participating in our research project. As a group, we're studying how tenants share their bills when living together. I would like to observe you performing the bill sharing action using Venmo. There will be some preliminary questions regarding your demographics before we begin and some follow-up questions after the observation is over. Your information is totally confidential, no one will get access to it except for the group members and the professor.

I'll be watching you performing the actions and will be taking some notes. I'll also ask you some questions if I find something interesting. Do you have any questions before we begin?

2. Have Them Sign the Informed Consent Form

Now I would like you to read the informed consent and sign your name. [present the informed consent]

3. Preliminary Questions Regarding Their Demographics

Before we begin, I have some preliminary questions for you:

- How old are you?
- How many roommates do you have?
- How do you know your roommates?
- How long have you lived with them?
- How do you communicate with your roommates about bill sharing (due dates, costs, etc.)?
- What bills do you share?
- How do you handle multiple shared bills?
- How long have you been using Venmo?
- What other means do you use to split any shared bills?

Google Survey <https://goo.gl/forms/qj1o4wEAx7d0De4j1>
<https://goo.gl/forms/qj1o4wEAx7d0De4j1>

4. Reminders to User Before Observations

I will be the apprentice and I will watch you as the master, by watching what you do. Occasionally, I'll ask a question or you can explain to me a key point about something; but ultimately, your role as the master will be to do what you normally do. Also, just narrate what you're doing without having to think about it or having to explain why you're doing it. Does this make sense

5. Observation

Ask questions, clarifications, and walk-throughs of an action occasionally, but don't let a discussion take over.

Try not to interrupt at all, but definitely jot down questions and clarifications you couldn't ask during the observation.

6. Follow Up Questions

[ask any questions that came up during the observation]

- What are the challenges you face when sharing bill payment between roommates?
 - Communication
 - Tool
- During the observation, was there anything that made you frustrated or anxious?
- Do you have any other comments about this observation?
- Do you have any suggestions on how I could perform the observation better?

Thanks you again for participation.

Appendix 2: Informed Consent

BILL SHARING - OBSERVATION

ADULT CONSENT TO PARTICIPATE IN RESEARCH

FACILITATE SHARED BILL PAYING AMONG ROOMMATES

Principal Investigator: Nadine Dawud, Johnathon Sanchez, Fei Gao, Elena Naidis.
Graduate Students in the Human Computer Interaction (HCI) Master's Program

Institution: DePaul University, Chicago, Illinois, USA

Department (School, College): College of Computing and Digital Media – Human
Computer Interactions Master's Program, DePaul University

Faculty Advisor: Cynthia Putnam, PhD., Associate Professor CDM, DePaul University

Collaborators: Nadine Dawud, Johnathon Sanchez, Fei Gao, and Elena Naidis.

What is the purpose of this research?

We are asking you to be in a research study because we are trying to learn more about how we can facilitate shared bill paying by roommates through a technology-based solution. We would like to observe people using bill paying applications. This study will allow us to understand the actions users must go through when completing a bill paying task. We will then analyze the information gathered in this observation to support our research question "How can we facilitate shared bill paying by roommates through a technology-based solution?". We hope to simplify this process and reduce the many complications that come with shared rent and utilities among roommates. This study is being conducted by HCI graduates students at DePaul University. This study is being conducted by Nadine Dawud, Johnathon Sanchez, Fei Gao, and Elena Naidis. This research is being supervised by his faculty advisor, Cynthia Putnam. There may be other people on the research team assisting with the study.]

We hope to include about 4 people in our observation research.

Why are you being asked to be in the research?

You are invited to participate in this study because you are currently using bill sharing/paying applications. You have used application of this nature in your everyday life to complete tasks such as paying bills, paying back friends, or paying rent/various costs. We believe you are a perfectly qualified to conduct the multiple actions that we request in this observation.

You must be age 18 or older to be in this study. This study is not approved for the enrollment of people under the age of 18.

What is involved in being in the research study?

If you agree to be in this study, being in the research involves conducting a 30 minutes - 1-hour user observation. Here we will ask you to complete a set of tasks within a bill paying application. This observation will take place at a location that is best suit for the participant

and our observers. This information will be discussed and planned in the participant ahead of time.

The observation will start with our introduction phase. This is where we will provide you with information regarding our study, goals, tasks, and why we need your participation. A series of background questions will be asked of you. These question will help to bring further insights to our observations. You can choose not answer these questions if you feel uncomfortable. You will then be asked to fill out a consent forum, this is optional and you do not need to give consent.

Our second phase begins, This is the observation step. The observer will then explain the tasks that they wish for you to complete. Here we will also set the stage for a mock scenario for example. You are at home and realize that you need to pay rent to your roommate. How would you use this application to complete that task? At this point the user will conduct the task as the observer takes notes and watches the user complete tasks. The observer has the floor and can ask you questions along the way. We would like you to complete the task to the best of your abilities. This task will be completed once the participant completes the actions requested of them. The purpose of this phase is watch the user complete a task in a natural setting. We will be able to gather insights and understand your bill paying process.

The last phase is the wrap-up. This is where we open the floor to you the participant. Here we can ask each other questions about the process, issues, and complications that arose.

All information will then be gathered and reviewed with our team. We will pool all the data from our observations and search for themes and compilations. The data gather here will help to influence direct our efforts as better understand bill sharing process among roommates.

The interview will not audio recorded. Will transcribed our observations into written notes in order to get an accurate record of what you said.

How much time will this take?

The interview will take about 30 minutes - 1 hour too complete. This time frame can change based on quickly you completely the task. The observation will be divided into three segments. Segment one is the introduction. Segment two is our observation. The last and final segment is the wrap-up. You have the right to stop the observation as anytime you see fit.

Are there any risks involved in participating in this study?

Being in this study does not involve any risks other than what you would encounter in daily life. You may feel uncomfortable or embarrassed about answering certain questions. You do not have to answer any question you do not want to. Your information will only be shared with our team of researchers. This information will also be coded to keep confidentiality.

Are there any benefits to participating in this study?

You will not personally benefit from being in this study. Your insights will allow us better understand the bill sharing process between roommates. This data can then be used to make informed decisions about how simplify this process and improve the lives of renters here and abroad.

Are there any costs to me for being in the research?

There is no cost to you for being in this research study.

Can you decide not to participate?

Your participation is voluntary, which means you can choose not to participate. There will be no negative consequences, penalties, or loss of benefits if you decide not to participate or change your mind later and withdraw from the research after you begin participating.

Who will see my study information and how will the confidentiality of the information collected for the research be protected?

The research records will be kept and stored securely. Your information will be combined with information from other people taking part in the study. When we write about the study or publish a paper to share the research with other researchers, we will write about the combined information we have gathered. We will not include your name or any information that will directly identify you. We will make every effort to prevent anyone who is not on the research team from knowing that you gave us information, or what that information is. However, some people might review or copy our records that may identify you in order to make sure we are following the required rules, laws, and regulations. For example, the DePaul University Institutional Review Board. All information will be coded and names will be altered. This is meant to keep all participant information confidential.

What if new information is learned that might affect my decision to be in the study?

This observation is not longitudinal study. You are able to stop the interview at anytime you like. If you no longer wish to participate. You have the option withdraw from the interview at anytime. You can also request the observer to refrain from documenting anything you do not wish to have recorded.

Example: If we learn of new information or make changes to any portion of the study, and the new information or changes might affect your willingness to stay in this study, the new information will be provided to you. If this happens, you may be asked to provide ongoing consent (in writing or verbally).

Who should be contacted for more information about the research?

Before you decide whether to accept this invitation to take part in the study, please ask any questions that might come to mind now. Later, if you have questions, suggestions, concerns, or complaints about the study or you want to get additional information or provide input about this research, you can contact the researcher,

Principal Investigators:

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Fei Gao

Email: gaofei@gmail.com

Elena Naidis

Email: elena.naidis@gmail.com

Faculty Advisor:
Cynthia Putnam
Email: cputnam@cdm.depaul.edu

This research has been reviewed and approved by the DePaul Institutional Review Board (IRB). If you have questions about your rights as a research subject you may contact Susan Loess-Perez, DePaul University's Director of Research Compliance, in the Office of Research Services at 312-362-7593 or by email at sloesspe@depaul.edu.

You may also contact DePaul's Office of Research Services if:

- Your questions, concerns, or complaints are not being answered by the research team.
- You cannot reach the research team.
- You want to talk to someone besides the research team.

You will be given a copy of this information to keep for your records.

Statement of Consent from the Subject:

I have read the above information. I have had all my questions and concerns answered. By signing below, I indicate my consent to be in the research.

Signature: _____

Printed name: _____

Date: _____

Appendix 3: Affinity Diagram

Below is our affinity diagram. The diagram is composed of the findings and observation notes gathered by our team. Our findings were grouped and sorted into three key sections describing the impactful stages of this observation.



Figure 14 – Affinity Diagram

Appendix 4: AEIOU Framework

AEIOU

Observation Framework

Researcher (R!): _____

Location: _____

Date: ____/____/____

The *AEIOU* framework is primarily used to code data gathered from ethnographic research. AEIOU stands for Activity, Environment, Interaction, Object, and User where: *activity* is the overarching goal of the *user*; the *environment* is where the *activity* takes place; the *interaction* is what needs to occur to carry out the *activity*; the *object* is any tool used (physical or not) to carry out the *interaction*; and the *user* is the one performing the *activity*.

USER(S)

What do we know about the user(s)?

Name: _____

Job Title: _____

Did I thank the user? Yes No

Age: _____

ACTIVITY / ACTIVITIES

What activity or activities is the user trying to accomplish?

ENVIRONMENT

Indicate the environment where the activities are taking place. Draw, write, or both.

AEIOU

Observation Framework

Researcher (R!): _____

Date: ____ / ____ / ____

INTERACTION/OBJECT	START TIME	END TIME
	____:____ AM PM	____:____ AM PM
<p>____:____ AM PM</p> <p>R! Questions/Comments:</p>	Interaction(s):	Object(s):
<p>____:____ AM PM</p> <p>R! Questions/Comments:</p>	Interaction(s):	Object(s):
<p>____:____ AM PM</p> <p>R! Questions/Comments:</p>	Interaction(s):	Object(s):
<p>____:____ AM PM</p> <p>R! Questions/Comments:</p>	Interaction(s):	Object(s):
<p>____:____ AM PM</p> <p>R! Questions/Comments:</p>	Interaction(s):	Object(s):

Appendix 5: Interview Protocol

INTERVIEW PROTOCOL: OBJECTIVE

Goal: To gain unbiased user data about bill sharing among roommates. This data will shed light on the complications and experience of sharing bills with multiple individuals. It will allow us to extract the issues in bill sharing and understand the needs and goals of the users. We must remember that we are not the user, which means we must not influence the interviewee as this would compromise the value of the data. Lastly, we will try and remain neutral during the duration of this interview [CP1] because positive/negative responses both physical and verbal may influence the interviewees responses.

Roles: Interviewer/Facilitator:

- Conduct interview and build a rapport with the interviewee

INTERVIEW PROTOCOL: INTERVIEW GUIDE

We are trying to understand how people in roommate situations bill share. We are interested in understanding more about your experiences in sharing and paying bills with your roommates.

Our interest is in learning from your experience. The collected comments, experience and suggestions from all of the interviews will be summarized; your information will be kept confidential.

This interview will take about 30 minutes. [CP1] There are no right or wrong answers to my questions; I want to hear what you have to say. Now we would like for you to view and sign the consent form, allowing us to record this conversation. You can ask to stop the recording at any time.

Research Question:

- How can we facilitate shared bill paying by roommates through a technology-based solution?

Screener questions

- Do you have roommates?
- Do you rent or own?

Intro Questions/Build Rapport:

- In the screener, you said that you had roommates. How many?
- How did you meet your roommates?
- How long have you lived with these roommates?
- How do you feel about your roommates?
- How do you feel about your current living situation?
- What is your preferred method of communication among your roommates?

General issues: Bill splitting

- How do you split the bills among your roommates?
 - Probe: Who is the primary bill payer in the household?
 - Probe - What bills do you split?
 - How do you split your bills (Venmo, PayPal, checks, etc.)?
 - How do you all manage the utility accounts?
 - How do you all manage the rent?
 - How do you all manage ad hoc shared costs (food, household items, etc.)
 - How long does your shared bill paying process typically take?
- What improvements can be made with your current bill sharing methods?

Deep focus: Conflicts

- Has there ever been a time where your roommates didn't pay their share of the rent/utilities?
 - (If yes) Tell me about how you dealt with the situation.
- Has there ever been a time when splitting bills among your roommates caused confusion?
 - (if yes) What do you believe led to that confusion?

Retrospective:

- How would you improve bill splitting among your roommates?
 - Follow-up if not mentioned → what kinds of technology-based solutions do you think would improve bill splitting among roommates.

Wrap Up:

Do you have any suggestions on how I could better conduct this interview?

This concludes the interview. Thank you for your time, your insights are truly valuable to us. Are there any questions, comments, or concern that you have before we wrap up?

Appendix 6: Interview Transcription

Participant 1 – Marcus (Male, 26 years' old)

Screening questions:

- Do you have roommates?
 - *Yes*
- Do you rent or own?
 - *Rent*

Intro Questions/Build Rapport:

- You said that you had roommates. How many?
 - *I currently live with one.*
- How did you meet your roommates?
 - *I met him in college, I actually mistook him for another friend of mine. It was actually really funny (laugh). We are close friends now.... I needed a roommate and he answered my Facebook post.*
- How long have you lived with him?
 - *It's been about a couple of month... 6 months.*
- Well how do you feel living with your roommate?
 - *I feel pretty good.... Epcally coming from a bigger house. It's a lot better to downsize and live with less people (use to live with more people).*
- How do you feel about your current living situation?
 - *I'm enjoying it, nothing seems to be out of place.*
- What aspects do you enjoy about it?
 - *I enjoy the amount of space we have and... yeah I have to say that's the one main thing for me. I also like the fact that it's affordable and the neighborhood is quiet. I really enjoy the cost for the amount of space.*
- How do you primarily communicate with your roommate?
 - *I usually just knock on their door and talk to them. I prefer talking to my roommate as opposed to texting them.*

General issues: Bill splitting

- How do you split the bill with your roommate?
 - *We split everything down the middle... like rent is half and utilities is half. That way we are both playing equal amounts.*
- Probe: who's the primary account holder for those bills?
 - *Uhhh... I guess both of us?*
- A good idea of this question is, who holds the most accounts.
 - *Uhhh... I do. I have the cable; I have the gas. Hmm I think that's it. My roommate manages the electric account and that's all the bills.*
- How do you split your bills (Venmo, PayPal, Checks, etc)? What's that process like?
 - *Paypal! Chase, or checks. Mostly I give them checks because paypal takes too long to process. It's fairly easy, we don't have any issues.*
- Do you manage the utilities accounts?
 - *I use excel... google excel. I write down how much money is owed for each person. I also put the due date of the bill.*
- Do you manage the rent? Is that covered in the spreadsheet?
 - *Yup, that's covered in spread sheet. I usually totally up everything. That way we know the total costs for the month.*
- How do you all manage ad hoc shared costs (food, household items, etc.)
 - *Whenever... Whenever everything is out, I just pick it up. I trust my roommate and I'm sure he will pick up the items if he knows they are needed.*
- How long does your current bill sharing process typically take?
 - *Uhhh.. are you talking about paying a bill?*
- Yea for example, when you're paying bills with your roommate, how long does that process take?
 - *Ohh it takes like a day I guess. I usually tell them how much I need right away or they check the spreadsheet.*
- What improvements can be made with your current bill paying process?
 - *Hmm.. really the only thing that I have as an issue is remember due dates. The people gas one. The gas one is always the one that scratches my mind. You*

have to pay that the day before or the day after. Even if I pay it the day it's due, it charges the day after.

Deep focus: Conflicts

- Has there ever been a time where your roommates didn't pay their share of the rent/utilities? You can also reflect on your past roommates as well.
 - *Umm... No. Most of them have paid their rent on time.*
- So you've never had a time that something was paid late by a roommate or you had to remind them to pay something? If so how did you handle it?
 - *The people gas or the first cable bill. Usually they reached out to me or I reached out to them and we got it paid for quickly.*
- Has there ever been a time when splitting bills among your roommates caused confusion? You can think back to previous situations as well.
 - *No... in previous ones. Someone else handled the bills. They would just tell me.*

Retrospective:

- How would you improve bill splitting among your roommates? This is a space for you to think about the situation however you like.
 - *If there was some way. like the google excel spreadsheet where it would already split it up easily... in excel you can do that but at least send an alert. Even have a payment method where you can pay it all at once, that way I don't have to pay through Comed or Gas or Comcast. It pays it all at once instead of having these multiple days that we have to pay. I want it all in one group.*

Participant 2 – Joe (Male, 27 years' old)

Screening questions

- Do you have roommates?
 - *Yes*
- Do you rent or own?
 - *Rent*

Intro Questions/Build Rapport:

- You said that you had roommates. How many?
 - *Uno, one... His name is Stin.*
- How did you meet your roommates?
 - *I met him in middle school... yeah*
- How long have you lived with him?
 - *Uhhh I think it's been four months... yeah*
- Well how do you feel living with your roommate?
 - *Uhhh he's alright (laugh). He tends to lock himself in his room a lot... so we don't talk much.*
- How do you feel about your current living situation?
 - *As far was what, like am I happy where I'm living? It's alright there is not a lot to do in this area but I'm not complaining.*

What aspects do you enjoy about it?

- *I enjoy the amount of space we have and... yeah I have to say that's the one main thing for me. I also like the fact that it's affordable and the neighborhood is quiet. I really enjoy the cost for the amount of space.*
- How do you primarily communicate with your roommate?
 - *Yodeling (laughs)... Uh what do you mean? Text phone call person to person?*
- Yeah, in what ways do you talk to each other?
 - *We are pretty open about everything, so it's like if we need something we just talk about it, You know?*

General issues: Bill splitting

- How do you split the bill with your roommate?
 - *We just cut it in half.*
- Probe: who's the primary account holder for those bills?
 - *I'm the primary bill holder on everything... Yeah, it was too hard to explain how to him how to split everything. I also already had all the accounts and it*

would be too hard to have everything transferred over to his name. This is Stin's first apartment.

- What bills do you split?
 - *We split electricity, we split internet, rent. We split groceries. We usually go shopping at the same time and split everything down the middle. Unless it's super specific like something only Stin will eat or only I will eat. If he's something like peanut butter or something appealing to both parties, we split it down the middle.*
- How do you split your bills (Venmo, PayPal, Checks, etc)? What's that process like?
 - *We use cash, I usually tell him how much he needs to pay and show him a copy of the bill on my phone. Then in a day or less, he will hand me what he owes.*
- Do you manage the utilities accounts? I know you touched on this a little.
 - *Stin is on all three accounts as a secondary, so we can both call or take care of the bills by paying them online. If I die he can take care of it (laughs).*
- Do you manage the basic rent? Is it a similar system to your bill splitting?
 - *Yup, Stin has checks. I don't have checks. So I hand him the money and he gives the landlord the check.*
- How do you all manage ad hoc shared costs (food, household items, etc.)
 - *Everything is split down the middle unless it's one of those weird situations. We had this come up a couple of weeks ago. We needed a new vacuum... but I recently bought the fire extinguisher. So we took the 20 he owed me for the extinguisher and put it toward the vacuum.*
- So you guys just did the math to make sure it was absolutely even?
 - *Yup, exactly.*
- How long does your current bill sharing process typically take? This confusing so I can repeat if you need me too.
 - *Uhhh.. so how long does it take for who owes what?*
- Yeah, like the whole process from who owes what to actually paying the bills.
 - *I mean it's immediate, Everything is super quick nowadays so the amounts are figured out and that pretty much it man.*
- What improvements can be made with your current bill paying process?

- *due dates. The people gas one. The gas one is always the one that scratches my mind. You have to pay that the day before or the day after. Even if I pay it the day it's due, it charges the day after.*

Deep focus: Conflicts

- Has there ever been a time where your roommates didn't pay their share of the rent/utilities? You can think back to your previous roommates and draw upon that as well.
 - *Not that I can remember... no.*
- So you never had a time in which a roommate forgot to pay rent?
 - *Not that I can remember... no.*
- Has there ever been a time when splitting bills among your roommates caused confusion? You can think back to previous situations as well.
 - *Ohh yes of course!*
- How did you guys get to the point confusion and how did you resolve it?
 - *As I recall, it was over a... it was a weird situation where we had to pay an electric bill. It was over changed for some reason. As opposed to saying who overpaid here or who over their.... I just said f@#k it and paid it all myself (laughs).*
- I mean that's a way to handle it (laughs), very effective.
 - *Ugh yes, it is (laughs).*

Retrospective:

- How would you improve bill splitting among your roommates? This is a space for you to think about the situation however you like.
 - *Make everything automated (laughs). I don't want to f#@kin talk to anybody, I just want the payments to happen... no hassle*
- What kind of technology-based solutions do you think would improve bill sharing among roommates?
 - *Like as an app for the answer?*
- Well, if you could think of any technologies that make this process better. An app doesn't have to be the answer, it's anything you want it to be.

- *I mean since a cellphone can save someone for cardiac arrest, I think that would be a good place to start. I would like a cellphone application that could link between all of our accounts and pool our money to pay the bills. I would also like to review and manage all my accounts in one place.*

Participant 3 – Candice (Female, 23 years' old)

Screener questions

- Do you have roommates?
 - *Yes*
- Do you rent or own?
 - *Rent*

Intro Questions/Build Rapport:

- You said that you had roommates. How many?
 - *I have two roommates*
- How did you meet your roommates?
 - *I met them on craigslist so I didn't really know them (laughs). They seemed nice.*
- How long have you lived with him?
 - *Little over a year*
- Well how do you feel about living with them?
 - *They're fine.. (rolled her eyes)*
- Is there anything you like or dislike about them?
 - *This is awkward. Me and my one roommate have had issues with the other one... We don't like her guest tendencies (laughs).*
- How do you feel about your current living situation?
 - *It's fine, I don't know my roommates are kind of annoying.*
- Why do you find them annoying?

- *Because we have a small apartment and there is three of us. We are always in each other's way. My other roommate leaves her weed everywhere... and in the silverware drawer so everything smells.*
- How do primarily communicate with your roommate?
 - *Depends on what we are talking about... If it's something important... it's usually via text. It's usually during the day and we are not altogether.*

General issues: Bill splitting

- How do you split the bill with your roommate?
 - *Evenly, besides rent...*
- How is rent split?
 - *That's based on the size of the room.*
- Probe: who's the primary account holder for those bills?
 - *My roommate Malory... she manages all the accounts I suppose.*
- What bills do you split?
 - *Gas, electricity, water, and, cable... yup that's it.*
- How do you split your bills (Venmo, PayPal, Checks, etc? What's that process like?
 - *Just Venmo.*
- So venmo is your go to, what do you like about it?
 - *It easy... it takes two seconds. You literally go on and type in the amount and hit pay. You don't have to login in and confirm your bank account all the time. Like if you were paying through like... transferring money through my bank account. I would have to logging in and answer security questions and stuff.*
- Do you manage all the utility accounts?
 - *Those are split down the middle*
- I know rent is managed based on room size... have you had any complications with that?
 - *Uhh... not really, my one roommate should be paying more then she is but whatever.*
- How do you all manage ad hoc shared costs (food, household items, etc.)

- *We just buy those items on a need bases and we just buy our own food and put our names on the important stuff.*
- How long does your current bill sharing process typically take? This confusing so I can repeat if you need me too.
 - *Uhh... well my roommate that does the process is annoying. She will be like I need \$125 for bills ASAP need it by the end of the day. It's like ok... They didn't just send you the bill and say they need it by the end of the day. Why can't you give us a heads up?*
- What improvements can be made to your current bill sharing methods?
 - *I Well I don't have any visibility into the bills and I don't know if we are getting charged for anything like a late payment or something. If that's late I should be paying for the late fee. Same goes for cable which is ridiculously expensive and they rent movies all the time. Those are like 6 bucks a piece and those are getting charged to me... which is unfair.*

Deep focus: Conflicts

- Has there ever been a time where your roommates didn't pay their share of the rent/utilities? You can think back to your previous roommates and draw upon that as well. Past and or present.
 - *Um my roommates in college. We would have bill paying issues. We would all leave for the summer and one of them would stay. She would be pissed because she had to pay for all the bills and would argue about how we should all split them. We were all not using the utility's since we were not staying there. That's something we had issues with. Also we had issues with people not paying on time. I was managing the accounts so the money would be taken out of my account. I would have to front them all the money.*
- How did you handle those situations?
 - *Hmm... well I would send out reminders but I don't know. They didn't really care.*
- Has there ever been a time when splitting bills among your roommates caused confusion? You can think back to previous situations as well. Past and or present.
 - *Yea, like with the situation I described. All of us moved out in the middle of the month and one of us stayed for the full month. So like how do we pay for this month? I think the timing caused the confusion.*

Retrospective:

- How would you improve bill splitting among your roommates? This is a space for you to think about the situation however you like.
 - *Um... I think it would be cool if all the bill could be automatically uploaded somehow. Then the app sent you a reminder. Instead of having to pay one person it was almost like this shared account but it's being used like a shared bank account. The app could house all the bills and send you a reminder about upcoming due dates. This would eliminate one person having to remind people to pay them or having to front costs.*
- What kind of technology-based solutions do you think would improve bill sharing among roommates?
 - *I would like a mobile application, that's seems like the easiest way.*
- Any other features that you would like on your perfect app?
 - *Um... maybe something that shows how much you paid... year to date... you know? Like all your bills, like here are all the bills you paid in electrical from here to now and this is how much rent you paid for here to now.*

Participant 4 – Ami Yang (Female, 24 years' old)

Screener questions

- Do you have roommates?
 - *Yes.*
- Do you rent or own?
 - *Owns a house.*

Intro Questions/Build Rapport:

- In the screener, you said that you had roommates. How many?
 - *5 total roommates - 5 girls*
- How did you meet your roommates?
 - *All met as students at NASA. They now all work full-time at NASA as Engineers or Flight Controllers*
- How long have you lived with these roommates?
 - *Ami bought the house June 2015*
 - *Since January 2016, the roommates kept moving in*

- *At one point they had 6 roommates living together.*
- How do you feel about your roommates?
 - *Really like having people to come home to. Good and bad. Don't go out very much because she always comes home to roommates.*
 - *There're always someone there to hangout and talk*
- How do you feel about your current living situation?
 - *It comes with some challenges like cooking and parking. Our neighbors hate us because we always have a lot of cars outside.*
 - *Everyone does a really good job about cleaning.*
- What is your preferred method of communication among your roommates?
 - *Mostly through generic group text messaging*
 - *Hard to get everyone together at the same time, and people are traveling.*
 - *"Best way is text so that everyone gets the same information"*
 - *Occasionally we do emails*

General issues: Bill splitting

- How do you split the bills among your roommates?
 - *When she first got the house, she wasn't really sure how much everything was going to cost, and she had enough going on, so she decided to do a Flat Rate.*
 - *Charge all roommates the same flat rate.*
 - *Then she pays for all of bills.*
 - *Tries to keep track of them.*
 - *Average utilities is about \$50/person*
 - *It is a lot easier on Ami*
 - *Didn't have them sign any kind of contract*
 - *Asks them to pay bills before the 10th of the month*
- Probe: Who is the primary bill payer in the household?
 - *Ami is the primary bill payer.*
- Probe - What bills do you split?
 - *Mortgage, water, gas, electricity, internet*
- How do you split your bills (Venmo, PayPal, checks, etc.)?
 - *Venmo and/or checks*
- How do you all manage the utility accounts?

- *All utilities and rent are “Autopay”*
- *Tried doing payments manually to try and keep track, but not anymore.*
- *Keeps a spreadsheet and at the end of the month, she records all the main categories of costs.*
- How do you all manage ad hoc shared costs (food, household items, etc.)
 - *Ami includes \$10 for all household items in the Flat Rate for things like TP and paper towels*
 - *Use Venmo for ad hoc food*
- How long does your shared bill paying process typically take?
 - *Spend about an hour a month just to keep track of things. Maybe 1.5-2 hours*
 - *It’s awesome to deposit checks through the phone - makes it much easier*
 - *Venmo - makes it much easier*

Deep focus: Conflicts

- Has there ever been a time where your roommates didn’t pay their share of the rent/utilities?
 - *It was a bigger issue when she first bought the house because she didn’t have as much financial leeway for people to be late. People aren’t generally late with payments, they might just wait to pay until a second pay period in the month.*
 - *Not really. Roommates appreciate the flexibility to pay her.*
- Has there ever been a time when splitting bills among your roommates caused confusion?
 - *Transition times when roommates were changing.*
 - *Flat rate has stayed pretty constant.*
- What do you believe led to that confusion?
 - *Another situation that was confusing in the past was having many different people responsible for what (paid parking spot, rent, utilities) and they were all managed by different people in the house so you pay each of them different amounts*

Retrospective:

- How would you improve bill splitting among your roommates?
 - *Website that you put in how many roommates you have and create automatic calculations to create the flat rate that Ami does already.*

- *It is good to be more transparent about how much each bill actually costs.*
- *Any way to create shared accounting would be helpful.*

Participant 5 – Hayley Archer (Female, 25 years' old)

Screener questions

- Do you have roommates?
 - *Yes.*
- Do you rent or own?
 - *Owns a house.*

Intro Questions/Build Rapport:

- In the screener, you said that you had roommates. How many?
 - *2 roommates - (3 including the interviewee)*
- How did you meet your roommates?
 - *Met one roommate through mutual friend (both were looking for roommates), second roommate was brother of first roommate.*
- How long have you lived with these roommates?
 - *Lived with first roommate since July 2014*
 - *Lived with second roommate since August 2015*
- How do you feel about your roommates?
 - *Unfortunately I did this interview at her house, while her roommates were present, so I did not feel comfortable asking this question with her roommates present.*
- How do you feel about your current living situation?
 - *She likes having company at home. Doesn't want to be living by herself.*
- What is your preferred method of communication among your roommates?
 - *Mostly find them in person*
 - *Otherwise will send a group text to both roommates*

General issues: Bill splitting

- How do you split the bills among your roommates?
 - *“It is a little confusing how we do it, but it works”*
 - *Google spreadsheet that all three roommates have access to*
 - *Loads all the payments from the previous month into spreadsheet*
 - *Hayley is the only one who really adds costs to the spreadsheet*
 - *Automatic formula that divides it all into three portions*
 - *Common household items also get added.*
- Probe: Who is the primary bill payer in the household?
 - *Hayley is the primary bill payer for all household bills.*
- Probe - What bills do you split?
 - *Rent, water, gas, electricity, cable/internet, miscellaneous home items*
- How do you split your bills (Venmo, PayPal, checks, etc.)?
 - *Both pay through Chase Quikpay*
 - *One likes to pay all of the bills at one time*
 - *One likes to spread the costs across multiple pay periods*
- How do you all manage the utility accounts?
 - *All utilities and rent are “Autopay”*
- How do you all manage the rent?
- How do you all manage ad hoc shared costs (food, household items, etc.)
 - *Chill about food. They just round robin with food. Mutual sharing of food and food costs as necessary.*
 - *Household purchases go to the spreadsheet.*
- How long does your shared bill paying process typically take?
 - *Probably 5 minutes*
 - *On the 14th of the month, she can check her credit card statement and then populate the spreadsheet*
 - *Text roommates to let them know “Bills are ready”.*
- What improvements can be made with your current bill sharing methods?
 - *Gets confusing because you’re paying bills back a month*

Deep focus: Conflicts

- Has there ever been a time where your roommates didn't pay their share of the rent/utilities?
 - *"Brian is forgetful"*
 - *Then she proceeds to remind him right then,*
 - *H: "Hey Brian, have you paid your bills for September?"*
 - *B: "No, but September got messed up"*
 - *H (to me): "See..."*
 - *B: "You said don't pay September yet because we had that messed up thing."*
 - *H: "It was August. Don't pay August yet. September is ready."*
 - *B: "Yeah I was going to go pay September and October this weekend."*
 - *H: "September and August. There is no October bills."*
 - *B: "I thought you said October. Isn't that what you said in the text."*
 - *H: "Did I say that? See October September very difficult for me. The last month is in there, which would be September, but I think it might be in the October line."*
 - *B: "Maybe I didn't pay August yet."*
 - *H: "Yeah August is the one that got messed up, but I figured it out."*
 - *B: "Okay, so I have August and September"*
 - *H: "Yep."*
- Has there ever been a time when splitting bills among your roommates caused confusion?
 - *Received an AT&T rebate card, but the bill itself was really high. Needed to account for a personal cost and receiving the gift card. Should only be a one-time confusion.*

Retrospective:

- How would you improve bill splitting among your roommates?
 - *Workflow would be really cool. ServiceNow workflow.*
 - *If it could pull the data from each of these autopay. Kind of like how you login to your accounts through Mint.*
 - *Then it would include Hayley to confirm the prices of the bills.*
 - *Then send text messages or email to roommates*
 - *Maybe give the user the option between receiving text messages or email*
- Follow-up if not mentioned → what kinds of technology-based solutions do you think would improve bill splitting among roommates.
 - *Would prefer website*
 - *Her roommates are very conservative with what they login to with their bank information. So neither of them have Venmo, so we all have Chase so it worked out.*
 - *Something that the roommates wouldn't have to login to, just the primary bill payer would login to.*

Participant 6 – Julie Braden (Female, 24 years' old)

Screener questions

- Do you have roommates?
 - *Yes.*
- Do you rent or own?
 - *Renting*

Intro Questions/Build Rapport:

- In the screener, you said that you had roommates. How many?
 - *4 roommates - 5 total*
- How did you meet your roommates?
 - *She didn't know any of her roommates before she started living with them. This house is owned by a NASA employee, and they rent it out to female interns/coops/full-timers working at NASA.*
- How long have you lived with these roommates?
 - *She has lived in this house a little over a year, and one girl had already lived there for like 3 years. 2 have been there 2 months, and 1 has been there 2 weeks.*
- How do you feel about your roommates?
 - *They all get along pretty well. "[Her] newest roommate is a little more...(long pause to come up with the right word)...outgoing than the rest of us?"*
- How do you feel about your current living situation?
 - *She liked it when she first moved to Houston, so that she had people to talk to and figure out where things were. She liked that she "wasn't living alone in a completely new state." It's fun to always have people around.*
 - *Dishes, cleaning, it can get very messy sometimes.*
- What is your preferred method of communication among your roommates?
 - *In person or over group text*
 - *The rest of her roommates use GroupMe, but since she has a dumb phone she just uses group texts.*

General issues: Bill splitting

- How do you split the bills among your roommates?
 - *Landlord gives the tenants a flat cost.*
 - *Past experience (in college) - One person paid one bill (internet), another roommate paid other bills (gas, electricity).*
- Probe: Who is the primary bill payer in the household?
 - *Landlord*
- Probe - What bills do you split?
 - *Rent, water, gas, electricity, Netflix, and internet*
- How do you split your bills (Venmo, PayPal, checks, etc.)?
 - *Now: PayPal*
 - *College: Paid landlord with checks, but split utilities either checks or cash.*
- How do you all manage ad hoc shared costs (food, household items, etc.)
 - *No specific way of sharing the costs of miscellaneous household items. Whoever is going to store when they need it.*
- How long does your shared bill paying process typically take?
 - *Most of the bills were setup as AutoPay, and she would get paid back within a week from roommates*
- What improvements can be made with your current bill sharing methods?
 - *It is easier when one person is paying for all of the bills.*

Deep focus: Conflicts

- Has there ever been a time where your roommates didn't pay their share of the rent/utilities?
 - *Had some weird payment months when there were transitions between different roommates and figuring out half months and when people are going to move out.*
- Has there ever been a time when splitting bills among your roommates caused confusion?
 - *No.*

Retrospective:

- How would you improve bill splitting among your roommates?
 - *Something that one person didn't have to front all of the money. Something like a Joint account that would pay all of the utilities. And everyone could contribute to that and then that could be used to pay all of the utilities.*

Participant 7 – Ran (Female, 22 years' old)

Screener questions

- Do you have roommates?
 - *Yes*
- Do you rent or own?
 - *Rent an apartment.*

Intro Questions/Build Rapport:

- In the screener, you said that you had roommates. How many?
 - *Two.*
- How did you meet your roommates?
 - *One of them is my classmate, I met her at school. Another one I met her in a social network.*
- How long have you lived with these roommates?
 - *One month. We live together since September*
- How do you feel about your roommates?
 - *They're good. One of my roommates is working, another one attends school like me. They're both nice.*
- How do you feel about your current living situation?
 - *It's clean and tidy, and very cozy. You know, It's not very big, but very...I live in a room and it has very convenient utilities. I think it's fine.*
- What is your preferred method of communication among your roommates?
 - *We just communicate by phone, by messages, to know the sharing prices for each one, I mean, before we rent our apartment.*

General issues: Bill splitting

- How do you split the bills among your roommates?
- Probe: Who is the primary bill payer in the household?
 - *My classmate.*
- Probe - What bills do you split?
 - *The rent, utility, electricity, and internet.*
- How do you split your bills (Venmo, PayPal, checks, etc.)?
 - *I think it's the chase debit card. Like visa... it's not chase quick pay, it's just the debit card... using the routine number.*
- How do you all manage the utility accounts?
 - *We have the... it is included in the rent. So we just log in to the website and pay for it.*
- How do you all manage the rent?
 - *Because it's based on the size of the room. If you live in a big room, you know, you should pay much more.*
- How do you all manage ad hoc shared costs (food, household items, etc.)
 - *We mainly do it separately. Sometimes we go shopping together, you know, if we go to the grocery stores and think oh we don't have something, so we buy it and in that situation we buy it together and will split the money. We will use chase quick pay.*
- How long does your shared bill paying process typically take?
 - *It's about.... hmm... five to ten minutes.*
- What improvements can be made with your current bill sharing methods?
 - *I think we're all fine with this.*

Deep focus: Conflicts

- Has there ever been a time where your roommates didn't pay their share of the rent/utilities?
 - *Yes. Once my roommate forgot so I had to remind her to pay the bill in time. I just sent her a message.*

- Has there ever been a time when splitting bills among your roommates caused confusion?
 - *No. we just made agreement first... hmm, we just communicate with each other by message and made agreements.*

Retrospective:

- How would you improve bill splitting among your roommates?
- Follow-up if not mentioned → what kinds of technology-based solutions do you think would improve bill splitting among roommates.
 - *Let me think. I think... you know, we have three people living together, we can log in to the website and and just pay your part, I mean the individual part, including the rent or something else, just the.... But now what we do is one person pay for all the money and the other two pay her their individual parts, you know.*

Participant 8 – Yunshan (Female, 23 years' old)

Screener questions

- Do you have roommates?
 - *Two months ago I had one roommate but now I live alone.*
- Do you rent or own?
 - *I rent a house right now, a studio.*

Intro Questions/Build Rapport:

- In the screener, you said that you had roommates. How many?
 - *One*
- How did you meet your roommates?
 - *Through Weibo, a social media network. Before I came to Chicago, I want to make sure my house... the place I'll live in and the person I'll with... hmm, so I post a message in Weibo about all the requirements that I had, my roommate then came to me and then we came together.*
- How long have you lived with these roommates?
 - *Two years.*
- How do you feel about your roommates?

- *Well, actually I never think people can be good friends after they live together... yeah... the thing is you meet your roommate day and night... sometimes, it's just ... you know... sometimes it's a bit awkward, especially when something happened between you two.*
- How do you feel about your current living situation?
 - *Like I just mentioned, I live alone right now, it makes feel free cause I have plenty of time to be alone and never be worried about whether I am disturbing others. So yeah, I'm very satisfied with my current living situation.*
- What is your preferred method of communication among your roommates?
 - *Typically through Wechat. When talking about the bills, we prefer face to face, talk with each other.*

General issues: Bill splitting

- How do you split the bills among your roommates?
- Probe: Who is the primary bill payer in the household?
 - *Half and half actually. When we rented the house, it was under my name. But we paid the bills like in turn. If I pay it this time, she'll transfer her bills to me. Next time she'll pay for it and I'll transfer money to her. We take turns to do it.*
- Probe - What bills do you split? Split payment
 - *The rent, electricity, internet, and utility*
- How do you split your bills (Venmo, PayPal, checks, etc.)?
 - *Except for the rent, all in half. Because in the house we have different space to live in. We use Chasequick pay.*
- How do you all manage the utility accounts?
 - *Actually all our accounts are under my name, we shared the bills.*
- How do you all manage the rent?
 - *I paid 50 more dollars than my roommate.*
- How do you all manage ad hoc shared costs (food, household items, etc.)
 - *This is a big issue. At the beginning, we shared everything, so we pay in half. But after a few months living together, we had our dinners and cook separately, so we didn't share any more.*
- How long does your shared bill paying process typically take?

- *It depends. We're not the kind of the person who would delay the paying on purpose, once we remember the issue we would pay the bills. But for me, I actually transfer money to her immediately after she paid the bill because I was afraid that I would forget paying her. But as for her, within a week.*
- What improvements can be made with your current bill sharing methods?
 - *Only one issue, I think roommates should determine how to split the bills in a very early time, I mean, at the very beginning when they decide to live together. But in terms of the paying method, I think Chase Quickpay is pretty enough for us.*

Deep focus: Conflicts

- Has there ever been a time where your roommates didn't pay their share of the rent/utilities?
 - *Never. We had some conversations about how to split the bills, that's why I think this is the biggest issue that roommates should deal with at the very beginning. We didn't do that, so after living together for about three months, we thought it was time to reconsider our bill sharing. And you know, it actually made our relationship awkward.*
- Has there ever been a time when splitting bills among your roommates caused confusion?
 - *Yes, a lot of times. So her major is accounting, so both of us thought she should manage our bills... So keeping a record of our bills was her job and I just needed to pay. I put 100% trust on her. But there was a time I looked at her record and found something that was not what I expected. So I talked to her and she was like "oh, yeah, maybe there was a mistake", and then she corrected it. But after that, I would check the bills myself and make sure everything is in the right track.*

Retrospective:

- How would you improve bill splitting among your roommates?
- Follow-up if not mentioned → what kinds of technology-based solutions do you think would improve bill splitting among roommates.
 - *I think it's better be... ah... it would be very nice if PPM (the landlord) ... we lived in 1120...right now the rent is 1700 per month... One person may live in living room and another one lives in bedroom, if there's an... like an official announcement on how to split this rent, you know... It will save us much time to consider this issue, everyone of us will follow the rule and there will be less confusion. As I just mentioned, we had to pay for four bills and we need to go to different website, it's like... especially for us international students who has never been here, we need to start over and it's really hard for us to remember every bill. If we could be reminded like now you should pay this, now you*

should pay that, maybe on a certain day of the month? Or if you have an APP that you can pay everything on that single app... that would be perfect.

Participant 9 – Dan (Female, 23 years' old)

Screener questions

- Do you have roommates?
 - *Yes*
- Do you rent or own?
 - *Rent*

Intro Questions/Build Rapport:

- In the screener, you said that you had roommates. How many?
 - *Two*
- How did you meet your roommates?
 - *One of my roommate is my classmate, we met when we studied together, another one is her friend.*
- How long have you lived with these roommates?
 - *About 7 months.*
- How do you feel about your roommates?
 - *They're really great, I like them very much.*
- How do you feel about your current living situation?
 - *I'm satisfied with that.*
- What is your preferred method of communication among your roommates?
 - *Typically, our primary bill payer will pay for all the rent, then she will send us a screenshot to our group. We just transfer our money to her by Venmo.*

General issues: Bill splitting

- How do you split the bills among your roommates?
- Probe: Who is the primary bill payer in the household?
 - *Eh... my classmate's friend.*

- Probe - What bills do you split?
 - *Rent, utility, electricity, cable.*
- How do you split your bills (Venmo, PayPal, checks, etc.)?
 - *Venmo*
- How do you all manage the utility accounts?
 - *It comes with our rent together. My classmate will pay for the electricity and cable, and her friend pays for the rent and utility. We can't pay for the rent separately, so one of us has to pay for all the rent and then we split the bill.*
- How do you all manage the rent?
 - *Answered in the previous question.*
- How do you all manage ad hoc shared costs (food, household items, etc.)
 - *Eh... we actually have dinners together, and buy things together. And after shopping we will just split the bills evenly into three parts. It's like all our monthly costs, like rent, utility, cable, food and other things are split evenly into three parts.*
- How long does your shared bill paying process typically take?
 - *It depends. Most cases it only take several minutes.*
- What improvements can be made with your current bill sharing methods?
 - *Not really, I like our currently way to share bills, there's no trouble and straightforward, and everybody is very nice.*

Deep focus: Conflicts

- Has there ever been a time where your roommates didn't pay their share of the rent/utilities?
 - *Yes... maybe.... But only the small things. We never forgot to pay for the big things like rent. But sometimes we may forget to pay for small things like food, like the things less than 10 or 20 dollars. But even if someone forgot to pay, we just let it go, it's really no big deal.*
- Has there ever been a time when splitting bills among your roommates caused confusion?
 - *Nope. Because we split the bills evenly, so it's quite simple and straightforward. Even for the small stuffs, like... for example... someone will*

go to Chinatown today and she says “hey I can buy something in Chinatown if you guys want”, and she went and bought some stuffs, and then we Venmo money to her. Oh, no, when we communicate, it’s actually like “we lack something and we need something”, not “I need something”, you know? I think we actually like a family and everyone would think about it like a family member. Normally no one forgets to pay her bills, we often keep the receipt and put it somewhere in kitchen, you know? And in the night when we get back we calculate how much should each of us pay. We often do it on the same day, or the next day. If it’s only 1 dollar or 2 dollars we then leave it for next time.

Retrospective:

- How would you improve bill splitting among your roommates?
- Follow-up if not mentioned → what kinds of technology-based solutions do you think would improve bill splitting among roommates.
 - *I think it’s good... I think there’s actually nothing more to improve... Well, maybe it depends, because everyone of us acts on her own initiative and we’re all satisfied with each other... I think I might act differently if I live with other people. If everyone is a good person, you don’t really care that much.*

Participant 10 – Emily (Female, 26 years’ old)

Screener questions

- Do you have roommates?
 - *Yes I do*
- Do you rent or own?
 - *I currently rent right now.*

Intro Questions/Build Rapport:

- You said that you had roommates. How many?
 - *I live with one roommate right now... I’ve lived with more in the past though.*
- You have? What was the most amount of roommates that you’ve... that you’ve had at one time?
 - *Hmm. I think the most at once was like...3 other roommates. So 4 in total with me.*
- How did you meet your roommates?

- *Through um study abroad...She was actually a friend of a friend and then she ended up living in Chicago. And she needed a roommate at the same time I was looking for a new place so we ended up living together.*
- Oh okay. How well did you know her before living together?
 - *Not very well. I mean...I knew her in Budapest and we hung out, but I was more friends with our mutual friend more than anything. It was more of a convenience thing since I prefer like...not living with a random person I didn't know at all (laughs) like a craigslist person or something. That would creep me out.*
- Well that's understandable for sure. How long have you lived with her?
 - *At this point...a little less than a year, like 9 months.*
- Okay so not too long then. Well how do you feel about living with her over the last 9 months or so?
 - *Not good (laughs), not so good! Umm... like we just have really different lifestyles. Like she is always home and I am like never there. And she like, gets really offended that I am like never there so like...our communication is very very very bad. I mean she's like a nice person just like not a good roommate for me personally.*
- How do you feel about your current living situation?
 - *I mean overall it's like...fine for me but she's upset all the time (laughs) so like...for her not so much. But like, we just aren't a good fit. But like I said for me I'm never really home and it's a temp. situation so like...anything is fine for me (laughs).*
- Well it sounds like you're flexible! You mentioned that you aren't home very much, so how do you primarily communicate with your roommate?
 - *Almost always through texting since I'm never really there.*

General issues: Bill splitting

- How do you split the bill with your roommate?
 - *So we each just uh..pay our rent separately and then we only have cable and electric to pay so I just pay her every month for whatever is due.*
- Probe: You said you would give her the money, so who was the primary account holder for those bills?

- *Yeah she has the accounts under her name and I just like..pay her a week before or something..like uh before its due.*
- So you said you pay your rent separately? What's that process like?
 - *Yeah. Well it's like online...so like, we just pay our own on there with like a card or like...i do it through my checking account.*
- Did you each have your own account through that system?
 - *Yeah we each have our own thing so we can just go on our accounts and pay.*
- How do you all manage ad hoc shared costs (food, household items, etc.)
 - *To be honest we don't really share any of that (laughs). Since I'm not home I just eat out a lot and like...we just like, buy our own stuff. The only thing we share is like...toilet paper (laughs) and she would buy that since again...I'm just never there.*
- What improvements can be made with how you currently pay?
 - *Like...doing quick pay or something. Cause like, I have to like go to the bank or ATM and get cash and like, give it to her since I don't really have checks. Like no one does that anymore.*

Deep focus: Conflicts

- Has there ever been a time where your roommates didn't pay their share of the rent/utilities?
 - *Umm...there were times when like, someone would like forget and like..end up paying late {in past living situations}. But it wouldn't really be anything that would like effect everyone... nothing like that dramatic of a situation. But like, I can't like really think of a time where either of us forgot to pay...like, I'm sure there have been times where I forgot to like give her utility money or like pay late and she got mad...but like, she's always mad (laughs) so like, it's hard to think of a specific time. But like, with me traveling all the time for work I'm sure there's been times where like...I'd forget to pay her ahead of time and she'd have to pay and I'd like have to pay her when I got back after the fact.*
- Does that mean she sometimes has to pay your portion without having the money?
 - *Yeah cause like I said, we literally do like...cash hand offs and if I'm not there or something. I've left her money on her bed a couple times and like...she's gotten mad for some reason cause like..she thinks for some reason someone could get in and like, grab it. Even though the rest of our stuff is in there and like, is also up for grabs in that case (laughs).*

- How did you deal with that situation since she was upset by that?
 - *I mean honestly....I don't take it seriously (laughs)...like what am I supposed to do for her? If we're rarely home at the same time and like...you need the money, then I'm going to leave it on your bed. I just say sorry and move on...like, it's something stupid.*
- Has there ever been a time when splitting bills among your roommates caused confusion?
 - *Uhh well..yes but not with this roommate....I had one apartment when like, one roommate had a much much smaller room and so like, her rent was a less than me and the other girl. So we'd have like, discussions about the utility bills every month even though she didn't really contribute much to the utility bills, and we were kinda okay with that...but like she still would argue the little she paid because she wanted to always split it by like...square footage basically (laughs) which was ridiculous and impossible. She like, thought because she had a much smaller room and paid less rent, therefore she like, didn't need to pay for gas or electric.*

Retrospective:

- How would you improve bill splitting among your roommates?
 - *Have an agreement ahead of time to know what everyone will be paying and not change it ahead of time. Maybe like...by percentage since like, some utilities obviously like, fluctuate in price per month. But like if you all have a percentage agreed upon then like...you won't have that issue. Or just don't live with that person (laughs).*
- You had mentioned that using something like quick pay. How do you think that would improve your bill sharing experience?
 - *Well if I was like traveling I can just quickpay her and like...it would be quick. She doesn't have quickpay so that's why we do the uh..the money handoffs. But ya like, you'd also have a record of exactly when things were paid for and the exact amounts. You can't really like, prove that with cash...luckily I haven't had any problems with cash in that sense.*

Participant 11 – Stephanie (Female, 23 years' old)

Screener questions

- Do you have roommates?
 - *Yes, I have 2 roommates currently.*
- Do you rent or own?

- *We uh, we rent.*

Intro Questions/Build Rapport:

- How did you meet your roommates?
 - *Well, the one I've known since like...junior year of college. And the other girl, I didn't know her well but the other roommate was pretty good friends with her before hand....so like, it just worked out that we all needed a place to live. I mean, I knew the second girl, but like....not well or anything.*
- How long have you lived with these roommates?
 - *Hmm...I think it's been like, 6 months with them. Yeah, like since April.*
- How do you feel about your roommates?
 - *I like them (laughs), they're not bad. I mean, we have our disagreements since the one chick is a little...little crazy about certain things like, never putting the heat or air on. And she's convinced mold is killing her in our apt...but like, yeah. We don't even have mold so...(laughs)*
- How do you feel about your current living situation?
 - *I'm pretty comfortable. I mean...nothing crazy has happened yet so it's cool. Typical roommate stuff.*
- What is your preferred method of communication among your roommates?
 - *We usually just talk if we're all home...or like, we text each other about random apartment stuff like we need paper towels. I'd say that's the main way actually, texting.*

General issues: Bill splitting

- How do you split the bills among your roommates?
 - *Uhh...well, I like...pay for the cable/internet. And we all pay for our portion of the rent but we give it to one person and they just make one check. Then the other girl handles the gas/electric bill. But like...since the gas/electric are similar usually, I just pay her the difference for my part and she doesn't pay the cable/internet. But the one girl who does the rent pays both of us for those other utilities....uhh does that make any sense?*
- Yes it makes sense! So how do you split your bills, like how do you pay (Venmo, PayPal, checks, etc.)?
 - *Either cash or checks mostly. It'd like to use something like Venmo but neither of my roommates use it I don't think.*

- Have you ever suggested it?
 - *Uhh, no (laughs) I don't think I have. I guess I never thought about it? I mean I have it but I like, don't really use it so it's not something I like...think about I guess.*
- How do you all manage ad hoc shared costs (food, household items, etc.)
 - *Me and the the one I'm like, friends with...we kinda of just cover things for each other. Like we don't like...split it down the middle or anything or like...keep track. Like, if she like gets the milk one trip I'll make sure to get whatever we need next time. We're both pretty laid back about it. But the other one isn't like that at all (laughs). So we kinda let her do her own thing and like...she just buys her own stuff.*
- How long does your shared bill paying process typically take?
 - *I guess that depends...like if I need to get cash or like...sitting there calculating everything. I don't really have a time though? Did you want like, a minute amount? I have no idea honestly.*
- What improvements can be made with your current bill sharing methods?
 - *Well now after like..talking about it I guess it's kinda like, messy! I didn't even realize it at all. It'd be easier to not have to figure out who owes who for what...like for the cable and gas. The rent is pretty easy though.*

Deep focus: Conflicts

- Has there ever been a time where your roommates didn't pay their share of the rent/utilities?
 - *Not with these roommates. Like they're pretty good about all of that. I lived with someone once who like, was always in financial trouble I guess, and like would have to find a way to pay like, last minute. Or sometimes we'd have to like...give her the money and she'd pay us back when she got paid. But she always paid us back so it like, wasn't a thing. But yeah, not with these roommates.*
- Has there ever been a time when splitting bills among your roommates caused confusion?
 - *Yeah I mean, the whole who is covering what and who needs to pay what is really annoying sometimes. Like, I hate having to figure out the difference between the cable and the gas so I can pay the other chick since it's different every month. It's just annoying really.*

Retrospective:

- How would you improve bill splitting among your roommates?

- *Just having everything like...a set price. Not having to figure things out every month.*
- Follow-up if not mentioned → what kinds of technology-based solutions do you think would improve bill splitting among roommates.
 - *Uhh well like we said, something like Venmo would definitely help. I'll probably bring it up to my roommates now.*

Participant 12 – Ken (Male, 28 years' old)

Screener questions

- Do you have roommates?
 - *Yeah I do*
- Do you rent or own?
 - *Rent*

Intro Questions/Build Rapport:

- In the screener, you said that you had roommates. How many?
 - *I have 2 roommates*
- How did you meet your roommates?
 - *Well I met one of them in law school, and the other we actually found on Craigslist because we were kind of desperate and on a time crunch.*
- How long have you lived with these roommates?
 - *The law school one--over a year. We lived together for our last apt. The craigslist guy only for like...5 months?*
- How do you feel about your roommates?
 - *I like them, they're cool guys. I mean we honestly don't like hang out much or anything. We're all pretty busy with work and we have our own social lives going so...yeah. The one craigslist one is pretty much never home, he basically lives with his girlfriend.*
- How do you feel about your current living situation?

- *It's fine for now. I'm here by myself a lot so, like I don't mind it. It's temporary though, I'm kind of over the whole roommate thing at this point in my life. Time to be a grown up and buy a place (laughs).*
- What is your preferred method of communication among your roommates?
 - *We usually text each other if need be.*

General issues: Bill splitting

- How do you split the bills among your roommates?
 - *We each pay our own rent and send it to the landlord separately. For the other stuff I have all of the accounts...like the gas and internet and cable. They just pay me their portion.*
- How do you split your bills (Venmo, PayPal, checks, etc.)?
 - *For the rent we pay by check. Well, I do. I'm pretty sure they do too. And ya we use Venmo. I just send them what was owed that month and they pay it over.*
- How do you all manage ad hoc shared costs (food, household items, etc.)?
 - *We really only split the toilet paper honestly. I usually buy my own groceries and none of us really cook much.*
- How long does your shared bill paying process typically take?
 - *I'm not really sure? Like...5 minutes?*
- What improvements can be made with your current bill sharing methods?
 - *I think it's pretty simple, although sometimes i do get annoyed with having like...the hassle of having all of the accounts and paying. But it's really not a big thing, I'm just lazy (laughs)*

Deep focus: Conflicts

- Has there ever been a time where your roommates didn't pay their share of the rent/utilities?
 - *Not that I can think of really.*
- Has there ever been a time when splitting bills among your roommates caused confusion?
 - *Hmm.. No? I mean it's pretty straight forward since I do all of the paying and they just pay me, it makes things easier.*

Retrospective:

- How would you improve bill splitting among your roommates?
 - *I think it's fine. I wish I would have done this method where one person does everything in the past honestly. It makes it easier as long as you trust the person isn't lying about like..how much the heat is or something.*
- Follow-up if not mentioned → what kinds of technology-based solutions do you think would improve bill splitting among roommates.
 - *I think using something like Venmo is smart to keep track and not worry about using cash or checks.*

Appendix 7: Persona Range

SPECTRUMS

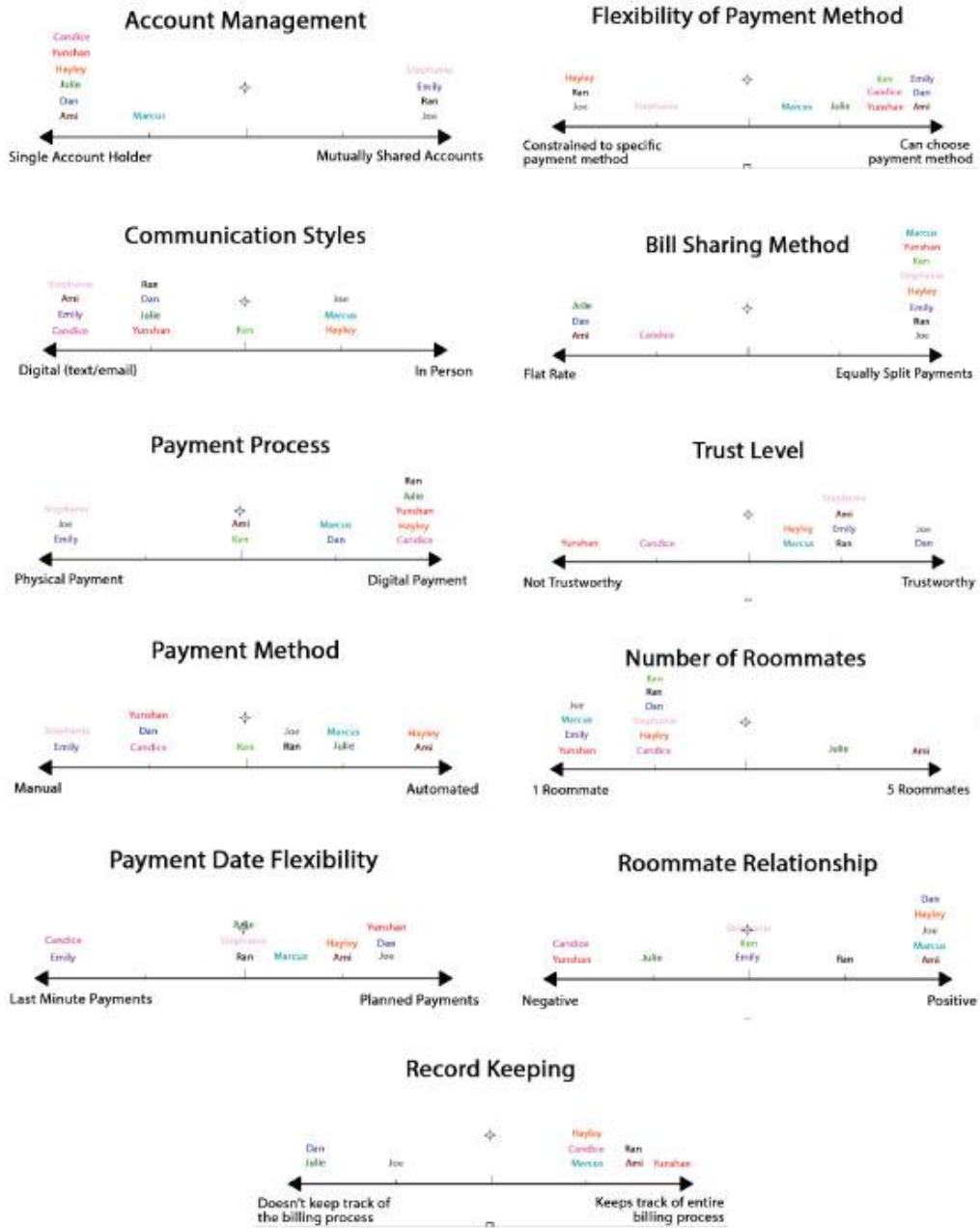


Figure 16 – Persona Range

Appendix 8: Survey

Hypothesis Question: How does trust affect the transparency of bill sharing among roommates?

Our goal of this survey is to gain unbiased user data about bill sharing among roommates. This data will shed light on the complications and experience of sharing bills with multiple individuals. It will also allow us to extract the issues in bill sharing and understand the needs and goals of the users.

Screener Questions:

1. Are you 18 years or older?
2. Do you live with roommates who are not your spouse or family?

If they say no to either – they skip them to a thank-you screen

QUESTIONS	INSTRUCTIONS	ANSWERS	REASONS
ROOMMATE RELATIONSHIPS			
How many roommates do you currently have?	None	<ul style="list-style-type: none"> • 1 • 2 • 3 • 4 • 5+ 	This allows us to understand the number of roommates for most situations.
What is your level of disagreement or agreement to the following statements: <ul style="list-style-type: none"> • I live with roommates to save money. • I live with roommates because I enjoy living with others. • I live with roommates because it's practical. • Other 	Select a level of agreement for each item. Write in an item for other, if applicable.	<ul style="list-style-type: none"> • Strongly agree • Agree • Somewhat Agree • Neither agree nor disagree • Somewhat disagree • Disagree • Strongly Disagree 	This helps us understand people's motivations behind choosing to live with roommates
Do you live with a roommate for reasons other than those above? If so, please explain.	Please write why you picked the statement in the text box provided	Long answer text—required	This gives us more insight into why and lets us hear more from the user's perspective.

How did you find your current roommate(s)?	Check all that apply.	<ul style="list-style-type: none"> • Through personal relationship network • Through social media • Craigslist • Other_____ 	Begins to highlight the relationship between the recruitment method of roommates and their current relationship.
How would you describe your relationship between/among you and your roommate(s) prior to living together?	Check all that apply	<ul style="list-style-type: none"> • Friends • Classmates • Colleagues • Strangers • Other_____ 	To find out if there are some connections between the type of prior relationship and their current living situation.
If you have more than one roommate, think about the one you've lived with the longest. How long did you know him/her prior to living together?	None	<ul style="list-style-type: none"> • Less than 3 months • More than 3 months but less than 1 year • More than 1 year but less than 3 years • More than 3 years 	To find out if there are some connections between the relationship prior to living together and after they live together.
Which of the following emotions most accurately describes your feelings toward your roommate(s)?	none	<ul style="list-style-type: none"> • Extremely positive • Moderately positive • Slightly positive • Neither positive nor negative • Slightly negative • Moderately negative • Extremely negative • Prefer not to answer 	This begins to give us insight toward emotions and how roommates feel about one another.
Please tell why you feel this way about your roommates. If you have more than one, please use initials rather than first names.	Please write why you picked the statement in the text box provided	Long answer text	This allows us to hear more from the user and see how these emotions affect the dynamics of their shared bill paying situation.
Do you rent or own your current residence?	None	<ul style="list-style-type: none"> • Rent • Own • Other_____ 	This allows us to divide tenants from landlords

<p>How important do you find the following on shared living?</p> <ul style="list-style-type: none"> • Having my own personal space • Knowing who I am living with • Being able to save money • Similar lifestyle, Cleanliness • Mutual respect, • Sharing household responsibilities • Other _____ 	<p>Select a level of importance for each item. Write in an item for other if applicable.</p>	<ul style="list-style-type: none"> • Not at all important • Slightly important • Moderately Important • Very Important • Extremely important • No Opinion 	<p>This allows us to understand what aspects of shared living are most important to people</p>
<p>How much do you trust your roommate(s)?</p>		<ul style="list-style-type: none"> • A great deal • A lot • A moderate amount • A little • None at all 	<p>We want to understand the level of trust between roommates and understand how this could affect payment and management.</p>
PAYMENT PROCESS			
<p>What is your preferred method of communication between/among your roommate(s) regarding bills?</p>	<p>None</p>	<ul style="list-style-type: none"> • In person • Over the phone • Text message • Email • Group message app • Other _____ 	<p>This allows us to understand what is the strongest form of communication and how that applies to specific relationships</p>
<p>What bills do you share monthly?</p>	<p>Check all that apply</p>	<ul style="list-style-type: none"> • Rent / Mortgage • Electricity • Gas • Water • Trash • Internet • Cable • Food • Household items • Other _____ 	<p>We are looking for how many different types of accounts need to be split to understand preferred ways of account management.</p>

How frequently do you use the following payment methods to pay bills?	Select frequency from the matrix: <ul style="list-style-type: none"> • Always • Most of the time • About half the time • Sometimes • Never 	<ul style="list-style-type: none"> • Mobile application • Desktop application • Cash • Check • Direct banking 	We want to understand the level of preference between different methods of payment, which ones do people use most frequently
Do you currently use tools to split your payments between/among roommate(s)?	None	<ul style="list-style-type: none"> • Yes • No 	We want to understand what applications or methods people use to manage and split bills between one another.
Which of the following payment tools do you use?	Check all that apply	<ul style="list-style-type: none"> • Venmo • Chase Quickpay • Paypal • Other _____ 	To understand trends in preferred payment applications and discover new applications.
Thinking about last month (October) about how long did bill sharing take (from generation of bills to when everyone has paid their money)?	Pick any of the options that apply to you	<ul style="list-style-type: none"> • Immediately • 2 weeks or less • 2-4 weeks • Over a month • Other _____ 	To understand the overall time span of sharing bills.
ACCOUNT MANAGEMENT			
Which of the following statements do you most agree with?	None	<ul style="list-style-type: none"> • I don't have to see the bills every month, I prefer not to be the primary account holder or have access to accounts. • I prefer to have access to all accounts, without being the primary account holder. 	We want to understand to what level of insight into the bill sharing process users prefer to have.

		<ul style="list-style-type: none"> • I prefer to split the primary account responsibilities between all of my roommate(s). • I prefer to be the only primary account holder in the household. • Other _____ 	
Tell us about the last time you had a problem with sharing bills with a roommate? (e.g., forgetfulness, unpaid bills etc.)		<ul style="list-style-type: none"> • Open ended 	
How did you handle the problem in your shared bill paying last time?	None	<ul style="list-style-type: none"> • Discuss discrepancies in person • Discuss discrepancies over text or email • Don't do anything • Other _____ • I never have had a problem with this 	We want to understand how people handle conflict and what means of communication would they use to address issues in the payment process.
Do you track your monthly bill costs? (Use branching)	None	<ul style="list-style-type: none"> • Yes • No • Sometimes 	
What tools do you use to track your bills?	Check all that apply	<ul style="list-style-type: none"> • Spreadsheet • Application (Wunderlist, Mint, etc.) • Other _____ 	To understand population trends in preferred bill tracking applications or discover new methods or applications.

Does tracking your bills impact your financial decisions? (use branching)	None	<ul style="list-style-type: none"> • Yes • No • Sometimes 	We want to understand how users plan and save for expenses. This will allow us to understand if tracking payments will ease the stress of the bill paying process.
Describe how tracking your bills impacts your financial decisions.		Long answer text	We want to have insight into the options picked above. This will allow us to have a full understanding of how financial and personal spending affects the process.
How useful do you think an automated report of all your monthly bills would be for you?		<ul style="list-style-type: none"> • Extremely useful • Moderately useful • Slightly useful • Neither useful nor useless • Slightly useless • Moderately useless • Extremely useless 	Would automated reports be a valuable resource, do they see it as a helpful tool.
What is your age group?	None	<ul style="list-style-type: none"> • 18 to 24 • 25 to 34 • 35 to 44 • 45 to 54 • 55 to 64 • 65 to 74 • 75 to 84 • 85 or older 	We are looking for adults who have the means and age to rent or own.
What is your gender?	None	<ul style="list-style-type: none"> • Male • Female • Prefer not to say • Other _____ 	Helps us establish gender.

Table 6 – Survey Questions

Appendix 9: Statistical Analysis

Trust and Transparency

Ranks			
	Level of Transparency	N	Mean Rank
Level of Trust	1	10	18.10
	2	19	20.00
	3	6	11.50
	Total	35	

Test Statistics	
	Level of Trust
Chi-Square	4.353
df	2
Asymp. Sig.	.113
a. Kruskal Wallis Test	
b. Grouping Variable: Level of Transparency	

Feelings about Roommates and Communication Preference

Ranks			
	Communication Preference	N	Mean Rank
Emotions Toward Roommate(s)	1	16	12.75
	2	19	22.42
	Total	35	

Test Statistics	
	Emotions Toward Roommate(s)
Chi-Square	10.060
df	1
Asymp. Sig.	.002
a. Kruskal Wallis Test	
b. Grouping Variable: Communication Preference	