

Designing Interactive Systems  
for Emerging Adults and their Parents

**Clarence Yung**, Master of Design Candidate

**Jodi Forlizzi**, Adviser

May 2012



# Loop

Clarence Chi-Chung Yung

BA Mathematical Economic Analysis

Rice University

May 2007

A thesis submitted to the School of Design, Carnegie Mellon University, for the degree of Master of Design in Interaction Design.

Copyright Clarence Yung 2012

---

**Clarence Yung**

Master of Design Candidate, Interaction Design

---

**Jodi Forlizzi**

Associate Professor, School of Design and  
Human-Computer Interaction Institute

# Loop

Clarence Chi-Chung Yung  
BA Mathematical Economic Analysis  
Rice University  
May 2007

A thesis submitted to the School of Design, Carnegie Mellon University, for the degree of Master of Design in Interaction Design.

Copyright Clarence Yung 2012

## Abstract

Psychologists have codified a human developmental stage called “emerging adulthood.” During this transitional period, the relationship with one’s parents evolves. Communication channels open up and a deeper, richer relationship emerges. This thesis explores this familial relationship through a review of related literature, ethnographic research and the creation of possible design interventions. Using these explorations, this thesis also suggests a preferred future state through a design for an interactive system, Loop —a mobile application that allows for private, reciprocal sharing through text, image, and video..

# Acknowledgments

Thanks to my mom, Shirley, and my brother, Kevin, for listening to me gripe endlessly and supporting me through the process.

This thesis is the culmination of my time at the School of Design in Carnegie Mellon University. I am indebted to Jodi Forlizzi, my advisor, for providing support and feedback throughout the entire thesis process.

I need to thank the rest of the Masters of Design students in the class of 2012 for their support, love, and honesty. A special thanks goes my fellow advisees under Jodi Forlizzi — Wes Johnson, Molly Lafferty, and Chongho Lee. Another special thanks goes to the other students always in Grad Studio for keeping me sane — Jessamyn Miller, Jessica Schafer, Roy Shin, and Kinnari Thakker.

# Table of Contents

<b>1</b>	Introduction	<b>12</b>
<b>2</b>	Process	<b>14</b>
<b>3</b>	Background	<b>20</b>
<b>4</b>	Research	<b>34</b>
<b>5</b>	Possibilities	<b>46</b>
<b>6</b>	Design	<b>64</b>
<b>7</b>	Conclusion	<b>78</b>
	Appendices	<b>86</b>

# 1 Introduction

There is a distinct period in a person's life between 18 and around 25 where she leaves the cradle of her family to become independent and self-sustaining. This period of life is a time filled with much change. New ideas are introduced, careers begin to form, deep loves come and go. It is a time filled with transitions, a time that becomes extremely important over the scope of a person's life. It lays the bedrock for the habits, values, and goals of the adult world, the world of marriage, new families, and long careers.

Psychologists have started to codify this stage as "emerging adulthood." During this period of a person's life, another important relationship is also in transition — the relationship with one's parents. It often evolves into something much different than the traditional relationship found in earlier stages of development. Communication channels open up, parents become more human, and a deeper, richer relationship often emerges. I embarked on this thesis with an interest in exploring the ways in which emerging adults sustain relationships with their parents even while living in distant places. I used this knowledge to suggest a future state where an interactive system could guide emerging adults to strong, healthy relationships with their parents as independent equals — to create the foundation for a strong relationship throughout adulthood.

## 2 Process

My initial thesis proposal and problem framing focused on understanding family dynamics and identity. To further narrow down this broad problem framing, I adopted Resnick and Kraut's approach for using findings and evidence from social sciences for the design of interactive systems<sup>1</sup>. However, instead of examining work on social dynamics and community, I examined research topics about families from various disciplines within the social sciences. I looked for topics that seemed unexplored by researchers and practitioners within design and human-computer interaction but had potential for worthwhile design interventions.

From my initial explorations on family identity and dynamics, I noticed that the design of interaction for emerging adults and their

---

<sup>1</sup> Robert E. Kraut and Paul Resnick, *Building Successful Online Communities: Evidence-Based Social Design*, eds. Robert E. Kraut and Paul Resnick. (Cambridge: MIT Press, 2012) 10 - 12.

families seemed unexplored. However, there was a fairly deep corpus of research on emerging adults and family. Much of this academic research over the past twenty years about emerging adults and families has been about broader interaction concepts and not specifically directed toward the design of systems. Few researchers examined how these implications could translate to design decisions.

I focused on two types of literature to read — in-depth work on emerging adulthood and related literature on familial interaction. I also examined findings and designed artifacts for families from human-computer interaction to understand various technical and social possibilities for family-oriented interactive systems.

In response to findings from literature, I crafted a research plan to understand interactions and material rituals between emerging adults and their parents.<sup>2</sup> In interviews, I emphasized directed storytelling questions in order to understand the details of how emerging adults and parents currently communicated and felt connect to each other. As described by Shelley Evenson, storytelling allows researchers to explore experience through users’ eyes without having to long-term immersion.<sup>3</sup> I also used research to confirm broader findings from literature about communication usage and feelings about communication technologies used between emerging adults and their parents.

I used Alan Cooper’s Persona method to elucidate possible user types for both emerging adults and their parents.<sup>4</sup> Key characteristics for

the emerging adult personas are synthesized from user research and literature. Parent personas are synthesized from user research.

An initial set of ten storyboards generated through concept ideation elucidate many possible future states. By testing these storyboards using Davidoff, Lee, Dey, and Zimmerman’s Speed Dating method, I discerned a set of preferred future states that would guide further iteration and ideation into a focused concept.<sup>5</sup> I used first-person narrative to describe three idealized future states to understand and elucidate an ideal experience not limited by form..

From these storyboards and diagrams, I chose one concept system to prototype in a higher fidelity way using a linear demo of the core interaction. Along the way, I iterated on this concept system and changed focus several times in a designerly way by doing what Donald Schon calls reflection-in-action while making the higher fidelity interface and interactions.<sup>6</sup> From these iterations, I created Loop, a

---

<sup>2</sup> This research plan was approved by Carnegie Mellon University’s Institutional Review Board under Protocol Number HS11-284.

<sup>3</sup> Shelley Evenson, “Directed Storytelling: Interpreting Experience for Design” in *Design Studies: Theory and Research in Graphic Design*, ed. Audrey Bennett (New York: Princeton Architectural Press, 2006) 231 – 240.

<sup>4</sup> Alan Cooper, Robert Reimann, Dave Cronin, *About Face 3: The Essentials of Interaction Design* (Indianapolis: Wiley Publishing, 2007) 77 – 88.

<sup>5</sup> Scott Davidoff, Min Kyung Lee, Anind K. Dey, John Zimmerman, “Rapidly Exploring Application Design through Speed Dating” in *the Proceedings of UbiComp 2007* (Springer-Verlag, 2007) 429–446.

<sup>6</sup> Donald Schon and John Bennett, “Reflective Conversation with Materials” in *Bringing Design to Software* (ACM Press, 1996) 171 – 184.

design possibility that illustrates a simpler way of sharing knowledge and experience between emerging adults and their parents.

To illustrate various aspects of the final design, I created three artifacts. First, system and UI flow diagrams detailed key aspects of the system and how a set of users would interact with the system. Second, a simple video illustrates a future state implied by my final design – with an emphasis on the lived experience of this future state. Finally, a refined linear interactive demo situated within a scenario expands on this lived experience, detailing the specific flows and ways in which a user would have a back-and-forth conversation through my system.

## 3 Background

Literature and design work from a broad range of academic disciplines have explored key ideas and themes related to communication between emerging adults and their parents. I examined select papers, books, and theoretical work from these disciplines to understand the context of designing interaction between emerging adults and their parents, and then categorized each work into three broad conceptual contextual frames: social, interaction, and material contexts.

### 3.1 Social Contexts

The social context of emerging adults and their parents is extremely varied. I used literature to examine common themes for emerging adults and to explore views on family among emerging adults.

#### 3.1.1 Emerging Adulthood

Over the past two decades, a group of developmental psychologists have theorized that a distinct phase of human development

occurs between traditional adolescence and adulthood. Dubbed Emerging Adulthood, this phase is extensively studied in Jeffrey Jensen Arnett’s book *Emerging Adulthood*. Though marked by transition, it is not necessarily a simple transitional phase. Arnett emphasizes that humans in this phase have psychological characteristics that are often unique to this phase, not merely characteristics that evolve into traditional adult characteristics. He details work in defining several dimensions of these characteristics through a review of literature, ethnographic interviews, and broader surveys. Broadly speaking, he notes five key characteristics of Emerging Adults — that they engage in “identity exploration ... instability ... self-focused ... feeling in-between ... possibilities.”<sup>1</sup> These characteristics mark almost every relationship or interaction that emerging adults engage in, from their approach to work to their romantic relationships.

3.1.2 Emerging Adulthood and Parents

These characteristics also affect familial relationships. Arnett and several developmental psychologists have begun exploring the dimensions of emerging adults’ relationships with their parents and their family. Arnett emphasizes the emergence of peer-like relationships that emerging adults begin to have with their parents. “Emerging adults also grow in their ability to understand their parents ... as emerging adults mature and begin to feel more adult themselves, they become more capable of understanding how their parents look at things”<sup>2</sup>. He also emphasizes that this happens for

parents, too. “Their role as monitor of their children’s behavior and enforcer of household rules diminishes.”<sup>3</sup>

Aquilano emphasizes that this sense of parity is also tempered by the continued need for parental support, both emotional and financial. In the later stages of emerging adulthood, parents and emerging adults also have to negotiate how emerging adults begin to be a source of support for their parents.<sup>4</sup>

Using other academic literature as support, Aquilano also notes how emerging adults’ relationships with their parents are not locked into the same pattern of interaction as in adolescence or childhood. Seminal shifts in an emerging adult or a parent’s life — leaving home, parental divorce, remarriage, and the empty nest — can shift interaction patterns. Emerging adulthood becomes can become a time for different, more evolved relationships between children and their parents<sup>5</sup>.

Finally, Aquilano highlights literature that shows the importance of familial relationships to emerging adults. The presence of strong familial relationships influences psychological well-being, and

---

<sup>1</sup> Jeffrey J. Arnett, *Emerging Adulthood* (New York: Oxford UP, 2004), 7.

<sup>2</sup> *ibid*, 56.

<sup>3</sup> *ibid*, 58.

<sup>4</sup> William S. Aquilano, “Family Relationships and Support Systems,” in *Emerging Adults in America*, ed. Jeffrey J. Arnett and Jennifer L. Tanner et al. (Washington, DC: American Psychological Association, 2006), 195-196.

<sup>5</sup> *ibid*, 196-200.

adjustment to the many new responsibilities and roles in emerging adulthood. When parents accept their children's independence and competence, emerging adults are shown to have higher self-esteem and individuation. Even academic performance has been shown to be linked to parental support.<sup>6</sup>

Through Arnett and Aquilano's work, we see the strong role that parental relationships play in the development of emerging adults. Any tool or interaction that is designed for parents and emerging adults should allow parents to support their children yet allow them to express their independence.

### 3.1.3 Emerging Adulthood in HCI

Researchers in human-computer interaction have also begun to explore college students and their relationship to their families as a possible area for design intervention. Smith, Nguyen, et. al. conducted an interview-based study of nineteen college students at an American university and their use of communication tools to interact with their parents. The implications in this study were that design opportunities exist for communication technologies to facilitate intimacy, but that these designs would need to fit into the nuanced nature of parent-child relationships.<sup>7</sup>

## 3.2 Interaction Contexts

Emerging adults and their parents interact in multiple ways. Though there is nascent interest in explicitly studying interaction

tools between emerging adults and their parents, there is significantly deeper research from on technologically mediated interaction between family members of all ages. I examined literature from HCI researchers focused on families — specifically, on the use of technology to maintain awareness and create a sense of presence. I also briefly examined literature on the use of direct communication technologies.

### 3.2.1 Awareness

Researchers and designers working in HCI have explored concepts of awareness in distance-based interaction. "Awareness" in this context refers to the feeling of being aware of characteristics of a person even when that person is not physically located in close proximity.

Neustaedter, Elliot, and Greenberg attempted to situate awareness in domestic spaces — in homes and other shared spaces. From prior literature and their own contextual study, they create a spectrum model of awareness needs that they call "interpersonal awareness." They theorize that for different relationships, people require different amounts of awareness. For immediate family members sharing homes, study participants required a strong

---

<sup>6</sup> *ibid*, 202 – 203.

<sup>7</sup> Madeline E. Smith et. al., "Going to College and Staying Connected: Communication Between College Freshmen and Their Parents," in *the Proceedings of CSCW 2012*, (ACM Press: 2012) 789 – 798 .

need for daily awareness of each other and that they required more detail out of descriptions of their lives. For immediate family members not sharing domestic space like a home — “intimate socials” — 93% of participants mentioned that they also desired this same level of awareness. They also examined techniques that people typically use to maintain awareness and theorized that people generally used three main techniques: visual cues from domestic artifacts, direct interaction, and mediated interaction. They describe different ways that people co-located in the same domestic space use these three techniques to maintain awareness, as well as techniques for “intimate socials.”<sup>8</sup>

Along the same lines, Ito and Okabe studied the patterns of cell-phone text message usage among teenagers and parents in Japan. Through a long-term ethnographic study, they theorize that the cell phone creates a sense of ambient awareness of a particular group — whether a teenage clique or a family — over time. They also theorize that the use of an asynchronous communication medium like cell phone email and text messages create an ongoing sense of awareness, a phenomenon significantly different than traditional “point-to-point” voice calls. The experience of ongoing cell phone email and text messaging with close ties is analogous to physical co-location. At a broad level, they theorize that technology placed in a social context — a “technosocial system” like the use of messaging among teenagers — creates an experience that is not suggested by the technology or the social context alone.<sup>9</sup>

Extending the implications of Neustaedter’s model of awareness, Judge and Neustaedter designed a shared video media space called the Family Window specifically designed for awareness and connectedness across distance. The Window is an “always-on” video device without audio (analogous to a physical window) designed to connect extended families in different places. They deployed within five extended families over several months to understand various interactions and uses in-situ. Some key findings of the Window influenced the design of Loop. Family members primarily used the Window to share very quotidian, small episodes of everyday life — that the primary use case for any kind of family social interaction are to share these small slivers of life. Privacy was extremely important even for intimate family members; but this was solved in an intuitive, physical way when family members considered where the Window might be placed. Even though designers added a feature called “Blinds” that allowed users to mute or turn off the window for short periods of time, this feature largely went unused.<sup>10</sup>

Mynatt, Rowan, Jacobs, and Craighill examined another physical object located in the home — photos and photo frames. They create

---

<sup>8</sup> Carman Neustaedter, Kathryn Elliot, Saul Greenberg, “Interpersonal Awareness in the Domestic Realm,” in *the Proceedings of OZCHI 2006* (ACM Press, 2006) 15 – 22 .

<sup>9</sup> Mizuko Ito and Daisuke Okabe, “Technosocial Situations: Emergent Structuring of Mobile E-mail Use,” in *Personal, Portable, Pedestrian*, ed. Mizuko Ito, Daisuke Okabe, Misa Matsuda (Cambridge: MIT Press, 2005), 257 – 273.

<sup>10</sup> Tejinder Judge, Carman Neustaedter, Andrew Kurtz, “The Family Window: The Design and Evaluation of a Domestic Media Space,” in *the Proceedings of CHI 2010 Systems* (ACM Press, 2010), 2361 – 2370.

the concept of a “digital family portrait” that is specifically designed to support elders by recording and visualizing distant family members’ everyday activities in a way that supports awareness. Though the design they come up with is a bit crude, the overall framework for understanding different aspects of everyday awareness information that create peace of mind is interesting — they categorize everyday information into health, environment, relationships, activities, and events.<sup>11</sup>

Romero et. al. engaged in a qualitative study of awareness for family members at a distance specifically to create design implications for an awareness system for extended families. Using other literature and qualitative interviews, the authors develop a concept called “Connectedness.” They describe this ideal as “the feelings of being in touch with someone, being aware of what happens in their lives, feeling they think and care about you as this results from a phone call, a mail, or any form of communication.” It is a longer-term feeling, a sense of connection between intimately related social networks.<sup>12</sup>

### 3.2.2 Presence

Closely coupled with awareness is the idea of presence. The difference between the two is subtle. Awareness is the feeling one gets by using directed communication over time. Presence is the feeling one gets by interacting with material objects or digital objects that have been changed or manipulated by another user.

Tollmar and Persson studied and interviewed people from extended families and their interaction with objects in order to qualitatively understand how artifacts can create a sense of emotional closeness. They found that objects with rich, deep narratives — like objects with some history of ownership, or objects that had some connection to a familial tradition — came to be more treasured and became tokens for maintaining a sense of a family member.<sup>13</sup>

They also created several prototypes to reveal how the design implications of this ethnographic study can be used in physical or digital objects. These prototypes used information from sensors placed by family members to control differently colored lights to create a sense of abstracted presence. Key findings from these prototypes that were useful for the design of Loop was the emphasis on accretive history and the use of constrained, abstracted interaction in order to mitigate concerns about privacy. The most useful finding was the effective use of metaphor in the design of the prototypes — that participants easily understood the abstract light fixture by comparing it to porch lights visible at a distance.

---

<sup>11</sup> Elizabeth Mynatt, et al., “Digital Family Portraits: Supporting Peace of Mind for Extended Family Members,” in *the Proceedings of CHI 2001*, (ACM Press, 2001), 333 – 340.

<sup>12</sup> Natalia Romero, et al., “Connecting the family with awareness systems,” in *Personal and Ubiquitous Computing* 11 (2007): 299 – 312.

<sup>13</sup> Konrad Tollmar and Joakim Persson, “Understanding Remote Presence,” in *the Proceedings of NordiCHI*, (ACM Press, 2002) 41 – 49.

3.2.3 Direct Communication

Finally, the most obvious interaction between emerging adults and their parents is direct communication. I examined several papers from communication theory and HCI to interrogate the role of direct communication in familial identity construction and in maintaining relationships between emerging adults and their parents.

Ochs, Taylor, Rudolph, and Smith argue that the act of storytelling among different family members cultivate and maintain key skills in theory-building and narrative construction. Further building on this, Gordon argues that the discursive nature of familial storytelling creates a sense of family identity – that direct communication and linguistic construction create group bonds.<sup>14</sup>

In a previously mentioned article, Smith et. al. examined how certain types of direct communication channels were used by research subjects based on contextual need. Synchronous voice and video were mentioned as being more laborious, but ultimately richer and preferred for certain types of conversation. Asynchronous communication – text messaging and emailing – were seen as quicker and easier, but did not seem appropriate for long conversations. Research subjects also managed the types of communication available to their parents. There was strong hesitancy at using Facebook and broadcasting availability through instant messaging.<sup>15</sup>

3.3 Material Contexts

The material world manifests itself in the relationship between emerging adults and their parents. Through material possessions and the rituals around them, emerging adults maintain some sense of connection to parents. To understand more about various material practices involved in familial relationships, I examined literature about presence, possession attachment, and gifting practices among families separated by distance.

3.3.1 Presence, Continued

Presence is also a significant part of the material context of familial relationships. Some researchers have already examined how particular materials create different experiences between family members – including emerging adults and their parents.

Swan and Taylor explored the material properties of photography in homes as a marker of presence. They document various photo displays in six homes – from collages on the wall to small photo frames on fireplace mantels. From this, they draw two key findings: first, there exists a particular kind of design vernacular that allows users to subtly express different emotions outside of the actual content of the photo itself. Second, the work that families do in

<sup>14</sup> Elinor Ochs, et al., “Storytelling as a Theory Building Activity,” in *Discourse Processes* 15, (1992) 37 – 72.

<sup>15</sup> Madeline E. Smith et. al., “Going to College and Staying Connected: Communication Between College Freshmen and Their Parents,” in *the Proceedings of CSCW 2012*, (ACM Press: 2012) 789 – 798 .

constructing and displaying material objects in the home is, in fact, work that helps families construct identity and morality.<sup>16</sup>

### 3.3.2 Material Attachment

In marketing theory, several researchers examine material attachment as a dimension of family identity. Material attachment is the connection that people have with their objects over time due to stories or practices. I looked at several papers in order to examine how material attachment might be useful in designing digital or physical objects used by emerging adults and their parents.

Kleine, Kleine, and Allen examined the process of possession attachment and the different types of possession attachment. Through several studies on dimensions of attachment to objects, they proposed that two main tensions exist in possession attachment. First, there is a strong desire for individuals to express their uniqueness while affirming connections to other people that help define their selves. Second, objects help manage a person’s ability to either stabilize their sense of self or mediate changes in identity. People become attached to possessions that represent their current self or their future self. Also, product class, possession type, and person type are all poor predictors of attachment. However, the way in which a possession is acquired is a significant predictor of attachment — gifts given by others or by oneself. This emphasis on the social dimension of sharing objects — physical or digital — is reflected in the final design for Loop.<sup>17</sup>

Epp and Price described the process of “object singularization and recommodification” in the home — how material objects become imbued with meaning through use and then recommodified as it they are transferred to different owners. Over a two year period of time, they examine how a family kitchen table becomes a unique locus for family conversation. Then, as it is transferred from a parent’s home to a child’s home, they examine how it is transformed in different ways. Several findings were interesting from this study. The notion of singularization is exemplified in the table — a somewhat ugly looking table imbued with much meaning and attachment by the participating family due to the activities that the table’s size and position affords. The impermanence of singularized objects is also interesting — even with its rich history and role in the family’s life, over time, other tables end up displacing the focal nature of the table.<sup>18</sup>

---

<sup>16</sup> Laurel Swan, Alex Taylor, “Photo Displays in the Home,” in *Proceedings of DIS 2008*, (ACM Press: 2008) 261 – 270.

<sup>17</sup> Susan Kleine, Robert Kleine, Chris Allen, “How is a Possession ‘Me’ or ‘Not Me’? Characterizing Types and an Antecedent to Material Possession Attachment,” in the *Journal of Consumer Research*, (University of Chicago Press: 1995) 327 – 343.

<sup>18</sup> Amber Epp, Linda Price “The Storied Life of Singularized Objects: Forces of Agency and Network Transformation,” in the *Journal of Consumer Research*, (University of Chicago Press: 2009) 820 – 837.

## 4 Research

Traditional design research and ethnographic research tools were employed to further understand issues around communication technology for emerging adults and their parents. All research activities were broadly design-directed – directed toward implications for creating a broad vision for a potential designed interaction or product.

### 4.1 Ethnographic Interviews with Emerging Adults

#### 4.1.1 Methodology

I conducted 8 hour-long qualitative interviews with participants aged 19 – 31. All were currently attending college as undergraduate or graduate students. Participants were selected from a short screener survey sent out to current students in the College of Fine Arts with 43 respondents. There was a small amount of compensation for each participant. I used a set of 8 leading questions with freeform followup. The questionnaire is included in the appendix. There were three themes touched on questions: the nature and subject of direct and in-

direct communication with their parents; the type of technologies used in communicating with their parents; and physical objects or rituals that reminded them of their parents. Two questions were storytelling-style questions – one on recalling the last time that they communicated with their parents, and another on a particular object (digital or physical) that reminded them of their parents. Notes were taken during the interview and were the main reference source for synthesis.

**4.1.2 Findings**  
**4.1.2.1 Relationship with Parents**

7 out of 8 participants felt that they had strong relationships with their parents consistent with literature on early adulthood. Almost all contacted their parents through some communicative medium at least once a week, if not significantly more. Several participants had parents who were divorced. In general, these participants expressed that they had strong relationships with both parents. This is consistent with literature on early adults and their relationship to divorced parents.

In directed stories and in interview questions, almost all participants indicated a relationship with their parents more akin to a peer relationship than a traditional parental relationship. P3 mentioned that her father gossips with her about parents of some of her friends.

P2 mentioned that she can easily reject advice from her mother. P5 specifically mentioned that she saw her mother as a friend.

P4 was somewhat different. This is likely due to cultural differences and expectations in the parent-child relationship – her parents were first-generation immigrants who spoke little English. However, she indicated several interesting ways that she related with her parents, including food and events. P7 also postulated that the quality of communication between himself and his parents might also result from cultural difference. However, he did contact his parents at least once a week.

All participants mentioned that they visited their parents at least once over the past year. Over half visited more than once. Several mentioned that they wished that they could have more time to visit their parents or expressed some regret in not visiting as much as they wanted to.

**4.1.2.2 Current Communication Tools**

All participants utilized the phone as the primary touchpoint for communicating with their parents.

Email was mentioned as a secondary communication tool. One participant mentioned that text messaging began supplanting email

as secondary communication. Participants mentioned that email was primarily used to exchange images, links, and occasionally for long-form communication. One participant also mentioned that photos exchanged in email often became a topic of conversation in phone calls.

One participant mentioned that instant messaging (through Facebook) became a new common mode of communication over the past two years. She mentioned that this only surfaced years after both the participant and the parent used Facebook. She indicated that this was the only form of instant messaging that the two of them ever tried. In an example story through directed storytelling, she mentioned that her chat was around 30 minutes long. One other participant had a visceral negative reaction to the idea of IM as a mode of communication. Another indicated that she had not considered it at all. One other participant mentioned that she tried it out with her mom and dad but that she found that it did not fulfill a need.

Almost all participants mentioned that they tried out video chatting through a number of services – Skype, Facetime, Google Talk, and Google+ Hangouts. All mentioned they did not continue using video chat. Common reasons cited included the ability to multitask while on a voice call, technical complexity, annoyance at having to visually compose oneself.

One participant independently brought up her family’s usage of Smugmug to share photos. Her family uses it peculiarly in that all of them log into her aunt’s account. Though nominally in her aunt’s name, the account is shared among several female members of the family through three generations.

One participant independently brought up her family’s use of group texting through iMessage through her families’ iPhones.

#### 4.1.2.3 Facebook

Several questions were asked about social networking websites to indicate the impact of SNS on their communicative practices. Facebook was the only major SNS mentioned by a majority of participants that had any uptake by their parents, although one participant mentioned that her father began using Google+ to help market his book.

Though all participants indicated that they used Facebook, there was varied uptake of Facebook by their parents. Half of the participants indicated that their parents were on Facebook. Among these participants, there was varied levels of engagement. Two mentioned that their parents rarely used the service. The other two were indicated that both of her parents were somewhat frequent users of the service.

All four participants mentioned that their parents interacted with photos on Facebook. Several participants mentioned that their parents did not post things to Facebook but commented on their photos.

Three participants mentioned without prompting that their parents' usage of Facebook and other social networks made them feel somewhat uncomfortable. One mentioned that she put her mother on "Limited Profile." Another mentioned that her mother "likes" every image that she posts, which felt somewhat obligatory. Another mentioned that her parents don't use Facebook often, but her dad has begun to use it and Google+ as a way to market his book, which felt somewhat peculiar to her.

**4.1.2.4 Material Practices**

A majority of the participants mentioned the presence of physical photos in their residence as a material reminder of their parents. Several pointed out virtual photos on phones and computer.

Most participants mentioned physical objects as reminders of their parents. These were as varied as a table to a diploma to a dog. Three participants mentioned objects in use, rather than on display. For example, one participant mentioned a midcentury coffee table that features prominently in her apartment. Three mentioned objects on

display. For example, one participant mentioned a diploma as a reminder of her parents through the college displayed on the diploma.

All of the virtual objects mentioned by the participants were photos. There were no videos or textual objects. These ranged from photos of trips to posed family photos. All of these photos were stored in some sort of user-enacted sorting system – either folders on their desktop or albums created on iPhoto or Facebook.

Four participants mentioned that their treasured physical photos were digital pictures printed out. One participant mentioned her desire to make physical manifestations of photos through a special smugmug album, but did not act on that desire.

One participant mentioned that culturally significant food was a touchpoint in reminding her of her parents. Three participants also mentioned food in the context of specific holidays as significant reminders of parents. Two mentioned the ritual around tea or coffee brewing and drinking as a reminder of their mothers.

**4.1.2.5 Family Rituals and Holidays**

Rituals featured prominently in family communication and presence. Three brought up rituals around Thanksgiving and Christmas as significant family moments. Half mentioned that they would likely

visit their parents over both holidays. Two mentioned that their parents would likely send them things having to do with the holidays; one mentioned that her parents would send items for other holidays, but mentioned that she did not ever really put up any Christmas decorations in her apartment.

One participant had an interesting story to tell about a Swedish holiday held two weeks before Christmas — St. Lucia’s Day. For her first year in college, she held a celebration on her dorm floor in lieu of her usual family celebration; she introduced everyone to the food and the rituals that her family engaged in during the holiday. She later shared that story with her parents.

**4.1.3 Key Findings**

Participants expressed some level of satisfaction with their current communication situation. Their primary method of communication was through 1 to 1 voice phone calls. 6 out of 8 participants mentioned that they talk to one parent at least once a week. Email was a consistent secondary form of communication.

All participants mentioned that they explored new forms of communication with their parents, including video chats, IM, Facebook status updates, and text messaging. However, only text messaging was had consistent uptake in use for multiple participants.

Half of the participants mentioned that their parents were on Facebook. However, their usage of Facebook for family communication was sporadic; only one participant mentioned consistent usage of Facebook in communicating with one parent. The problems mentioned in using Facebook with parents included inconsistent usage patterns of Facebook by parents; lack of context for understanding status updates and images; embarrassment to friends; peculiar or nontraditional usage of social interactions by parents.

A majority of participants kept images, either physical or virtual, as reminders of their parents and their family. Several participants mentioned the rituals around possessions or specific annual events as another key point of connection with their parents. Examples included decorating for the holidays, guitar playing, tea making, sending cheap gifts back and forth, and eating culturally significant food.

**4.2. Ethnographic Interviews with Parents**

In response to initial feedback about my focus on only contacting emerging adults, I interviewed two parents about their communication practices with their children.

**4.2.1 Methodology**

I adapted the script and protocol from the ethnographic interviews with emerging adults. For the participants, I reached out previ-

ous participants and asked if I could interview their parents. All were conducted over the phone. Synthesis findings were primarily culled from notes.

**4.2.2 Findings**

I only detail distinct findings here. Most findings were similar to those of the emerging adults; I have chosen not to detail them again.

**4.2.2.1 Technology Usage For A Purpose**

Both parents were not averse to technology. One had an iPad and expressed a high interest in the Nest digital thermostat. Both described some use of video chat and text messaging. Newer one-to-one technologies clearly seemed appealing to them. In discussing Facebook, both mentioned hesitation with using Facebook because there seemed to be little practical use for the service. One parent mentioned how she did not enjoy getting contacted by people she had no interest in keeping in touch with. However, both mentioned that they felt like they might have some compelling use for the service only if close family members used it to distribute photos. In particular, one parent mentioned that another child’s use of Facebook for photo sharing — an adult child with a newborn baby — might prompt her to use the service more.

**4.2.2.2 Use of Physical Media Sharing**

One parent used physical artifacts in an interesting way. She sent clippings from magazines and newspapers as a way of sharing information. This was not to the exclusion of digital sharing — she also shared PDFs and links to articles online to her children.

## 5 Possibilities

After reviewing background literature and interview notes, I created several models to synthesize my understanding of users. To illustrate how adolescents, emerging adults, and adults communicate with their parents in different ways, I devised a model illustrating how children maintained relationships with their parents during these three stages of development. I also used Cooper's work on personas to take research and background literature to model possible user types with different characteristics found in emerging adulthood.

With these models in mind, I engaged in an ideation process focused on exploring possible future states for these users. Using literature and storytelling notes, I ideated on possible opportunities and latent needs. From there, I clustered like needs and opportunities to four broad product opportunity areas.

Using user models along with models of possible needs and opportunity areas, I devised nine storyboards illustrating future states connected to these needs and opportunities. Using these storyboard concepts, I engaged 3 emerging adults and 2 parents to understand which possible future states might be preferred over other states. Several findings are discussed below.

With these preferences, I narrowed down nine storyboards to three possible future states. I wrote out first-person narratives for these future states using the personas generated in research. Using these narratives, I teased out an ideal experience and selected one focus area. Initial prototypes for one of these concepts led me to synthesize some of these narratives into one final design – a focused design that addresses several aspects of these three future states.

5.1 Conceptual Model of Communication

To understand more about the technosocial context of communication between emerging adults and their parents, I utilized findings from research and literature to create a generalized model of parent relationships and communication over adolescence and emerging adulthood. This model is shown in diagram 5.1.1

There are several salient details that are revealed through this model. First, we see the result when an emerging adult moves out of the family home in the transition from abstract, indirect communication to direct communication. We also see a shift in the type

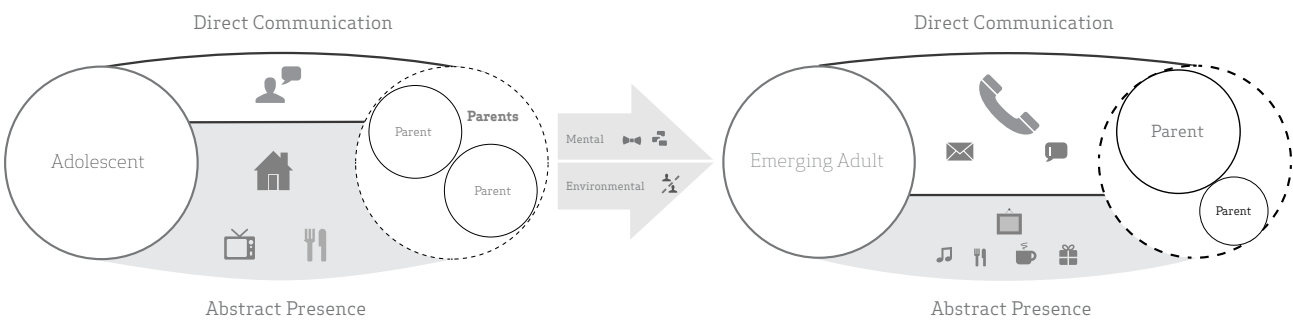


Diagram 5.1.1 Conceptual Model of Communication.

of direct and indirect communication between adolescents and emerging adults, a significant increase in the diversity of communication channels. There is also an interesting shift recorded in interviews, but not in literature – typically, emerging adults find themselves connected to one parent more than the other. Fewer radical shifts occur in the transition from emerging adulthood to adulthood, except an increased use of rich media to share significant life events and experiences around extended family members.

5.2 Persona Models from Research and Literature

In order to create a richer sense of the types of users that might inhabit current and future states, I turned to Cooper’s model of the persona. This fictitious model of a user seemed perfect to try to synthesize and stabilize some model of a user from literature and research. These personas are in Appendix A.

For personas representing emerging adults, I took my notes from interviews along with first-person stories from literature to understand natural cleavages in user typologies. Three distinct types emerged from this exercise. First, there were emerging adults who recently left high school and were either in college or in the workplace. These users seemed to typify the popular conception of the emerging adult — a young person in major flux and shift, exposed to new ideas outside of their homes. Second, there were emerging adults who had just left college and moved either to a new city for graduate school or for a career. These users felt significantly different than the college aged students — somewhat more secure in their career or future, but “starting over” in a new city. Finally, there were the “older” emerging adults — emerging adults who felt more settled in a city and more distant from their college experiences, yet still open to major career changes and school changes.

From literature, I created five “sliding scale” characteristics for each persona. These covered friendships, roots in a location, reliance on others for decision-making, career prospects, and financial security. I also created short narrative stories and goals for each of the emerging adult personas.

For personas representing parents, I took my notes from parent and emerging adult interviews along with some of the stories presented in literature of the parents of emerging adults. There were fewer natural cleavages in user typologies, but I modeled

them based a bit on their interest and relationship with their child. One persona type reflected the desire of some parents to simply understand the emotional state of their child; another reflected the desire of some parents to connect based on shared interests and tasks; yet another was a younger parent, still attached to the strong desire to protect and nurture his child.

Instead of the sliding scale characteristics, I modeled which types of communication technology he or she would be comfortable with based on my interviews. I developed overall life goals and short narratives about their lives. Finally, I created narrative arcs between the emerging adult personas and the parent personas — connecting each parent with an emerging adult.

## 5.3 Possible Opportunities and Needs

Going back to my interview notes and findings, I noted every possible user need that was either articulated or implied. I did a cluster of these possible needs and opportunities and created four areas for possible design interventions.

### 5.3.1 Actively Shaping Family Communication

This opportunity space was around the idea of services that actively shape the pattern of communication between emerging adults and their parents. Participants mentioned that they felt close to their parents, but they had periods where they neglected their relationship with their parent. Some of the older participants also mentioned

that there was a period earlier in their emerging adulthood where they had to become acclimated to regular communication with their parents. Literature also referenced how parents occasionally have problems acclimating to the idea of treating their children as adults or peers. Could there be a tool that could help nudge and shape communication patterns between emerging adults and their parents?

**5.3.2 Communication as Possession**

This possible theme was derived from the simple stories people told about various cherished artifacts and objects that were originally communicative artifacts, like letters. With current cloud-based software, possessions become communicative artifacts. When someone uploads an image to Facebook, the interface for that object is primarily through the News Feed, a time-sorted, communication-oriented interface. But in the physical world, communication artifacts often make the inverse transition. A letter written with care and craft ends up in someone’s purse to remind her of her parents. A purely communicative photo of friends on vacation becomes a framed image on a wall. The central question around this theme was how a service could bring the idea of communication as possession into virtual worlds.

**5.3.3 Voice as Rich Media**

The dominance of one-to-one voice communication for familial close ties was clear from user research. Other forms of one-to-one communication have largely failed to unseat voice as the primary sensorial medium for synchronous family communication. Partici-

pants mentioned several reasons why voice communication was their preferred mode of communication — the common reason was the ability to multitask and shift attention without the other participant picking up on that cue. With the advent of smartphones and internet-enabled voice dialing, however, other forms of media can be used as a way of enhancing — not supplanting — voice phone calls.

**5.3.4 Ritual in Interactive Systems**

This theme was derived around stories that people told about the rituals that either reminded them of their parents or were actual rituals of one-to-one communication. Emerging adults and parents described these rituals as being some of the most important touchpoints and interactions in their relationship. However, most of these rituals are centered around physical presence and physical gift changing. What ways could designers create digital systems that use patterns from real life familial rituals?

**5.4 Initial Ideation**

Using these themes for ideation, I developed 10 product concepts connected with these needs and other smaller needs. These ranged from a reminder application for contacting parents to a digital image locket given to emerging adults updated by their parents. These initial idea storyboards are attached in Appendix B. Each storyboard consisted of a title, several identified needs, three comic narrative panel drawings, and text describing the scenario below each panel.

**5.5 Needs Validation**

Using these 10 concepts mapped onto the needs and opportunities identified, I tested them in need validation sessions in the Speed Dating method developed by Davidoff, Lee, and Zimmerman.

**5.5.1 Methodology**

I recruited five participants who had participated in earlier interview sessions – three emerging adults and two parents. All were female and ranged from 28 to 62. All emerging adult and parent pairs lived apart from each other. For the two parents, they participated in the study along with their child so they could respond to each other. Each participant was shown a storyboard. The facilitator read aloud the scenario for the storyboard and then asked a lead question. Responses were recorded along with other reactions to the lead question. Sessions lasted from 30 minutes to 45 minutes.

**5.5.2 Findings**

**5.5.2.1 Strong Desire to Share**

Several storyboards (Parent Timeline, Storyshare, Clipper, Smithopedia, Sherpa, Crystal Ball) dealt with different dimensions of sharing. Some were more aimed toward advice, knowledge, or experience, but all had varying levels of positive responses. Both parents mentioned Facebook and how some of the rich media sharing tools of Facebook appealed to them – and how one storyboard felt similar to Facebook (Parent Timeline) – but the confusing privacy model made them wary of using the service for anything more than cursory comments.

**5.5.2.2 Subtle Shaping of Familial Communication**

Two storyboards (Faminder, Crystal Ball) were a bit more explicit about shaping familial relationships. Reactions to the Faminder were particularly outright negative – the overt reminder system of the Faminder felt too harsh, too nagging for two emerging adult participants. Both parent participants did not feel the need for a tool to remind them to contact their children; they felt that their own patterns in contacting their children were healthy already. In contrast, no participants particularly felt strong negative reactions to the more subtle interactions in the Parent Timeline, Storyshare, Sherpa, Clipper, and Smithopedia storyboards.

**5.5.2.3 Email Imperfections**

One question post-prompt on Storyshare was around the need for richer tools for sharing stories. One emerging adult mentioned that they shared photos and other rich media on email currently, but that they often lost or did not enjoy the photo or narrative experience of email. One parent also mentioned that they began migrating away from email toward text messaging because of the ease of use and the notification system of text messaging.

**5.5.2.4 Physical Form Boundries**

Two emerging adults expressed some hesitation to certain physical forms presented in storyboards. Both expressed an interest in the overall need attached to the “Charmer” storyboard but independently and without prompting mentioned how the form of the

wristwatch did not appeal to them. Also, there was a strong negative reaction to the form detailed in the “Crystal Ball” storyboard, but this was somewhat conflated with the negative reaction to the overall need expressed in the storyboard. The form factor expressed in the “Locket” storyboard appealed to all participants, but one emerging adult brought up the gendered nature of the locket.

Overall, concepts that utilized existing digital devices — mobile phones, tablets, and laptop computers — elicited no reaction about form, while there was almost always some reaction to more novel forms. One emerging adult expressed how she did not want to carry around additional digital gadgets. However, a parent mentioned that the form of the Charmer keychain felt novel and “cool.”

**5.5.2.5 Privacy and Control**

The negative reaction over “Crystal Ball” also revealed an interesting insight about privacy. Parents and children wanted to manage their own privacy by simply revealing or not revealing things about themselves in one-to-one conversation. They did not want a device that would in any way make any decision about information to reveal based on context — they did not want the crystal ball to make a decision for them about what advice to reveal to their child. Both parents and all emerging adults felt that their relationship with their parents was strong enough where if they really felt that they needed a piece of advice about a topic, they would simply talk about it with and obscure details that they wanted to keep private.

**5.6.2.6 Strong attachment to Visual Storytelling**

One parent participant mentioned that for the Sherpa storyboard, she would prefer to answer questions and read questions in a way that was more visual — either through video or photos. In response to the Storyshare storyboard, one emerging adult independently brought up Pinterest and her enjoyment of the prominence of photos and imagery. The Rich Phone Call storyboard resonated with one parent, although she also mentioned how she had the ability to use Facetime or Skype but never really felt the need to use rich media in her phone conversations. In that sense, visual storytelling seemed to be more important for asynchronous communication.

**5.7 Final set of Possible Future States**

These findings were synthesized into future states with three foci: Knowledge Sharing, Experience Sharing, and Future Phone Calls. To think through the future experiential state rather than through product or form in a designerly way, I devised first-person narratives around each foci using my three persona pairs.

**5.7.1 “Future Phone Calls” Experience Narrative**

**Neel (Emerging Adult)** “I share a lot of things with my dad over the phone. Like just yesterday, we were talking about my ride up to Capitol Hill. It was one of those gorgeous days in Seattle, one of those days that doesn’t happen so often in the spring. I loved that my dad could see that. Like it wasn’t just my words. He could see the view from the rooftop of that coffee shop.

A couple months ago, he started actually cooking Sunday dinner. He never did that when I was around at Michigan — it was always takeout with my sisters. But he’s trying! So it’s great to see the video when he’s recounting the crazy story about the rice boiling over, or the looks on Mira and Tara’s faces when they try the stew for the first time.”

**Korak (Parent)** “You know, it’s funny. I don’t really think about the fact that I might want to hear the story again when I’m hearing it. I know it’s a great story, but I just don’t really think about the fact that I might want to hear it five years later. And you know what? Sometimes I do just listen again, just to remember how crazy my son is.

I was telling Neel about this the other day. I was a little sad because Neel wasn’t around for our usual Sunday family dinner — which was so easy when he was in town at Michigan — but then I remembered about the time he had to skip family dinner, when he had his first interview out at the University of Washington. I listened to it again and I saw the photos that he sent over with that conversation. He was so apologetic, so nervous, so in love with the school. And you know, it was another sunny day in Seattle. [Laughs] They totally fooled him with that one.”

There are several features of this experience that felt salient for my final design. First, the use of appropriate rich media felt contextual — more dependent on the situation rather than an arbitrary desire to use a particular type of media. Second, an ideal experi-

ence would allow for both the retelling of stories synchronously as well live sharing of experiences like cooking the stew. Finally, the ability to archive and revisit shared memories felt like a huge part of any ideal future state of synchronous communication.

### 5.7.2 Future Knowledge Sharing

**Natalie (Emerging Adult)** “I’ve been trying to recreate my Dad’s famous carnitas recipe. It’s pretty complex, especially for our dorm kitchens. But you know, I get homesick some days. And the carnitas around here are no match for my Dad’s recipe. I just prop my tablet up, click over, tap over to the photo slideshow, and follow along through my Dad’s pics.

Sometimes I add little notes — like, ‘Dad! What about the paprika?!’ to the recipe, and he’ll change the recipe around a little bit. I know I can write stuff like that since it’s not open to the world. That it’s just me, my dad, and my mom. So like... when I added a photo of my first try, my mom was like ‘Great try, honey!’ like any good mom. My crazy dad was like, ‘Looks good, but you need more jalapeno in there!’”

**Fernando (Parent)** “I love sharing with Natalie. It’s a huge part of our relationship. It’s so different than when she was in high school. We usually share stories — little stories — over the phone, but it’s hard to share some stuff, like my favorite carnitas recipe or a recent news item about my labor union in el paso. Sometimes stories come out of the most random things, like when she made a new note with

**Image 5.7.2.** Visual Representation of Future Knowledge Sharing



a sopapillas recipe she found online. I remembered that abuela had a great version of sopapillas, and I took a photo of that recipe that’s in the family recipe book. I wrote the story up on the board.”

This future state felt a bit less technologically interesting than the synchronous communication future state, but the emphasis on accretive, social content between the emerging adult and the parent felt important for any final design. The emphasis on private communication allows for the knowledge to feel personal and emotional, not just a rote discussion of a particular knowledge item. A less crucial part of the experience was the ability for either party to change content over time rather than having content fixed in time, like email.

### 5.7.3. Future Presence

**Alice (Parent)** “It’s Wednesday. Cookie day. I love finding an interesting photo of a cookie online that I think Miranda would like,

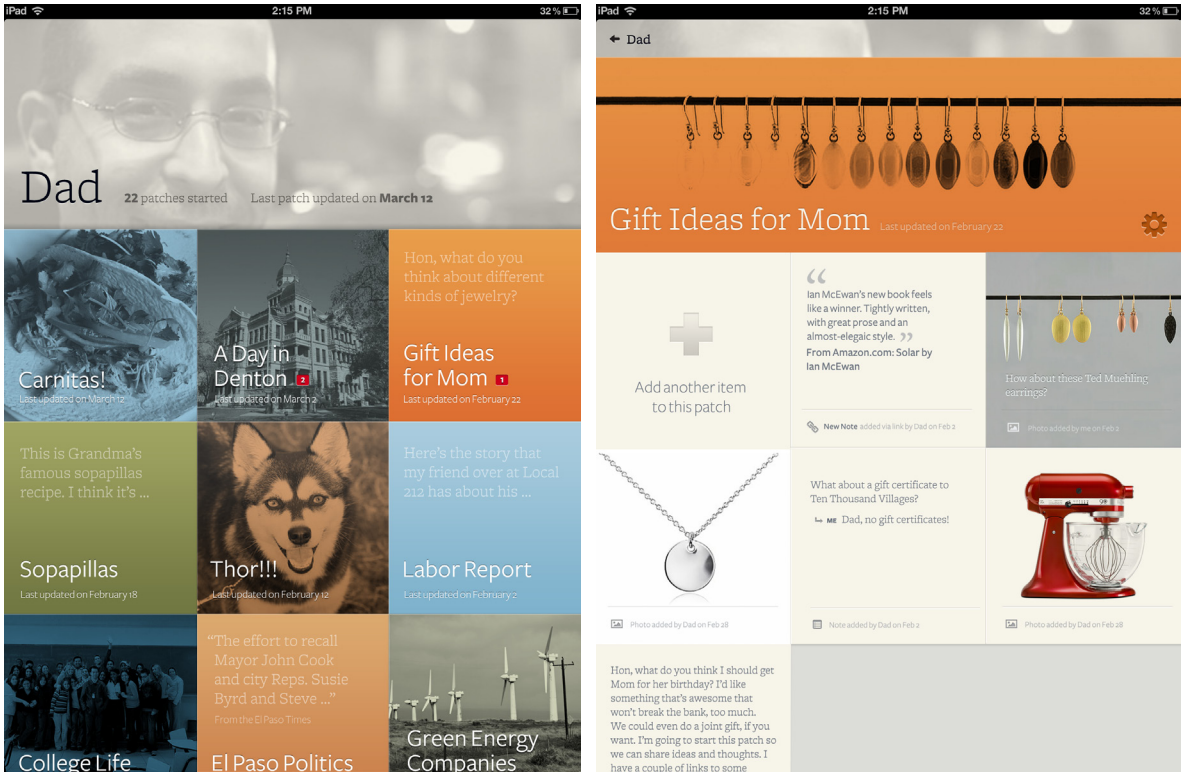
and I know she’ll see and and we’ll talk about it. It’s kind of weird, I know. But I used to send her cookies in college, and somehow that changed into this tradition. I’ve been doing this every Wednesday. Sometimes she’ll bake them, sometimes she won’t. It doesn’t matter too much – but it makes me feel like I’m still a part of her life.

She’ll send me little things to my locket, too – but it’s not as much of a ritual. Just a couple of photos every couple of days of herself doing funny little things, like her rock climbing. But those first days, when I’m surprised by a new photo – there’s something really special about knowing that she’s thinking about me.”

**Miranda (Emerging Adult)** “We have weird rituals, I know. But I hold on to them and cherish them... because I know that someday, we might not have them again. And it makes me remember a little bit about the fact that we weren’t so close in high school. That maybe this



**Image 5.7.3.** Visual Representation of Future Knowledge Sharing



**Image 5.8.1 and 5.8.2** *Patch, an initial prototype exploring the “Future Sharing” scenario.*

time that we spend thinking about each other is special. Even if it’s about cookies or baking or something that seems kind of frivolous.”

An extension of the Locket storyboard, this future state emphasizes both experience sharing and presence in a physical product. A finding that weaves its way to my final design is the idea of give-and-take — that any experiences shared or rituals involve some sense of exchange. The prominence of visuals finds form in this experience; the two exchange tidbits of visuals, not text.

## 5.8 Initial Prototype

My initial prototype was an interactive linear demo of a knowledge sharing application with a heavy emphasis on visuals. I labeled this “Patch” — patches of information stitched together that were jointly created between two or more people. I attempted to translate the experience narrative of Future Knowledge Sharing to this prototype almost verbatim; there is the ability to edit and comment on notes and visuals on each patch. The one significant change is the idea of excerpted content from other sites and emails, an inspiration derived from the prevalence of repurposed and remixed content online.

I played with this prototype and showed it to several colleagues. Initial reaction from colleagues were that people understood the overall prototype, but that it felt a bit too similar to current “board” or “pin” web services. The tablet interface felt interesting and new, but the overall experience did not leverage as many of the findings I derived out of both initial research and needs validation.

Two findings were derived from this prototype. The system needed a strong physical metaphor with an accompanying physical product as a way to feel a bit more distinct from the traditional board/pin web services. Also, in interacting with each patch, there was no sense of liveliness or sense of the other person’s presence in the interaction; my final design needed to use ritual and give-and-take to create a sense of presence.

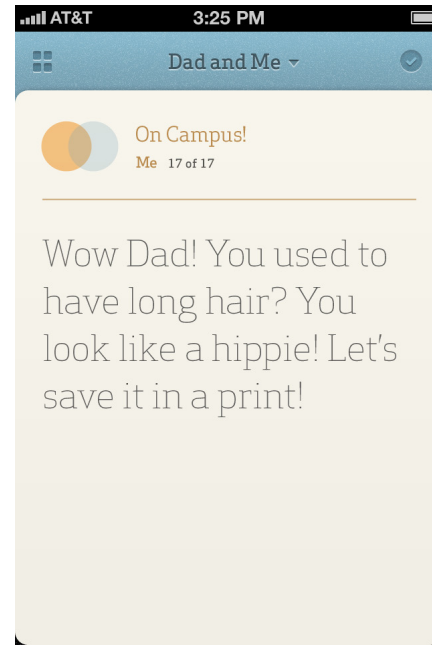
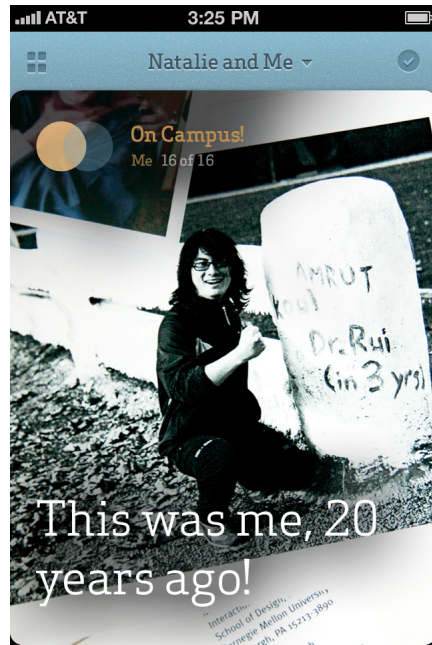
## 6 Design

My final design is called “Loop.” It is a mobile application designed for emerging adults to share experiences and knowledge privately through text, image, and video.

### 6.1 Basic Narrative of Use

#### 6.1.1 Creating

When a child or parent has a new topic of interest that they want to share, they create a loop and add a piece of text, an image, or a video as the first card of the loop. This loop is always private — only visible to the parent and child. The flow for creating a loop emphasizes labeling the loop, with ideas about what kinds of experiences to share to emphasize the value of the loop. A push notification is sent to the other party with the text or image — displaying value of reciprocating to the other party.



**Image 6.1.2.1 and 6.1.2.2**  
Sample Loop cards — photo and text cards

### 6.1.2 Sharing

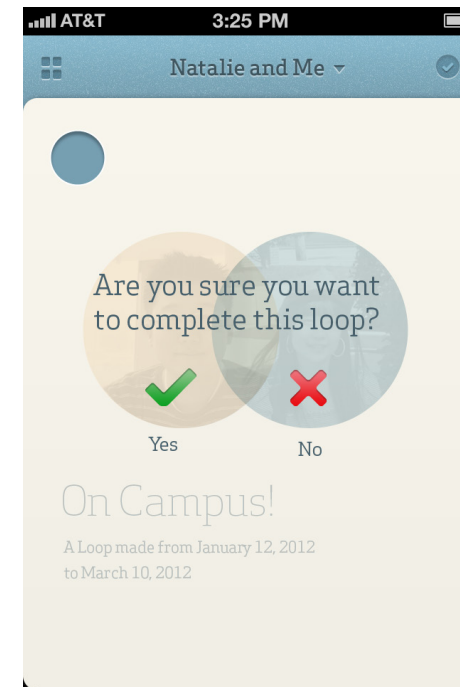
After a loop is created and seeded with an image, the user's parent or child then adds a message or image of her own as a new card. The parent and child add more and more cards to the loop on the loop topic, responding to each other's shared knowledge or experiences. To create a sense of reciprocity, the parent or child can only add a card after the other party has added a card.

Users can also add cards via email, text, or phone — any private, 1:1 medium. This allows users to use Loop in the way that suits them best.

As more cards are added, the parent and the child flip through the cards to see the things that they've shared.

### 6.1.3 Finishing

After a loop feels done, the parent or child can complete it. This closes the loop. Either person cannot add additional cards to the loop. A "cover card" is added to the loop consisting of images selected from the loop. That sense of completion roots the loop as an object. Archived loops are browsed through a scrollable library interface, a collection of the covers of all of the completed loops.



**Image 6.1.3.1 and 6.1.3.2**  
The user interface for completing a loop and the cover card for a loop.



**Image 6.1.4** *A physical printout of a Loop*

#### 6.1.4 Remembering

Users can then also order a print of the loop (see Image 6.1.4), a physical artifact of their shared knowledge. The loop now exists in real life with a sense of place, so it can be a supplement to traditional, 1 to 1 conversation.

### 6.2 System Configuration

At an abstract level, the system is fairly simple. (See Diagram 6.2) Users are associated with each other bidirectionally (users must approve of connections with other users). Users can have non-real names — there is just a unique numerical ID assigned by the system and an associated user name inputted by the user. Users do not interact with each other directly except for establishing connections. Instead, users interact with data that has limited access with two users — to mimic the notion of interacting with another user. For the mobile client, there are a limited number of interaction primitives for

changing data —creating new loops, adding additional content to loops, and completing loops. These primitives can cover the wide array of interactions offered to users. Data is modeled logically — loops have a limited set of metadata and associations to content pieces with their own associated metadata. Data is presented in a variety of views; only associated users (creators/collaborators) are allowed to view loops.

### 6.3 Experience Narrative

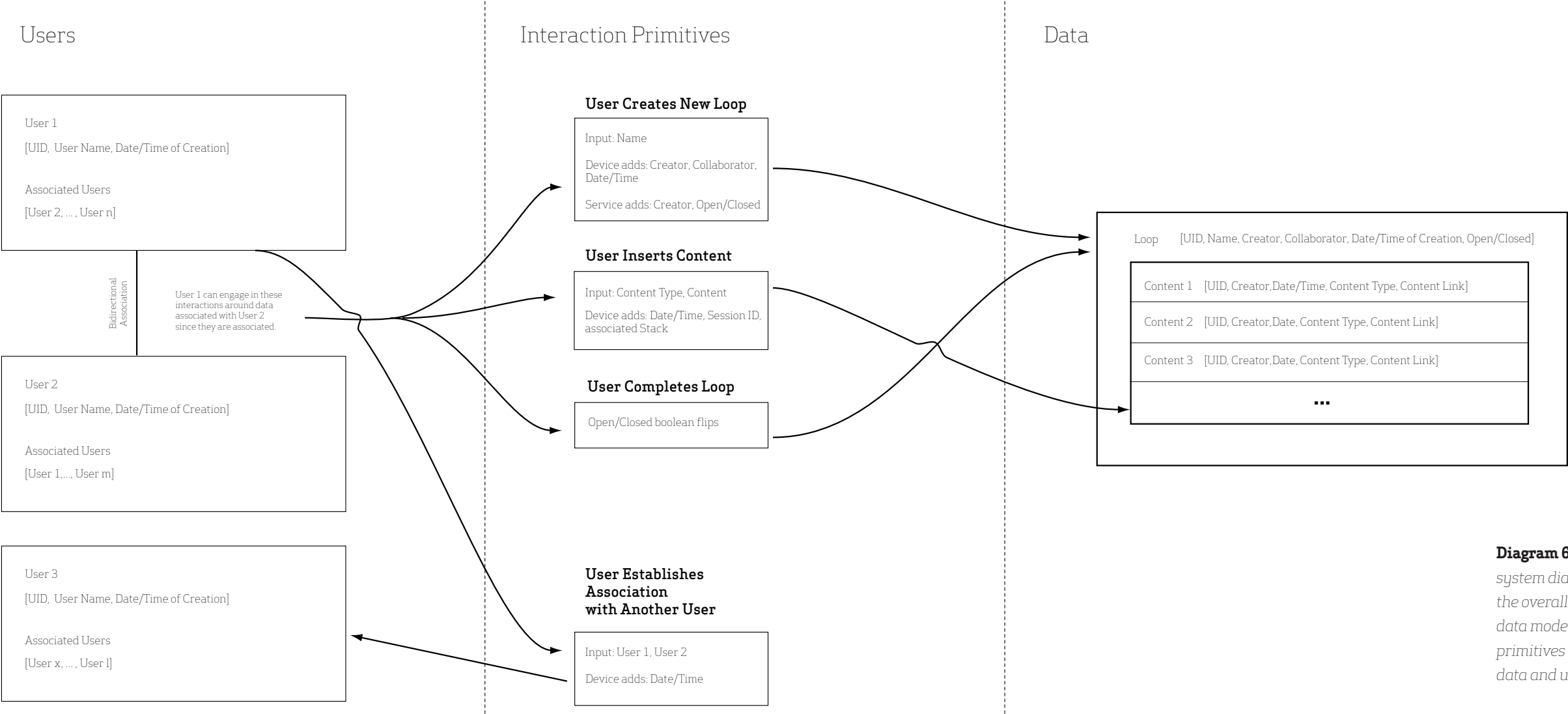
This experience narrative is expressed in my video sketch — an overall sense of the experience of using Loop.

**Natalie (Emerging Adult)** “I love that I get to share little experiences with my Dad about being at CMU. I chose it because my dad had such great stories about going to school here, so it’s really interesting to compare our experiences. The other day, I told him about how hard Operating Systems is and how I pulled an all-nighter for the first time on the third project. He just laughed and said ‘Just one?’ He knew just the right thing to give me confidence, and yeah... I got an A!

I’m going to go take a photo of the fence — my club just painted it last night! It’s so cool. I bet Dad has some crazy stories about the fence.”

**Fernando (Parent)** “I just Looped this old photo of myself at the fence — Natalie will get a kick out of my hair! She loves this stuff —

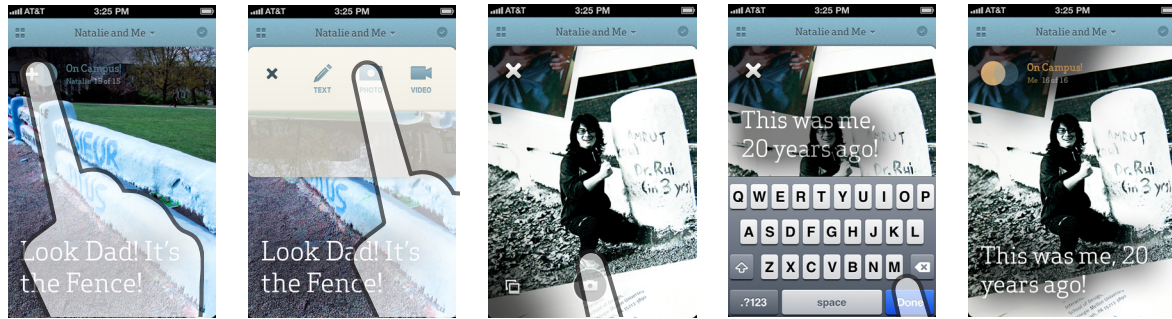
# System Diagram



**Diagram 6.5** An abstract system diagram representing the overall user model, data model, and interaction primitives for manipulating data and user connections.

**Diagram 6.5** UI flow diagram for the mobile application.





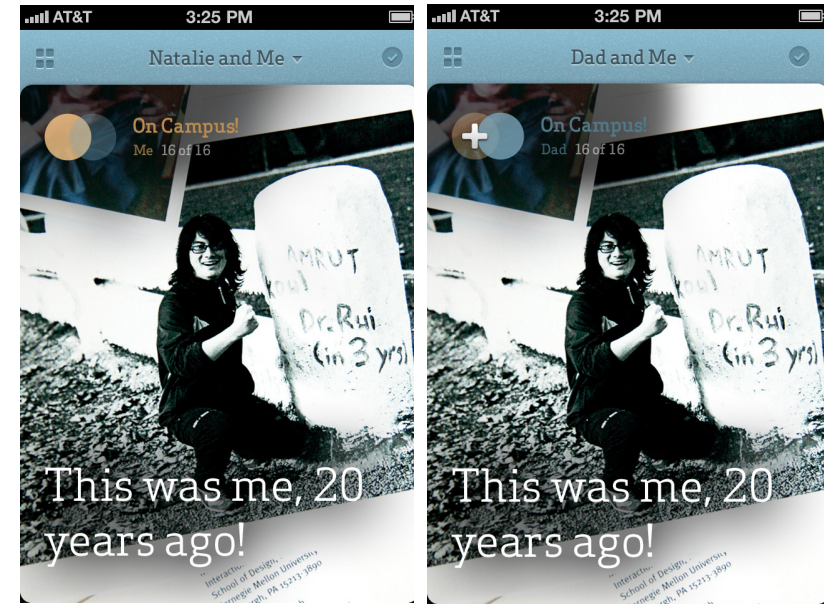
**Image 6.4.1 – 6.4.5** The interaction flow for adding a photo card to a loop

these old photos of me and her mom when we were at CMU, and the weird stories we have about Buggy and Carnival and everything.

I love that I can still experience a little part of Natalie’s life, and that she’s grown into such a fun and interesting woman. More and more, I feel like her friend — her older, uglier friend! But I get a kick out of sharing the experiences I’ve had, and helping her out whe . Sometimes when we talk over the phone, I grab an old Loop that’s about a carnitas recipe she tried to make. I love the last photo in that Loop - she took this beautiful photo of her and her friends, all gathered around this platter of carnitas.”

## 6.4 Details about Sharing

The main interaction that pairs of users have is the creation of a card to add to a loop. Creating a card constitutes the act of sharing some piece of content, whether knowledge or experience. See Photo 6.4.1, 6.4.2, 6.4.3, and 6.4.4 to see the interaction of adding a



**Image 6.4.6, 6.4.7** The same loop card from the perspective of two different users

card. 6.4.1 shows the user tapping on the “+” button, indicating that she would like to add a card. 6.4.2 shows the user selecting between a choice of three options — text, photo, or video. 6.4.3 shows the user snapping a photo. 6.4.4. shows user captioning the photo, and 6.4.5 shows the new card.

To establish a ritual-like reciprocal rhythm of use, 6.4.6, 6.4.7 show two states of a Loop — one Loop where one person can add a card to the loop, and another loop where the same user can’t add a card to the deck but can “nudge” the other person to add a card.

6.5 Details about Other Interactions

Refer to the UI Flow Diagram (6.5) to understand how a user would access these interactions.

6.5.1 Creating a Loop

Creating a loop is another major ancillary interaction. A loop is a collection of cards – the overall subject that ties together a set of cards. The process is generally simple – the user goes to a grid view of all of the loops that he or she has created with another user and taps on a “New Loop” icon to create another Loop. See Image 6.5.3 to see an example of the grid view with the “New Loop” icon.

6.5.2 Finishing a Loop

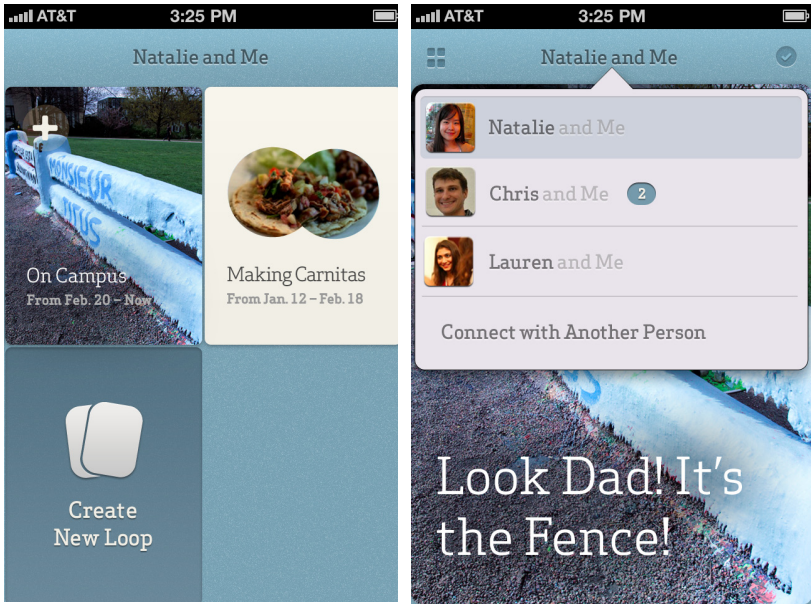
Like previously stated, loops can be “finished” – stored as a digital object with a cover. After finishing a loop, users have the ability to order a print that would be sent to both users.

6.5.3 Switching Loops

Multiple loops can be created for each user and managed at the same time. There’s a simple way to navigate through multiple loops – including previously finished loops. Image 6.5.3 shows the grid view with an unfinished loop and a finished loop.

6.5.4 Switching people

Finally, the user can switch between users to see loops created with other users. Image 6.5.4 shows the “People Switcher” view. Though



**Image 6.5.3, 6.5.4**  
*The Grid view for Loops and the People Switcher view*

optimized for the back and forth conversation that would occur between emerging adults and their parents, the system is extensible enough to allow users to add other people. All loops, however, are private and only 1 to 1 to simplify the reciprocal interaction.

## 7 Conclusion

In this paper, I've described a design process that uses literature from the social sciences to frame user-centered research and design. By combining findings from broader studies in literature with experience-centered research, I was able to synthesize and frame findings within personal narratives as well as broader concepts.

From literature and research, I've argued that emerging adults have a strong, yet nuanced relationship with their parents centered around one-to-one, private communication and small rituals and objects that remind emerging adults of their parents. They rely on the phone to communicate, and use other technological tools to share small bits of information and digital objects. Their reliance on the phone over digital tools reflects a paucity of rich, interesting, well-designed digital products for privately sharing knowledge or experience. Yet the richness of digital interaction can be comple-

mentary to the richness of phone calls, if designed correctly. I've also pointed out the role of physical objects and artifacts in establishing presence and enhancing the relationship between emerging adults and their parents.

The second part of this thesis has shown how these findings point at many interesting implications for designing interactions for emerging adults and their parents. To help narrow down the many to the “right” concept, I described a user-centered idea generation process that helped quickly find needs through “speed dating” concepts. Using those concepts along with a narratively-driven method for generating possible future states, I chose a concept and iterated through making interactions.

In my final design, I've described a novel way of shaping the relationship between emerging adults and their parents to allow for more dynamic, personal ways of sharing experiences and knowledge. With Loop, emerging adults begin to understand their parents as peers while maintaining the vital support from them that they need throughout their time of change. Loop leverages reciprocity to create rituals of use around sharing, and it ties it to the power of physical objects while maintaining a familiar, easily understood form factor.

# References

William S. Aquilano, "Family Relationships and Support Systems," in *Emerging Adults in America*, ed. Jeffrey J. Arnett and Jennifer L. Tanner et al. (Washington, DC: American Psychological Association, 2006), 193 – 217.

Jeffrey J. Arnett, *Emerging Adulthood* (New York: Oxford UP, 2004).

Alan Cooper, Robert Reimann, Dave Cronin, *About Face 3: The Essentials of Interaction Design* (Indianapolis: Wiley Publishing, 2007).

Scott Davidoff, Min Kyung Lee, Anind K. Dey, John Zimmerman, "Rapidly Exploring Application Design through Speed Dating" in *the Proceedings of UbiComp 2007* (Springer-Verlag, 2007) 429–446.

Amber Epp, Linda Price "The Storied Life of Singularized Objects: Forces of Agency and Network Transformation," in the *Journal of Consumer Research*, (University of Chicago Press: 2009) 820 – 837.

Shelley Evenson, "Directed Storytelling: Interpreting Experience for Design" in *Design Studies: Theory and Research in Graphic Design*, ed. Audrey Bennett (New York: Princeton Architectural Press, 2006) 231 – 240.

Mizuko Ito and Daisuke Okabe, "Technosocial Situations: Emergent Structuring of Mobile E-mail Use," in *Personal, Portable, Pedestrian*, ed. Mizuko Ito, Daisuke Okabe, Misa Matsuda (Cambridge: MIT Press, 2005), 257 – 273.

Tejinder Judge, Carman Neustaedter, Andrew Kurtz. "The Family Window: The Design and Evaluation of a Domestic Media Space," in *the Proceedings of CHI 2010 Systems* (ACM Press, 2010), 2361 – 2370.

Susan Kleine, Robert Kleine, Chris Allen, "How is a Possession 'Me' or 'Not Me'? Characterizing Types and an Antecedent to Material Possession Attachment," in the *Journal of Consumer Research*, (University of Chicago Press: 1995) 327 – 343.

Robert E. Kraut and Paul Resnick, *Building Successful Online Communities: Evidence-Based Social Design*, eds. Robert E. Kraut and Paul Resnick. (Cambridge: MIT Press, 2012).

Elizabeth Mynatt, et al., "Digital Family Portraits: Supporting Peace of Mind for Extended Family Members," in *the Proceedings of CHI 2001*, (ACM Press, 2001), 333 – 340.

Carman Neustaedter, Kathryn Elliot, Saul Greenberg, "Interpersonal Awareness in the Domestic Realm," in *the Proceedings of OZCHI 2006* (ACM Press, 2006) 15 – 22 .

Elinor Ochs, et al., "Storytelling as a Theory Building Activity," in *Discourse Processes* 15, (1992) 37 – 72.

Natalia Romero, et al., "Connecting the family with awareness systems," in *Personal and Ubiquitous Computing* 11 (2007): 299 – 312.

Donald Schon and John Bennett, "Reflective Conversation with Materials" in *Bringing Design to Software* (ACM Press, 1996) 171 – 184.

Madeline E. Smith et. al., " 'Going to College and Staying Connected: Communication Between College Freshmen and Their Parents," in *the Proceedings of CSCW 2012*, (ACM Press: 2012) 789 – 798 .

Laurel Swan, Alex Taylor, " Photo Displays in the Home," in *Proceedings of DIS 2008*, (ACM Press: 2008) 261 – 270.

Konrad Tollmar and Joakim Persson, "Understanding Remote Presence," in *the Proceedings of NordiCHI*, (ACM Press, 2002) 41 – 49.

# Appendix A

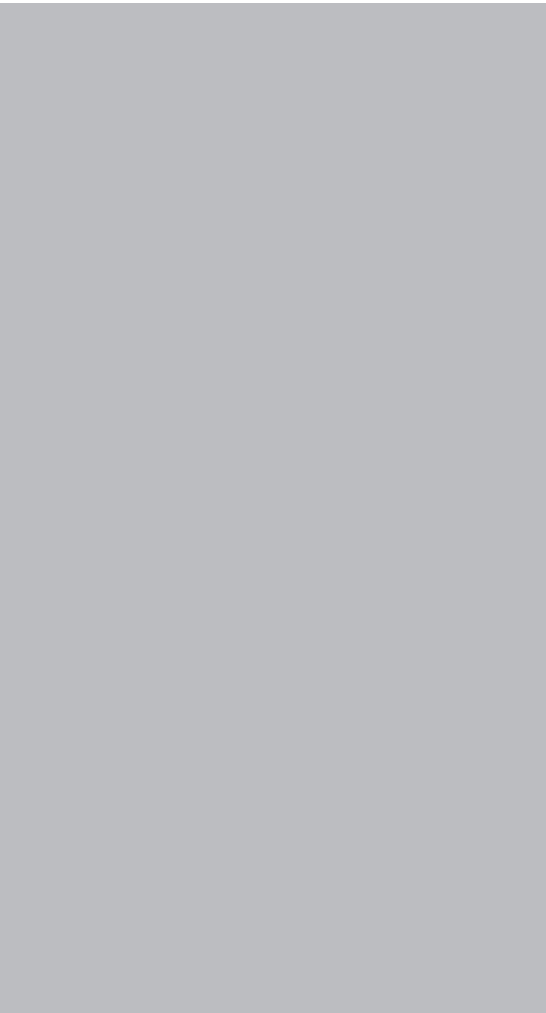
Persona Models

# Miranda and Alice

A frequent topic of conversation is Miranda’s work and personal problems. Since Alice and her husband Gary met during a stint in the Peace Corps, she has some insight into the operations of an NGO. Also, Alice and Gary’s marriage is an inspiration to Miranda. They’ll also talk about her brother Sam, since he’s just graduated college. Alice will sometimes share a story about some crazy law students, and she secretly wonders if Miranda’s days in college were like that.

Alice has a tendency to ramble on about some stories, and sometimes Miranda forgets what stories she’s told to Alice and what stories she’s told to Gary. But that’s OK, because she just likes to hear their voice from time to time.

Miranda visits her parents once a year aside from the holidays, while Alice and Gary drop by Washington twice a year to see the sights and to see Miranda.



## Miranda, 26

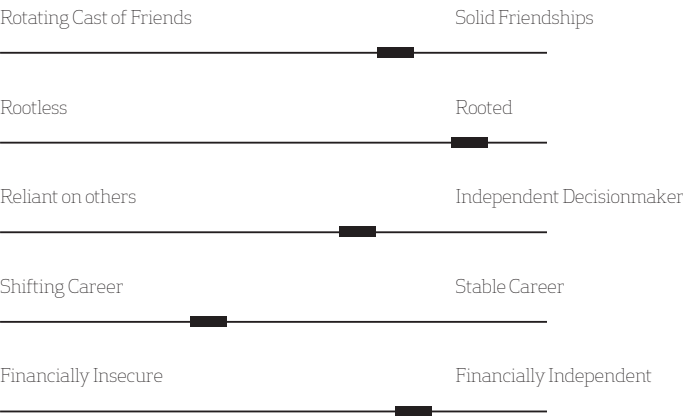
Lives and works in Washington, D.C.

Since she graduated college, Miranda’s been living and working for an NGO based out of D.C. She’s settled into life in D.C., and she even felt like a native for the first time a couple months ago. She’s really found a groove in her post-collegiate life. But as she’s getting a little older, she’s worrying that she might be a little too comfortable — she hasn’t found the right guy, and her job doesn’t quite do it for her.

### Goals

- To get through her entry-level job to something a bit more meaningful.
- To keep feeling good about her life in D.C.
- To find the right guy who wants the same things she wants out of life.

### Early Adulthood Characteristics



# Alice, 58

Lives in Braintree, Massachusetts

Alice is Miranda’s mom. She works as a librarian at Boston College. She’s been married for 36 years and raised two children, Miranda and Sam. Both went to college and are now living on their own in Washington D.C. and Philadelphia. She’s proud that Miranda has grown up to be a mature, independent, thoughtful woman.

**Goals**

- To be able to experience new things with her closest friends and family — her husband and her adult children.
- To be there for her son and daughter and to support them in whatever
- To retire and spend more time with her family — she’s got a “around-the-world” vacation that she’s always wanted to do with her husband.

**Communication Tech That She’s Comfortable With**

- Her new iPad
- Her featurephone — she likes to text
- Skype — used it when Sam was abroad on his Peace Corps mission
- Smugmug — learned to use it as a collaborative photo album tool with her sister

**Communciation Tech That She Doesn’t Like or is Uncomfortable With**

- Facebook — she likes it but is confused about privacy settings
- Her Windows PC — always worried about viruses and spyware
- Chat / IM — doesn’t really understand IM

# Neil and Korak

They’re both basically engineers, so they’ll talk often about research and work. They also both share a deep love of classic rock, cars, and food, so Neil will share some of his latest explorations of Seattle culture. He’ll sometimes talk about girls, but he knows that his dad be “parent-ish” about that part of his life.

Korak will often talk about the car he’s working on in his spare time — and he’ll send a photo or two of the engine block or some other part that he’s working on. Neil’s thinking about buying a motorcycle to work on, and he’s been asking for some advice from Korak about things to keep in mind.

Korak hasn’t visited Seattle since Neil moved in six months ago, but he’s thinking about surprising him with a visit sometime in the spring — when it isn’t so cloudy. Neil went back last Christmas to see his parents and his brother and sister, but he stayed behind for Thanksgiving to have a “Friendsgiving.”

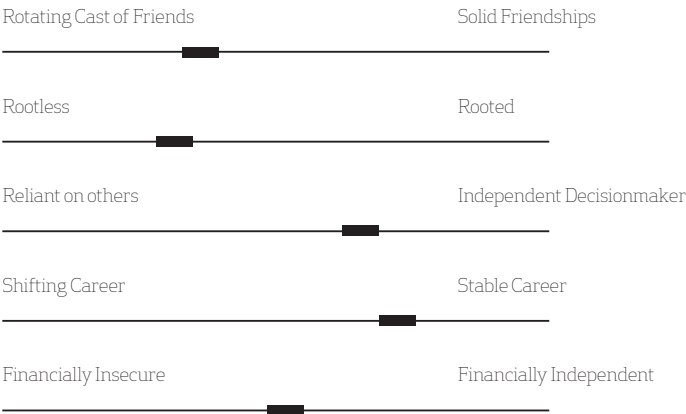


# Neil, 22

Lives and works in Seattle, Washington

Neil just graduated from the University of Michigan and is now working on a Ph. D. in Bioengineering at the University of Washington. He's new to town and he's still trying to find his roots. Back at UM, he lived on campus but he was only about 20 minutes away from his dad's house in Farmington Hills and his mom's house in Grosse Pointe. It's his first time living so far away from his parents, and he's finding that technology's helping him maintain a close connection to his parents.

- Goals**
- To explore more of Seattle.
  - To meet new people and feel rooted in the city.
  - To be a great engineer and scientist.



# Korak, 55

Lives in Farmington Hills, Michigan

Korak has been an engineering manager at Ford for the past 15 years. Originally born in Mumbai, his family moved to Michigan when he was 14. He's definitely American in his outlook on life — he loves working on his collection of old cars in his free time, and he's been divorced twice. That said, he's a little conservative when it comes to his three children — and he's got high hopes for Neil, his oldest son. But they still share a tight relationship, especially since Neil has interests and aspirations similar to himself.

- Goals**
- To work harder — to be distinguished as an engineer at Ford
  - To make Ford products best-of-class in price and performance
  - To retire at some point and move somewhere a little warmer than Michigan
  - To inspire his children to be good students and (hopefully) engineers
  - To keep his son's love of mechanical things alive, even though he's a bioengineer

- Communication Tech That He's Comfortable With**
- His iPhone and iPad — loves the fit and finish of each product, ease of use
  - Facetime — loves using the back-facing camera to show off some car part to his kids
  - Flickr — he considers himself an amateur photographer
  - Email — primary way for him to send images and video back and forth with kids

- Communciation Tech That He Doesn't Like or is Uncomfortable With**
- Facebook — he finds the notion of sharing things to a huge audience weird
  - Google stuff — occasionally hears something about data privacy, and is worried about "big brother"

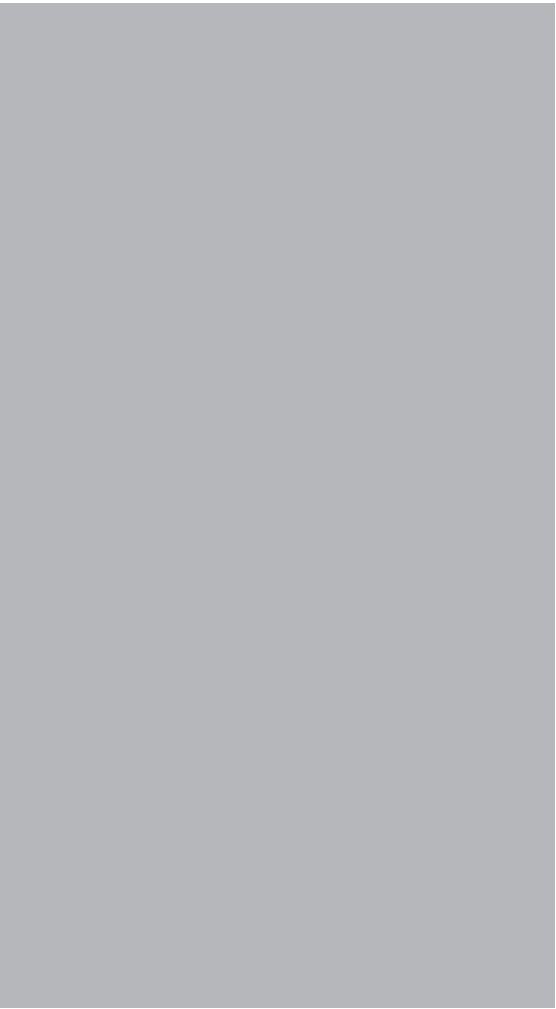
# Natalie and Fernando

Natalie’s really close to her parents, so she calls them once every other day. She’ll also occasionally video chat her mom, Maria, but her dad doesn’t really like video chat. So she keeps it mainly limited to phone, email, and text. They’ll talk about anything from her experience in college – which is fascinating to Fernando, since he didn’t go to college – to her new friends from all around Texas. She’s always be daddy’s little girl, so she feels like he can be moralizing sometimes. Some topics will always be a little off-limits.

Fernando will update her on the status of the ranch that he’s always wanted to build, and on random things having to do with their extended family in El Paso. She sometimes feels homesick, so hearing anything about El Paso can be a huge relief.

Fernando and Maria visit Denton once a year, since his oil and gas work sometimes lead him to North Texas on business. Natalie comes back to El Paso every break – Spring Break, Thanksgiving, and Christmas.

## Current Mix of Communication



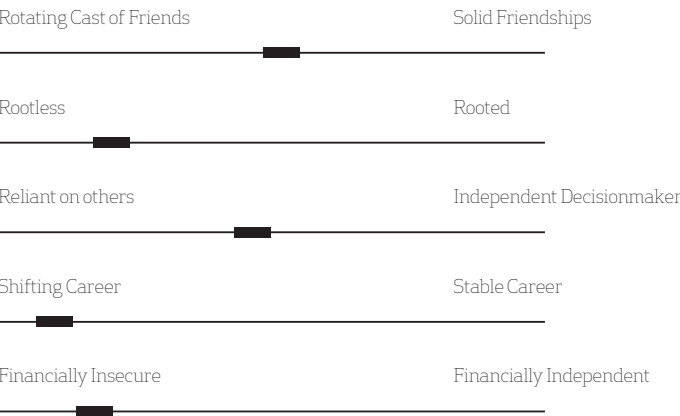
## Natalie, 19

Lives and studies at the University of North Texas in Denton

Originally from El Paso, Natalie’s a sophomore at UNT double majoring in Geology and Materials Science. She stuck around a couple of her friends from El Paso her freshman year, but this year, she’s been trying to make new friends through a couple of organizations on campus. But a lot of her time is spent working hard in school. She loves updating her mom and dad about her life in Denton, especially since the two of them didn’t go to college.

### Goals

- Meet new people – to basically make the most out of college
- Get training to get a solid job in energy
- Experience things outside of the “El Paso Bubble”



# Fernando, 44

Lives and works in El Paso, Texas

Born and raised in El Paso, Fernando works in IT for an oil and gas company. He loves three things in life: his wife, Maria; his only daughter, Natalie; and the Dallas Cowboys. Before meeting Maria, he led what he would admittedly call a “bad boy” kind of life, but since then, he’s cleaned up his ways. There was a time when Natalie would say that Fernando was kind of a harsh father, but he just wants to make sure that his daughter doesn’t make the same kinds of mistakes that he did while growing up.

## Goals

- Finish building a small ranch on a plot of land outside of El Paso
- Provide for Maria and Natalie emotionally and financially
- See Natalie graduate college and lead a rich, beautiful life

## Communication Tech That He’s Comfortable With

- His Android phone — uses it to text or call Maria, check up on a couple of clusters he manages
- Twitter — keeps up with his favorite tech and sports writers
- Chat / IM — loves popping on just to make a sarcastic comment to Natalie

## Communciation Tech That He Doesn’t Like or is Uncomfortable With

- Skype — he’s not a big video chat kind of guy
- Facebook — actually uses it a lot, but knows that he doesn’t want to see everything that Natalie does

# Appendix B

Ideation Storyboards

# Storyshare

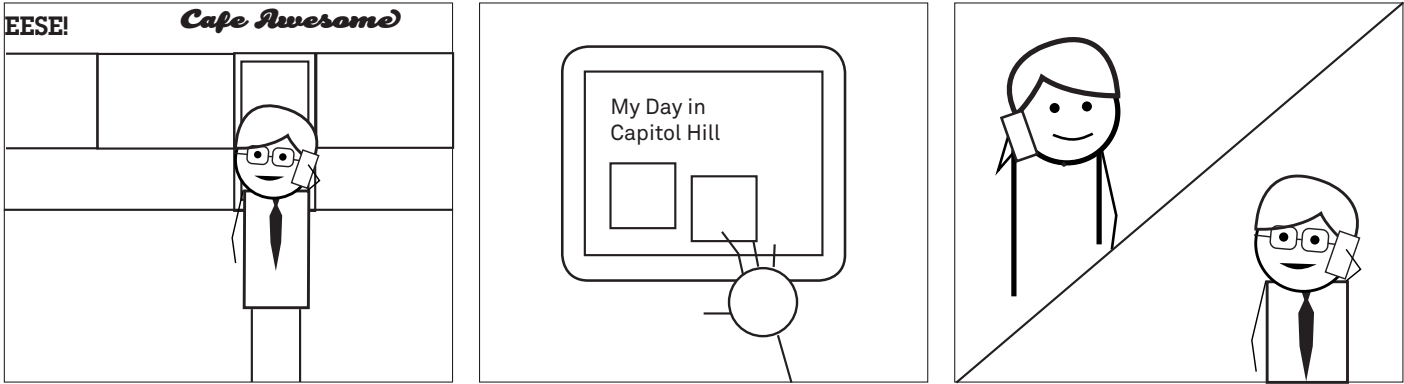
- PRIMARY NEED

SECONDARY NEED

BOUNDARIES
- Experience Sharing

Emotional Support, Knowledge Sharing

Parent/Child Privacy



Korak's going to his favorite coffee place in Ann Arbor. He snaps a photo of his donut, cappuccino, and the local guitarist.

At home, he takes the photos he's taken and the story of the guitarist that he talked to and stitches together a “story” to share with his son.

His son Neil sees the story on Storyshare and calls Korak back to hear about the great donuts and coffee from Top Pot.

# Charmer

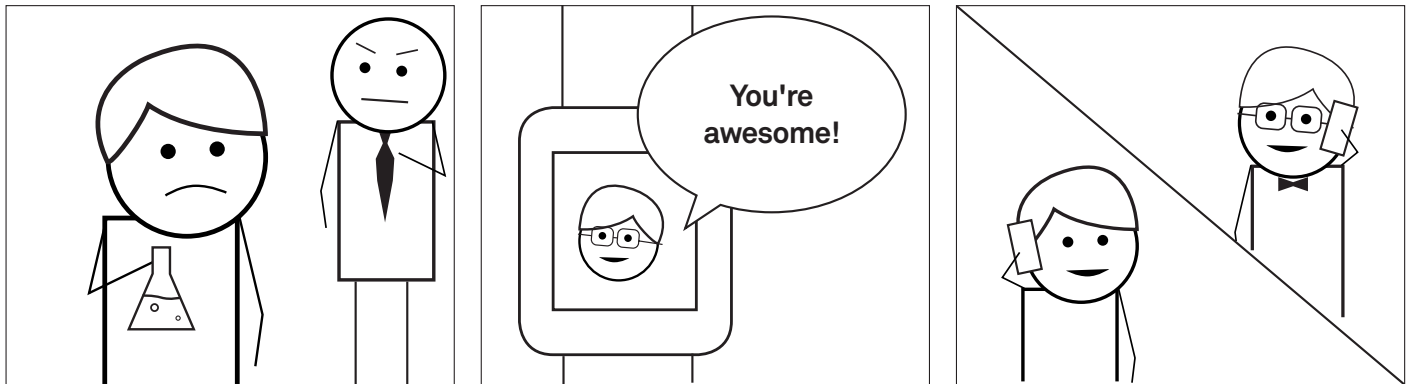
- PRIMARY NEED

SECONDARY NEEDS

BOUNDARIES
- Emotional Support

Supporting Family Communication

Parent/Child Privacy, Unfamiliar Tech



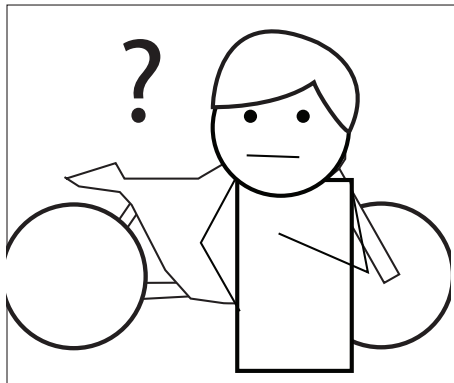
Neil's just left a lab meeting. He's a month behind on his initial thesis proposal, and his advisor's really mad at him.

His Charmer senses his mood and sends a pre-recorded message from his dad, Korak, about how proud he is that he's pushing new scientific boundaries.

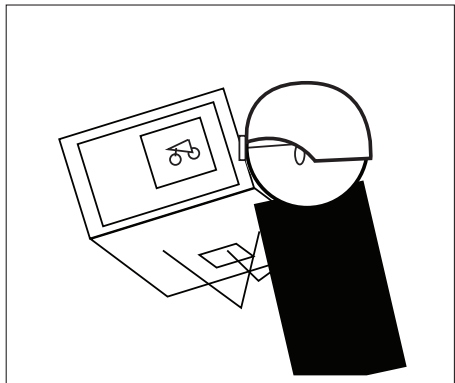
Neil's feeling a lot better with his dad's support. Later, he calls her dad and thanks him for the kind words that he left on his Charmer.

# Sherpa

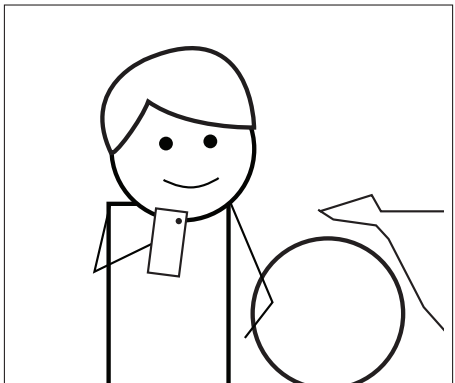
**PRIMARY NEED** Knowledge Sharing  
**SECONDARY NEED** Decision-Making Support  
**BOUNDARIES** Parent/Child Privacy



Neil needs some advice on his new motorcycle project. He posts a photo and a question about the engine block on Sherpa.



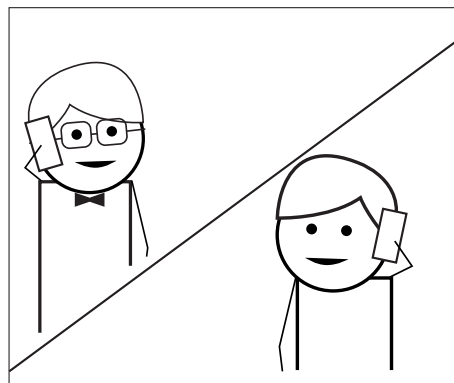
Later, Korak checks Sherpa and notices that Neil's got a question. Since he's a car nut and a mechanical engineering by training, he answers the question.



Neil fixes up his motorcycle and responds with "Thanks, Dad!"

# Enhanced Phone Call

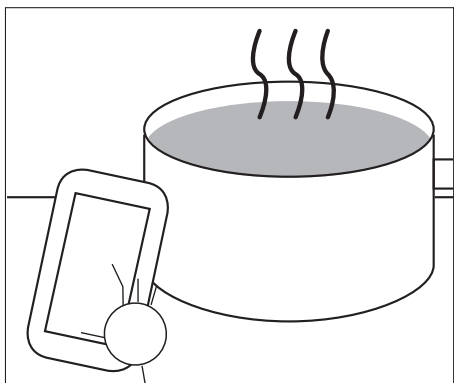
**PRIMARY NEED** Experience Sharing, Rich Voice  
**SECONDARY NEEDS** Supporting Family Communication  
**BOUNDARIES** Parent/Child Privacy, Unfamiliar Tech



Neil and his dad, Korak are doing their usual Sunday night call



Neil's talking about the awesome coffee shop that he found in Capitol Hill yesterday. Korak looks down and sees the photos that Neil took on his phone yesterday as they're talking.



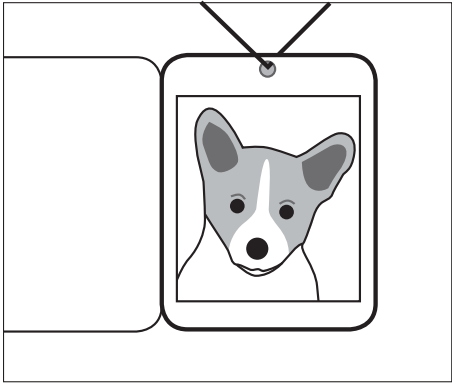
Near the end of the phone call, Korak shows Neil that he's working on a new stew for the family. Neil's impressed that his dad's actually cooking for once!

# Locket

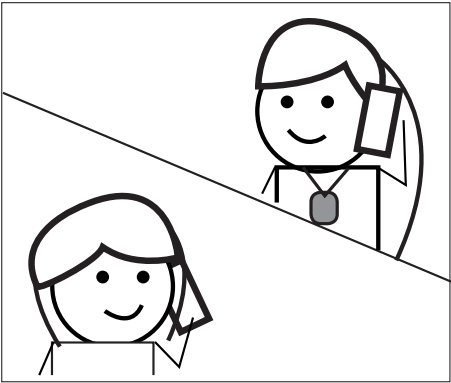
PRIMARY NEED	Presence, Emotional Support
SECONDARY NEEDS	Supporting Family Communication
BOUNDARIES	Parent/Child Privacy, Unfamiliar Tech



Miranda's feeling a little down today. She's got a big job interview and she's nervous.



Miranda fiddles with her locket and opens it. She's surprised and happy to see that her mom, Alice has sent a cute image of her dog, Thor, to the locket.

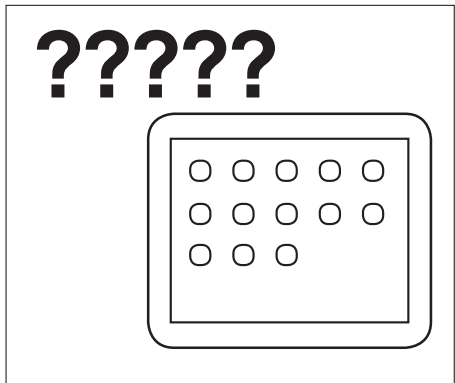


In her weekly phone call, Miranda asks how Thor's doing. Offhand, she mentions how she aced the interview because she calmed down because of Thor and Alice.

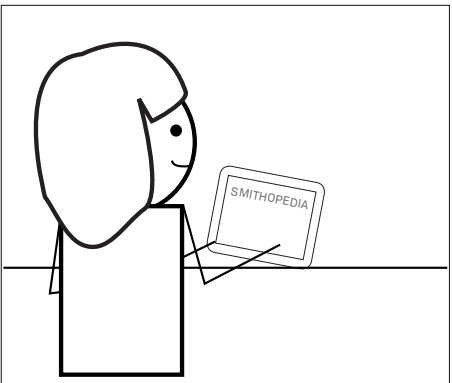
# Smithopedia

Parent Perspective

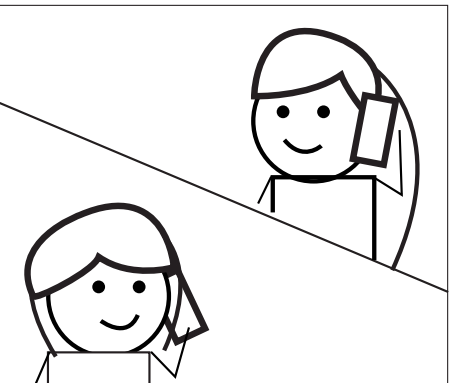
PRIMARY NEED	Knowledge Sharing
SECONDARY NEEDS	Decision-Making Support
BOUNDARIES	Unfamiliar Technology



Alice Smith is having a little trouble installing a new app that she's heard about from her friend on her iPad.



She checks out the family's personal "Smithopedia." Lo and behold, there's that short tutorial that her daughter Miranda wrote a year ago about installing apps on the iPad.



Later, Alice and Miranda talk on the phone. Miranda's happy that Alice seems to love her iPad, and she can't wait to send her another app she might like.

# Faminder

Emerging Adult Perspective

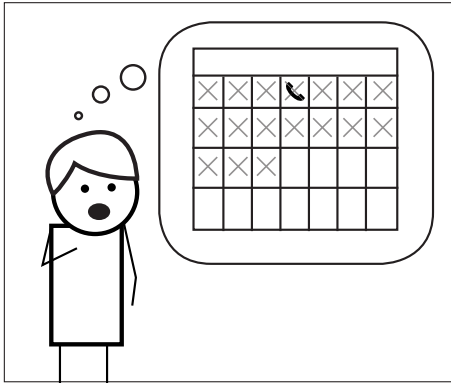
- PRIMARY NEED

SECONDARY NEEDS

BOUNDARIES
- Supporting Family Communication

Experience & Knowledge Sharing

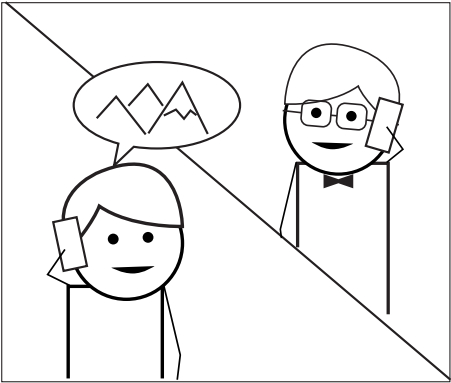
Annoyance



Neil's been so excited with all of the new things he's discovered that he hasn't talked to his dad for two weeks!



Faminder reminds him that he hasn't talked to his dad in a while. It also displays all of the things he's done on his smartphone and Facebook since his last call.



Neil and his dad have a great conversation via Skype about his hike on Blake Island.

# Crystal Ball

Parent Perspective

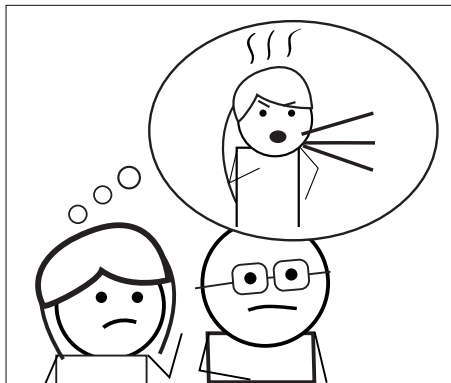
- PRIMARY NEED

SECONDARY NEED

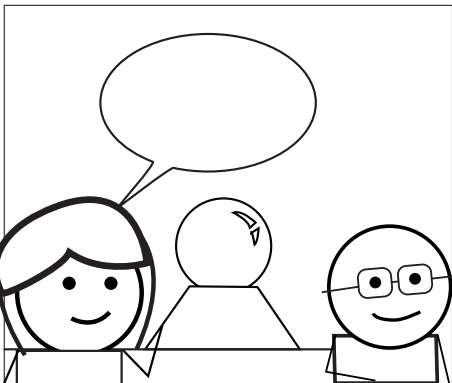
BOUNDARIES
- Emotional Support

Knowledge Sharing

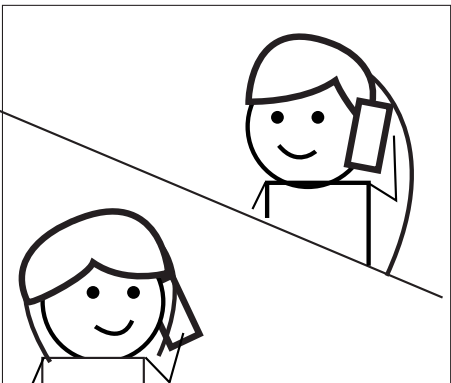
Parent/Child Roles



Alice, and her husband Tom like their daughter Miranda's new boyfriend Albert. But they know that they sometimes have huge fights that Miranda doesn't like to talk about.



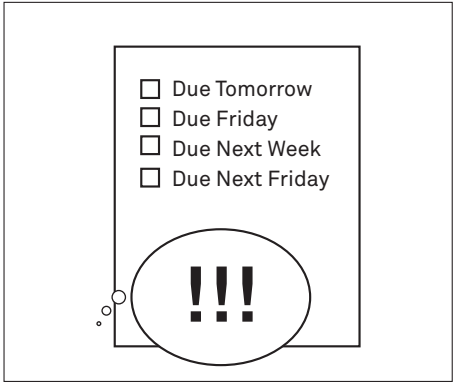
So they decide to use the Crystal Ball to record a couple of encouraging messages that Miranda can access on her own time.



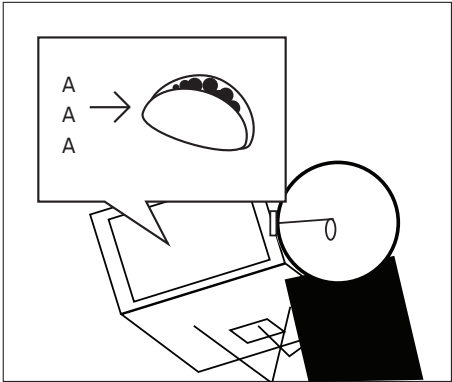
Later, Miranda tells Alice over the phone that she really loved that message that the two of them recorded on the Crystal Ball.

# Cheerleader

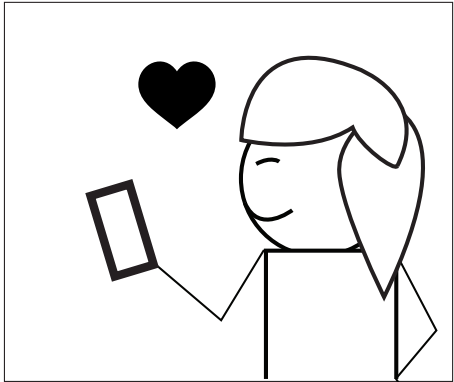
**PRIMARY NEED** Emotional Support  
**SECONDARY NEED** Decision-Making Support  
**BOUNDARIES** Privacy



Natalie's falling a little behind in school, so she sets a goal on Cheerleader to get straight A's next semester.



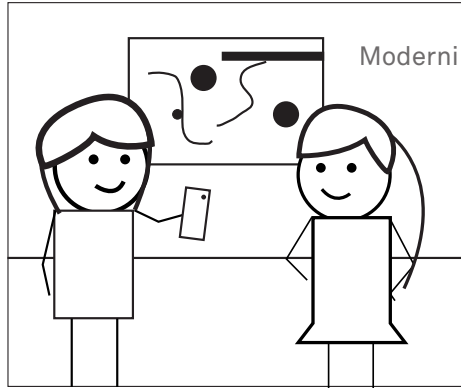
Fernando sees this in an email, so he decides to watch the goal. He adds an incentive — that he'll cook up Natalie's favorite carnitas tacos — and takes a photo of himself with a thumbs up.



Natalie's heartened to see that her dad cares. Also, she's ready for some homemade tacos!

# Virtual Family Room

**PRIMARY NEED** Experience Sharing  
**SECONDARY NEEDS** Knowledge Sharing, Emotional Support  
**BOUNDARIES** Unfamiliar Technology, Parent/Child Privacy, Overall Privacy



Miranda's mom Alice is in town to visit! The two go to their favorite restaurants, shops, and art galleries in the city, and they take pictures of everything.



After going back to Massachusetts, Alice goes online to the Virtual Family Room and uploads all of her photos from the trip to the album.



Miranda helps sort through and star her favorites, annotating them with little quips and comments about her new shopping finds.

