Improving Well-Being With *Naber*: Creating A Mobile App Experience to Help People Move and Thrive in a New Neighborhood

Amy L. Conley
Master of Science in Industrial Design
2018

Improving Well-Being With *Naber*:

Creating a Mobile App Experience to Help People Move and Thrive in a New Neighborhood

By

Amy L. Conley

Thesis

Submitted to the University of Houston

In partial fulfillment of the requirements

For the degree of

Master of Science in Industrial Design

2018

Thesis Committee

Jeff Feng

EunSook Kwon, PhD

Rodica Damian, PhD

Improving Well-Being With *Naber*:

Creating a Mobile App Experience to Help People Move and Thrive in a New Neighborhood

_____

Amy L. Conley

Approved by
Committee Members:

_____

Chair of the Committee
Jeff Feng, Associate Professor
Department of Industrial Design,
Gerald D. Hines College of Architecture and Design

_____

Dr. EunSook Kwon, Professor and Director
Department of Industrial Design,
Gerald D. Hines College of Architecture and Design

_____

Dr. Rodica Damian, Assistant Professor
Department of Psychology,
College of Liberal Arts and Social Sciences

Abstract

Millions of Americans move each year to a new location. Moving can have negative impacts on the movers' well-being, as they may experience stress due to changes in their routines or feel mentally paralyzed by the multiple decisions that must be made during the process. The goal of this thesis was to develop a digital tool through a user-centered research and design process in order to help with relocation and positively impact the well-being of those who relocate.

This thesis conducted four phases of research to find a solution. During the first phase, a direction was determined by reviewing previous publications, conducting interviews, conducting an online survey, and analyzing existing tools. This phase discovered the importance of becoming familiar with a new location due to the positive impact that finding a compatible neighborhood can have on well-being. Furthermore, this phase found that becoming familiar with a new area can be difficult as individuals must consult multiple resources to do so, and the information learned is not always accurate. An opportunity was discovered for those relocating to get digital assistance with finding and exploring compatible neighborhoods. Learning about neighborhood amenities such as grocery stores, restaurants, gyms, parks, and local recreation will help individuals gain a good understanding of whether or not they want to live in a specific neighborhood.

During the second phase, a concept of a mobile application was developed that focused on this opportunity. This concept helped the user find a compatible neighborhood by directing him or her down a path that leads to concise yet important information about the neighborhood.

During the third phase, three iterations of the mobile application were developed into digital, clickable prototypes and tested with potential users. This testing verified the usability and need of the mobile application to quickly create a more effective solution. Results were analyzed and a final design was proposed in the fourth phase.

Through four phases of research, this study created a solution that can help people learn about a new area and find a compatible neighborhood while providing a positive impact on their well-being.

Keywords: industrial design, interaction design, design research, user experience, UI/UX, well-being, neighborhood compatibility, relocation, relocation preparation

Table of Contents

Abstract i

Chapter 1: Introduction 1

1.1 Psychological Stresses of Relocation 1

1.1.1 Relocation Can Cause Stress through Changes in Daily Routines 1

1.1.2 Relocation May Cause Decision Making Paralysis 3

1.2 Relocation Stresses Can Be Alleviated 4

1.3 Developing a Relocation Aid Using Design Research 5

1.3.1 Research Methodology 5

1.3.2 Research Questions 7

1.4 Significance of Study 8

1.5 IRB Approval 9

Chapter 2: Understanding the Issues Encountered During Relocation 10

2.1 Millions of Americans Relocate Each Year 10

2.2 Relocation Impacts One's Well-Being 13

2.3 Negative Impacts on Well-Being Can Be Lessened Through Move Preparation 15

Chapter 3: Finding Opportunity to Help Those Who Relocate 19

3.1 Interviews Support Need for Location Familiarization Assistance 19

3.2 Survey Results Highlight Relocation Preparation and Location Familiarization 23

3.3 Existing Digital Tools Leave Room for a New Solution 28

3.4 Opportunity Lies in Assisting Newcomers with Neighborhood Familiarity 30

Chapter 4: Developing the Design Concept 31

4.1 User Needs and Site Objectives are Key in Developing Strategy 33

4.2 Content Requirements and Functional Specifications Build the Scope 35

4.3 Interaction Design and Information Architecture Provide Structure 36

4.4 Navigation Design and Wireframing Build the Site Skeleton 39

4.5 Organized Aesthetics Support a Consistent User Interface 44

4.6 Concept Summary 47

Chapter 5: Developing the Design through Usability Testing 48

5.1 Initial Ideation and First Round of Usability Testing 49

5.2 Secondary Ideation and Second Round of Usability Testing 54

5.3 Tertiary Ideation and Third Round of Usability Testing 59

5.4 Test Results Support Concept and Direction 63

5.5 Final Design Refinement 68

5.6 Future Opportunity to Build Community through the Application 70

5.7 Developing the Prototype into a Working App 70

Chapter 6: Discussion and Conclusions 73

6.1 Innovating with Research for Design 73

6.3 Future Opportunities 74

6.4 Conclusions 75

References 76

Vita 80

Appendix: Research Materials 81

Chapter 1: Introduction

1.1 Psychological Stresses of Relocation

Millions of Americans move each year to establish a home in a new location. US Census data shows that an average of 35 million people relocate each year. Individuals and families relocate for multiple reasons including family life-cycle changes, status changes, and individual personality differences (Shumaker & Stokols, 1982). These individuals are experiencing many changes and making multiple decisions in a small amount of time as they transition from one place to another. With relocation comes potential complications; making multiple changes and decisions at once could cause individuals to feel overwhelmed. Relocation can also evoke negative feelings such as anxiety, loneliness, and depression, as individuals and families are removed from familiar surroundings and connections (Gaylord, 1979; Oishi & Talhelm, 2012; Riemer, 2000).

A common theme in previous research is the impact of relocation on one's mental well-being (Brett, 1982; Magdol, 2002; Martin, 1995; Moyle & Parkes, 1999; Munton, 1990; Oishi, 2010; Stokols & Shumaker, 1982). Well-being can be described as the psychological quality of a person's life, affected not only by what lies inside one's mind but also by the conditions in which one lives. It is most impacted by how one views one's self and one's standard of living, family life, work, and social relationships (Campbell, 1981). Perceiving stress in any of these areas can lead to a negative impact on overall well-being.

1.1.1 Relocation Can Cause Stress Through Changes in Daily Routines

Studies related to well-being and job transfer have found employees and their families to be dissatisfied with their social lives. Weak social relationships can be a source of stress, along with the preparation and transitional period just prior to the move (Ammons, Nelson, &

Wodarski, 1982; Brett, 1982; Munton, 1990). Many of the events that occur or change during or after relocation are listed on the Holmes and Rahe Social Readjustment Rating Scale (SRRS), or the Holmes and Rahe Stress Scale (Table 1). Holmes and Rahe (1967) surveyed over 5,000 medical patients to study the contribution of stress towards illness and used the results to develop a scale to measure overall stress levels. This scale identifies events in life that require an adaptive or coping reaction from the individual experiencing the event. Life events listed on the scale require a change in the individual's daily routines, which can cause stress or illness. A higher score indicates a higher chance of the individual developing an illness.

Table 1 – Social Readjustment Rating Scale (Holmes & Rahe, 1967)

Rank	Life Event	Mean Value	Rank	Life Event	Mean Value
1	Death of spouse	100	23	Son of daughter leaving home	29
2	Divorce	73	24	Trouble with in-laws	29
3	Marital separation	65	25	Outstanding personal achievement	28
4	Jail term	63	26	Wife begin or stop work	26
5	Death of close family member	63	27	Begin or end school	26
6	Personal injury or illness	53	28	Change in living conditions	25
7	Marriage	50	29	Revision of personal habits	24
8	Fired at work	47	30	Trouble with boss	23
9	Marital reconciliation	45	31	Change in work hours or conditions	20
10	Retirement	45	32	Change in residence	20
11	Change in health of family member	44	33	Change in schools	20
12	Pregnancy	40	34	Change in recreation	19
13	Sex difficulties	39	35	Change in church activities	19
14	Gain of new family member	39	36	Change in social activities	18
15	Business readjustment	39	37	Mortgage or loan less than $10,000	17
16	Change in financial state	38	38	Change in sleeping habits	16
17	Death of close friend	37	39	Change in number of family get-togethers	15
18	Change to different line of work	36	40	Change in eating habits	15
19	Change in number of arguements with spouse	35	41	Vacation	13
20	Mortage over $10,000	31	42	Christmas	12
21	Foreclosure of mortgage or loan	30	43	Minor violations of the law	11
22	Change in responsibilities at work	29			

The events on the list can occur during the same time, and experiencing multiple items at once will result in a higher score. As Stokols and Shumaker (1982) indicate, home relocation

alters multiple areas of one's life (including daily routines, social connections, and recreational activities) and can have a large impact on one's life. Aside from "change in residence," life events on the scale that could be altered due to relocation also include "marital separation," "change in financial state," "higher mortgage," "change in responsibilities at work," "spouse beginning or stopping work," "change in living conditions," "change in recreation," and "change in social activities," among others. Relocation has multiple facets that can contribute to stress or illness among individuals and families due to these changes in routines.

1.1.2 Relocation May Cause Decision Making Paralysis

Many decisions need to be made during relocation, including what to move, how to move, and where to move. Each decision presents its own list of choices. While it is good to have these choices, examining too many choices at once may be difficult for an individual to process. With relocation there are multiple steps in the overall process, leading to a compounding number of choices to analyze and decisions to make. Schwartz (2015) argues that although having the ability to choose leads to an improved well-being, having too many things to choose from in certain situations can lead to negative effects. Studies have shown that as people face an increased number of choices, these choices begin to have a negative affect and can build until the person becomes incapacitated by the choices (Iyengar & Lepper, 2000; Botti & Iyengar, 2006; Sethi-Iyengar, Huberman, & Jiang, 2004). Being presented with an unconstrained freedom of choice can lead to a mental paralysis that prevents someone from making decisions and moving forward. However, it is suggested that having constraints on these choices can lead to optimal functioning and an improved well-being (Schwartz, 2015). Putting constraints on the choices analyzed during the relocation process may help individuals make better decisions and have an improved well-being.

1.2 Relocation Stresses Can Be Alleviated

Past research has shown that preparation can significantly help with the well-being of an individual or family being relocated, although this research was not specific what is involved in preparation or what exactly is helpful. The research found that the more one prepares prior to the move, the better his or her psychological well-being will be following the move. Preparation helps not only with post-move health but also with reducing problems encountered during the move (Martin, 1999). Preparation ahead of the move may also help with finding a compatible neighborhood. If individuals perceive the new environment to be a good fit for their personality, they will react positively to the move (Stokols & Shumaker, 1982). Therefore, it is important for those relocating to find a neighborhood that will bring satisfaction. Taking initiative and becoming informed about the new location will help with finding a suitable neighborhood and prevent possible complications related to relocation (Ammons, Nelson, & Wodarski, 1982; Fisher & Shaw, 1994; Martin, 1999; Packard, 1972).

These concepts were considered during the further determination of a research concentration for this thesis. This thesis interviewed individuals who recently relocated to learn what they liked or disliked about their relocation experience, and what they would have done differently. Aspects that were most difficult were related to human connections and familiarity. Respondents felt that better relocation experiences would come from gaining an advanced knowledge and understanding of the new area, becoming familiar with the area prior to the move, and receiving assistance with making new social connections.

In summary, the well-being of individuals relocating should be positively impacted if they can have an easier way of preparing for the move and/or an easier way of becoming familiar with their new location. This thesis examined satisfaction with both relocation preparation and

familiarity of the new location in order to gain insight on important and helpful steps individuals take during relocation. Strategies for successful relocations were collected from those with greater relocation experience. Crucial choices were specified that can be presented to those relocating to guide them through important relocation decisions without presenting too many choices to the user.

1.3 Developing a Relocation Aid Using Design Research

To help make a positive impact on the millions who relocate, this thesis focused on designing a digital solution to assist an area identified to be crucial to those relocating. This study concentrated on solutions that addressed specific relocation needs but also limited the number of choices presented to the user, thus decreasing the number of decisions and effort made by the user. The needs of the user were kept at the forefront of the research. User research was conducted prior to and along with the design development. Per the Interaction Design Foundation, this type of research can be labeled as “research for design,” as relevant information was gathered and applied towards the design solution throughout the study (Stappers & Giaccardi, n.d).

1.3.1 Research Methodology

Practices from user experience (UX) design were implemented to help determine strategy and develop a useful concept and solution. The International Organization for Standardization (ISO) defines UX as a “person's perceptions and responses resulting from the use and/or anticipated use of a product, system or service” (International Organization for Standardization, 2010), while the Nielsen Norman Group defines UX as a concept that “encompasses all aspects of the end-user's interaction with the company, its services, and its products” (Norman & Nielsen, n.d.). When applied to digital design, a positive user experience

can be created not only by focusing on how the application looks but also by developing the entire service following the users' cognitive decision-making process. The Neilson Norman Group state that research methods for UX design can include stages of discovering, exploring, testing, and listening (Farrell, 2017). During the discovery phase, the researcher aims to learn about the user and fully understand the problem at hand. During exploration, the researcher begins brainstorming potential solutions to the problem and creates product prototypes (mocked-up solutions) to represent these solutions. These prototypes are analyzed and those with greater potential are kept for further development. During testing and listening, the researcher tests these prototypes with actual potential users and makes modifications as needed to push for a more useful solution. Together, these research methods can be defined as a mixed-methods approach since they integrate both qualitative and quantitative research methods (Creswell, 2014). Table 2 summarizes the specific research methods implemented during this study, separated into the four phases of this project.

Table 2 – Implemented Research Methods (modified from Farrell, 2017)

Implemented Research Methods	
Phase 1 - Discover	• User interview • Stakeholder interview • Literature review • Problem identification • Requirements & constraints gathering • Competitive analysis
Phase 2 - Explore	• Design review • Persona building • Task analysis • Prototype feedback & testing (paper prototypes)
Phase 3 - Test and Listen	• Prototype feedback & testing (clickable digital prototypes) • Qualitative usability testing (in-person) • Usability survey
Phase 4 - Summarize	• Analytics review • Review findings • Propose final solution

During Phase 1, a literature review was conducted to help frame the problem and determine an overall concept direction. The direction was refined through surveys and individual interviews to help determine necessary requirements. Existing solutions were examined to look for areas for innovation. Phase 2 explored key issues identified from Phase 1 in order to develop a proposed concept that could alleviate these issues. Prototyped solutions were developed and analyzed in Phase 3 through usability testing, and a final solution was refined and summarized in Phase 4.

1.3.2 Research Questions

Research questions were asked throughout the first two phases to fully understand the issues, identify the problem, and look for opportunity. The third phase was used to verify the relevance of the proposed solution. Questions are summarized in Table 3.

Table 3 – Research Questions

Research Questions	
Phase 1 - Discover	• How are individuals impacted by relocation? • Where do specific difficulties exist? • How can negative impacts be relieved?
Phase 2 - Explore	• What type of solution can help people become familiar with a new location and choose a compatible neighborhood to move into? • How can design be used to give the user a pleasant experience while searching for a compatible neighborhood?
Phase 3 - Test and Listen	• Will this solution help the user become familiar with new neighborhoods? • Can this solution positively impact well-being?

1.4 Significance of Study

The goal of this thesis was to develop a digital tool through a user-centered research and design process in order to help with relocation and positively impact the well-being of those who relocate. A mobile application was developed and tested to fulfill the physical and emotional needs of becoming familiar with a new location and finding a compatible neighborhood to move into.

Findings from interviews support prior research statements that better relocation experiences would come from gaining an advanced knowledge and understanding of the new area, becoming familiar with the area prior to the move, and receiving assistance with making new social connections. Survey results show exactly what type of preparation is helpful in finding a new place to live (visiting the location, using a realtor, and conducting online research) and exactly which items are most important to learn about when becoming familiar with and settling into a new area (work commute/traffic flows, grocery stores/restaurants, and gyms/parks/recreation). Survey results also show that participants were least satisfied with their familiarity with an area prior to a move, indicating that there is room for improvement in this area.

Furthermore, this study implemented user experience design methods to design and test prototypes for a mobile application that can be used by those relocating to learn about and find a compatible neighborhood. Findings from usability testing support the idea that fewer choices for finding a compatible neighborhood may be better for well-being. Participants were in favor of gaining a simpler way to search for a new area to live, as long as the choices presented captured topics deemed most important. Participants appreciated a mobile application that would decrease the need to visit multiple websites and mobile apps to explore a new city, especially since it

prevented them from having to sort through multiple sources while giving them relevant categories to explore while choosing a new neighborhood. Feedback from user testing also supports the idea that such a digital tool could aid in the well-being of individuals who relocate, as this tool would help them become familiar with the new area while giving them the specific knowledge they desire.

1.5 IRB Approval

This thesis included research methods that involved the participation and behavioral analysis of human subjects. Prior to commencement of research, approval was received from the University of Houston Institutional Review Board (IRB). Initial approval was given on October 27, 2017, under IRB ID: STUDY00000590. Modifications were approved on November 21, 2017, under IRB ID: MOD00000774 and on March 9, 2018, under IRB ID: MOD00000972.

Chapter 2: Understanding the Issues Encountered During Relocation

Phase 1 of this study set out to determine main themes to be explored through further research. A literature review was conducted to help frame the problem and determine an overall concept direction. Main findings from this review are discussed in this chapter. To summarize, millions of Americans move to a new location each year. Individuals and families move for a variety of reasons, and impact on health and well-being can vary. Relocation is hardest on those moving longer distances, and dissatisfaction seems to come most from having few social connections and living in an incompatible neighborhood. Potential negative impacts can be reduced by planning and preparing for the move and taking the initiative to speed the time needed to adjust to a new location.

2.1 Millions of Americans Relocate Each Year

Within the last decade, the U.S. Census Bureau found that an average of 35 million Americans relocated to new homes each year (Figure 1), with individuals moving roughly 11.7 times in their lifetime. While most moves take place within the same county, over 13.5 million are moving larger distances. 9.8 million are moving to a different county within the same region, 2.4 million are moving to a different US region (Figure 2), and 1.3 million are moving abroad (U.S. Census Bureau, 2015; U.S. Census Bureau, 2016).

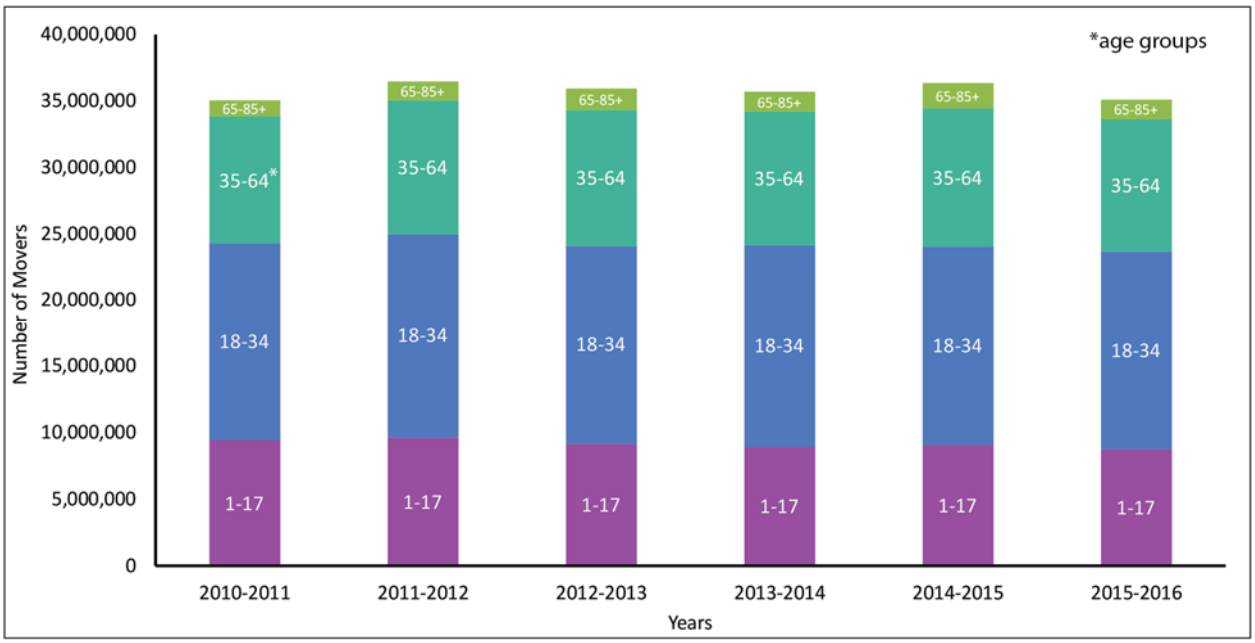


Figure 1 – Trends in United States Moving Population (U.S. Census Bureau, 2010 - 2016)

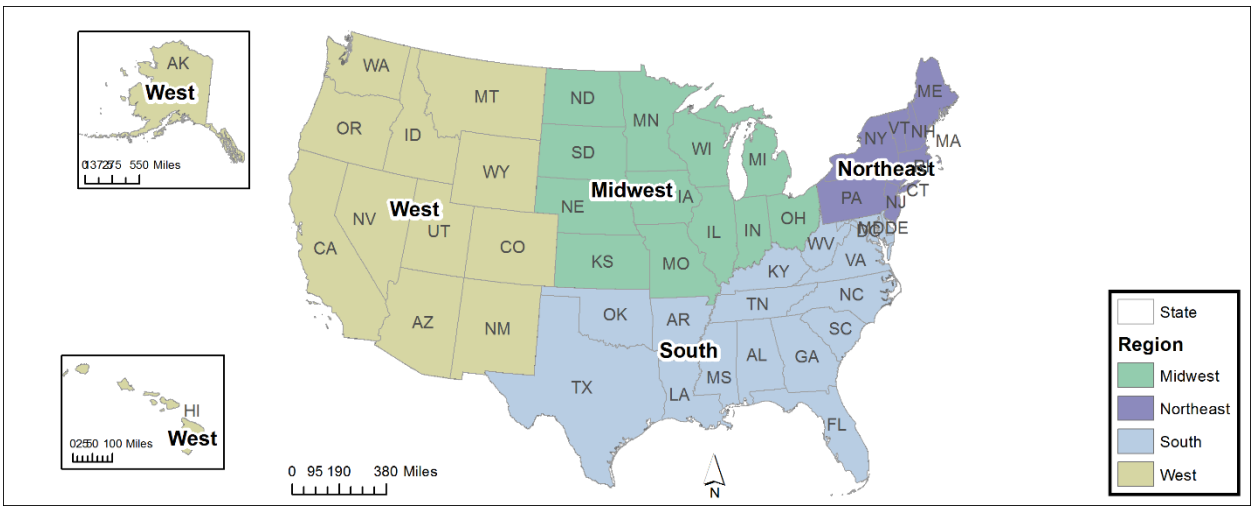


Figure 2 – Regions in the United States (U.S. Census Bureau, 2015)

Figure 3 shows that individuals and families relocate for multiple reasons, but most commonly for housing, family, or employment (U.S. Census Bureau, 2016). According to Shumaker and Stokols (1982), individuals and families can be influenced to relocate for a variety of reasons, including family life-cycle changes, status changes, and individual personality

differences. These reasons include relocating to a different sized house, for a job or school, or for a desire to live in a different culture. Those moving larger distances tend to be well-educated with a professional career, willing to move large distances to improve their lifestyles (Packard, 1972; Miller, 1977).

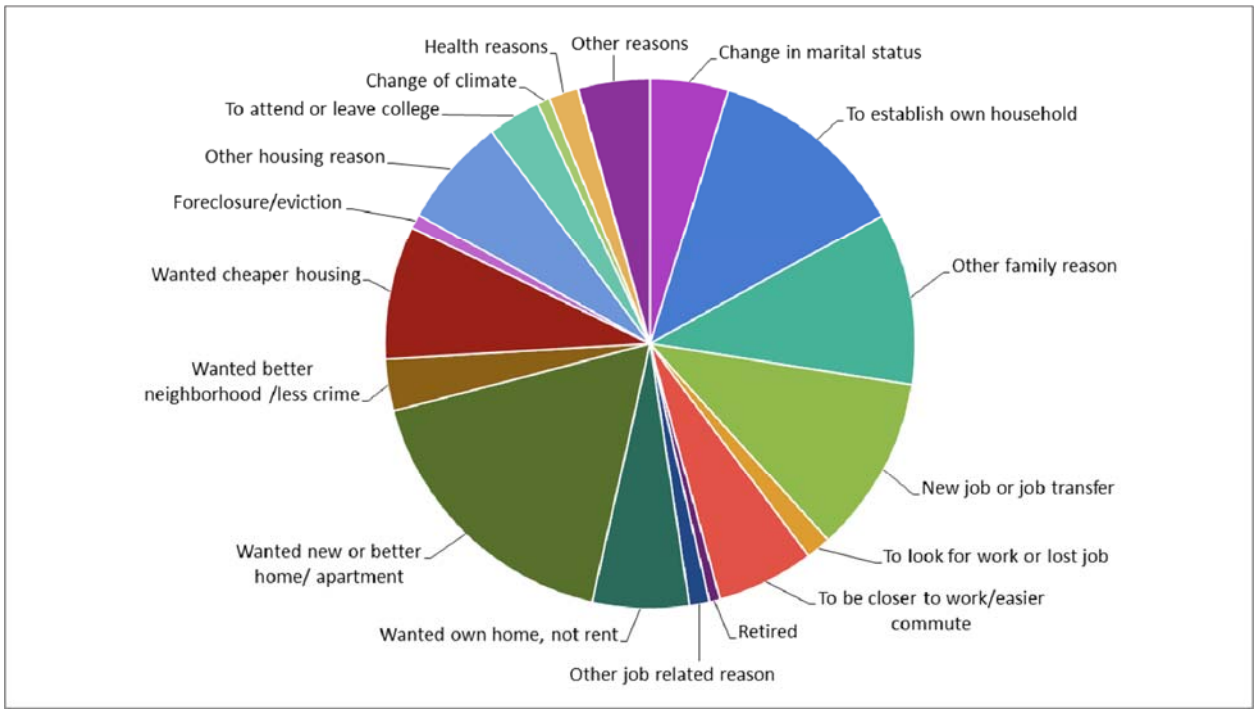


Figure 3 – Reasons why people move in the United States (U.S. Census Bureau, 2016)

Packard (1972) reported that roughly 75% of those moving larger distances were doing so for work, and doing so frequently. Miller (1977) found a large portion of the group making an interstate migration to be “chronic movers” who have lived in at least three different states. Regarding those who frequently relocate, similar personality traits can be found, such as having individualistic identities. Human connections are made based on individual interests, and frequent relocation leads to transient social lifestyles and broad networks. These individuals have the ability and willingness to make new friends, but maintain weak social ties and tend to feel restless in life (Oishi, 2010). Evidence has also been found that those who frequently relocate

feel disconnected from either people or places and continue to search for roots (Packard, 1972; Reimer, 2000).

2.2 Relocation Impacts One's Well-Being

Past research has shown people have various reactions and opinions towards relocation, depending on the personality of the person and details surrounding the move. Based on previous studies, relocation evokes feelings of anxiety, loneliness, and depression, but also enthusiasm, as individuals and families are removed from familiar surroundings and connections (Gaylord, 1979; Oishi & Talhelm, 2012; Riemer, 2000). Regarding personality traits, Stokols, Shumaker, & Martinez (1983) found that moving seems to have a greater negative effect on those with "low levels of exploratory tendencies," while Oishi (2010) reported a greater negative impact on introverts.

One common theme in previous research is the impact of relocation on one's mental well-being (Brett, 1982; Magdol, 2002; Martin, 1995; Moyle & Parkes, 1999; Munton, 1990; Oishi, 2010; Stokols & Shumaker, 1982). Campbell (1981) describes well-being as the psychological quality of a person's life, affected not only by what lies inside one's mind but also by the conditions in which one lives. Humans will generally tend to maximize their sense of well-being and seek as positive of an outlook on life as possible. An individual's *perception* of their reality can have a great impact on their overall well-being, and this perception depends on one's values, expectations, and personality traits. Satisfaction in life also impacts well-being. According to Campbell (1981, p. 24), "Satisfaction-dissatisfaction is a function of the gap the individual perceives between his or her present situation or status and the situation of status he or she aspires to, expects, or feels entitled to. Change in satisfaction level may result from a change in a perceived situation or a change in aspiration level or both." One's sense of well-being can be

changed either by changing one's circumstances or changing one's psychological perspective of these circumstances.

Well-being is most impacted by how one views the following "domains" of life: self, standard of living, family life, work, and social relationships (Campbell, 1981). Brett (1982) investigated these domains as they related to a job transfer, finding little difference in the well-being of more and less mobile and stable individuals. However, families who relocate for work were less satisfied with their social lives. This dissatisfaction comes both from leaving prior friends and struggling to make new connections. Munton (1990) studied stress as it related to a job transfer, finding weakened social relationships to be a source of stress, along with the preparation and transitional period just prior to the move. Stress was found to be directly related to the distance moved, possibly due to the physical distances and differences between the locations and the need to make quick decisions from afar. Ammons, Nelson, and Wodarski (1982) examined specific sources of stress among relocated corporate executives and their spouses. The spouses reported feelings of boredom, loss, depression, and loneliness more than the executives, who experienced much more enthusiasm towards the move. The spouses may report these feelings because they felt more isolated from their sources of social support from the pre-move location.

Fisher and Shaw (1994) conducted a longitudinal study analyzing relocation attitudes and adjustments of military personnel transferring for job assignments. Among many hypotheses, they posited that having pre-existing friends in the new location would support a better post-move attitude and fewer adjustment difficulties. Their findings reinforced this idea, as friends most likely provided emotional support along with informational support. However pre-existing friends only helped with adjustment for the first three months after the move; the study suggests

that new friends and sources of social support may be needed for long-term adjustments and attitudes.

Stokols and Shumaker (1982) suggest that past studies on how relocation affects well-being inadequately represent the dynamic and multi-dimensional aspects of moving, stating that relocation is something that can have a larger impact on one's life rather than being an isolated life event with short-term consequences. Relocation is not as simple as moving from one location to another. All areas of one's life can be altered, including daily routines, social connections, and recreational activities. Impacts of relocation can be either positive or negative, depending on the mindset of the individual and the circumstances surrounding the move. If individuals perceive the new environment to be a good fit for their personality, they will react positively to the move. However, if individuals do not agree with their fit in the new environment, their well-being can be negatively affected. Those who relocate may be more prone to periods of illness immediately following the move as they adapt to new surroundings. They may develop chronic mental strains if separated from family for long periods of time or continuously exposed to negative environmental changes (such as a longer and undesirable work commute). Since impact on physical and mental health can vary, it is difficult to fully connect relocation with specific health-related consequences. It is suggested that impact of relocation on health be analyzed not only by looking at immediate circumstances related to moving, but also by considering one's past moving experiences, current circumstances, and future plans.

2.3 Negative Impacts on Well-Being Can Be Lessened Through Move Preparation

Becoming informed about the move and new location will assist with easing or preventing possible complications related to relocation. Referencing previous organizational psychology studies arguing that being prepared and informed of an upcoming change can reduce

the negative impacts of the change, Martin (1999) surveyed individuals regarding preparations for relocation. Results showed that there was indeed a correlation. The more the relocator prepared prior to the move, the better his or her psychological well-being was following the move. Preparation helped not only with post-move health but also with reducing problems encountered during the move. Fisher and Shaw (1994) hypothesized that knowing what to expect in the new job and community would help with post-move adjustments, however, expectations of the move vs actual post-move adjustments were not significantly related. The authors suggest that pre-move expectations may not have been accurate, leading individuals to form attitudes and make decisions based on incorrect assumptions. Attitudes and adjustments to relocation may be improved by providing more and clearer information to help individuals make better decisions based on more accurate expectations. Having a positive attitude can be helpful, as Martin (2000) found that a pessimistic attitude towards the move can cause negative mental health and relocation-specific stress. Taking initiative after the relocation can be beneficial as well. Ammons, Nelson, and Wodarski (1982) suggest that families who take more initiative towards becoming integrated into their new location adjust more quickly to their new surroundings than those who do not. The families in the study who had a better adjustment to their new location actively acquired information about the community and sought out neighbors, neighborhood organizations, and local amenities. The researchers suggest the need for collective group support activities to be offered by communities for new residents. These activities would assist new residents in forming friendships and gathering information about community resources. Benjamin (1991) proposes support services as well, positing that relocation consultants and specialists will increase a relocated employee’s job performance after the relocation.

Preparation ahead of the move may also help with finding a compatible neighborhood. Stokols and Shumaker (1982) discuss place dependence (the strength of an individual's perceived attachment to a specific place). If one feels attached to a place, he or she will have a better attitude towards the location and feel less stressed by residing in that place. The definition of place goes beyond a residential setting to also include the surrounding neighborhood and local amenities. The researchers state that health problems are more likely to occur in undesirable places where one has no personal ties. Therefore, it is important for people to feel an attachment to their new location so they can have an easier adjustment. Having a perceived congruence or compatibility to a location helps with forming this attachment. The level of congruence will vary depending on an individual's perceived compatibility with their residence, neighborhood, shopping areas, and schools, along with access to features that help achieve personal goals. The proposed hypothesis that perceived congruence of the current residence is inversely related to health problems was supported; one of the major findings was that respondents who reported low levels of congruence also reported poorer spirits and greater medical problems. Respondents who believed they had access to desirable residential options had better attitudes and were more energetic than those who did not. Findings suggest the importance for further research to be conducted to measure person-environment congruence as it relates to one's adjustment to a new residential location post-move, as remaining in a highly congruent residence may be associated with better health.

Subjects from the Ammons, Nelson, and Wodarski (1982) study who moved to neighborhoods with more mobile residents found these neighborhoods to have much more friendly and responsive neighbors than those who moved to neighborhoods with more stable residents. Some also participated in clubs for new residents, finding them helpful with

developing new relationships and adjusting to their new location. Packard (1972) reported similar findings. Packard discusses the difficulties that “newcomers” found when trying to rebuild a social circle in their new location. They especially struggled to form connections in neighborhoods with more permanent residents. Those who had lived there for long periods of time saw the new residents as someone who was not worth the time to form a relationship with since would most likely move again in a few years. Highly mobile individuals stated that they preferred to live in newer neighborhoods with more mobile residents, as those residents tended to be more outgoing and welcoming to newcomers. Residents in the newer areas had shared concerns over developing relationships and were more open to developing these relationships. This openness may not always result in a close friendship, but it will help with being connected to the community and could lead to meeting a variety of other neighbors.

Chapter 3: Finding Opportunity to Help Those Who Relocate

Phase 1 of the current study continued by conducting interviews and a survey of individuals who had prior relocation experience. Stressors related to relocation were examined to help determine what factors are important during relocation and settling in a new location. Since past literature (discussed in Chapter 2) has shown that preparing for the move, becoming informed about the new location, and maintaining social connections can help with the well-being of an individual or family being relocated, the current study asked questions regarding what was done to help with these aspects of relocation. True to prior research, interview participants in the current study mentioned that better relocation experiences would come from gaining an advanced knowledge and understanding of the new area, becoming familiar with the area prior to the move, and receiving assistance with making new social connections. Survey results from the current study show exactly what type of preparation is helpful in finding a new place to live (visiting the location, using a realtor, and conducting online research) and exactly which items are important to learn about when becoming familiar with and settling into a new area (work commute/traffic flows, grocery stores/restaurants, and gyms/parks/recreation). Survey results also show that participants were least satisfied with their familiarity with an area prior to a move, indicating that there is room for improvement in this area.

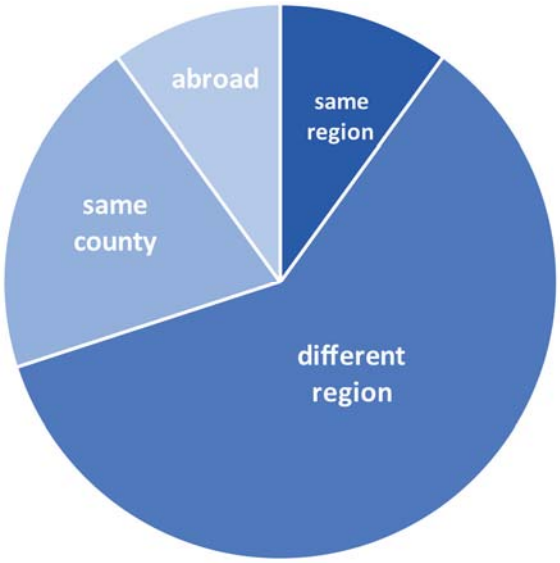
3.1 Interviews Support Need for Location Familiarization Assistance

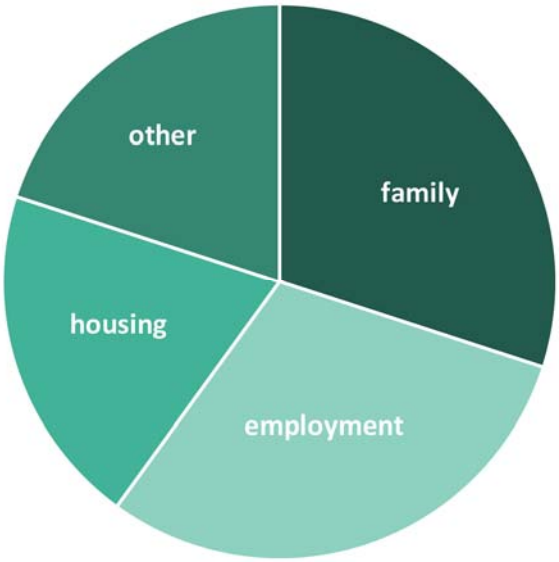
Prior to conducting interviews, this study surveyed previous studies on well-being and relocation to help frame the structure of the interviews. Campbell (1981) states that mental well-being can be defined in three different ways – by society, by a psychiatrist or psychologist, or by individuals. The latter definition involves a self-evaluation of well-being, influenced by an individual's perception of the quality of life experiences. This latter definition was tested through

Campbell's interviews during which individuals verbally reported their feelings, experiences, moods, etc. to help describe their overall sense of well-being, or how happy or content they were with their life. Campbell's study found people were open and willing to discuss their private feelings of well-being (or ill-being) and the researchers used sample surveys to obtain a broad idea of America's well-being. Since well-being is a subjective concept, Campbell states that it is best assessed through qualitative interviews. The current study was inspired by Campbell's approach and crafted open-ended interview questions to encourage study participants to self-evaluate their feelings towards relocation.

Stokols and Shumaker (1982) suggest that past studies on how relocation affects well-being inadequately represent the dynamic and multi-dimensional aspects of moving, stating that relocation is something that can have a larger impact on one's life rather than being an isolated life event with short-term consequences. Their findings suggest that the impact of relocation on health should be analyzed not only by looking at immediate circumstances related to moving, but also by considering one's past moving experiences, current circumstances, and future plans. This broader approach was also taken into consideration while crafting interview questions for the current study.

To further examine stressors related to relocation, the current study conducted interviews with ten individuals who have moved between three and twenty-six times each. These individuals were asked to describe the details of their most recent relocation, including where they moved and why they moved. Figures 4 and 5 summarize the answers given to where and why the participants relocated.





Figures 4 and 5 – Where and Why Interview Participants Relocated

Questions were asked related to emotions felt during relocation and what the individuals liked or disliked about their experience. Past moves were compared to most recent moves, and questions were asked related to future plans. Individuals described what steps they took during their relocation, how they moved their belongings, and what they would have done differently. Words used to describe their experiences were equivalent to emotions listed in previous literature, with most individuals saying their moves were stressful, exhausting, anxiety-causing and chaotic, but also exciting and relieving. Those with a greater number of relocations still experienced the same emotions as those with fewer relocations.

Questions were also asked related to planning for the move and settling in at the new location. Approaches to planning varied. Some individuals planned very little, while others visited the area multiple times prior to moving, utilized a realtor to help learn new areas, and conducted online research through multiple websites to gain a sense of the new area. Those who spent the least amount of time planning their move also experienced the longest periods of settling in. No correlation was found between relocation experience and thoroughness of

planning. To feel settled in a new location, similar answers were given among participants (Figure 6), but becoming familiar with the new location was mentioned the greatest number of times.

Figure 6 – What Interview Participants Did to Feel Settled

Familiarity was also one of the most difficult things to achieve, along with being away from friends and family and making new social connections. Impressions developed through online research regarding new cities and neighborhoods were sometimes inaccurate, and a few individuals found difficulties with navigating their new cities. Interview participants felt that better relocation experiences would come from gaining an advanced knowledge and understanding of the new area, becoming familiar with the area prior to the move, and receiving assistance with making new social connections.

The current study also interviewed professionals both to search for topics not introduced through initial interviews and to get feedback from potential stakeholders. A Houston area realtor was questioned about what his clients looked for in homes and neighborhoods. He mentioned

that his clients conduct online research prior to meeting with him and are most concerned with the price, size, and age of the house, the length of the commute to work, and the schools in the area. The realtor seems to have a great sense of knowledge about potential neighborhoods for newcomers but is utilized mostly for viewing and purchasing homes. Professional relocation coordinators were asked about what they considered to be the most stressful aspects of the relocation of goods on their clients. They reported scheduling changes and unexpected costs related to packing items to be the biggest causes of stress. Determining an exact date for when goods will be delivered is difficult due to fluctuations in the truck driver's priorities and scheduling, and clients sometimes reside in the new location for days or even weeks prior to receiving their items. Both the realtor and relocation coordinators reacted positively to the potential for a digital tool to assist with neighborhood compatibility.

3.2 Survey Results Highlight Relocation Preparation and Location Familiarization

Previous literature findings and responses from initial interviews helped determine content for a larger survey that the current study distributed online. Preparation for the move and familiarity with the new location were the main topics broached. Results were intended to prioritize and specify exactly what type of preparation is helpful in finding a new area to live and exactly which items are important to learn about when becoming familiar with and settling into a new area. Since Miller (1977) and Packard (1972) found that those moving larger distances might experience higher levels of stress than those moving shorter distances, an assumption was made for this thesis that move preparation and location familiarity would be more important to those moving larger distances. Therefore, participants of the online survey were asked to answer questions related to their experience with moving from one region to another, or abroad.

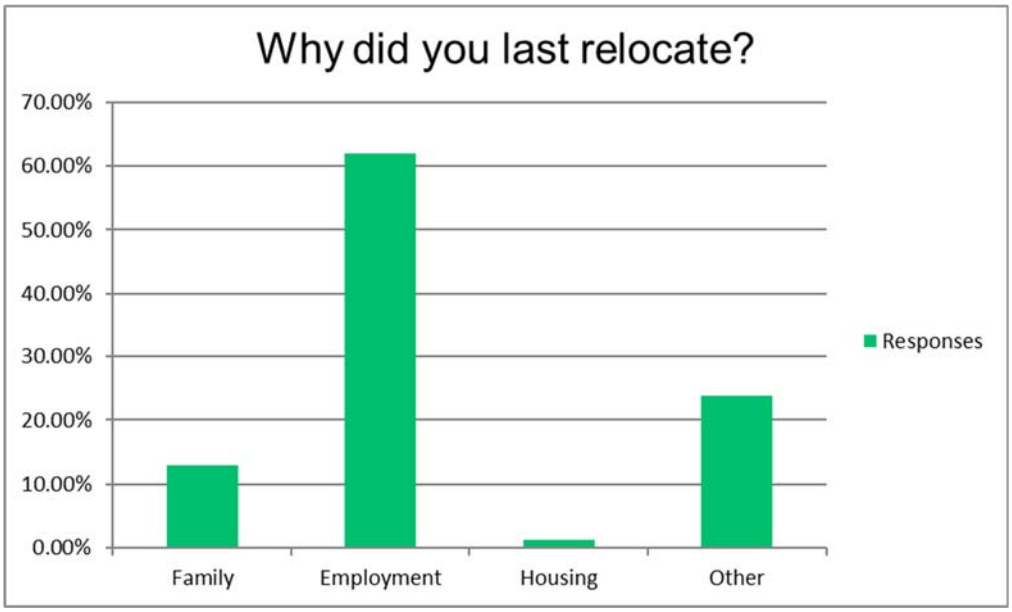


Figure 7 – Why Survey Participants Relocated

155 individuals completed the survey, most of whom relocated for employment reasons (Figure 7). Participants discussed relocation experiences from various locations. Most responses came from inner United States relocations but also included moves to and from Canada, Costa Rica, France, India, Ireland, Italy, Korea, the Netherlands, Nigeria, Norway, Spain, Taiwan, Venezuela, and Zambia.

Figure 8 – Rating of Satisfaction of Specific Tasks During Relocation

Regarding overall move satisfaction, participants were least satisfied with their familiarity with the new location prior to the move (Figure 8).

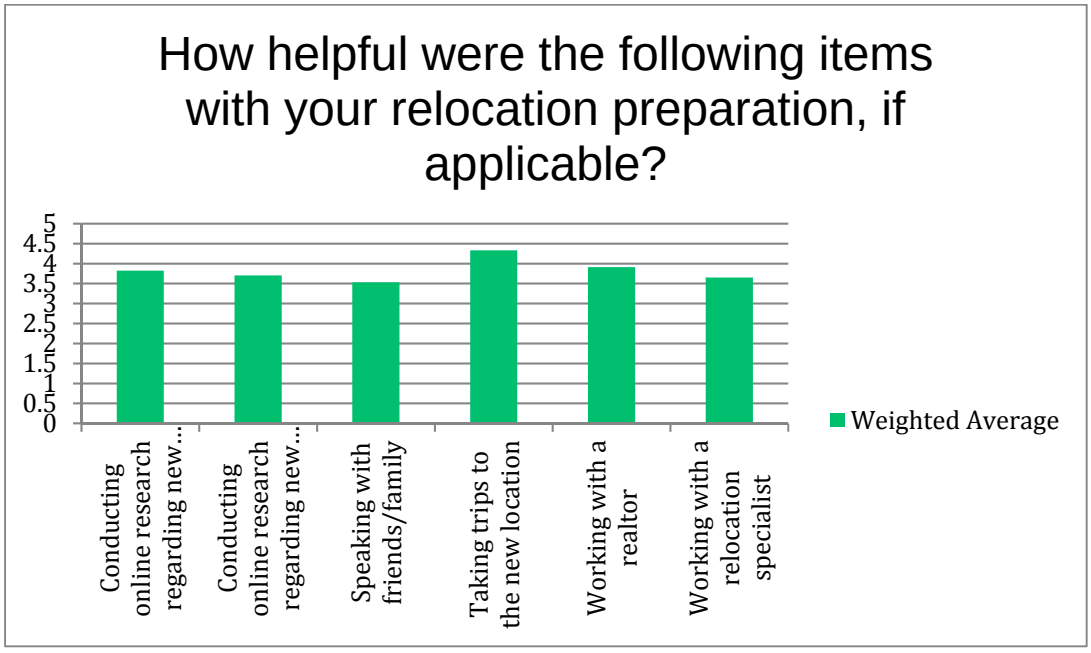


Figure 9 – Rating of Helpfulness of Specific Tasks During Relocation

In preparing for the move, responses indicate that taking trips to the new location, using a realtor, and conducting online research were the three most helpful items (Figure 9).

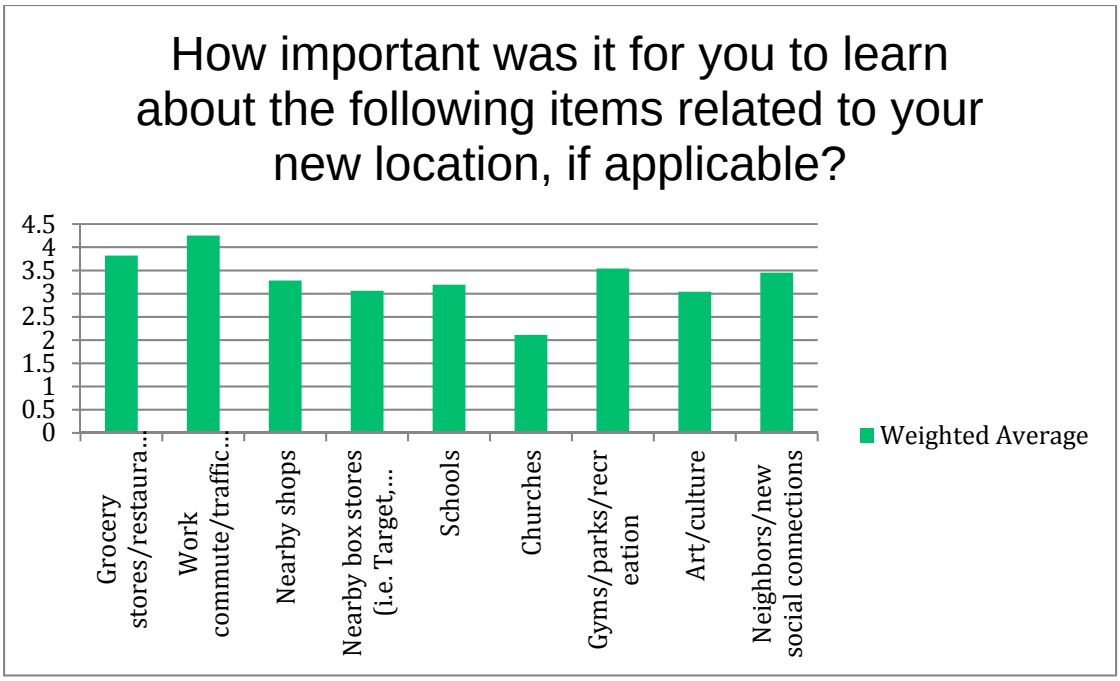


Figure 10 – Rating of Importance of Specific Items During Relocation

When becoming familiar with the new location, the three most important items to learn about included work commute/traffic flows, grocery stores/restaurants, and gyms/parks/recreation (Figure 10).

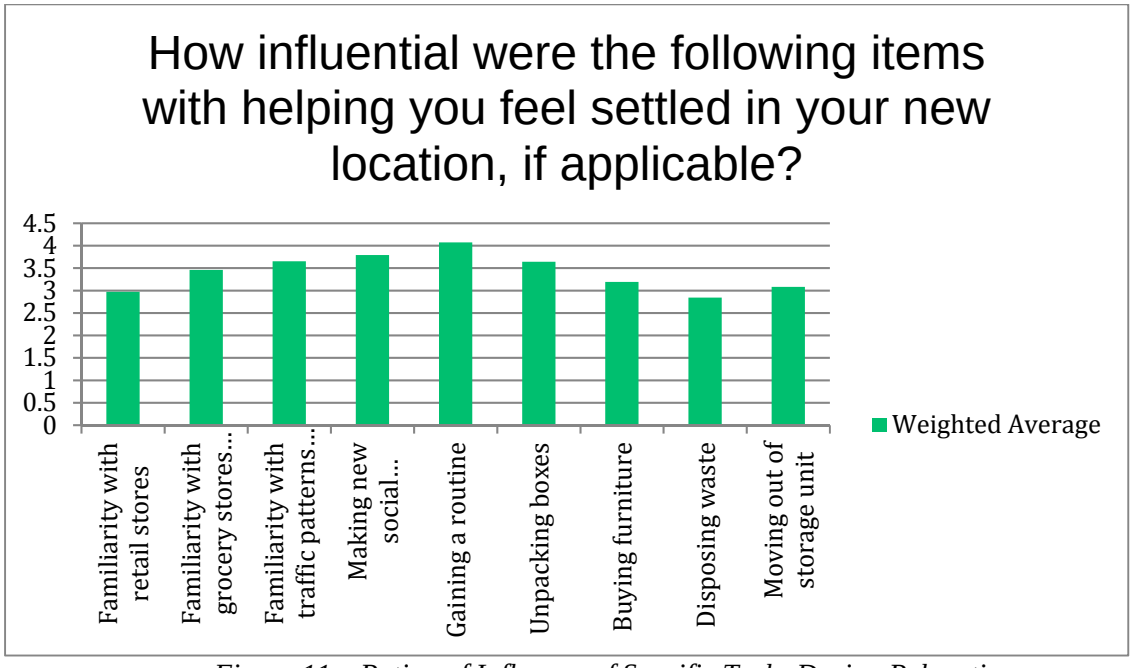


Figure 11 – Rating of Influence of Specific Tasks During Relocation

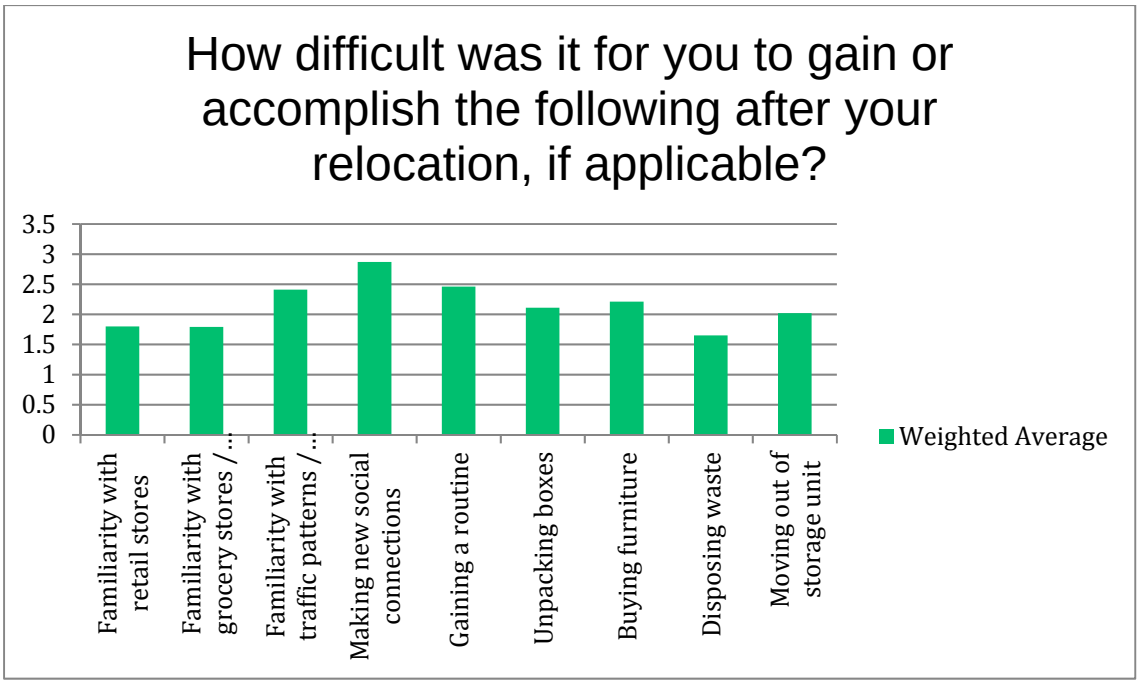


Figure 12 – Rating of Difficulty of Specific Tasks During Relocation

And finally, the three most influential items to learn about in a new location were also the three most difficult to accomplish – making social connections, gaining a routine, and learning the commute (Figures 11 and 12).

3.3 Existing Digital Tools Leave Room for a New Solution

Phase 1 of this thesis concluded by exploring existing products, as summarized in Table 4. Since a high emphasis was placed by those interviewed on the helpfulness of online research, the current study analyzed existing online solutions to see what currently exists to help with relocation. Ten common websites and mobile applications were surveyed to see what is currently available to help people become familiar with a new neighborhood and choose an appropriate place to live. These websites and mobile applications focused on real estate, vacation planning, restaurant information, mapping services, and social media. These sites were analyzed based on whether they allowed the user to gain knowledge in eight different topics that were identified as being important with helping people become familiar with a new location. Topics were chosen

based on what was found to be important during interviews and surveys. The first four topics were based on survey results. The sites were analyzed to see whether the user could specify a commute time to the location, research and locate restaurants and grocery stores, research and locate parks and recreational activities, and connect to neighbors and/or make new social connections. The sites were also analyzed to see whether they provided information on real estate, schools, area crime, and hospitals. These last four topics were based on interview comments and determined to also be important when becoming familiar with new neighborhoods. Google Maps seems best at letting the user explore neighborhoods. However, the user cannot search and compare multiple items at once, and it is difficult to get a real feel for the neighborhood. The real estate websites all fall under the general process of choosing a home and then exploring the neighborhood. It is sometimes possible to type in a neighborhood and search, but the action is not intuitive and the information is not well presented. No application captured every important theme from the online survey results and interviews.

Table 4 – Competitive Analysis of Existing Website and Mobile Application Solutions

Company	Format	Purpose	Familiarity Topics Identified through Survey				Other Familiarity Topics of Importance				Comments
			Commute Times	Restaurants & Groceries	Parks & Recreation	Social Connections	Real Estate	Schools	Crime	Hospitals	
Trulia	Website and App	Real Estate	✓	✓			✓	✓	✓		easy to search for homes; neighborhood info is simplified; has "city guides"; also gives demographics; no reviews on locations; must sign up for an account to get commute times; pulls data from yelp for restaurants; gyms are only visible if they appear on Google Maps
Zillow	Website and App	Real Estate					✓	✓			data overload on houses listed on map; neighborhood is listed after home is chosen but only info given is on nearby real estate; no reviews on locations
HAR	Website and App	Real Estate	✓	✓			✓	✓			Texas only; search options aside from real estate seem a little overwhelming; first impression - "where do I start?"; must type in neighborhood or choose one from a list; map is not separated by neighborhood; info on some nearby places are listed on property map at very bottom of listing more details on website; can include reviews of locations but this option is not well utilized; commute times are only on the website
Realtor	Website and App	Real Estate		✓			✓	✓	✓		has map that lets you explore area after you click on home to view; map does not allow for multiple topics to be viewed at once (only real estate listings and one more item such as crime or coffee shops); can also search by neighborhood if you know the specific name to type into the search bar; no reviews on locations
Apartments	Website and App	Rentals	✓				✓				easiest part is typing in a city and rent prices/number of bedrooms/bathrooms; other search criteria must be explored by scrolling down website; does give "points of interest" after you choose a place to analyze; has "local guide" but not neighborhoood specific; can search for apartments in specific neighborhoods; has reviews on apartments
Trip Advisor	Website and App	Vacation Planning		✓		✓					intended for travel, but still gives insight into cities; has good photos of attractions; includes reviews from visitors; search for city, then click on "things to do"
Yelp	Website and App	Restaurant Information		✓	✓					✓	intended for finding a restaurant but can give you a sense of whether or not there are a lot of food places in the area; can search for key words in reviews; has photos of food and businesses; has reviews on food and businesses
Google Maps	Website and App	Mapping Service	✓	✓	✓			✓		✓	easy to find specific locations; does not let you search for multiple things at once (i.e. you cannot search for an address and then view everything in the surrounding area like restaurants, grocery stores, schools etc. (only one at a time); has photos of locations and streets; has reviews on businesses
Next Door	App	Social Media				✓					neighborhood specific; must live in specific location to have access to news feeds; users can post photos and leave reviews on whatever they want; user must scroll down a feed but can sort for specific topics
Facebook	Website and App	Social Media				✓					can search for links and people connected to specific areas; users can post photos and leave reviews on whatever they want; user must know of a specific group and be connected to it

3.4 Opportunity Lies in Assisting Newcomers with Neighborhood Familiarity

Phase 2 of this thesis began by considering possible solutions that could alleviate the issues discovered in Phase 1. Based on interviews and survey results, an ideal solution would help those relocating on multiple aspects of familiarity of a new location, including choosing a compatible neighborhood, gaining advanced knowledge and understanding of this area, and possibly developing new routines. Receiving assistance with learning the commute and making social connections would also be beneficial. A common task noticed during research is that those relocating were inclined to conduct online research and consult multiple websites with the goal of learning about the new location. Some of the existing websites and mobile applications examined in the comparative analysis can help familiarize users with topics deemed important, but the user must visit and compile their own information from multiple sites, none of which are built with location familiarity and neighborhood compatibility as the main objective.

There is an opportunity for an online website and/or mobile application that assists individuals and families become familiar with a new location, choose a compatible neighborhood, and develop new routines. For this study, the structure of a mobile application (app) interface was developed to assist with these tasks. It was developed as an app prototype because an app is a simple medium through which to provide information and a potentially convenient tool for people to use while relocating. The assumption was made that if the structure can be well implemented through an app, it has the potential to be developed into a website in the future.

Chapter 4: Developing the Design Concept

Phase 2 continued by developing the concept for the structure of a mobile application that helps potential newcomers become familiar with their new location and choose a compatible neighborhood. The intention of this phase of the thesis was to review the necessary elements for potential digital designs, develop personas and analyze tasks, and begin creating low-fidelity prototypes.

Survey results and comments from interviews specified which items are important to learn about when becoming familiar with and settling into a new area. Multiple topics must be examined by those relocating, leading to a large amount of data to be provided in one application. Since those relocating could possibly feel overwhelmed by the entire relocation process, it is especially important for the solution to be easy for the user to interact with and for the data to be displayed in a way that is easy to understand. This is particularly true in mobile application design. The Interaction Design Foundation (n.d.) states that “mobile users engage with their devices at *crucial* moments and only for *short* periods. Their experiences need to be personalized, efficient, and enjoyable in order to keep them engaged and ensure their continued use of such items.”

Creating a positive user experience (UX) of the mobile application will help provide such a solution. User experience development stems from the computer science discipline of human-computer interaction, or HCI. This discipline has been developed over the past 40 years, beginning when computers were implemented into the homes of nonexperts who began using them as a tool to assist in their daily lives. HCI is concerned with the design, evaluation, and implementation of computing systems for human use. Those involved in the discipline strive to improve the overall usability of a system (including its safety, utility, effectiveness, efficiency,

usability, and appeal) by concentrating on a user centric development rather than a data-centric development (McCracken & Wolfe, 2004). As technology advanced and interactive products became more fashionable, experts began to consider the concepts of HCI to be too narrow. UX definitions were preferred, as they seemed to capture the broader nature of how humans could interact with technology (Hassenzahl & Tractinsky, 2006). The Nielsen Norman Group defines UX as a concept that "encompasses all aspects of the end-user's interaction with the company, its services, and its products" (Norman & Nielsen, n.d.). When applied to mobile application design, a positive user experience can be created not only by focusing on how the application looks but also by developing and understanding the entire service it is providing and the way it is used.

Breaking the user experience design process down into "elements" can aid in developing the overall design of a website or mobile application. Garrett (2002) defines these elements by describing them in five planes from which to better understand user needs. The elements are categorized into the strategy plane, the scope plane, the structure plane, the skeleton plane, and the surface plane.

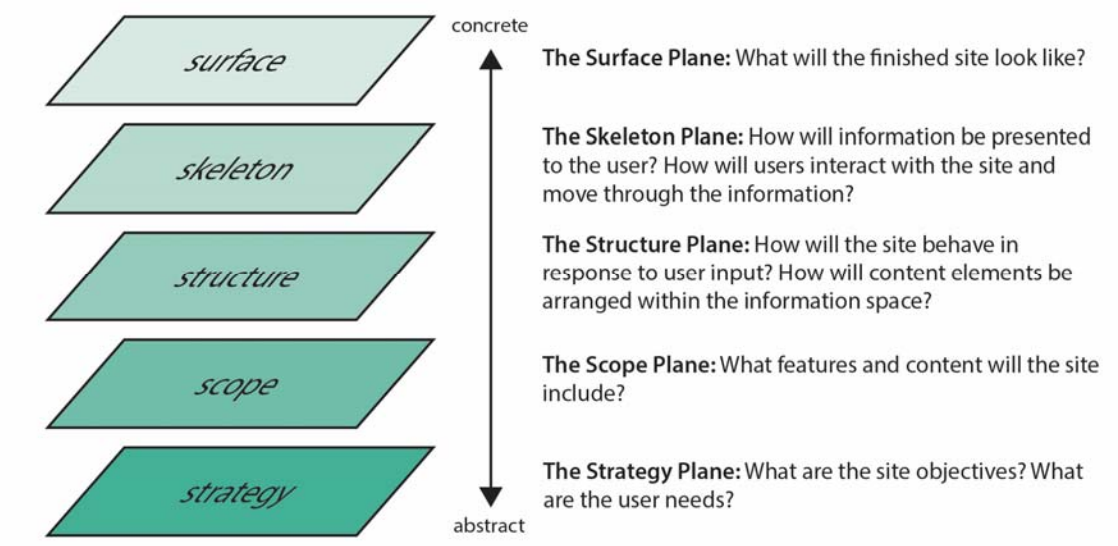


Figure 13 – The Elements of User Experience (Garrett, 2002)

By analyzing and making decisions related to all five planes, the designer can develop a better product for the user. Each plane builds upon one another to influence the overall user experience and is dependent on the planes below it. With each plane, the tasks become more concrete and decisions become more specific and detailed. These planes were used as a conceptual framework for the development of the mobile application for this thesis.

4.1 User Needs and Site Objectives are Key in Developing Strategy

The Strategy Plane defines both the user needs and the site objectives. Determining what the audience wants and what the goals of the site are helps create a foundation to help make further decisions during the design process (Garrett, 2002). To determine user needs, it is important to first identify the target audience. For the current concept, targeted users can be broken into two separate user segments. The first includes adults who relocate to new cities that are large enough to have unique and labeled neighborhoods. The second includes those who need assistance finding things to do in the neighborhood in which they reside. Both users incorporate technology into their everyday lives and are comfortable learning and using mobile applications. The current concept focused on the first segment of those relocating to a new city while leaving room in the mobile application for further development regarding the second segmentation. To represent the needs of a large range of users, three separate personas were created based on information obtained during initial interviews (Figure 14).

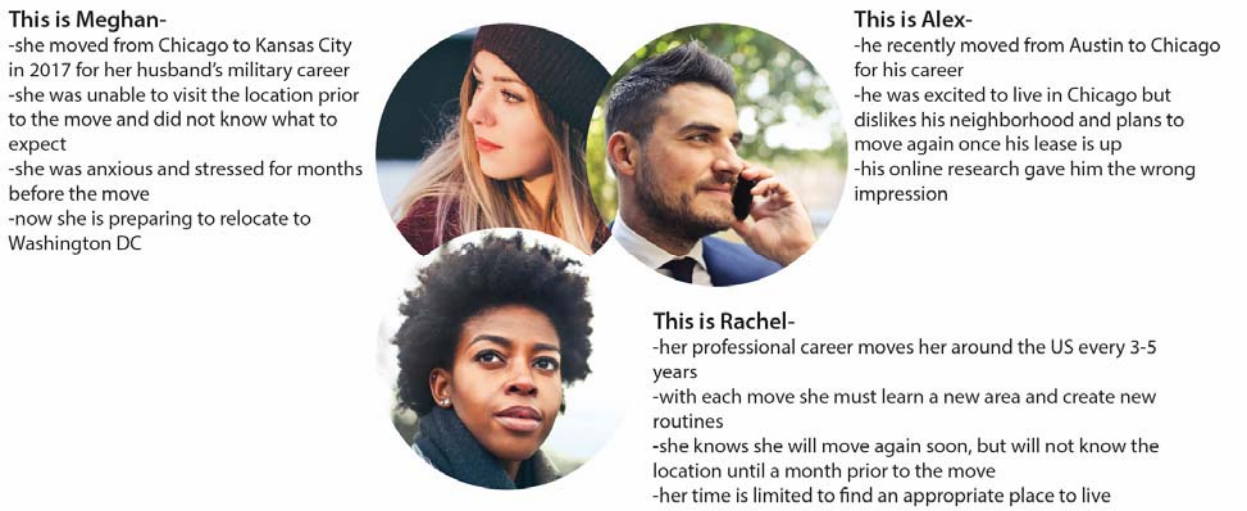


Figure 14 – User Personas

From interview and survey data, the audience needs were assumed to be obtaining assistance with finding a compatible neighborhood in which to live and learning about the amenities of the neighborhood. Since individual needs and neighborhood compatibilities vary, it is important for the site to be flexible on what information is provided so it can cater to a variety of needs. It should be built in such a way as to either direct the user to a compatible neighborhood or give the user the power to explore different neighborhoods. Also, since individuals may need to make quick decisions on where to live based on a limited timeframe, the site should quickly provide the necessary information and not be cluttered with too many details.

The site objective is to help people learn about new neighborhoods and find nearby amenities and businesses. By focusing at the neighborhood level, the user can concentrate their home search on a smaller area of the city rather than feel overwhelmed by a large metropolitan area. The brand identity of the site is meant to be fun and somewhat playful, to encourage users to enjoy interacting with the site and continue to use it. Funding for the site could potentially come through an advertising business model, through selling app subscriptions, or through selling the solution to a company that manages or encounters a large number of relocations.

4.2 Content Requirements and Functional Specifications Build the Scope

The strategy can be progressed into the Scope Plane by specifying the content requirements and site functionality that will help capture the user needs and satisfy the site objectives. Knowing the features and functions of the site prior to developing its structure will help properly build it (Garrett, 2002). For the current concept, the main features of the site are a set of criteria to help the user narrow an area of interest and an interactive map that includes the various neighborhoods in a specific city. The map includes specific information on each neighborhood to help the user learn about the area. The map will be developed with categorized map markers that can be shown or hidden to allow the user to determine which information is provided on the screen.

The categorized information provided on the map makes up the bulk of the content requirements. This content will need to be managed by a mobile content management system (CMS) to make sure the content is correctly provided to the users and kept up to date (Garrett, 2002). Most data managed by the mobile CMS will need to be mined from the content inventories of existing sites, such as Google Maps, Yelp, and real estate websites with up-to-date home listings. In future versions of the mobile application, the mobile CMS can manage reviews and profile information provided by users in the application. This information will be kept in a separate content inventory and used to both provide a more customized view to the user and to display user reviews on the map for others to see. The goal of the mobile CMS is to properly organize all information and deliver it to the user.

4.3 Interaction Design and Information Architecture Provide Structure

After the scope is understood, the structure of the mobile application becomes important. The structure describes how all aspects of the site fit together as a whole and how the site information will be presented to the user. Within the Structure Plane, the *interaction design* and *information architecture* are defined. The interaction design outlines how the site should best react to and respond to input from the user, and the information architecture determines the arrangement of content within the information space (Garrett, 2002).

Garrett explains interaction design through the use of conceptual models, or how people think a task should be carried out when the product is in use. Defining the site's conceptual model(s) helps designers communicate the overall intention of the site and make consistent design decisions during development. Depending on the complexity of the system, it can have one or more conceptual model (Garrett, 2002). For the current concept, the main conceptual model is the map that allows users to explore various neighborhoods in a city. This conventional model was chosen because it is a good tool to display the layout and places of interest in a neighborhood, and it is something that people are familiar and comfortable with using.

Although Garrett's definition of interaction design is not as developed as modern definitions, the base of the definition is the same – that products should be created with a focus on the way a user will use them and enable the user to achieve their objective in a streamlined way. The Interaction Design Foundation expands on the envelope of interaction design, stating that it also concerns the vocabulary and visuals used, and the aesthetics or visual attractiveness of the product (Siang, 2018). Garrett addresses vocabulary under information architecture and categorizes aesthetics under the Surface Plane. Although definitions of categories vary, the inclusion of overall fundamentals remains mostly unchanged.

The information architecture includes the organizational and navigational structures that allow the user to effectively move through the site information (Garrett, 2002). For the current concept, the information begins with the broadest category (the entire city) and breaks down into subsections of individual neighborhoods, with information on each neighborhood. Each neighborhood includes details on the locations specific to that neighborhood. This hierarchical structure allows the user to begin with a large amount of information but break it into smaller, more manageable amounts of data. The steps to get from one section to the next should come naturally to the user to help him or her easily sort through the data. Figure 15 represents this hierarchical structure, showing the sections as “nodes” which act as empty shells into which the content can later be added. These nodes have a parent/child relationship, with the parent node containing the broader information and the children nodes containing narrow amounts of information. Each node contains a parent (i.e. the location information on the map is part of the neighborhood, which is part of the entire city) but not every node contains a child (the detailed information on the locations on the map reaches the end of the chain of information). To move from parent to child, the user will select filters or answer questions regarding applicable criteria that will help guide them to a compatible neighborhood.

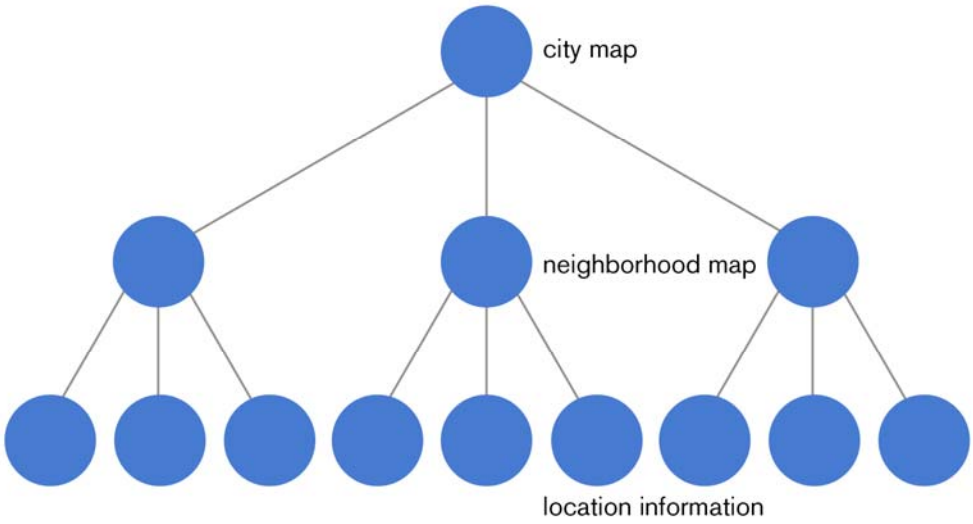


Figure 15 – Hierarchical Structure for the Site (adapted from Garrett, 2002)

An architectural diagram was developed from the hierarchical structure so that the site could begin to come together visually. This diagram shows the relationships between the pages and information on the site to help the developer visualize which categories are connected and how the sequence of steps will fit together. Figure 16 displays the initial architectural diagram for this thesis. Further iterations were explored during user testing with the goal of minimizing the number of steps necessary for the user to obtain the desired information. These iterations are discussed in Chapter 5.

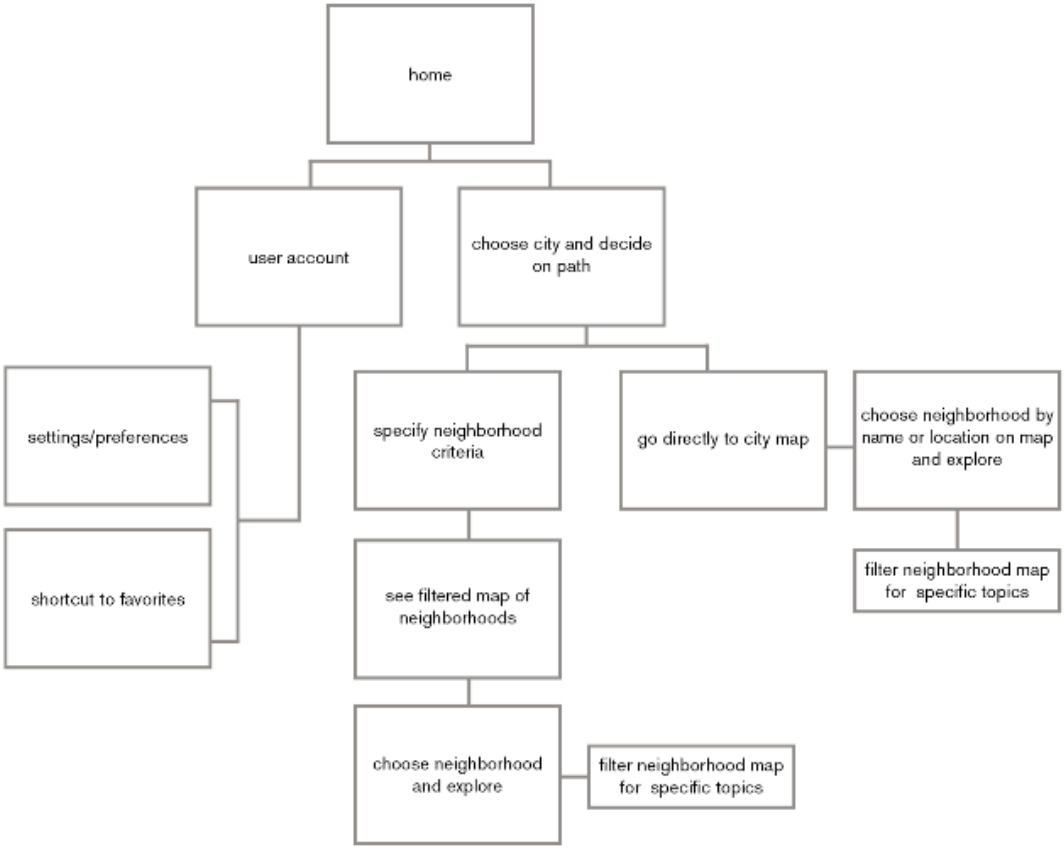


Figure 16 – Initial Architectural Diagram for the Site

4.4 Navigation Design and Wireframing Build the Site Skeleton

After determining the main sections that will direct the user through the site, the next step is to refine these sections into individual pages that highlight the building blocks of what the site will look like and how the user will navigate through the information. This is represented by the Skeleton Plane. Developing the *interface design* and *navigation design* will create concrete guidelines from which to build the pages. The interface design helps the user "do things" and includes tangible items such as buttons, drop-down menus, filters, arrows, and other components. The navigation design helps the user "go places" and creates a lens through which the user sees the structure of the information space. These designs are brought together in the *information design*, which is how the information is presented to the user on the page. Information design is

developed through wireframing the site to define where interface components, text, and images will be placed on the page. This step is normally done by prototyping the general layout of the pages onto paper (Garrett, 2002).

Initial interface design mostly included action buttons and elements through which the user would select desired information (Figure 17). These buttons and elements were refined through user testing and are discussed in Chapter 4.

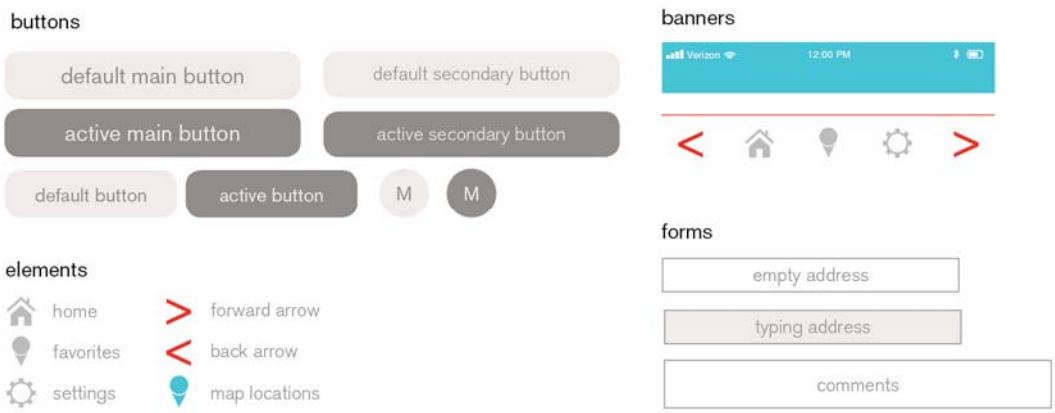


Figure 17 – Initial Interface Elements for the Site

Two main navigation systems were implemented into the site for this thesis. The first is the local navigation system (Figure 18), which allows the user to access what is nearby the page he or she is viewing. In terms of hierarchical architecture, the user will have access to the page's parent and children. For example, when viewing the map of a neighborhood, the user will be able to see the key locations related to that neighborhood, but not key locations related to other neighborhoods. These locations will be accessible through buttons or icons that are shown on the same page as the neighborhood map.

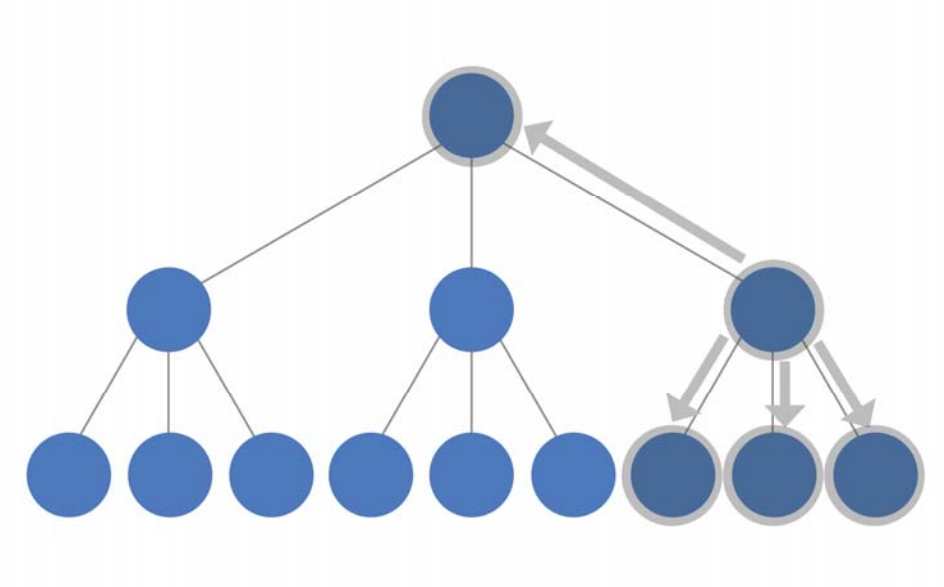


Figure 18 – Local Navigation System (adapted from Garrett, 2002)

If the user needs to return to a higher level in the app, such as the city map or the home page, he or she can do so through the global navigation system (Figure 19). This is implemented with the use of shortcut icons located on each page.

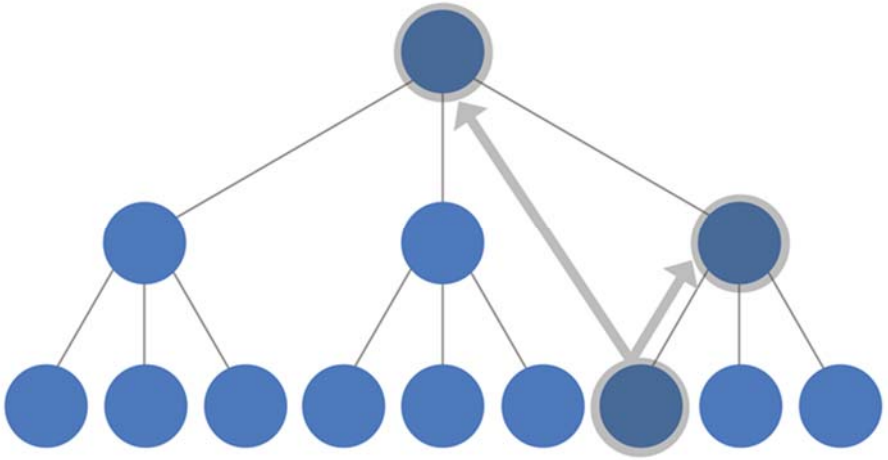


Figure 19 – Global Navigation System (adapted from Garrett, 2002)

The information design is developed by considering the best way to present information to the user so that it can be easily understood. It can include grouping information and items into

categories or lists and presenting tasks in a logical order. The goal is to consider how the user would complete the task required to obtain the desired information, and find a way to clearly arrange and communicate this information to support the user to complete the task. For this thesis, the focus started off broad by considering potential complications and questions that could occur during relocation in order to visualize the entire moving process and search for connections, as seen in Figure 20.

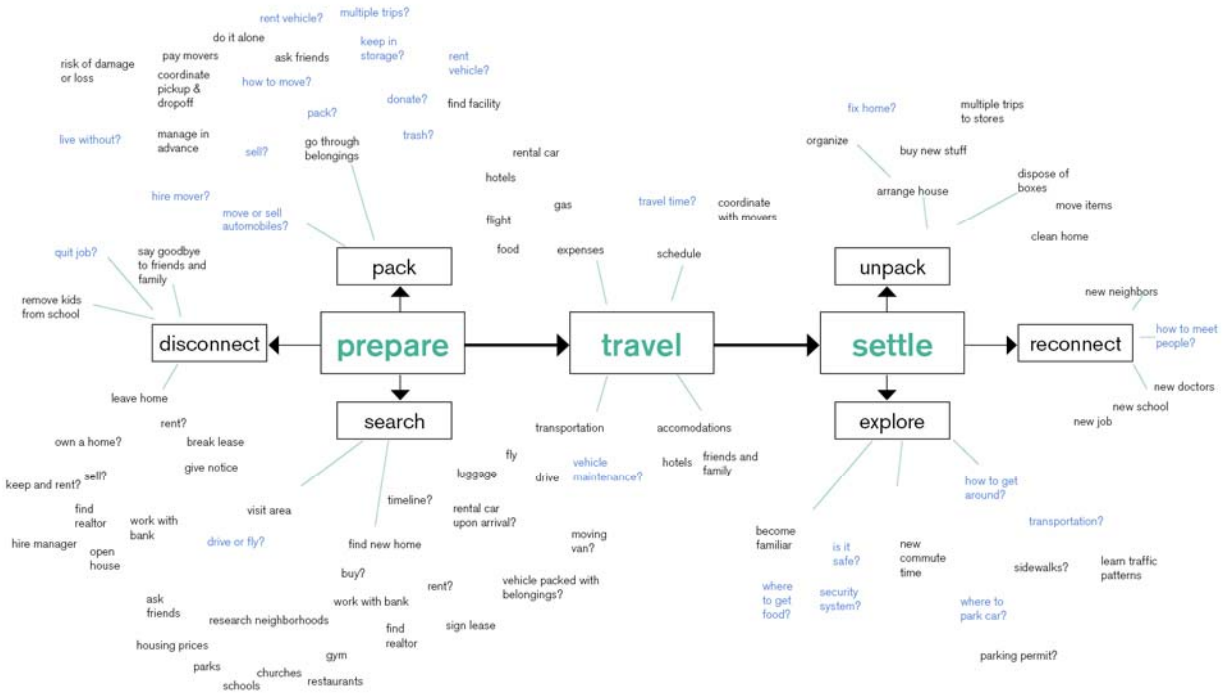


Figure 20 – Brainstorming the Moving Process and Potential Issues or Questions

Next, the task of seeking a neighborhood was analyzed by looking at the layout of existing map applications such as Google Maps and Yelp, and existing home finding sites such as Trulia and Zillow. Potential processes for finding a neighborhood were mapped out on paper, and flow charts were developed to help optimize the necessary steps to do so. Processes were further visualized through paper prototyping, as seen in Figure 21. An initial wireframe was developed

to begin laying out the necessary components and screens, as seen in Figure 22. This wireframe leads to the development of the final layer of design - creating the visuals of the site.

Figure 21 – Task Analysis and Paper Prototyping Processes for Finding a Neighborhood

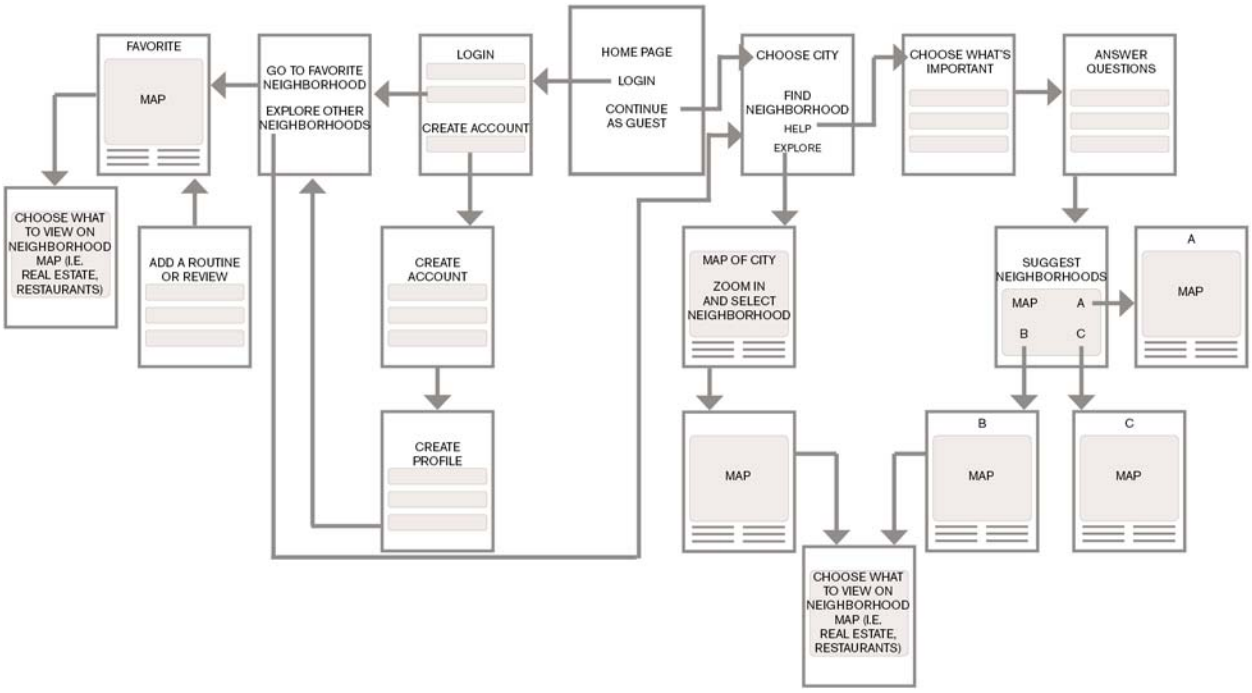


Figure 22 – Initial Wireframing of the Site

4.5 Organized Aesthetics Support a Consistent User Interface

The final component in designing the user experience of the site is to focus on the visuals of the site – the Surface Plane. The visuals are what the user first notices about a site and are used to fulfill the goals of the previous planes. The arrangement of information has been determined in the previous steps and must now be visually presented to the user to clarify and reinforce the structure of the site. Visual techniques can be used to attract and direct the attention of the user (Garrett 2002).

Visuals are used to help the user follow a smooth flow across the page and be guided through what must be accomplished on the page being viewed. Contrast and uniformity are important in helping the user accomplish the task. Contrast helps the user see what is essential on the page and understand relationships between the interface elements in the view. Uniformity of

graphics prevents the user from needing to learn redundant buttons and elements. Uniformity helps keep a consistent layout throughout the site and can also be obtained by using a grid-based layout (Garrett, 2002). This thesis used the grids as shown in Figure 22, with slightly varied layouts depending on the information being portrayed.

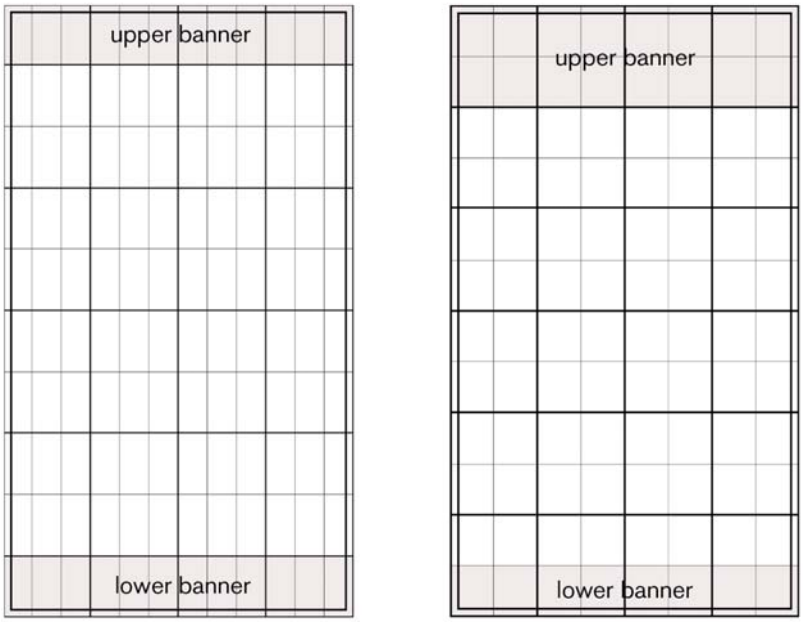


Figure 22 – Grid Layouts for the Prototyped Sites

These techniques and others have been summarized into various design guidelines and principles throughout the years. Shneiderman developed “Eight Golden Rules of Interface Design,” Nielsen developed “Usability Heuristics,” and Constantine and Lockwood developed “User Interface Design Principles.” These guidelines tend to somewhat overlap, all with the aim of developing consistent user interfaces (Picking et al., 2012). This thesis referenced those of Constantine and Lockwood (1999) to help create a consistent user interface throughout the site. Summarized in Table 5, these principles focus on organization, clarity, simplicity, tolerance, and consistency.

Table 5 – Constantine and Lockwood User Interface Design Principles (adapted from Picking et al 2012)

Principle	Description
The Structure Principle	Your design should organize the user interface purposefully, in meaningful and useful ways based on clear, consistent models that are apparent and recognizable to users, putting related things together and separating unrelated things. The structure principle is concerned with your overall user interface architecture.
The Simplicity Principle	Your design should make simple, common tasks simple to do, communicating clearly and simply in the user's own language, and providing good shortcuts that are meaningfully related to longer procedures.
The Visibility Principle	Your design should keep all needed options and materials for a given task visible without distracting the user with extraneous or redundant information.
The Feedback Principle	Your design should keep users informed of actions or interpreta-tions, changes or state or condition, and errors or exceptions.
The Tolerance Principle	Your design should be flexible and tolerant, reducing the cost of mistakes and misuse by allowing undoing and redoing, while also preventing errors wherever possible.
The Reuse Principle	Your design should reuse internal and external components and behaviors, maintaining consistency with purpose rather than merely arbitrarily consistency, thus reducing the need for users to rethink and remember.

Figure 23 highlights the initial screens developed for the site, however, these visuals were created with the goal of further analyzing the initial wireframing. More attention was given to the visuals during the design development stage of this project.

Figure 23 – Initial Visuals for the Site

4.6 Concept Summary

This mobile application aims to assist relocating families and individuals who need to learn about their new location and find a compatible neighborhood to live in. The target audience includes adults who relocate to new cities that are large enough to have unique and labeled neighborhoods. The main features of the site are a set of criteria to help the user narrow an area of interest and an interactive map that includes the various neighborhoods in a specific city. The map includes specific information on each neighborhood to help the user learn about the area. The information given in this app uses a hierarchical structure that allows the user to begin with a large amount of information in the broadest category (information on neighborhoods and places in the entire city) and break it into smaller, more manageable amounts of data (specific information on places in each neighborhood). The goal of this app is to positively impact the user's well-being by helping them learn about the amenities of the various neighborhoods and make a more informed choice on where to move.

Chapter 5: Developing the Design through Usability Testing

Phase 3 of this thesis involved the development and analysis of prototyped solutions. This phase allowed for the rapid discovery and remedy of issues. To develop the design, this study implemented an iterative cycle of designing, prototyping, and evaluating the proposed solutions, as displayed in Figure 24. Three separate prototypes were evaluated. Usability testing was conducted using fifteen adult participants, separated into three groups of five. Participants all had experience with relocation and had either relocated in the last two years or were planning to relocate within the next six months at the time of the study. Lifestyle backgrounds of the participants varied, including those who were single and employed, single and unemployed, married and employed with children, married and employed with no children, and married and retired with no children at home. Professional backgrounds also varied, including engineers, artists, designers, real estate agents, sales associates, and technology specialists.

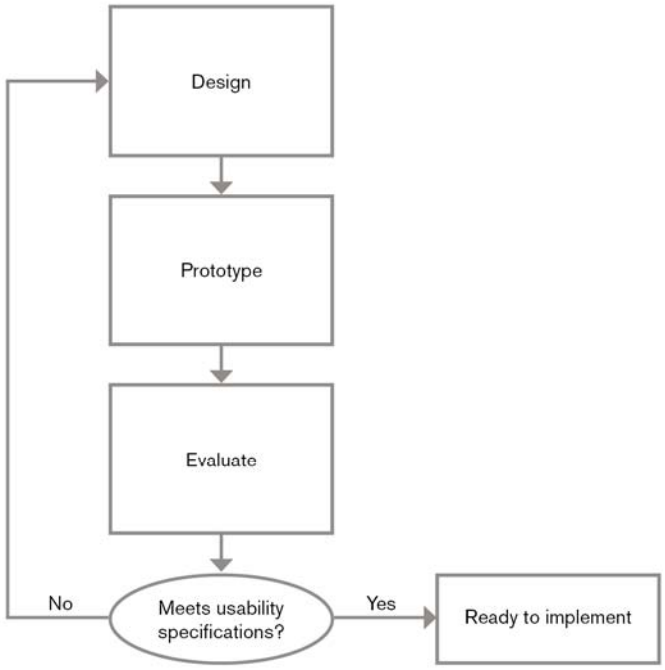


Figure 24 – User-Centered Development Cycle (McCracken and Wolfe, 2004)

Usability testing protocol was established to search for problems not considered during prototype development and to determine if the proposed design was viewed as a viable solution that could easily and successfully help the user learn what he or she would like to know about a new neighborhood. The principal research investigator sat with each participant during testing, encouraging the participant to speak his or her thoughts while viewing the screens. This is known as an "active intervention" technique (Dumas & Redish, 1999) or a "think aloud" technique (McCracken & Wolfe, 2004). Participants were given 3 scenarios and asked to complete tasks using the app. While the participant completed the tasks, the investigator questioned the participant's understanding of how the app functioned by asking him or her to verbally describe what steps he or she would take to complete the tasks, and whether the interface of the app successfully satisfied what was needed to complete the task. Participants were questioned whether the proposed concept was an easy and useful way of finding a new area to live or explore. Attention was given to the emotional responses provided by the participants. Answers and feedback from testing were taken into consideration during design development of the next cycle. After completing scenario testing, participants completed a computer system usability questionnaire, modified from Lewis, 1995. This questionnaire also included questions related to familiarity and well-being, and was used to track progress of design development.

5.1 Initial Ideation and First Round of Usability Testing

Initial mobile application ideation for this thesis began by focusing on the structure and skeleton prior the visuals, as discussed in Chapter 4. During this same time, names for the app were considered to help develop a sense for potential branding of the site. Shorter names were preferred that would be easier to say or remember, but also give somewhat of a sense of the purpose of the app (Figure 25).

Figure 25 – Name Ideation for Mobile App

The name "Naber" was chosen, stemming from the word "neighbor," to give the user the sense that they were receiving help from their first neighbor on obtaining information on the neighborhoods. Furthermore, "naber" is Turkish slang for "what's happening," "what's up," or "what's new," and therefore seemed quite appropriate for allowing users to find out "what's happening in the neighborhood." Logos were examined as well; some of which can be seen in Figure 26.

Figure 26 – Samples of Logo Ideation for Naber

Initial visuals are displayed in Figure 27. These screens were developed to further visualize a potential layout for initial user testing. Clickable options on the app were represented through stylized buttons to help the user filter for what was important to their search for a new neighborhood.

Figure 27 – Early Visuals for Naber

Potential processes for finding a neighborhood were continuously mapped out on paper, and flow charts were developed to help optimize the necessary steps to do so. Ideas from Garrett's user experience planes (Garrett, 2002) and Constantine and Lockwood's design principles (Constantine & Lockwood, 1999) were taken into consideration. The goal was to organize the interface in a way that clearly communicated the tasks without distracting the user with unnecessary information. Multiple options were displayed on screen to test the organization and see how well the participants would process the information. Ideas were further visualized through paper prototyping, and more developed screens were created to be analyzed through usability testing as seen in Figures 28 and 29.

After finalizing the visuals for the screens, the app was developed into a clickable, digital prototype for the first round of usability testing. This prototype was built through the user experience design software application Adobe XD, developed by Adobe Systems. This software was chosen because the prototypes could rapidly be built and easily be shared and downloaded onto a phone for offline testing.

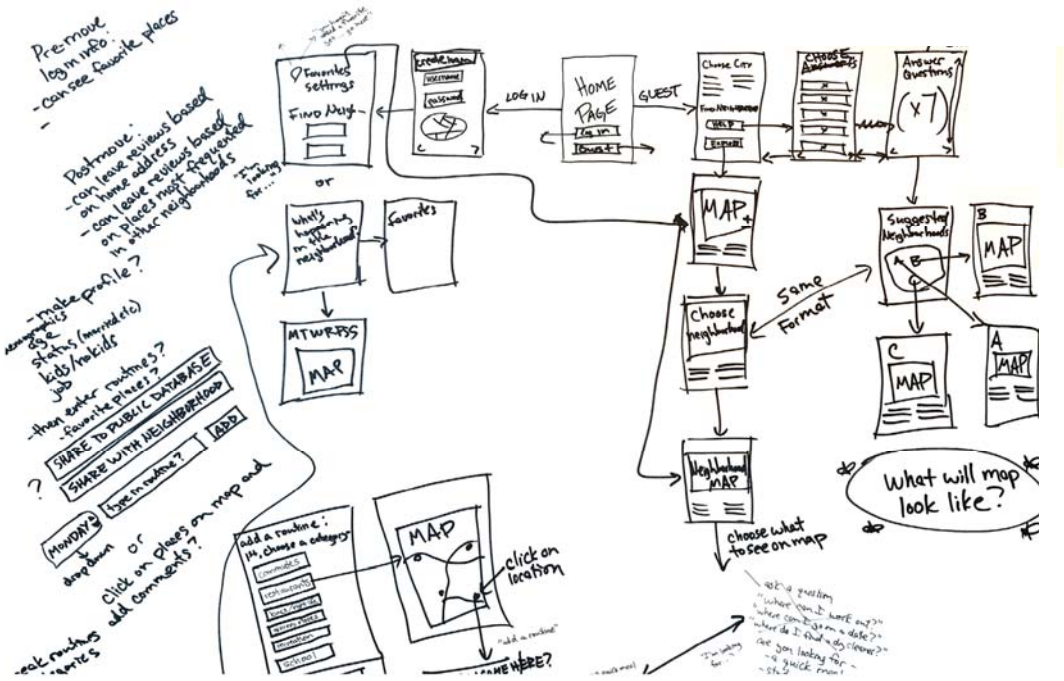


Figure 28 –Example of Ideation Prior to First Round of Usability Testing

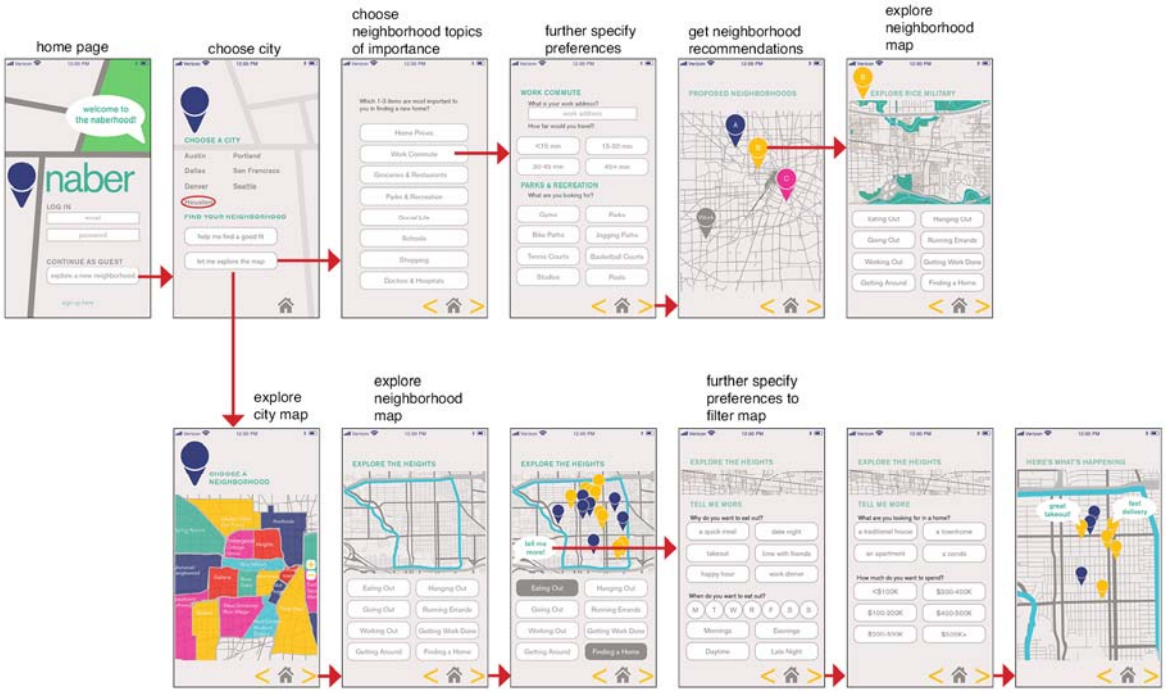


Figure 29 –Examples of Screens Developed for First Round of Usability Testing

Results from the first round of usability testing revealed that information was not communicated as clearly as intended, and too much information was presented on each screen. The beginning of the app did not clearly state what the user needed to do to obtain the necessary information. Users expressed confusion but not frustration. Users hesitated on what to do and asked for guidance on how to navigate the screens. Also, some of the neighborhood filtering options were confusing. Overall, there were too many words and too much information presented per page. Specific issues are highlighted in Figure 30.

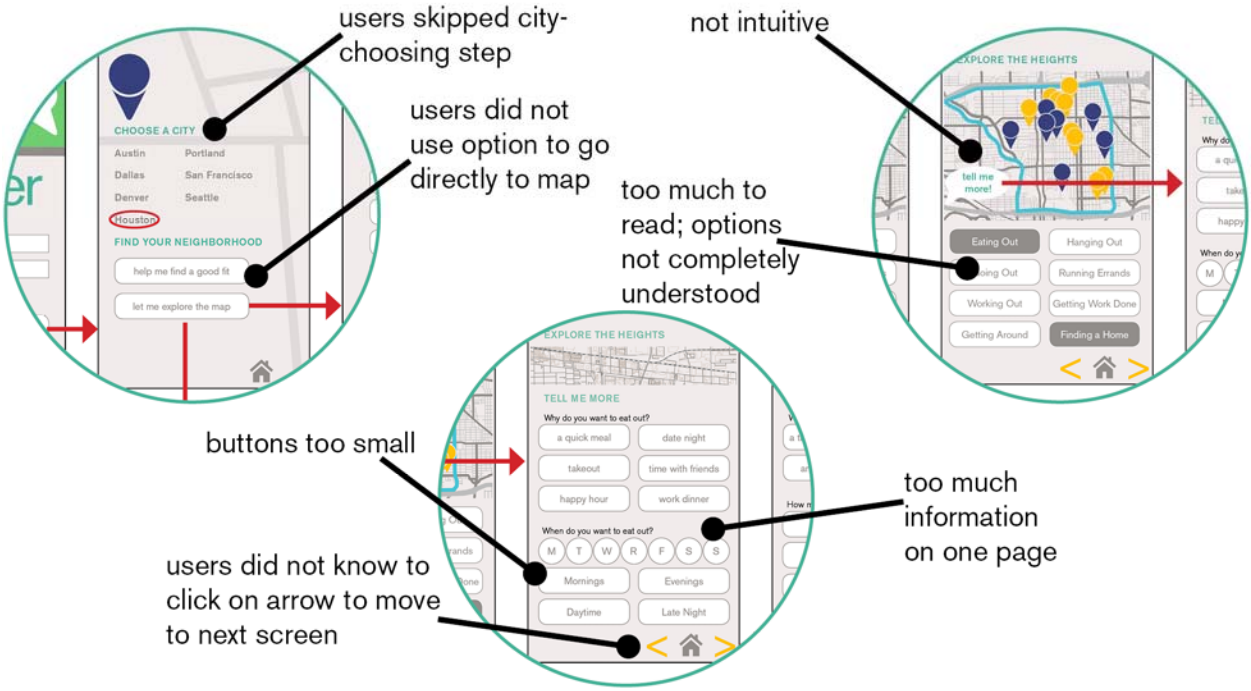


Figure 30 –Usability Issues Discovered During First Round of Usability Testing

Participants did mention positive aspects regarding the concept. During testing they expressed happiness with the overall choices provided under categories of neighborhood amenities, but they wanted them presented in a clearer way. They were pleased at the thought of consulting one app rather than multiple websites to learn about the neighborhoods, thus reducing the choice of what to consult prior to a move. They mentioned the benefit of "having one app for everything I need," having "search criteria that is more relevant than other home finding aps," and thought the concept was "a great start."

5.2 Secondary Ideation and Second Round of Usability Testing

Usability problems from the first round of testing were addressed prior to the second round of usability testing. Emphasis was placed on determining how to show information to the user and deciding which choices were important to provide to the user without overwhelming

them. Process steps were separated into a greater number of screens to help give the user less information on each screen. The layout of choosing to view the map or answer questions was modified to present the entire city map on screen and include an option for the user to specify neighborhood criteria for filtering. Nomenclature used for category filters was edited to be more specific on which topics were included in each category. Architectural and wireframing diagrams were updated for the next prototype (Figures 31 and 32).

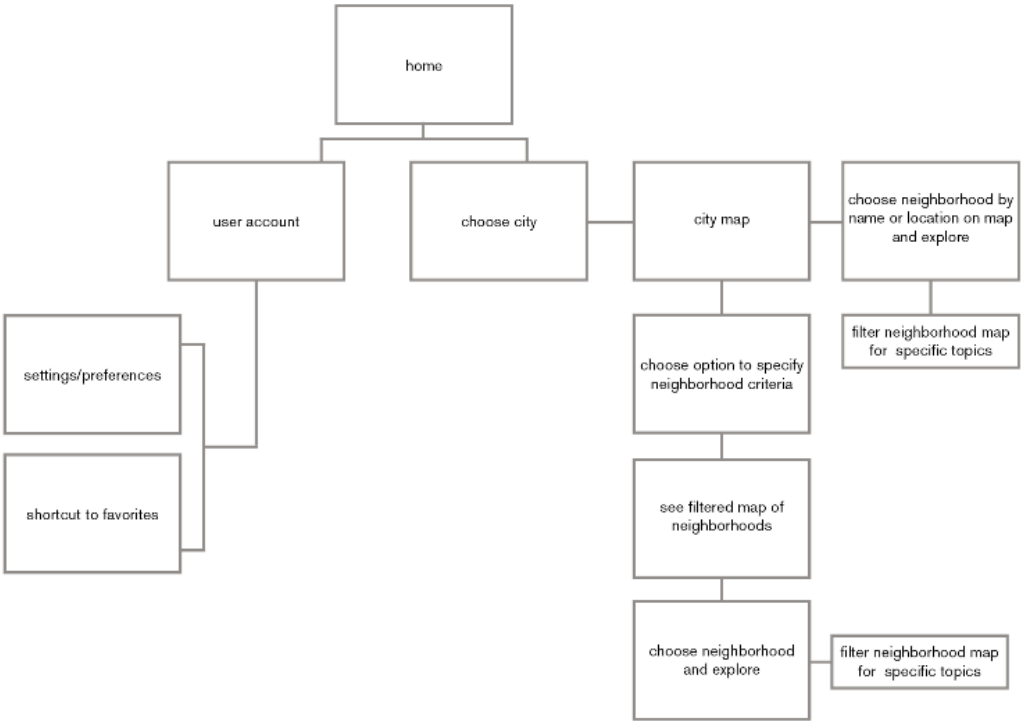


Figure 31 –Edited Architectural Diagram Prior to Round Two of User Testing

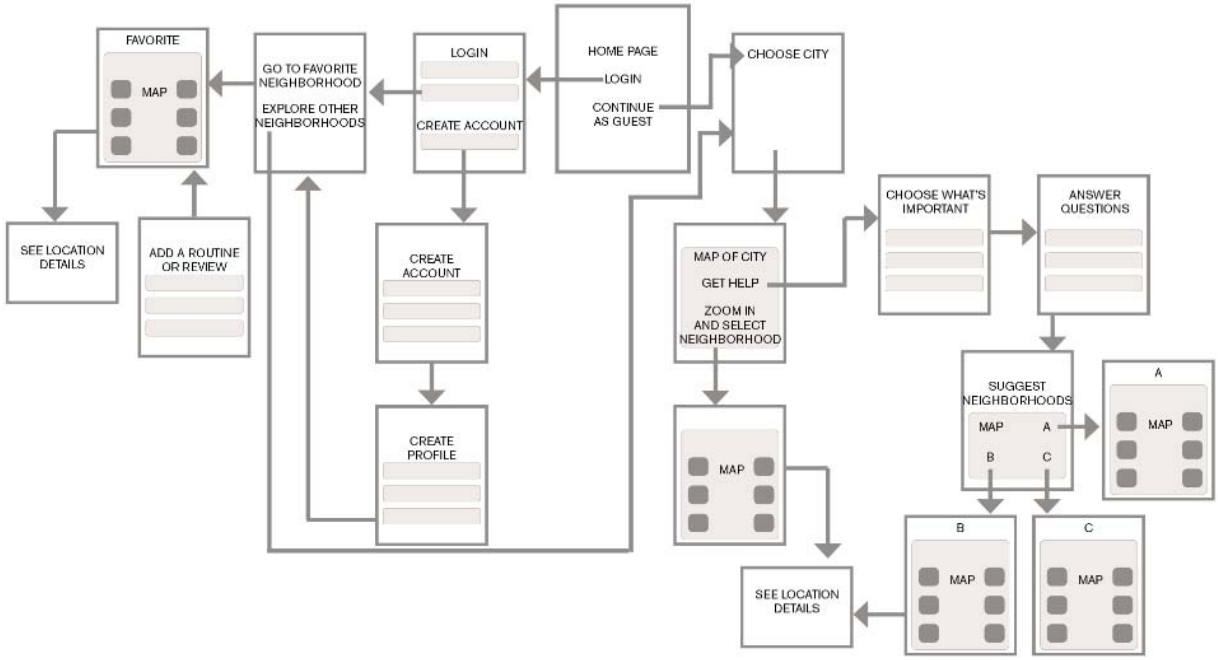


Figure 32 – Edited Wireframing Prior to Round Two of User Testing

Interface edits were made by enlarging the buttons, modifying the hierarchy of information on each page, and converting text descriptions on the map page to icons. The use of icons rather than text allowed for a larger map to be implemented on screen. These icons could change color when selected to give the user feedback on selections and remind them of the category being viewed. To help the user navigate the app, the concept of a “neighborhood squirrel” was added to the visual branding to act as the mascot or the logo of the app (Figure 33). The squirrel would benefit the user by helping guide his or her eye and appear on screen when more information was needed. The map location marker graphics were edited from conventional colored map markers to colored acorns; conceptually, the squirrel was leaving acorns around the neighborhood to highlight items of interest to the user. Figure 34 shows screens used in the second round of usability testing.

Figure 33 – Squirrel Icon Ideation for Visual Branding

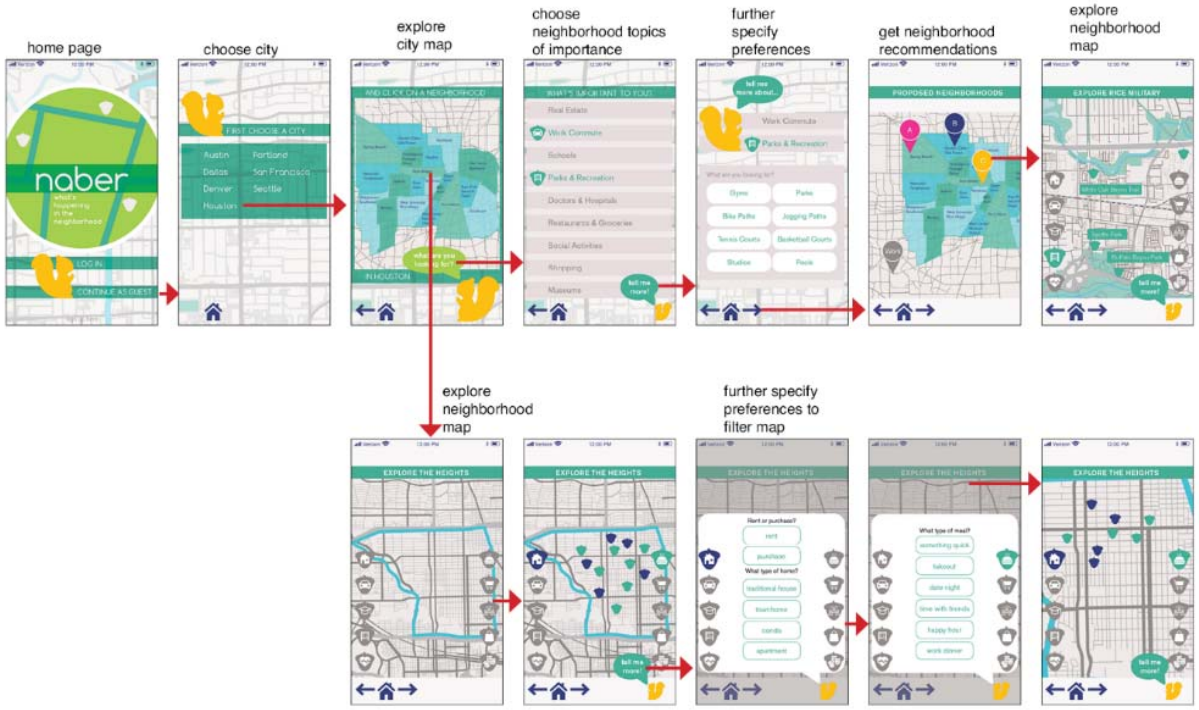


Figure 34 –Examples of Screens Developed for Second Round of Usability Testing

Results from the second round of usability testing revealed that the app needed further screen navigation improvements; the participants still hesitated on how to continue from page to page. The icons were well received and were an improvement from the initial text, however visually they did not stand out enough on the screen. Participants expressed confusion on what information was presented under some categories, indicating that the categories were not fully intuitive. Reaction to the squirrel and acorns were positive, however the squirrel needed to offer more navigational assistance throughout the screens. Specific issues are highlighted in Figure 35.

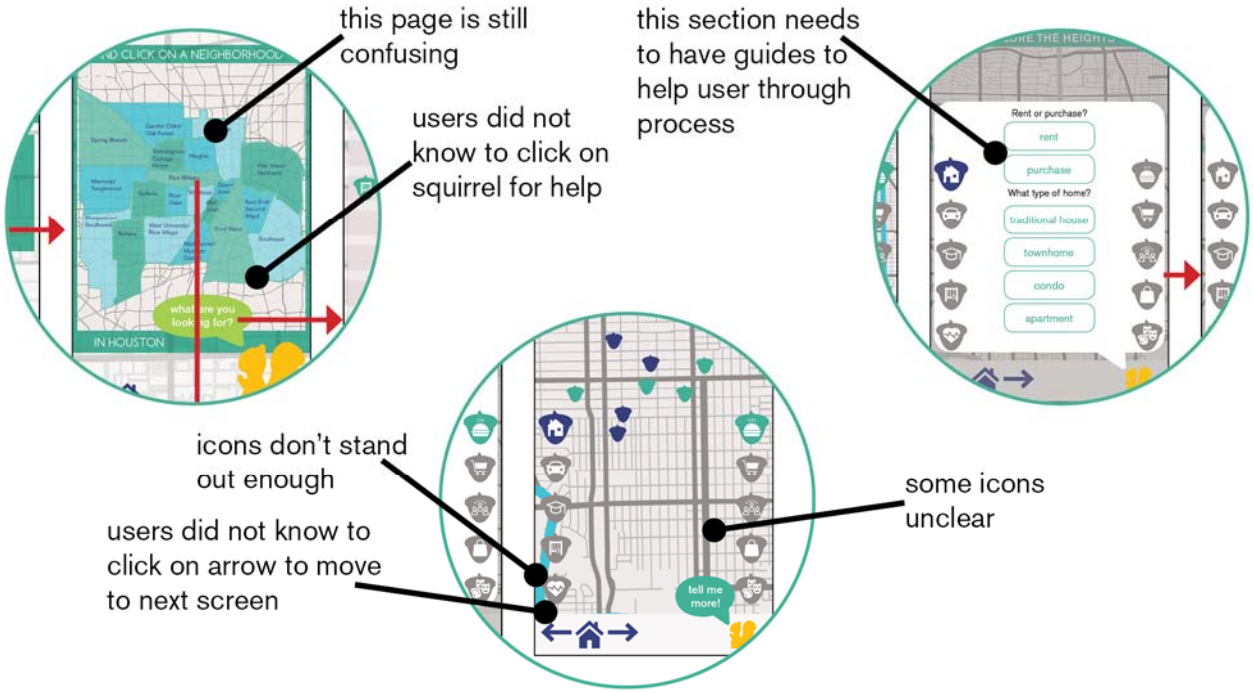


Figure 35 –Usability Issues Discovered During Second Round of Usability Testing

The second round of participants reacted positively to the overall concept. These participants remarked that they would like to have a product that would reduce the need to utilize several sources while providing the necessary information. Comments included "it is an app I would

love to use when relocating," "it asks me the questions on what is important to me when relocating," "it has all categories in one app," and "I wish I had something like this when I moved."

5.3 Tertiary Ideation and Third Round of Usability Testing

Usability problems from the second round of testing were addressed prior to the third round of usability testing. Since participants were still hesitating on the initial screens, a different approach was taken to guide the user to a neighborhood. Assumptions were made that someone relocating for work would already have a general idea in their head of their work location, and would have a pre-determined preference for living in a downtown, midtown, or suburban environment. If work commute was most important, the user could quickly view an area of the map in the general direction of their work. If living downtown was important, the user could bypass possible midtown or suburban neighborhoods. Therefore, preferences for living environment and general cardinal directions were addressed up front. After a generalized area was chosen, neighborhood "snapshots" were introduced to give the user a quick overview of the neighborhood prior to deciding if it is worth exploring. These overviews included the main neighborhood characteristics and average home and rental prices.

To help guide the user through the steps, "thought bubbles" with text directions were added to converse with the user. The squirrel remains as the app "helper," and is introduced through the initial thought bubble to avoid confusion. The acorn icons from the map were edited to clearly indicate what category they represented; two categories were removed to reduce the number of choices on the screen. These acorns were added on an individual screen prior to the map to give the user the option to choose important neighborhood categories or needs. More directional help was implemented through labeled arrows. Shortcuts were refined on the bottom

banner of the screens to allow the user to have the flexibility to return to previous screens and to prevent major navigational errors.

Updated architectural and wireframing diagrams were drafted prior to visual edits and are shown in Figures 36 and 37. Examples of screen visuals are shown in Figure 38.

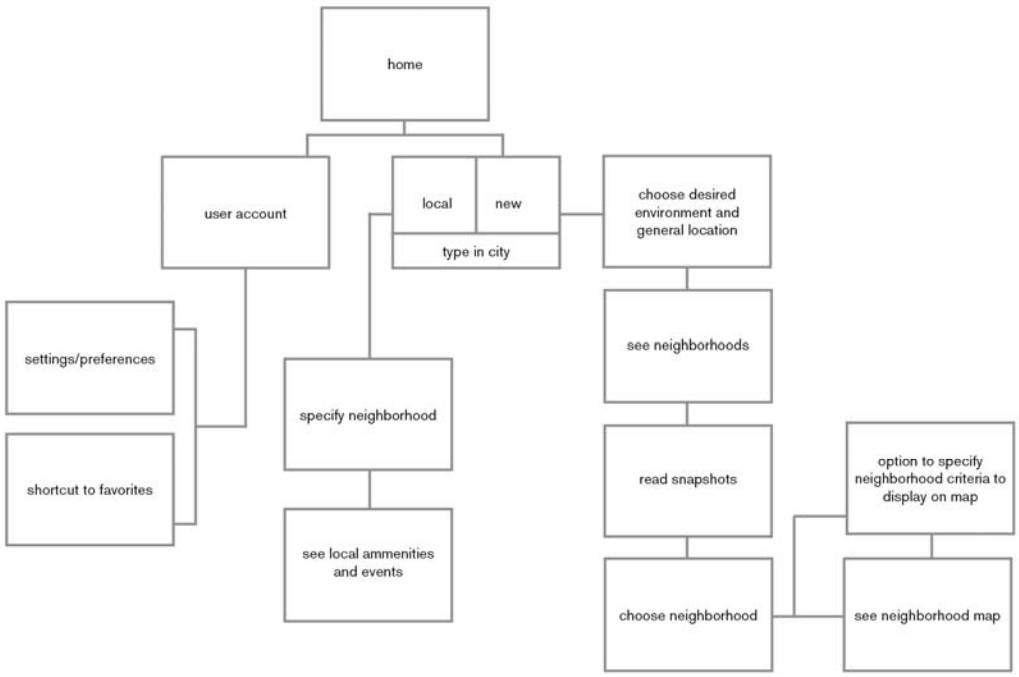


Figure 36 –Edited Architectural Diagram Prior to Round Three of User Testing

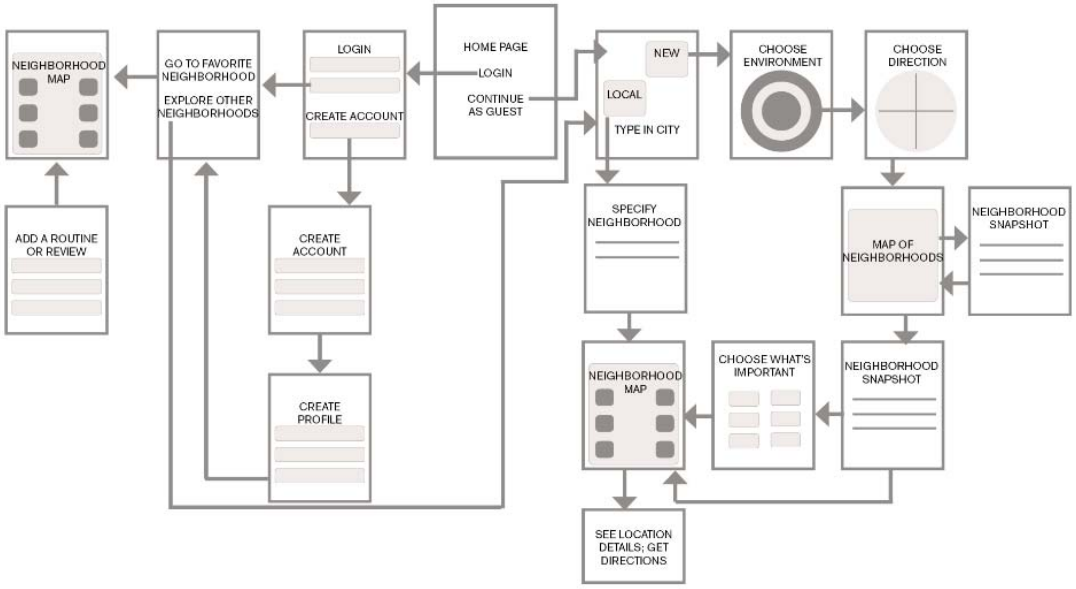


Figure 37 – Edited Wireframing Prior to Round Three of User Testing

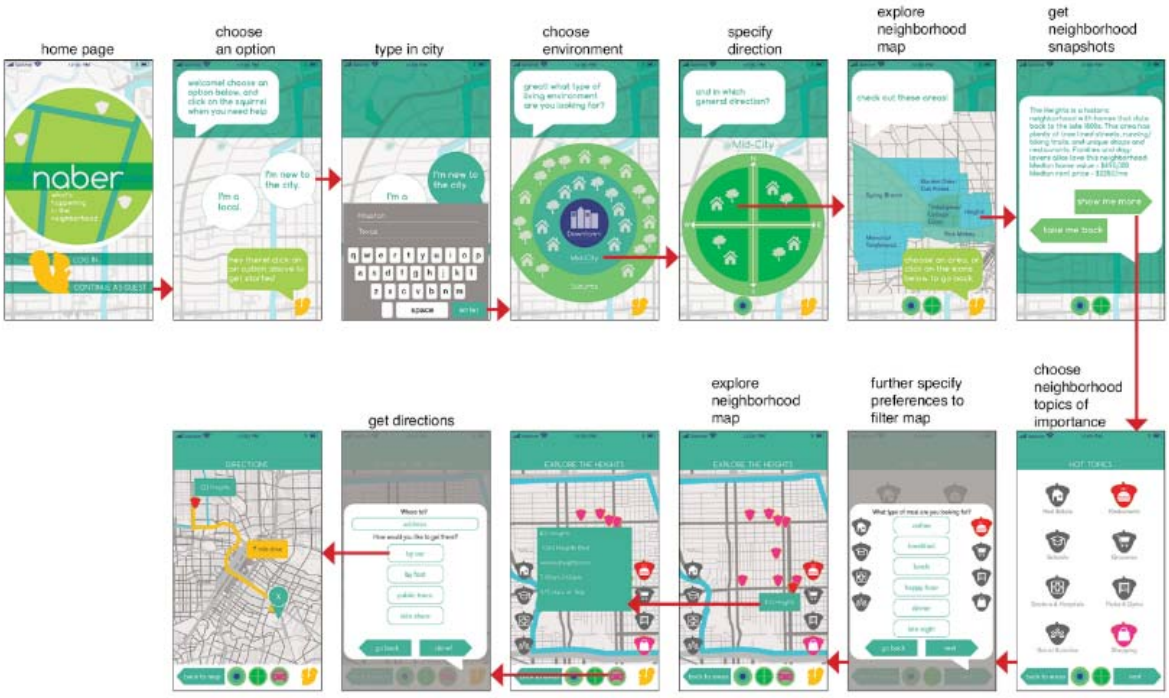


Figure 38 – Examples of Screens Developed for Third Round of Usability Testing

Results from the third round of usability testing revealed that the app is becoming more user friendly. Comments evolved from questions on how to navigate the pages into comments regarding possible additions to the app (Figure 39). Participants expressed excitement and wanted to see further development. Map location reviews were not shown on the prototype in the first scenario but two participants commented that they would be a good addition. The second scenario included a clickable link to Yelp, which was well received. Two other participants wished for more filtering options, suggesting that the current choices were not overwhelming and the interface was simple enough for more options to be added. Overall, participants understood how to navigate from screen to screen and were pleased with the neighborhood snapshots. Participants commented on the "simplicity and access" and "easy to use interface" of the app and thought the app would "fill a void in the market." The navigational style tested during this round of usability testing was carried into the final refinement of the app for this study.

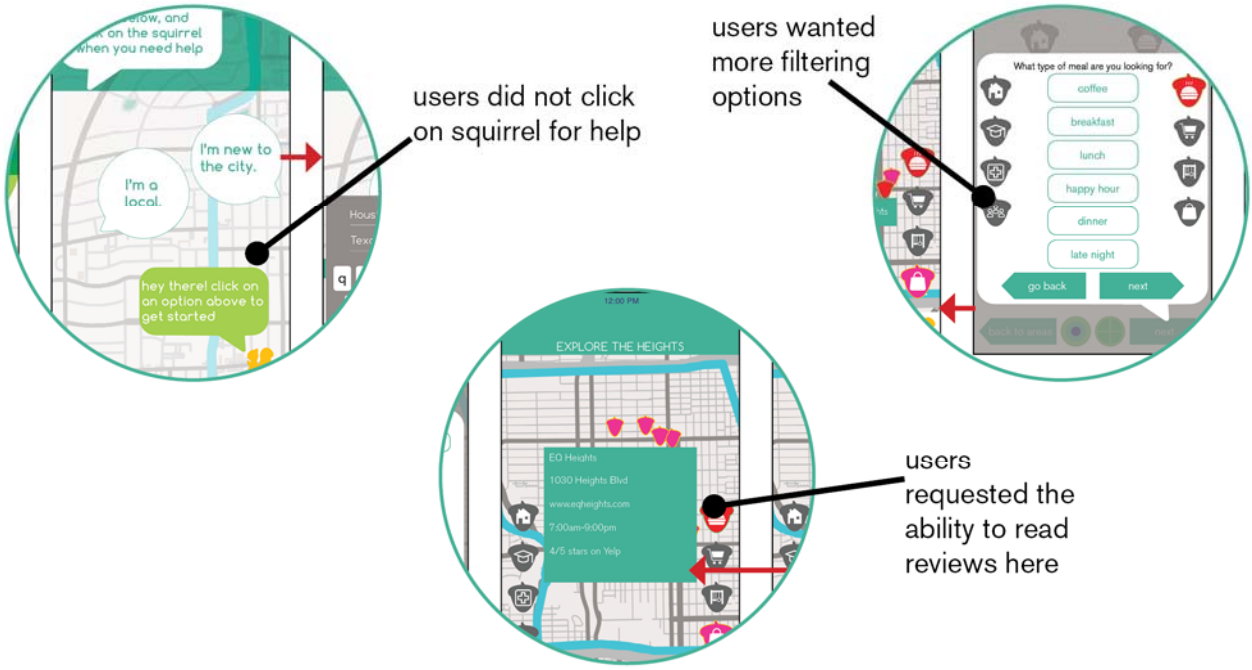
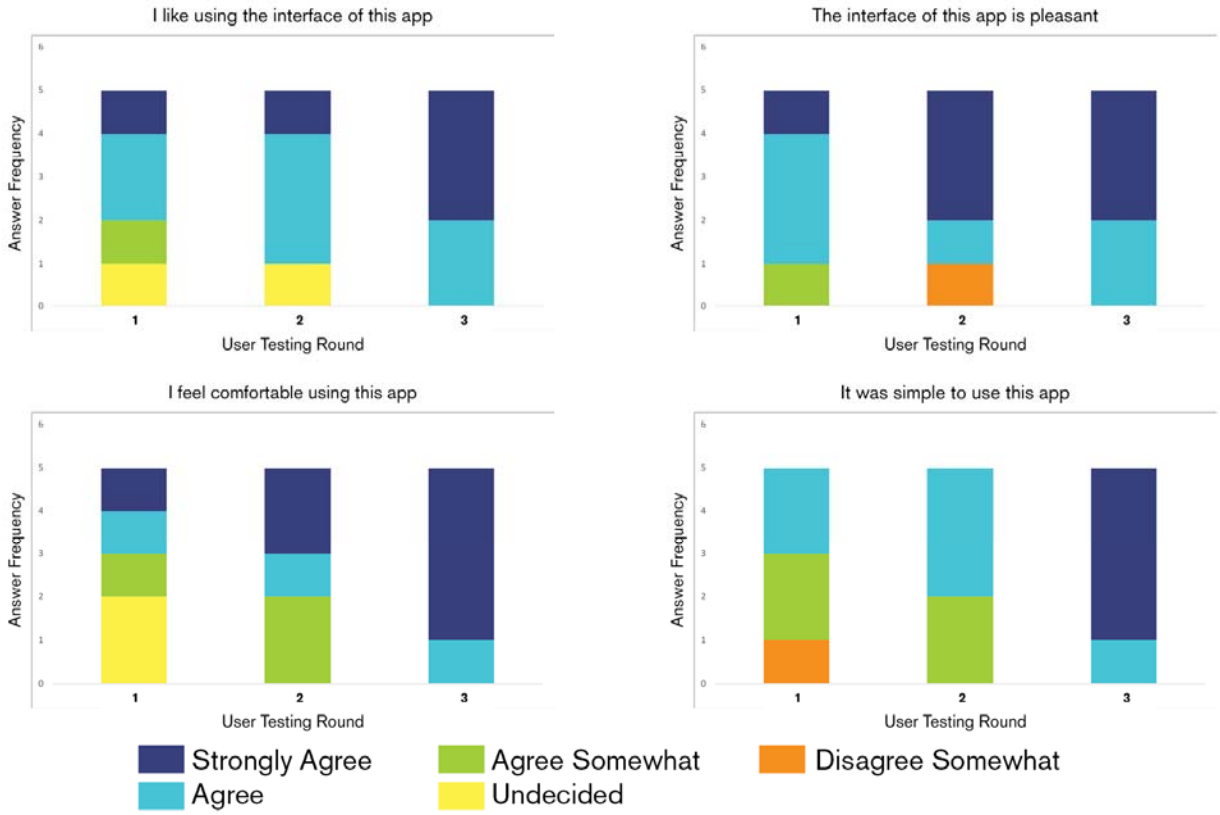


Figure 39 – Discoveries During Third Round of Usability Testing

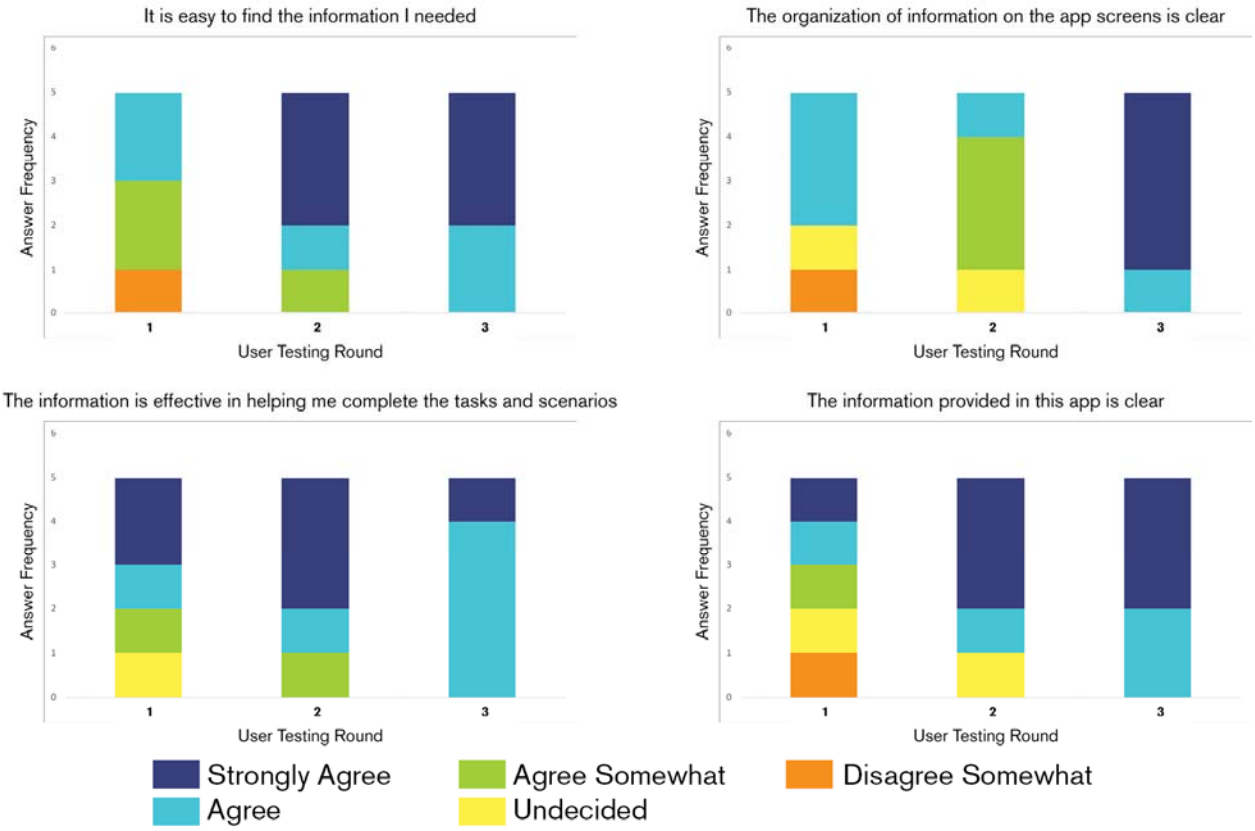
5.4 Test Results Support Concept and Direction

Phase 4 began so findings could be summarized and a final design could be proposed. After three rounds of usability testing, results from the usability questionnaire (modified from Lewis, 1995) were analyzed to see if beneficial edits were made to the prototypes. The questionnaire implemented a seven-point Likert-type scale so participants could rate answers to questions on usability and familiarity. Answer choices ranged from “strongly disagree” to “strongly agree.” Due to the small number of participants, a statistical analysis was not completed. Instead, answers were analyzed by comparing rounds of testing to see if the answers trended in a constructive direction. The following figures show answer trends from Round 1 to Round 3 of usability testing. Topics include visuals, content, overall function, familiarity, and perceived stress.



Figures 40-44 – Participant Ratings of Visuals

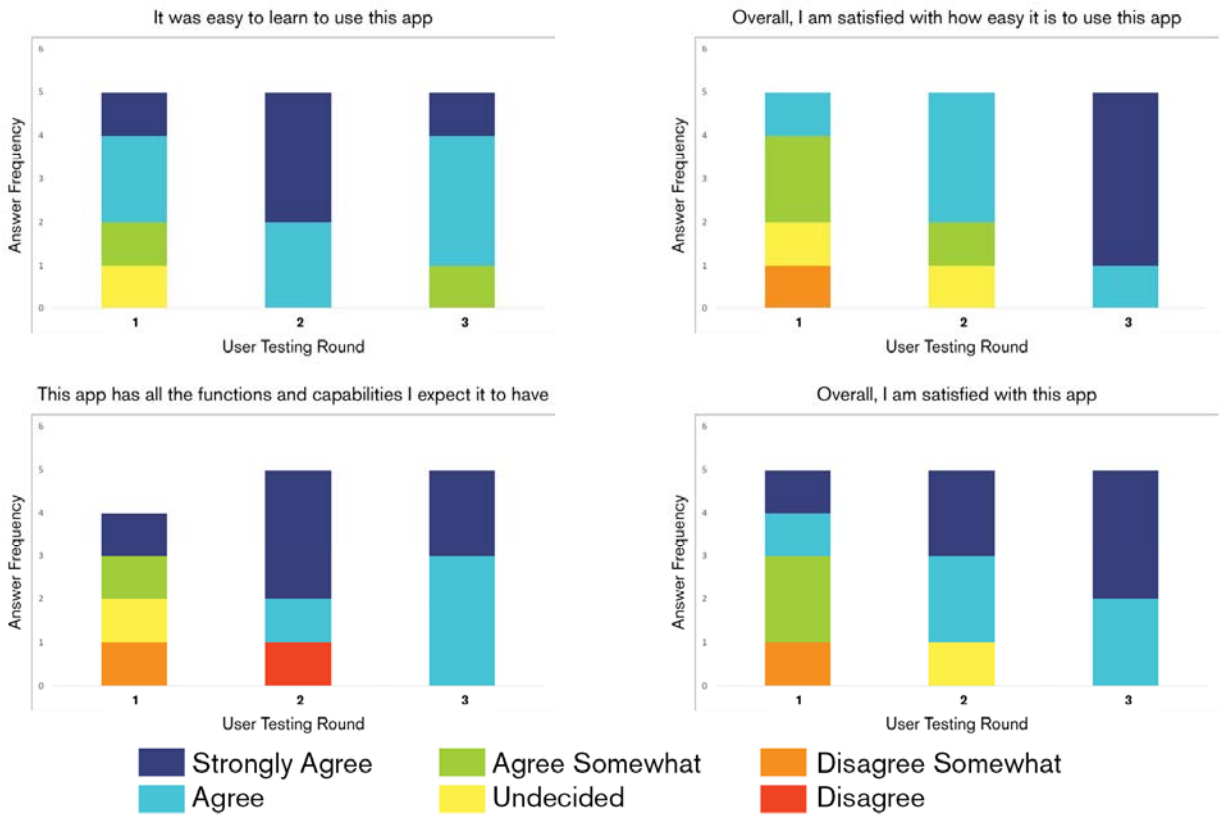
Ratings of the visuals of the app improved over the three iterations (Figures 40-44). The simplicity of the app and comfort of using the app had the greatest improvements, indicating it was beneficial to include larger buttons and directional arrows and to utilize icons rather than written text. The addition of conversation bubbles to direct users through the app may have also encouraged more positive ratings in the later iterations.



Figures 45-48 – Participant Ratings of Organization and Information

The edits to the design of how the information was presented to the user led to improvements in how the participants viewed the display and organization of information (Figures 45-48). The addition of directional arrows and deduction of how much information was presented per page may have helped with this trend. Participants in the third round of user testing

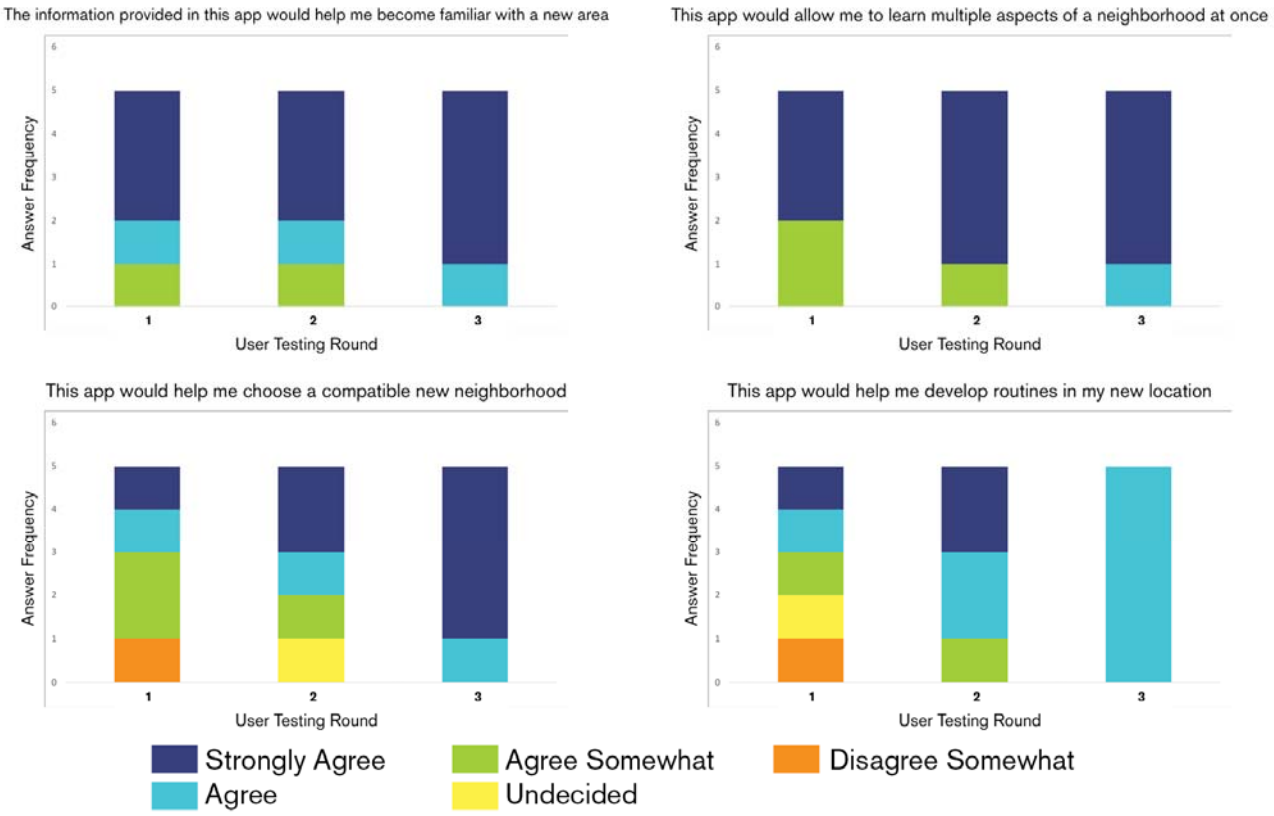
gave the best ratings to organizational structure, indicating that the presentation of information was better understood. Ratings on how well “the information is effective in helping me completed the tasks and scenarios” is good but could be better. Perhaps more direction could be provided to the user at the beginning of the app in the form of an optional tutorial on how to navigate the app. Furthermore, a progress bar could be added to communicate how far along the user is in the process of finding a compatible neighborhood.



Figures 49-52 – Participant Ratings of Overall Function

Regarding overall function, participant ratings were most positive in the third iteration (Figures 49-52). Improvements can still be made to the ease of learning how to use the app, indicating that more assistance should be given to help the user. Ratings on functions and

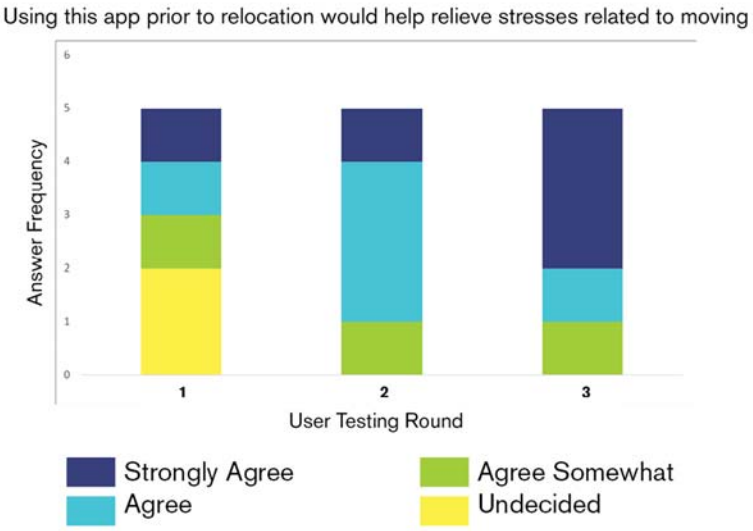
capabilities show that the app is providing what users expect, but could still provide more information. The third round of participants specifically requested more filters and the addition of location reviews; these additions should further improve app functions, capabilities, and overall user satisfaction.



Figures 53-56 – Participant Ratings of Gaining Neighborhood Familiarity

Trends on becoming familiar with the new neighborhood and choosing a compatible new neighborhood were encouraging (Figures 53-56). Feedback on all three iterations suggest that the correct information was being provided to help the participants become familiar with and learn about a new neighborhood. This feedback supports the idea that constrained information can be helpful to a user if it accurately informs the user of what is important. The navigational

confusion verbally reported in the first two iterations can be seen in the answers to “this app would help me choose a compatible neighborhood,” but it appears that the third round of prototyping mostly fixed this issue. The addition of the “neighborhood snapshots” may have allowed for more positive feedback in the third iteration. Regarding routines, answers in the first two iterations were mixed, however, all participants marked “agree” in the third round of user testing, indicating the possibility of the app helping in this area as well.



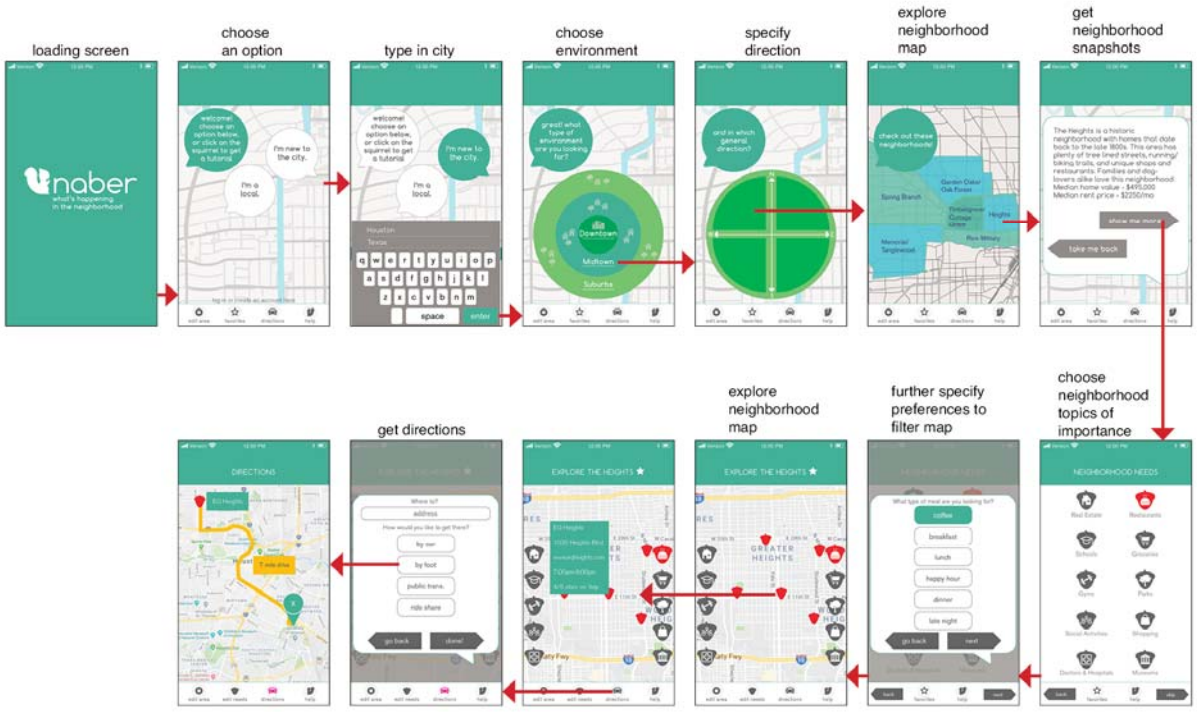
Figures 57 – Participant Ratings of Perceived Stress

A final question was presented to participants to address stresses related to relocation (Figure 57). Answers trended towards more agreement throughout the three rounds of testing, with most participants having some level of agreement during each round. This data suggests that there is potential for the proposed solution to relieve stresses related to relocation.

5.5 Final Design Refinement

Phase 4 concluded by refining the final design. The navigational structure from the third iteration was carried into the final refinement of the mobile application design for this study. Users will choose a neighborhood environment (suburban, midtown, or downtown) and a general cardinal direction. Users will then read a brief overview of each neighborhood in the narrowed area of interest before choosing a location to explore further. Overviews will include the main neighborhood characteristics and average home and rental prices. After choosing a neighborhood, the user is presented with information on that neighborhood via a neighborhood map. The final working mobile application will have a map of a city specified by the user that can be moved around to desired locations and zoomed to show varying levels of detail. Information displayed on the neighborhood maps is organized into ten final categories: real estate, schools, restaurants, grocery stores, parks, gyms, doctors and hospitals, social activities, shopping, and museums. These categories were vetted during user testing and determined to be appropriate. The user specifies which information to view on the map. For example, if schools and recreation are important needs, the user can specify the desired school category (i.e. preschool or elementary school) and type of gym (i.e. yoga studio or conventional gym) to help filter the map into a smaller location. Information (such as business information and reviews) on these specific locations should be borrowed and referenced from existing sites. Although map applications such as Google Maps and Yelp and home-finding sites such as Trulia and Zillow do not give all desired information, they do provide some key information that is familiar and trusted by their users. Referencing data directly from these sites could help users build trust and feel familiar with this mobile app as well.

Edits were made to the visuals to reduce the amount of color used and reduce the size of graphics to prevent from distracting the user with extraneous information. Contrast and clarity of the graphics were refined to help guide the user's eye. Text size was edited to match existing mobile applications. Components were reused to maintain consistency and prevent the user from having to learn redundant buttons and screens. Icons for the shortcut buttons on the bottom banner were decreased in size and text descriptions were added to help clarify where the shortcut would take the user. Examples of final screen refinement are shown in Figure 58.



Figures 58 – Examples of Screens Developed for Final Refinement

5.6 Future Opportunity to Build Community through the Application

Additional modifications to the app should be considered prior to further development. Per research findings, social connections are an important aspect of relocation. The topic of making social connections was discussed during interviews, but not explored during product development as it was deemed out of scope with becoming familiar with new neighborhoods. However, social activities were included as an acorn category on the map and would include events such as concerts, plays, sporting events, and networking opportunities. This concept could be expanded upon with a social calendar of events that could encourage users to continue to use the app. Furthermore, the app could include a chat system that connects users in the neighborhood. Once users move into the neighborhood, they could create profiles with Naber that identifies them with that specific neighborhood, through which they could connect to their neighbors. Perhaps it could suggest social connections based on their profiles, or allow them to reach out and send messages to their neighbors. Once Naber establishes itself within the neighborhood, it could become a safe place where users feel comfortable introducing themselves and asking to make connections. Individuals that previous literature identified as being more vulnerable to developing relocation-related stress (introverts and those with “low levels of exploratory tendencies”) might feel more comfortable interacting with neighbors through the app. Continued use could build community both internally and externally of the app, further helping the well-being of the users.

5.7 Developing the Prototype into a Working App

After the prototype structure, skeleton, and visuals have been fully vetted, the prototype may enter development. A platform must be chosen between iOS, Android, or Windows. Each platform requires a specific programming language, such as Java or Objective-C, and has

guidelines and best practices so that new apps can be developed consistently. Upon completing development, the app can be tested on actual devices prior to launch. This testing will ensure that the app will run smoothly on all devices. After testing, the app will be inspected and then published through the platform's application marketplace, such as Google Play for Android or iTunes for iOS (Abhi, 2018). The app may remain updated by utilizing plugins that embed data from externally referenced websites (Selders, 2018). Additionally, mobile APIs (application programming interfaces) could be utilized to deliver updated data. APIs are packages of information that allow software programs to communicate with each other (Gazarov, 2016). For example, Google provides mobile APIs that developers may use to embed the latest version of Google Maps or Google Places into an app (Google, n.d.). Internal content created by Naber will be managed using a mobile content management system to ensure the content is correctly provided to the users and kept up to date (Garrett, 2002).

Furthermore, machine learning could be implemented so the app customizes content for each user's needs. Machine learning is a subfield of Artificial Intelligence (AI) in which the program analyzes collected information and learns about user habits while the user is interacting with the app (Gimon, n.d.). In Naber, the app could learn the user's habits and adjust what information is shown based on the selections of the user over time. For example, if the user views neighborhoods but never looks at schools, the machine could determine that schools are not of importance and remove them from view. Over time, only items determined to be important would be shown, giving the user a customized experience. This same intelligence could also adjust the user's home page, showing most frequented neighborhoods or places of interest, so that the user may quickly get the information that is important. Additionally, the app

could analyze all user data and suggest popular places and neighborhoods throughout the city, or provide feedback to the app developers on sections of the app that are not well utilized.

Finally, Houston was chosen as the test city for the prototype and is recommended to be the focus city for initial app development. The moving equipment and storage company U-Haul has ranked the city as the top destination for U-Haul trucks for the past eight years (Lockridge & Reyes, 2017). Houston resides in Harris County, which has ranked either first or second in the nation for overall population growth during that same time frame. Over 56,000 individuals relocated to Harris County in 2016 (Kriel, 2017), supporting a high number of potential users.

Chapter 6: Discussion and Conclusions

6.1 Innovating with Research for Design

This study examined stresses related to relocation with the goal of developing a product that could have a positive effect on an individual's well-being during the relocation process. Relocation presents its own unique challenges that a person must face, including multiple decisions that must be made on where and how to move and multiple changes to one's daily routines. Managing these decisions and changes can cause the person to feel stress. Considerations made during development and prototype testing were not only given to usability, but also to whether or not the concept would assist the user cognitively. The goal was to provide the user with a tool that helped with the relocation process while positively impacting the user's well-being. This was done by specifying areas that could both benefit the user's well-being and be translated into a product. Focus areas (helping those relocating become familiar with a new area and choose a compatible neighborhood) were determined through literature review, user interviews, and an online survey and were implemented into the overall strategy during concept development. Existing products that could help individuals become familiar with and find a compatible neighborhood were examined to find an opportunity for a new product. Prototypes were designed and tested through common methods of usability testing that included questions targeted at well-being. Through "think aloud" user testing, user reactions to completing tasks on the prototype were noted to help gauge whether the concept prompted positive emotions. A standard post-test questionnaire on usability also incorporated questions regarding whether or not the strategy was achieved. Through this modified usability testing, improvements were quickly made to the structure of the prototype prior to more detailed development.

By determining specific categories that are important to those relocating, this thesis put constraints on the choices of what the user can search and filter to possibly prevent "decision-making paralysis" and aid in their well-being. An unconstrained freedom of choice could lead to a mental paralysis that prevents one from making decisions and moving forward. However, having constrained choices may lead to optimal functioning and an improved well-being (Schwartz, 2015). Participants in usability testing commented positively on how the app had the search criteria that was important to them and allowed them to learn what they needed without consulting multiple sources. These responses indicate that adding these constraints may have successfully benefited the overall design. Future UX projects that pertain to a topic with such variability on the stresses it can cause the user may benefit from prioritizing important information and placing constraints on the information provided to the user.

6.3 Future Opportunities

Due to the positive feedback received throughout user testing, there appears to be an opportunity for this solution to be further prototyped and developed into a working mobile application. Further insight can be obtained by speaking with larger groups and conducting additional rounds of usability testing. Supplemental topics such as safety and social network integration can be tested to determine further modifications. A fully developed app can be tested through case studies with individuals and families prior to relocation to see if they are able to use it to find a compatible neighborhood. Participants' health and stress levels could be tested prior to and after using the app to measure the impact on well-being.

6.4 Conclusions

Relocation can cause stress to individuals as they are uprooted from their known surroundings, connections, and routines while making multiple decisions related to the move. It can, however, have less of an impact on one's well-being if the individual can easily become familiar with the new location prior to the move and find a compatible neighborhood in which to live. Becoming familiar with a new area can be difficult as individuals must consult multiple resources to do so, and the information learned is not always accurate. Visiting the location prior to the move, using a realtor, and conducting online research are all helpful ways people currently use to gain an understanding of their new surroundings. Learning about neighborhood amenities such as grocery stores, restaurants, gyms, parks, and local recreation will help individuals gain a good understanding of whether or not they want to live in a specific neighborhood.

This thesis aimed to provide a solution for those relocating to easily explore and learn about new neighborhoods so they could choose a compatible area to move to. User experience design methods were implemented to design and test the structure for a mobile application intended to do just that. Participants who tested the app were in favor of gaining a simpler way to search for a new area to live and found the categories presented to them to be satisfactory. They appreciated a mobile application that would help them explore new areas, especially since it prevented them from having to sort through multiple sources while choosing a compatible neighborhood. Results support the idea that such a digital tool could aid in the well-being of individuals who relocate. As this thesis has demonstrated, a mobile tool of this nature shows significant promise. With further development and testing, this product may be introduced to the market to begin assisting those who are relocating.

References

Abhi (2018). A Complete Beginner's Guide to Developing Apps (iPhone, Android, and Windows). Retrieved from [https://thedroidguy.com/2018/03/complete-beginners-guide-developing-apps-iphone-android-windows-74292].

Ammons, P., Nelson, J., & Wodarski, J. (1982). Surviving corporate moves: Sources of stress and adaption among corporate executive families. Family Relations, 207-212.

Benjamin, J. Y., & Eigles, L. (1991). Support services to relocated families increase employee job performance. Journal of Career Development, 17(4), 259-264.

Botti, S., & Iyengar, S. S. (2006). The dark side of choice: When choice impairs social welfare. Journal of Public Policy & Marketing, 25(1), 24-38.

Brett, J. M. (1982). Job transfer and well-being. Journal of Applied Psychology, 67(4), 450.

Campbell, A. (1981). The sense of well-being in America: Recent patterns and trends.

Constantine, L. L., & Lockwood, L. A. (1999). Software for use: a practical guide to the models and methods of usage-centered design. Pearson Education.

Creswell, J. W., & Creswell, J. D. (2014). Research design: Qualitative, quantitative, and mixed methods approaches. Sage publications.

Dumas, J. S., & Redish, J. (1999). A practical guide to usability testing. Intellect books.

Farrell, Susan (2017). UX Research Cheat Sheet. Retrieved from [https://www.nngroup.com/articles/ux-research-cheat-sheet/].

Fisher, C. D., & Shaw, J. B. (1994). Relocation attitudes and adjustment: a longitudinal study. Journal of Organizational Behavior, 15(3), 209-224.

Garrett, J. J. (2003). The elements of user experience. Indiana: New Riders.

Gaylord, M. (1979). Relocation and the corporate family: Unexplored issues. Social Work, 24(3), 186-191.

Gazarov, P. (2016). What is an API? In English, Please. Retrieved from [https://medium.freecodecamp.org/what-is-an-api-in-english-please-b880a3214a82].

Gimon, Z. (n.d.). How to Use Machine Learning in Mobile App. Retrieved from [https://theappsolutions.com/blog/development/machine-learning-in-mobile-app/].

Google (n.d.). Documentation. Retrieved from [https://developers.google.com/maps/faq#whatis].

Hassenzahl, M., & Tractinsky, N. (2006). User experience-a research agenda. Behaviour & information technology, 25(2), 91-97.

Interaction Design Foundation (n.d.). Mobile User Experience (UX) Design: User Experience (UX) topic overview/definition. Retrieved from [https://www.interaction-design.org/literature/topics/mobile-ux-design].

International Organization for Standardization (2010). ISO 9241-210:2010 Ergonomics of human-system interaction — Part 210: Human-centred design for interactive systems. Retrieved from [https://www.iso.org/obp/ui/#iso:std:iso:9241:-210:ed-1:v1:en].

Iyengar, S. S., & Lepper, M. R. (2000). When choice is demotivating: Can one desire too much of a good thing?. Journal of personality and social psychology, 79(6), 995.

Kriel, L. (2017). Harris County drops to No. 2 nationally in population growth, according to Census data. Retrieved from [https://www.houstonchronicle.com/news/houston-texas/houston/article/Harris-County-drops-to-No-2-nationally-in-11024290.php].

Lewis, J. R. (1995) IBM Computer Usability Satisfaction Questionnaires: Psychometric Evaluation and Instructions for Use. International Journal of Human-Computer Interaction, 7:1, 57-78.

Lockridge, J., & Reyes, S. (2017). Migration Trends: Houston Still No. 1 Destination for U-Haul Trucks. Retrieved from [https://www.uhaul.com/Articles/About/11312/Migration-Trends-Houston-Still-No-1-Destination-For-U-Haul-Trucks/].

Magdol, L. (2002). Is moving gendered? The effects of residential mobility on the psychological well-being of men and women. Sex roles, 47(11), 553-560.

Martin, R. (1999). Adjusting to job relocation: Relocation preparation can reduce relocation stress. Journal of Occupational and Organizational Psychology, 72(2), 231-235.

Martin, R., Leach, D. J., Norman, P., & Silvester, J. (2000). The role of attributions in psychological reactions to job relocation. Work & Stress, 14(4), 347-361.

McCracken, D. D., & Wolfe, R. J. (2004). User-centered website development: A human-computer interaction approach. Englewood Cliffs: Prentice Hall.

Miller, A. R. (1977). Interstate migrants in the United States: Some social-economic differences by type of move. Demography, 14(1), 1-17.

Moyle, P., & Parkes, K. (1999). The effects of transition stress: A relocation study. Journal of Organizational behavior, 625-646.

Munton, A. G. (1990). Job relocation, stress and the family. Journal of Organizational behavior, 11(5), 401-406.

Norman, D. and Nielsen, J. (n.d.). The Definition of User Experience (UX). Retrieved from [https://www.nngroup.com/articles/definition-user-experience/].

Oishi, S. (2010). The psychology of residential mobility: Implications for the self, social relationships, and well-being. Perspectives on Psychological Science, 5(1), 5-21.

Oishi, S., Miao, F. F., Koo, M., Kisling, J., & Ratliff, K. A. (2012). Residential mobility breeds familiarity-seeking. Journal of personality and social psychology, 102(1), 149.

Oishi, S., & Talhelm, T. (2012). Residential mobility: What psychological research reveals. Current Directions in Psychological Science, 21(6), 425-430.

Packard, V. (1972). A nation of strangers (No. 1972). McKay.

Picking, R., Grout, V., McGinn, J., Crisp, J., & Grout, H. (2012). Simplicity, Consistency, Universality, Flexibility and Familiarity: The SCUFF Principles for Developing User. Innovative Applications of Ambient Intelligence: Advances in Smart Systems: Advances in Smart Systems, 179.

Riemer, J. W. (2000). Job relocation, sources of stress, and sense of home. Community, Work & Family, 3(2), 205-217.

Schwartz, B. (2015). The Paradox of Choice. In S. Joseph (Ed.), Positive Psychology in Practice: Promoting Human Flourishing in Work, Health, Education, and Everyday Life (2nd ed., pp. 121-138) Hoboken, NJ: Wiley.

Selders, S. (2018). 3 Ways to Add Reviews to Your Website Using HTML and WordPress. Retrieved from [https://www.webpagefx.com/blog/general/3-ways-add-reviews-website/].

Sethi-Iyengar, S., Huberman, G., & Jiang, W. (2004). How much choice is too much? Contributions to 401 (k) retirement plans. Pension design and structure: New lessons from behavioral finance, 83, 84-87.

Shumaker, S. A., & Stokols, D. (1982). Residential mobility as a social issue and research topic. Journal of Social Issues, 38(3), 1-19.

Siang, Teo (2018). What is Interaction Design? Retrieved from [https://www.interaction-design.org/literature/article/what-is-interaction-design].

Stappers, P., and Giaccardi, E. (n.d.) Research through Design - The Encyclopedia of Human-Computer Interaction, 2nd Ed. Retrieved from [https://www.interaction-design.org/literature/book/the-encyclopedia-of-human-computer-interaction-2nd-ed/research-through-design].

Stokols, D., & Shumaker, S. A. (1982). The Psychological Context of Residential Mobility and Well-Being. Journal of Social Issues, 38(3), 149-171.

Stokols, D., Shumaker, S. A., & Martinez, J. (1983). Residential mobility and personal well-being. Journal of Environmental Psychology, 3(1), 5-19.

Tetrick, L. E., & LaRocco, J. M. (1987). Understanding, prediction, and control as moderators of the relationships between perceived stress, satisfaction, and psychological well-being. Journal of Applied psychology, 72(4), 538.

U.S. Census Bureau (2015). Calculating Migration Expectancy Using ACS Data. Retrieved from [https://www.census.gov/topics/population/migration/guidance/calculating-migration-expectancy.html].

U.S. Census Bureau (2015). Geography Atlas – Regions. Retrieved from [https://www.census.gov/geo/reference/webatlas/regions.html].

U.S. Census Bureau (2016). Table 1. General Mobility, by Race and Hispanic Origin, Region, Sex, Age, Relationship to Householder, Educational Attainment, Marital Status, Nativity, Tenure, and Poverty Status: 2015 to 2016. Retrieved from [https://www.census.gov/data/tables/2016/demo/geographic-mobility/cps-2016.html].

U.S. Census Bureau (2015). Table 1. General Mobility, by Race and Hispanic Origin, Region, Sex, Age, Relationship to Householder, Educational Attainment, Marital Status, Nativity, Tenure, and Poverty Status: 2014 to 2015. Retrieved from [https://www.census.gov/data/tables/2015/demo/geographic-mobility/cps-2015.html].

U.S. Census Bureau (2014). Table 1. General Mobility, by Race and Hispanic Origin, Region, Sex, Age, Relationship to Householder, Educational Attainment, Marital Status, Nativity, Tenure, and Poverty Status: 2013 to 2014. Retrieved from [https://www.census.gov/data/tables/2014/demo/geographic-mobility/cps-2014.html].

U.S. Census Bureau (2013). Table 1. General Mobility, by Race and Hispanic Origin, Region, Sex, Age, Relationship to Householder, Educational Attainment, Marital Status, Nativity, Tenure, and Poverty Status: 2012 to 2013. Retrieved from [https://www.census.gov/data/tables/2013/demo/geographic-mobility/cps-2013.html].

U.S. Census Bureau (2012). Table 1. General Mobility, by Race and Hispanic Origin, Region, Sex, Age, Relationship to Householder, Educational Attainment, Marital Status, Nativity, Tenure, and Poverty Status: 2011 to 2012. Retrieved from [https://www.census.gov/data/tables/2012/demo/geographic-mobility/cps-2012.html].

U.S. Census Bureau (2011). Table 1. General Mobility, by Race and Hispanic Origin, Region, Sex, Age, Relationship to Householder, Educational Attainment, Marital Status, Nativity, Tenure, and Poverty Status: 2010 to 2011. Retrieved from [https://www.census.gov/data/tables/2011/demo/geographic-mobility/cps-2011.html].

U.S. Census Bureau (2016). Table 17. Reason for Move, by Sex, Age, Race and Hispanic Origin, Relationship to Householder, Educational Attainment, Marital Status, Nativity, Tenure, Poverty Status, and Type of Move (All Categories): 2015 to 2016. Retrieved from [https://www.census.gov/data/tables/2016/demo/geographic-mobility/cps-2016.html].

Vita

Amy Conley wants to create fun, well-made, and helpful products that people enjoy using. She is influenced by her love for all well-designed products, whether it is a great piece of furniture or a useful kitchen tool. She holds a Bachelor of Science in Chemical Engineering, and her background has trained her to optimize the processes in front of her. She enjoys practicing this through multiple aspects of life, whether it involves turning raw chemicals into finished products, enhancing user satisfaction through design, or brewing a great cup of coffee.

Appendix: Research Materials

Initial Interview Questions

1) How many times have you relocated in the past?

   _____

2) When did you last relocate?

   _____

3) Where did you last relocate from/to?

   From _____ To _____

4) Why did you last relocate?
   ☐I moved for work
   ☐I moved for personal reasons

5) What level of assistance did you have for your move?
   ☐I moved myself
   ☐Friends helped me move
   ☐I used professional movers
   ☐I had both a relocation manager and professional movers

6) Did you think about the move prior to the actual event?
   ☐No, I did not think about the move prior to scheduling it
   ☐Yes, I thought about the move 1-2 months prior
   ☐Yes, I thought about the move 6 months prior
   ☐I am always thinking about my next move

7) What special preparations/planning did you take to help with your relocation?
8) What adjectives would you use to describe the relocation?
9) Was there anything in particular that you liked/disliked about your last relocation experience?
10) How long did it take you to feel settled in your new location?
11) Did you find anything difficult related to settling in to your new location?
12) If you are relocating again in the near future, how does that make you feel?
13) How were you affected personally for the first few months after the move?
14) What would you have done differently?

Relocation Survey Questions Created for Survey Monkey

1	What is your first name?					
2	Where did you move from?					
3	Where did you move to?					
4	Why did you last relocate?					
	☐	Family				
	☐	Employment				
	☐	Housing				
	☐	Other				
5	How would you rate your satisfaction for the following items related to your relocation?					
		Not at all Satisfied	Not Very Satisfied	Not Applicable	Somewhat Satisfied	Very Satisfied
	Preparation for the Move					
	Familiarity of New Location Prior to the Move					
	Ability to Familiarize with New Location After the Move					
6	How helpful were the following items with your relocation preparation, if applicable?					
		Not at all Helpful	Not Very Helpful	Not Applicable	Somewhat Helpful	Very Helpful
	Conducting online research regarding new location					
	Conducting online research regarding new homes					
	Speaking with friends/family					
	Taking trips to the new location					
	Working with a realtor					
	Working with a relocation specialist					
7	How important was it for you to learn about the following items related to your new location, if applicable?					
		Not at all Important	Not Very Important	Not Applicable	Somewhat Important	Very Important
	Grocery stores/restaurants					
	Work commute/traffic patterns/public transportation					
	Nearby shops					
	Nearby box stores (i.e. Target, Home Depot)					
	Schools					
	Churches					
	Gyms/parks/recreation					
	Art/culture					
	Neighbors/new social connections					

Relocation Survey Questions Created for Survey Monkey

8	**How influential were the following items with helping you feel settled in your new location, if applicable?**					
		Not at all Influential	Not Very Influential	Not Applicable	Somewhat Influential	Very Influential
	Familiarity with retail stores					
	Familiarity with grocery stores / restaurants					
	Familiarity with traffic patterns / public transportation					
	Making new social connections					
	Gaining a routine					
	Unpacking boxes					
	Buying furniture					
	Disposing waste					
	Moving out of storage unit					
9	**How difficult was it for you to gain or accomplish the following after your relocation, if applicable?**					
		Not at all Difficult	Not Very Difficult	Not Applicable	Somewhat Difficult	Very Difficult
	Familiarity with retail stores					
	Familiarity with grocery stores / restaurants					
	Familiarity with traffic patterns / public transportation					
	Making new social connections					
	Gaining a routine					
	Unpacking boxes					
	Buying furniture					
	Disposing waste					
	Moving out of storage unit					
10	**Do you have any further comments regarding what helped you prepare for your move or settle in your new location?**					

naber Mobile Application Post-Testing Survey

Anticipated Familiarity and Usefulness Questionnaire			1	2	3	4	5	6	7		N/A
1	This app would allow me to learn multiple aspects of a neighborhood at once	strongly disagree								strongly agree	
2	The information provided in this app would help me become familiar with a new area	strongly disagree								strongly agree	
3	This app would help me choose a compatible new neighborhood	strongly disagree								strongly agree	
4	Using this app prior to relocation would help relieve stresses related to moving	strongly disagree								strongly agree	
5	This app would help me develop routines in my new location	strongly disagree								strongly agree	

Usability Questionnaire			1	2	3	4	5	6	7		N/A
1	Overall, I am satisfied with how easy it is to use this application (app)	strongly disagree								strongly agree	
2	It was simple to use this app	strongly disagree								strongly agree	
3	I can effectively complete my tasks using this app	strongly disagree								strongly agree	
4	I feel comfortable using this app	strongly disagree								strongly agree	
5	It was easy to learn to use this app	strongly disagree								strongly agree	
6	I believe I became productive quickly using this app	strongly disagree								strongly agree	
7	The information provided in this app is clear	strongly disagree								strongly agree	
8	it is easy to find the information I needed	strongly disagree								strongly agree	
9	The information provided in the app is easy to understand	strongly disagree								strongly agree	
10	The information is effective in helping me complete the tasks and scenarios	strongly disagree								strongly agree	
11	The organization of information on the app screens is clear	strongly disagree								strongly agree	
12	The interface of this app is pleasant	strongly disagree								strongly agree	
13	I like using the interface of this app	strongly disagree								strongly agree	
14	This app has all the functions and capabilities I expect it to have	strongly disagree								strongly agree	
15	Overall, I am satisfied with this app	strongly disagree								strongly agree	

Mobile Application Post-Testing Survey

Please list the most positive aspect(s)	
1	
2	
3	

Please list the most negative aspect(s)	
1	
2	
3	

Comments