

PROJECT DOCUMENTATION

THE GIGABIT CONNECTION

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Graduate Studio 2

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PROJECT OVERVIEW

The 2006 Microsoft Design Expo set forth as its theme **THE GIGABIT CONNECTION**—opportunities and issues in a high bandwidth ubiquitous computing world. As we move from a low bandwidth world to a truly pervasive broadband world, our experience with media will change dramatically. But what will ubiquitous access to high bandwidth really enable? What opportunities will it afford, and how will they benefit society? How will social interactions be affected? Are there potential downsides that need to be considered? The Design Expo challenged us to explore a specific scenario concerning the future of computing in light of pervasive high bandwidth, identify opportunities, foresee implications, and design for meaningful experiences.

adapted from the Graduate Studio 2 syllabus,

Professor Shelley Evenson

PROCESS OVERVIEW

Our design solution was developed over the course of sixteen weeks, in five distinct project phases:

DEFINITION

Frame the project in terms of context, audience, and technologies, and define a shared project direction.

EXPLORATORY RESEARCH

Conduct immersive field research to learn about the target audience, identify a specific opportunity space, examine the competitive landscape, and develop a guiding set of design implications.

GENERATIVE RESEARCH

Use participatory design methods, personas, and scenarios to shape the nature of the product interaction and determine a concept direction.

REFINEMENT

Revise and evaluate the product experience and interaction through iterative prototyping and testing.

REFLECTION & COMMUNICATION

Continue to refine product interaction and market positioning while creating supporting materials.

THE DESIGN TEAM

Team members were drawn from multiple disciplines, providing for a wide range of points of view and areas of expertise.

Jason Chalecki
Human-Computer Interaction

Susan Dybbs
Interaction Design

Rebecca Hume
Communication Planning & Information Design

Min Kyung Lee
Interaction Design

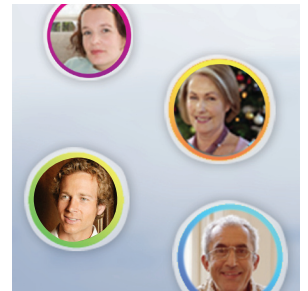
K.C. Oh
Human-Computer Interaction



SOLUTION OVERVIEW

aura is an emotive network for families. This integrated service and application system brings family members a continuous sense of awareness and inclusion in one another's daily lives, whether they are living in the same household or hundreds of miles apart. The system also provides a collective space to create, share, and store memories in the form of photos, videos, drawings, voice messages, and text.

Combining the instant data-transfer promise of ubiquitous high bandwidth with the sensing capability of regular cell phones, aura affords a feeling of connectedness that is both powerful and non-invasive. And because the application requires minimal attention and runs on multiple platforms—PC, cell phone, or a dedicated in-home display—aura fits seamlessly into the busy ebb and flow of family life.



DEFINITION

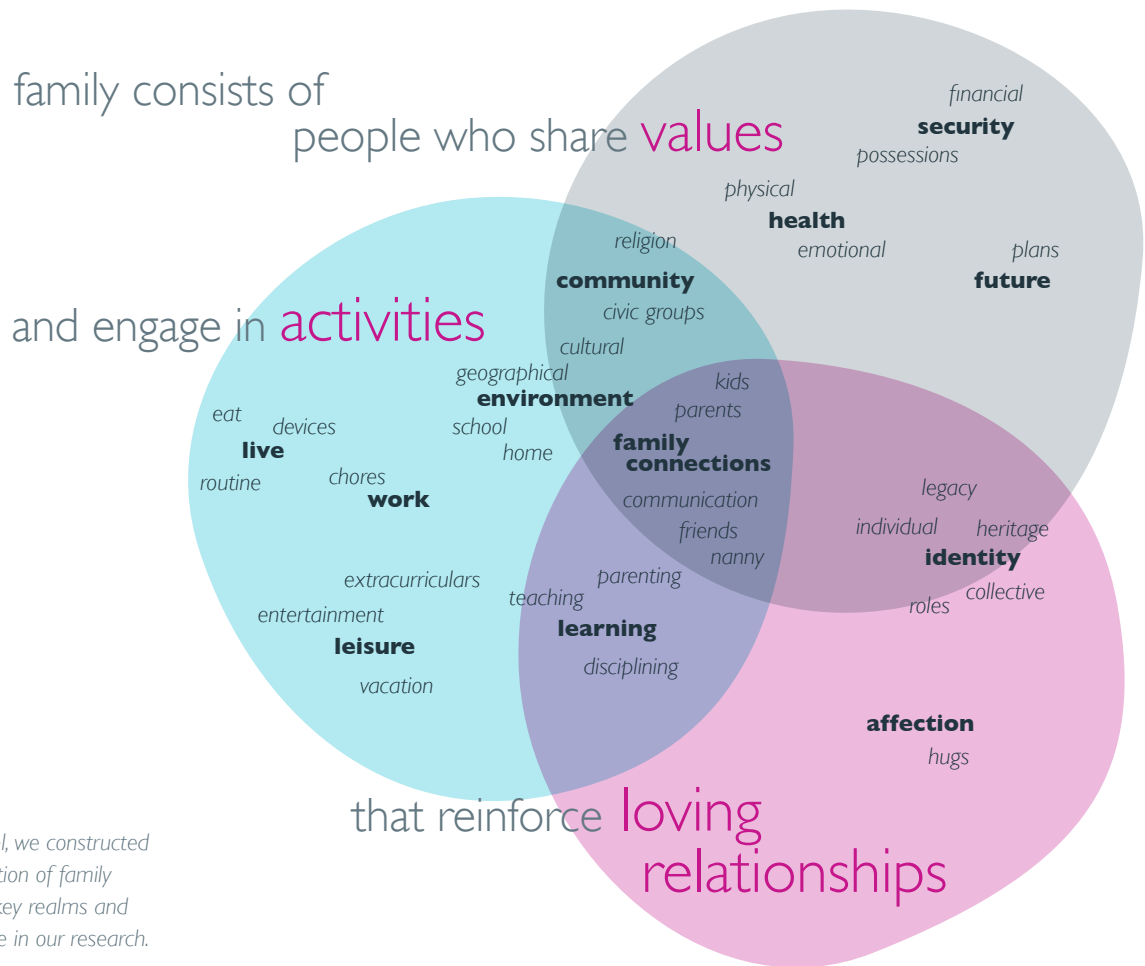
PROJECT DIRECTION

From even our earliest group discussions, it became clear that all team members were interested in looking at families and family life. In setting our project direction, we sought to discover:

How can high bandwidth and pervasive computing enhance family connections?



TERRITORY MAP



With this model, we constructed a shared definition of family and identified key realms and ideas to explore in our research.

EXPLORATORY RESEARCH

TARGET AUDIENCE

Our research explorations involved members of 21 families. We sought to include a wide range of family structures and phases—from new parents to grandparents—as well as analogous situations such as groups of single people living together as roommates.

RESEARCH METHODS

We made use of a variety of methods to discover what family members say, make, and do:

Observation

Families and their activities were observed in a number of contexts: grocery store, shopping mall, restaurant, and children’s museum.

Touchstone Tour

Participants guided us through important areas and artifacts in their home or daily routine.

Directed Storytelling

A series of questions was used to prompt discussion about what people think and feel about their families.

Literature Review

We learned about current research and products related to families and family communication.



top to bottom: touchstone tour artifacts, the Pittsburgh Children’s Museum, whiteboard notes for an affinity diagram

FAMILIES SPEAK

*“We played with Noah’s train set...
we helped him build the tracks.”*

*“One of my cousins just had a baby, so
everyone gathered to see her...”*

*“My father and his brothers all owned
Kosher butcher shops in Pittsburgh...”*

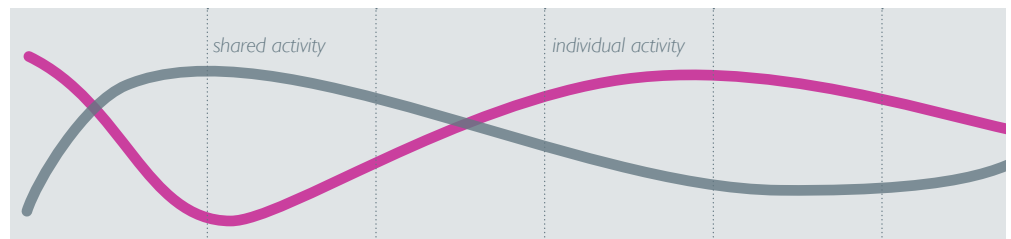
*“Today I talked with my older
son...every Sunday he calls.”*

*“We drop her off at daycare together and
then he continues to walk me to work.”*

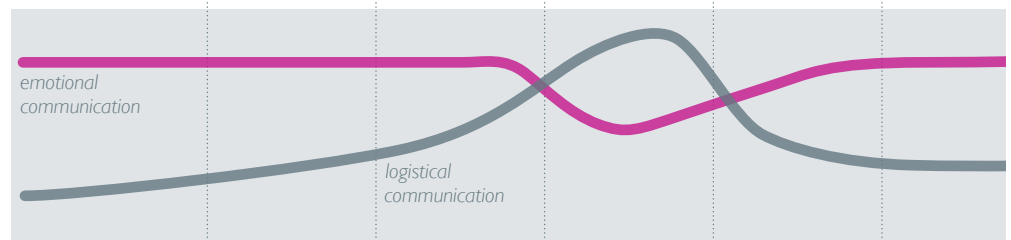
Every family we encountered was unique, and each family member had a story to tell. Gradually, though, we began to perceive themes and issues that carried throughout.

FAMILY PHASES

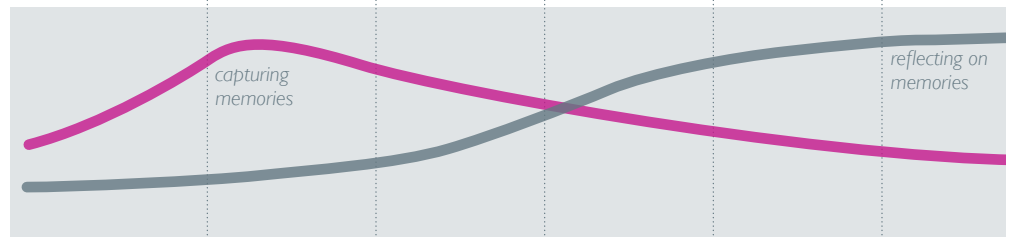
individual vs. shared activity



emotional vs. logistical communication



family photos & mementos



We found that family life could be divided into phases marked by distinct patterns of connection. Three major themes pervaded all phases of the family life cycle.



FINDINGS & IMPLICATIONS

Our research pointed toward three basic phases of family life: families with babies or school-age children, those with teens or young adult children who have moved out, and elders who are often parents of children with families of their own. Each phase displayed unique patterns of connection and communication, but three major themes seemed to span all stages of the family life cycle:

Individual vs. Shared Activity, Emotional vs. Logistical Communication, and Family Photos & Mementos.

Based on these findings, we set a project vision:

Our solution will use non-verbal communication to allow family members to express real-time emotion and create enduring memories.

This statement touched on all the major themes we observed, including the need in all phases of family life to balance personal and together time, the desire for more emotive communication, and the important role of family traditions and memories.

Within this overarching vision, we identified three key goals that our solution should achieve:

- *provide for enhanced expression and awareness of emotions and activities of individual family members*
- *add emotive and memory-based dimension to the home and surrounding environment*
- *create a platform for fun shared activity, even across distance*

GENERATIVE RESEARCH

RESEARCH METHODS

Through a series of participatory activities, we brought families into the design process, uncovering ideas about what enhanced family connections should look, feel, and be like.

Camera & Diary Study

Family members documented and reflected routine interactions, providing us with insights into current communication attitudes and practices.

Multi-sensory Collage

Using a range of evocative materials, family members constructed collages of their current and ideal family connections. These allowed us to discover how the senses might be engaged in emotive communication.

Card Matching

Product images were matched with emotion word cards, revealing what emotive qualities are attached to current product forms and features.

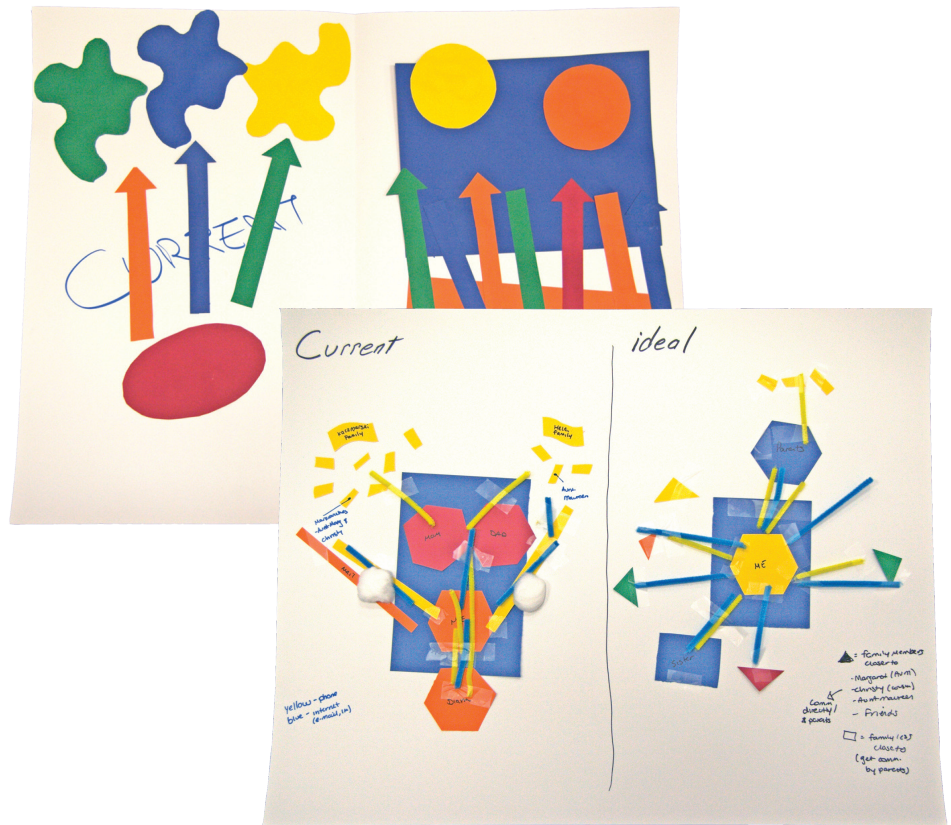


top to bottom: photo from the camera study, a family member creating a multi-sensory collage, card matching activity

MULTI-SENSORY COLLAGES



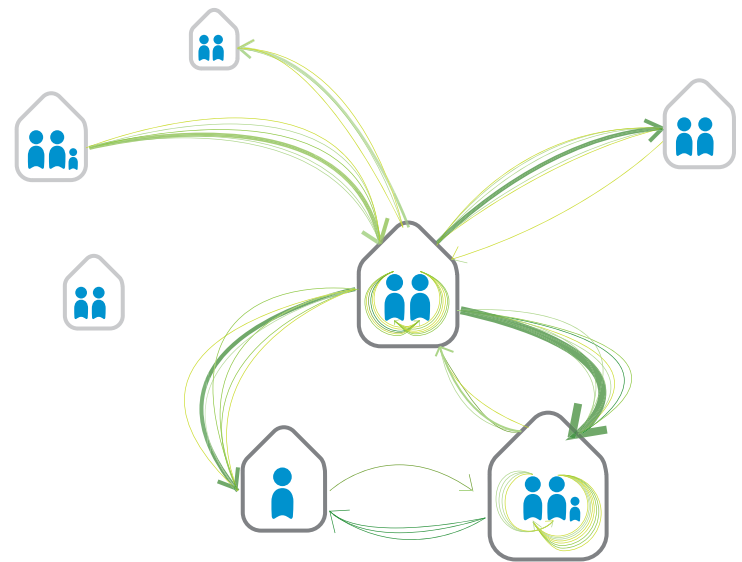
Collages using non-traditional materials helped give us an idea what the sensory experience of enhanced family connections might be like.



FINDINGS & IMPLICATIONS

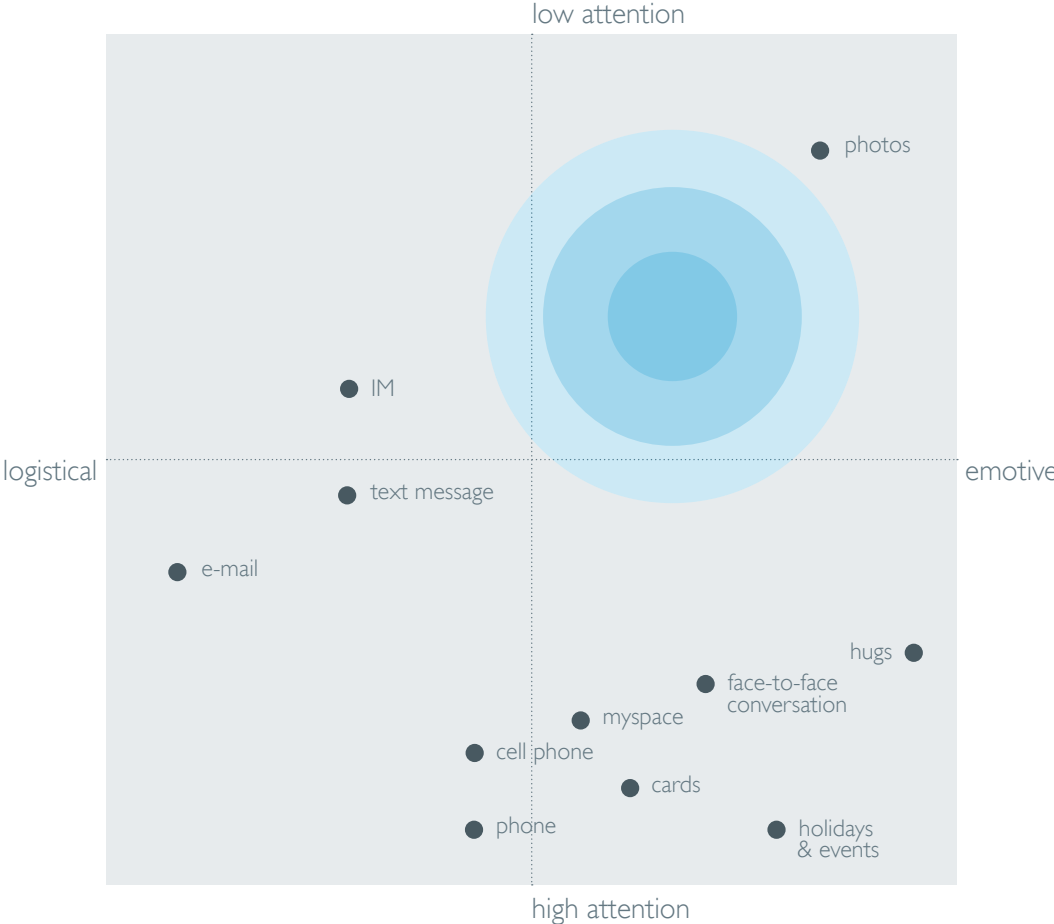
Significant insights from this research phase included:

- Photos, objects, and mementos were key points of connection to family, and lent a strong sense of emotional resonance to home and work environments.
- Individuals made a number of special efforts to keep in contact with family members and wished to know more about their activities and wellbeing.
- In many families, not all members were equally “in the loop,” and the burden of initiating and maintaining connections was not as evenly distributed as they might wish.
- Within families and even for individuals, different modes of communication were used (phone, IM, face-to-face) depending on the type of message, message content, and relationship with the receiver.
- Most current modes of communication either do not allow for sufficient emotive quality or require more attention than family members are regularly able to devote.



Families want to stay connected and make use of many different modes of one-on-one communication. However, current communication often relies on a central “hub” person to initiate connections or distribute information.

ATTENTION & EMOTION

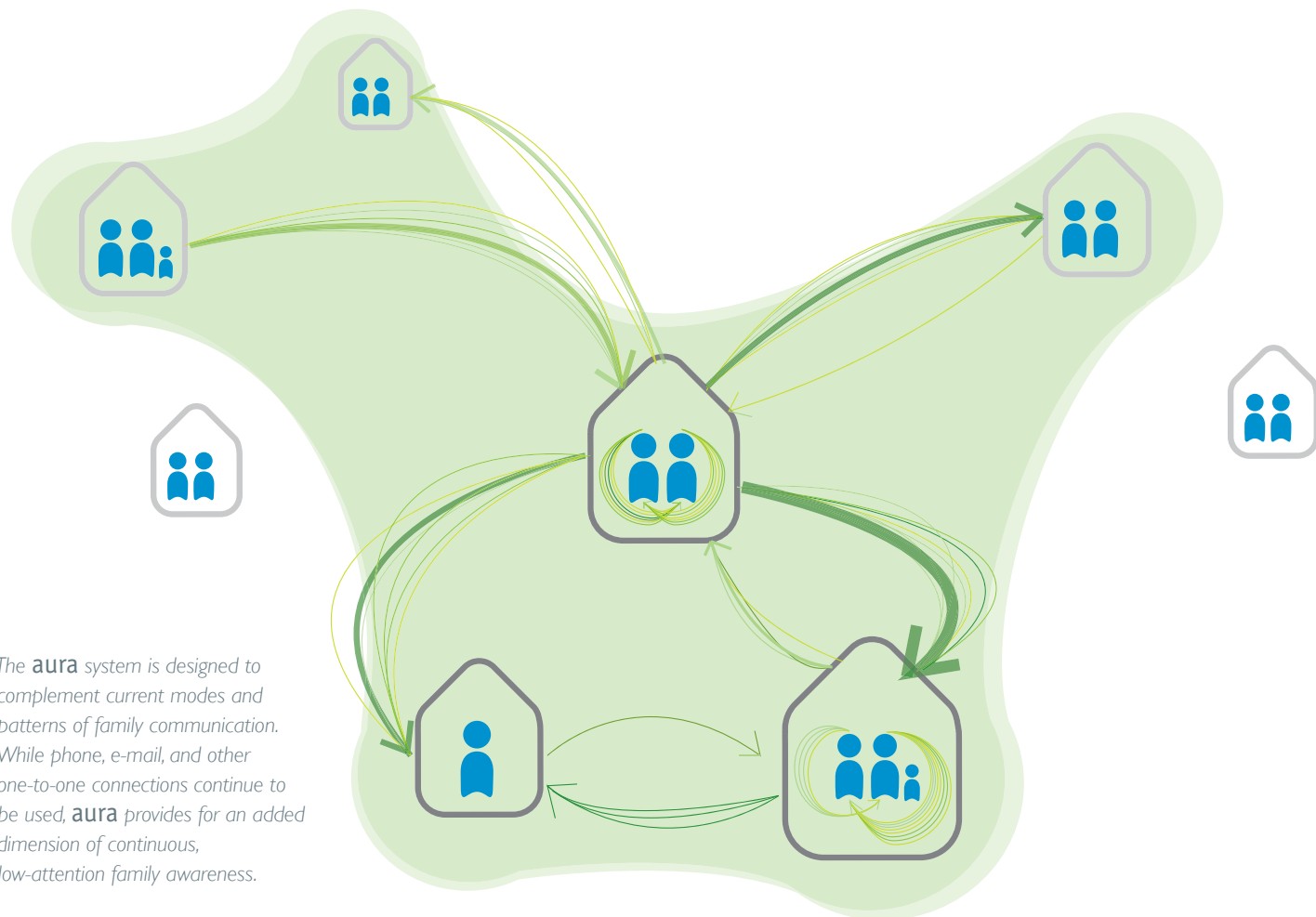


Our design solution is positioned to enable highly emotive family connections—like the feeling of reminiscing over cherished photos—without requiring a great deal of effort or attention.

CONCEPT

Based on our research findings, our solution was to create an emotive network for families. This network pairs a service with a software application, allowing for a sense of connectedness through constant background awareness of family activity levels. Additionally, it provides extensive media exchange and storage capabilities so families can actively share memories and engage in collective creative interaction.



CONNECTION MODEL

REFINEMENT

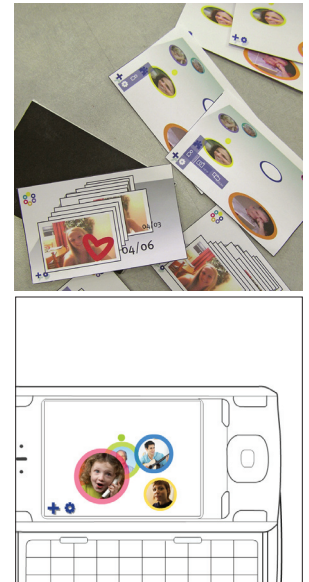
PROTOTYPING METHODS

After exploring different means of gathering awareness information as well as several possible ways for representing this data, we constructed two testable prototypes. The first consisted of a series of paper screens, which were used to gauge ease of navigation and emotional resonance of the visual metaphor. Because motion was to be an important communicative element, a digital demo was also created. This second prototype simulated the kind of movement we were envisioning, and tests of this version allowed us to gauge whether the motions were readable and meaningful.

FINDINGS & IMPLICATIONS

The following findings guided subsequent refinements:

- Family member detail space was easy to navigate.
- Settings and profile management were associated with personal detail space.
- Recognizable cues were required for navigation icons.
- Dynamic model was required to understand display.
- Display's subtleties were understood only if they were pronounced and specific.



top to bottom: paper prototype, screen shot from the dynamic digital prototype

THE AURA SYSTEM

SYSTEM FEATURES

As an emotive network for families, *aura* combines three dimensions to fulfill family connection needs. These correspond to the design goals created during the course of our research.

Low-Attention Activity Awareness

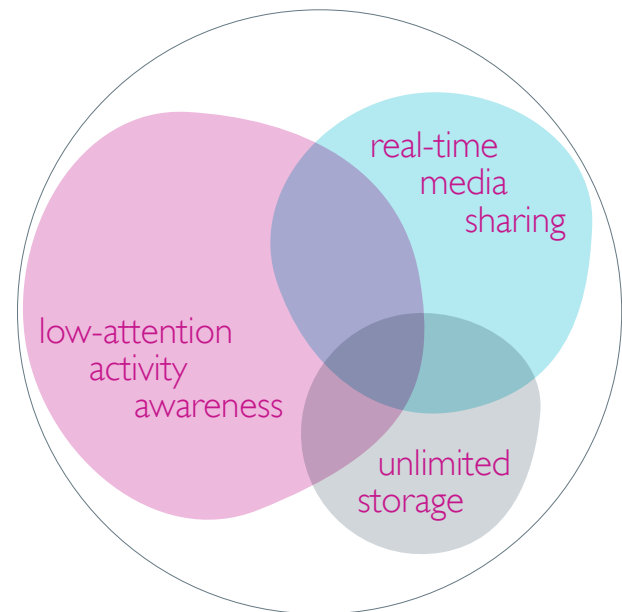
aura provides for enhanced awareness of individual family members through a continuous, low-attention display. Customizable elements such as backgrounds, display colors, and profile photos allow for rich, emotional expression.

Real-time Media Sharing

Photos, video, voice, drawing, and text can all be exchanged instantaneously through *aura*, letting family members participate in memory-making as it happens. These options can also be used to comment or add to existing media content, providing a platform for fun shared activity, even across distance.

Unlimited Storage

Capitalizing on the gigabit connection, the *aura* system offers unlimited media storage, allowing family members to access and relive memories anytime, in any environment.

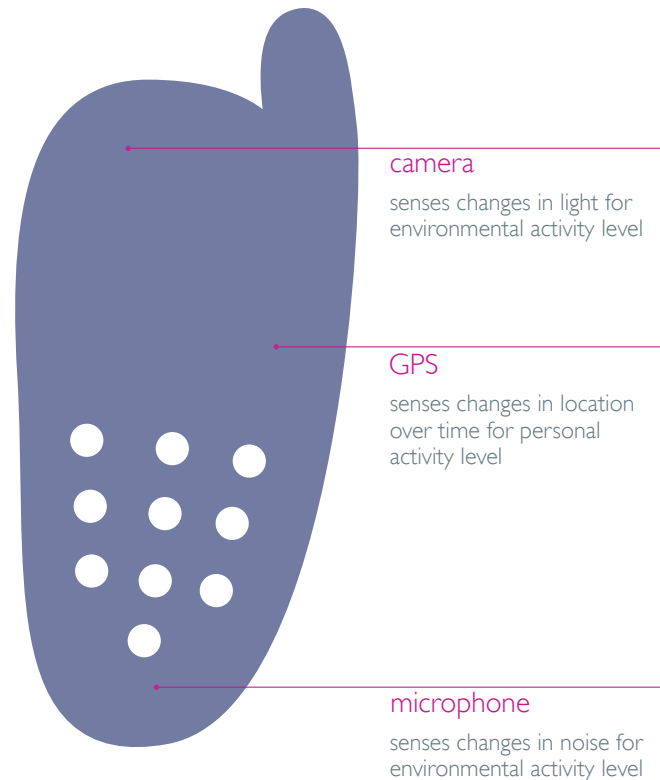


*Three primary features of the **aura** system work together to create enhanced family connections.*

SENSING AWARENESS

The core benefit of the *aura* system is the sense of connection it fosters by providing family members with a general sense of each other's activity levels. Collection of this data had to be as non-intrusive as its display. Utilizing sensors already included in modern cell phones, the system is able to continuously sample family members' environmental activity (noise and light change, via microphone and camera) as well as personal activity level (rate of motion, via GPS).

In dealing with awareness, it was important that activity levels shown not be traceable to specific tasks, such as working or sleeping. For each individual, the data gathered is dynamically averaged over the course of the past hour so it remains accurate yet somewhat abstracted. It is these past-hour averages that determine the current motion on the activity display.



*Cell phones are already equipped to gather all the data necessary for the **aura** awareness display.*

THE AURA DISPLAY

COMMUNICATING AWARENESS

Devising an emotive visual metaphor was a key element in developing *aura*. The display that evolved shows family members moving across the screen in individual portals. Clicking on a portal opens up a full history of all media content added by that family member. Profile and network settings are accessed by clicking on one's own portal. With this basic framework in place, we developed detailed interaction guidelines to ensure rich emotive connections.

Visual Language

The look was carefully honed to feel like family: unique and familiar, fun and reassuring, all at once.

Motion Language

We developed portal movement patterns that corresponded intuitively with personal and environmental activity levels.

Transitions

Navigating the different areas became like moving through space, not just clicking to a new screen.

Multiple Platforms

The *aura* experience was designed to be consistent across mobile, stationary, and dedicated platforms.

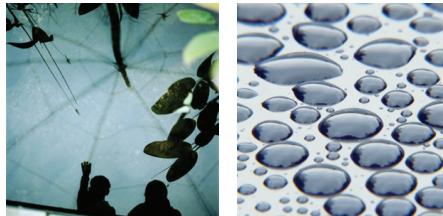


sketches showing possible ideas for alternate visual metaphors.

VISUAL LANGUAGE

Designing an appropriate visual language was a key element for enabling emotive communication. The mood developed for the **aura** application was soothing yet fun, with clear and approachable icons and customizable colors for the portal display.

reflective



friendly/cheerful



main color



accent



customizable



logo & icons: subtle/approachable/imperfect



MOTION LANGUAGE

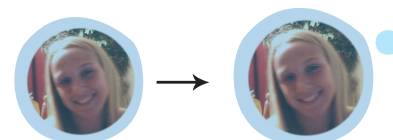
In order to convey awareness information in a way that was both meaningful and emotive, it was necessary to develop a motion language governing the way in which the portals move across the **aura** display screen.

identity Each individual chooses his or her own photo to be displayed in the portal.

color Each individual assigns portal colors for all the family members appearing on his or her display.

new content

When new media is added, a satellite indicator appears in orbit around the portal.

**environmental activeness**

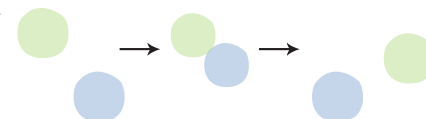
Opacity, color saturation, and portal pulse rate fluctuate with the activity of the surrounding environment.

color*pulse***personal activeness**

The speed of the portal changes based on personal activity.

speed**communication patterns**

The frequency of bumping among portals varies based on the communication patterns between individuals.

bumping

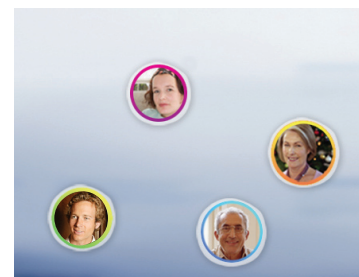
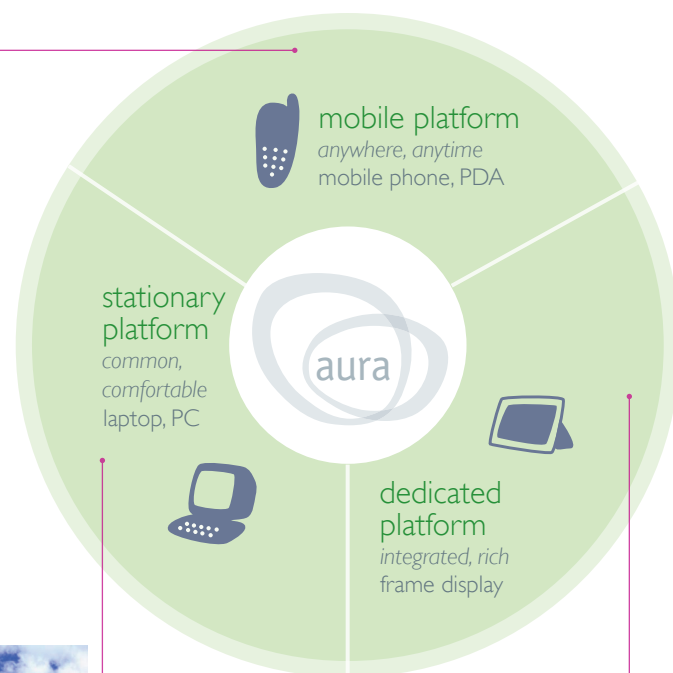
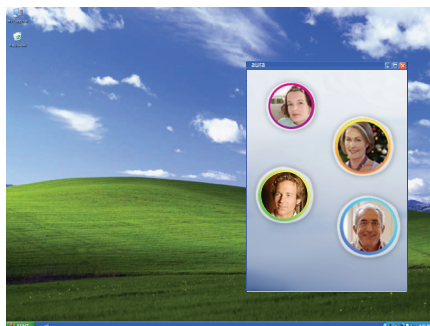
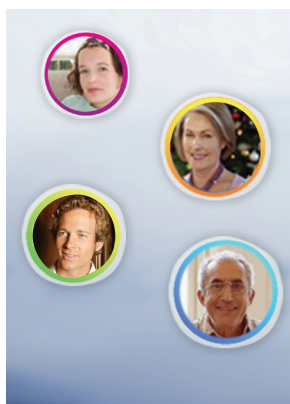
SCREEN TRANSITIONS



We wanted **aura** to feel like a shared family space, not a standard software application. Designing the transitions between screens became an important way to do this. Moving from the awareness display to individual media content, the effect is one of entering that person's portal. When the corner outside the portal is clicked, the view zooms back out to the main display.

MULTIPLE PLATFORMS

As a cross-platform application, **aura** is available anytime, anyplace. Mobile platforms let families feel connected on the go, while stationary and dedicated frame devices help add emotive dimension to the home and work environments. The look and feel of **aura** is similar across all platforms, making for a consistent experience.



AURA IN USE

PERSONAS

Drawing heavily from our research findings, we developed a family of personas to enact a scenario of use for **aura**. The scenario illustrates six basic ways in which the system allows each family member to achieve his or her individualized family connection needs and goals:

Enabling Shared Awareness

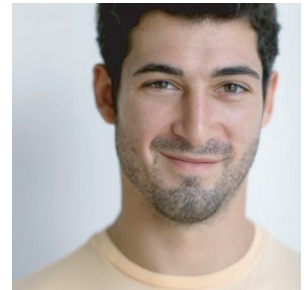
Integrating with Existing Communication Modes

Allowing Simple Set-up & Configuration

Encouraging Spontaneous Sharing

Enabling the Reliving of Memories

Providing for Fun, Creative Collaboration



PERSONA: AMY ROLLINS

31

Cleveland, Ohio

Nonprofit Strategist

Married to Michael Rollins for 4 years; they have a 2-year-old daughter, Samantha

A mother, a wife, a daughter, a sister, and a career woman, Amy is always on the go. She loves spending time with her daughter and watching how quickly she learns and grows.

Making a positive impact through her job is important to Amy, but she sometimes feels guilty about bringing work home as much as she does.

Amy strives to keep her family up to date on each of Samantha's accomplishments. She hopes that, in spite of the distance, her daughter will grow up feeling close to her uncle and grandparents.

PERSONA: JULIA BJORNSTAD

63

Rockland, Maine

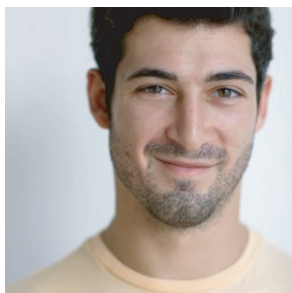
Retired Nurse

Married to Robert Bjornstad for 37 years; their children, Amy and Ryan, are both grown.

Julia feels a deep-rooted sense of commitment to her family and community. History and tradition are very important to her.

Despite being retired, she remains physically and intellectually active. She enjoys hiking and canoeing with her husband and is also writing a book on local history.

Julia wishes she were more involved in her children's everyday lives and looks forward to holiday gatherings throughout the year.

PERSONA: RYAN BJORNSTAD

29

Silver Lake (L.A.), California

Production Assistant

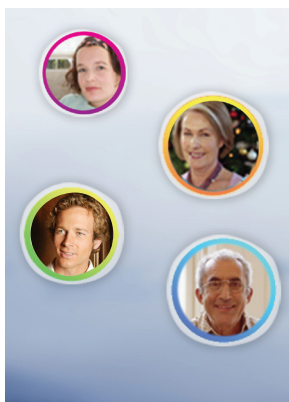
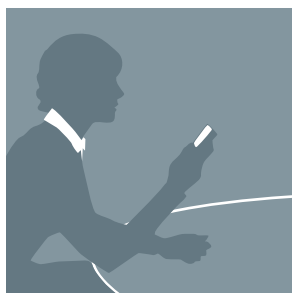
Single

Ryan is passionate about moviemaking. After graduating with a film major from UCLA, he stayed out West to pursue a career in Hollywood.

Having worked his way up on independent films, Ryan is finally getting his big opportunity to do a film for a major studio.

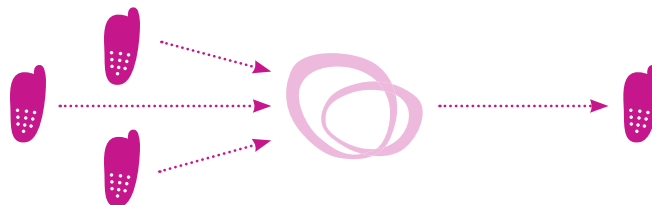
Ryan depends on the love and support of his family but just doesn't have time to connect with them on a regular basis.

ENABLING SHARED AWARENESS: ACTIVITY AWARENESS

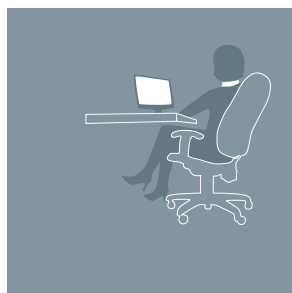


*It's Monday morning and Amy rushes off to work. In the few moments before her meeting begins, she checks the time on her phone then glances at her **aura** display. The rest of the family is already on the go today as well, she sees.*

*The mobile devices of all networked family members constantly sample and send data to the **aura** system. This data is then displayed on each device running the application.*

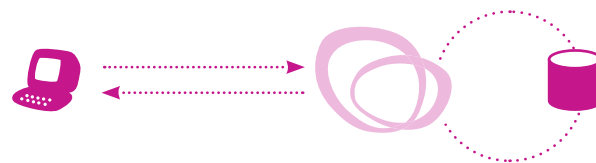


ENABLING SHARED AWARENESS: MEDIA CONTENT

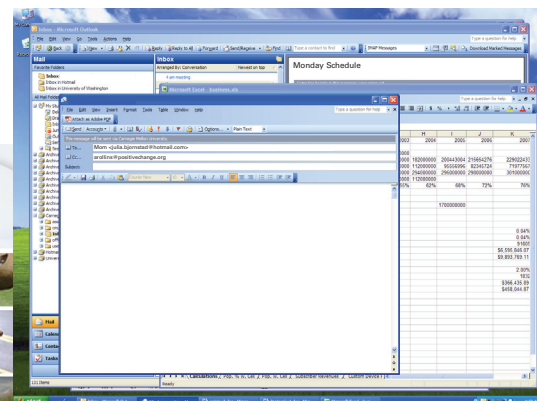


Amy keeps a window with her **aura** display open on the background of her desktop to stay up to date on her family's activity. Between work tasks, Amy notices a satellite indicating that her mom has updated her media content. She clicks on Julia's portal to see what has been added.

As Amy clicks on the portal, the computer sends a request to the **aura** system to display the content. The content, stored in the system's database, is then relayed to the computer and shown.



INTEGRATING WITH EXISTING COMMUNICATION MODES



Thinking about her mom, Amy decides to send her a quick e-mail. Clicking the e-mail icon in the **aura** menu bar, Amy is taken directly to a composition window in her Outlook account with Julia's address already filled in.

Because **aura** is integrated seamlessly with other Microsoft applications, a single mouseclick takes individuals from one program to another.

SIMPLE SET-UP & CONFIGURATION: SENDING AN INVITATION

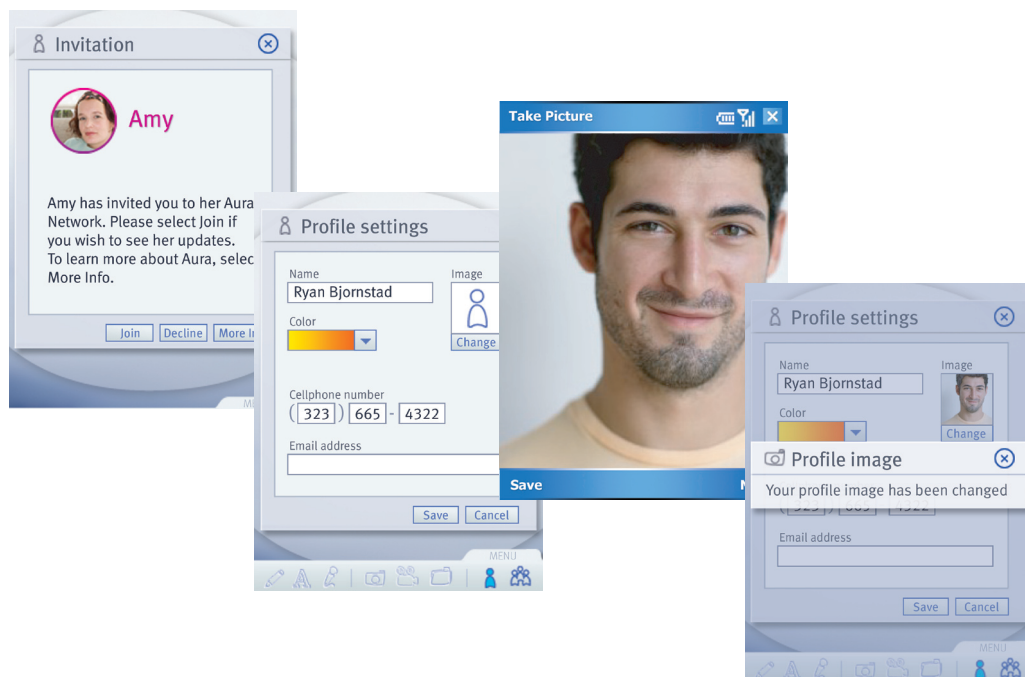
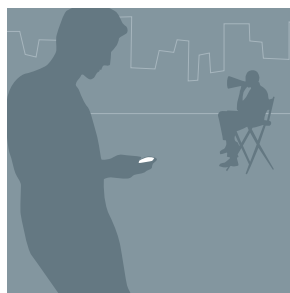


Reminded by her mom, Amy decides to invite her brother, Ryan to her **aura** network. She clicks on the network icon within her own portal, chooses to add a contact, fills in Ryan's phone number and confirms to send.

Upon receiving Amy's request, the system checks the information she's provided to determine whether the person is already a member of the network. Ryan does not yet belong, so depending on what contact Amy has entered, he receives an e-mail or text message inviting him to join.



SIMPLE SET-UP & CONFIGURATION: ACCEPTING AN INVITATION

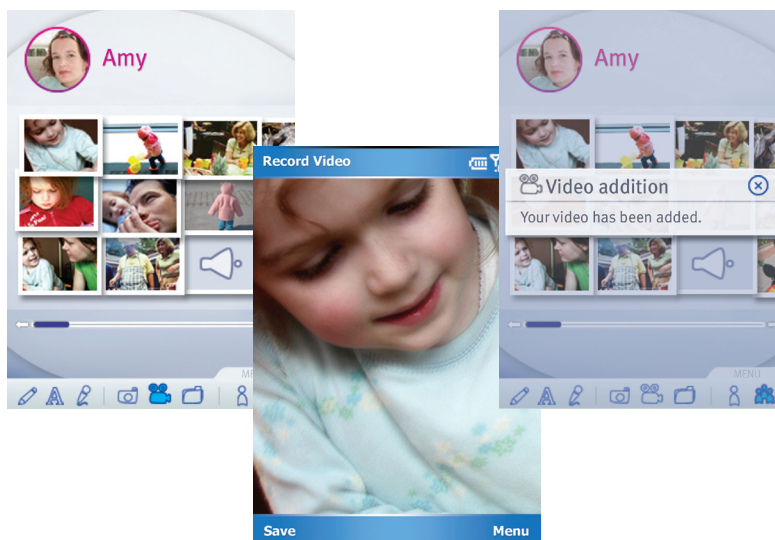
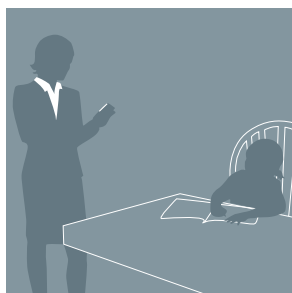


Ryan is on the set checking his text messages when he receives Amy's invitation. Thinking it can't hurt to become a free member, he accepts, enters the remaining profile information required, and takes a picture of himself to appear in his portal.

The system receives Ryan's acceptance and records his profile information and preferences. His portal will now appear on Amy's display, and Amy's on his. He will be able to view her media content but add only text as a free member.

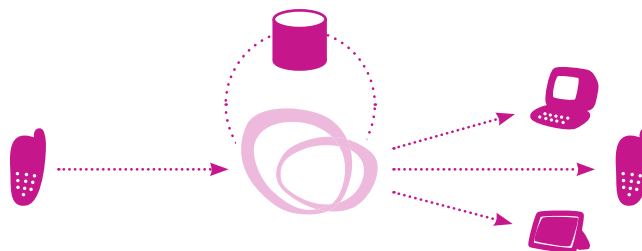


ENCOURAGING SPONTANEOUS SHARING

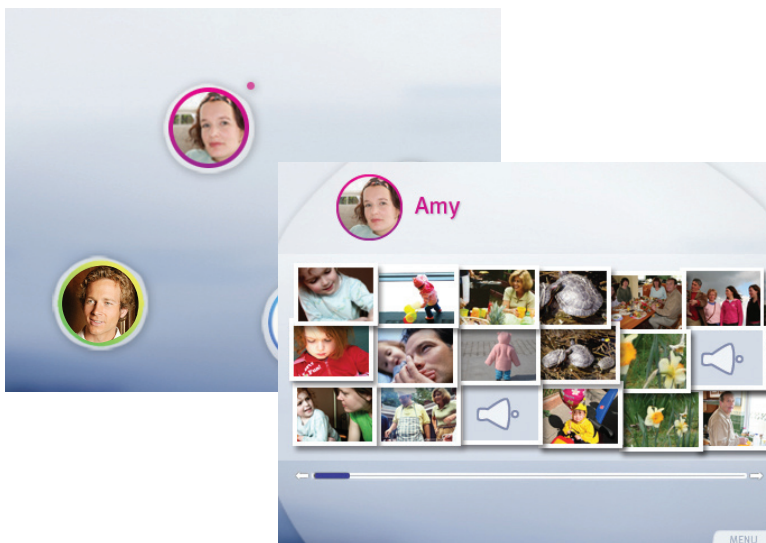


Now that Ryan has joined **aura**, Amy decides to give the filmmaker of the family a glimpse of “normal life” by posting a video of her daughter. Within her own portal, she chooses the video icon, shoots some footage, and confirms that she would like to share it with her network.

Amy's video is automatically stored in the **aura** database. When she confirms that she would like to share it, a satellite appears around her portal on the displays of all the family members in her network, and the new media content is made available to them.

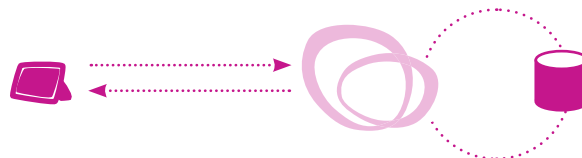


ENABLING THE RELIVING OF MEMORIES

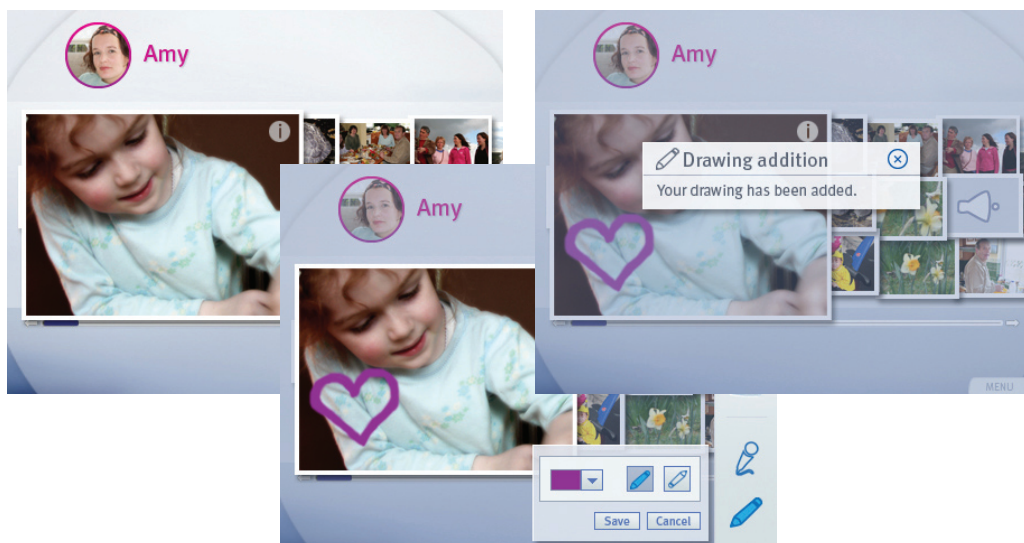
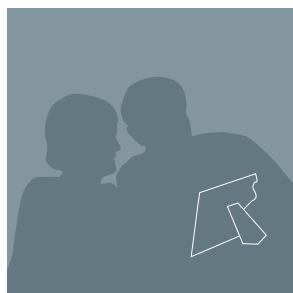


After dinner, Julia and Bob often sit down with their **aura** frame to reminisce over old photos and check to see if any new ones have been updated. They notice that Amy has added something and decide to take a look.

As Julia touches a portal on screen, a request to display media content is sent to the **aura** database. The full shared content history for that family member is then made visible for her to browse at leisure.

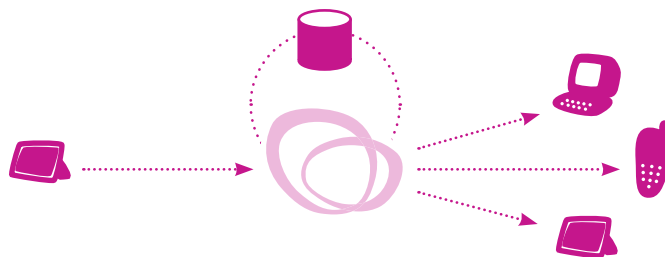


PROVIDING FOR FUN, CREATIVE COLLABORATION



Seeing the adorable video of Samantha, Julia decides to add a response of her own, conveying just how much she loves her granddaughter. Selecting the drawing tool from the menu, she chooses a favorite color, draws a heart on the screen, and shares the feeling with the whole network.

Julia's modification is saved on the network. A satellite will appear on the other family displays, and any member clicking on the original video will be able to view Julia's heartfelt addition as well.



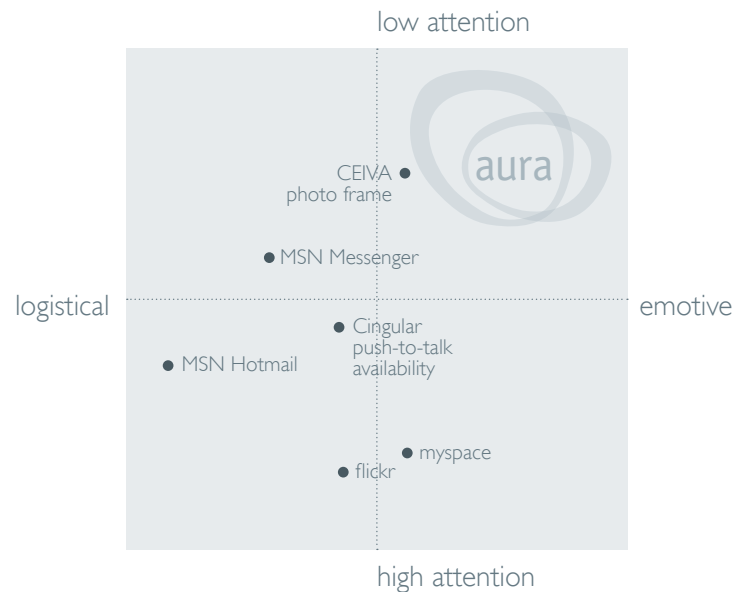
BUSINESS POSITIONING

A MARKET FOR EMOTION

Many of the communication and photo-sharing services available today are targeted toward families, indicating that there is a significant market for such services. However, none of these currently focuses on the low-level, emotive connections we found that families desire. By making connections simple and emotive, **aura** stands out among competitors, and is therefore well poised for broad-based adoption.

INTRODUCTION STRATEGY

In order to gain initial exposure, a free version of the **aura** application will be bundled with Microsoft Windows and Windows Mobile operating systems. The software will also be downloadable from the Internet to computers and phones. Because the value of the service is based on entire families belonging rather than individuals, the number of **aura** members will quickly expand beyond those who first received the free version.



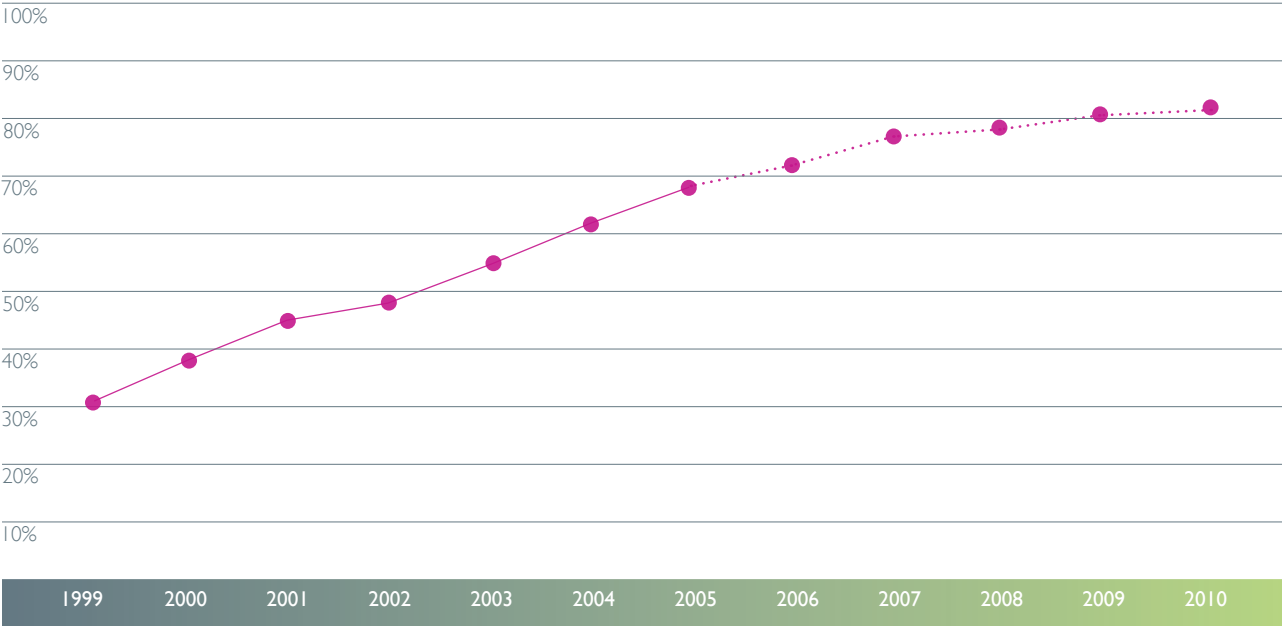
*The **aura** system is uniquely positioned among existing photo-sharing and communication services for families.*

MARKET SIZE

Projections based on data from the U.S. Census Bureau indicate that cell phones are still on the rise. By the year 2010, over 80 percent of Americans will own and use a cell phone. Taking into account population growth projections, the national market for *aura* in that year will

be roughly 250 million people. Because the network uses standard cell phone sensors to gather awareness data and runs on a mobile platform as well as stationary ones, *aura* is ideally positioned to capitalize on this growth trend.

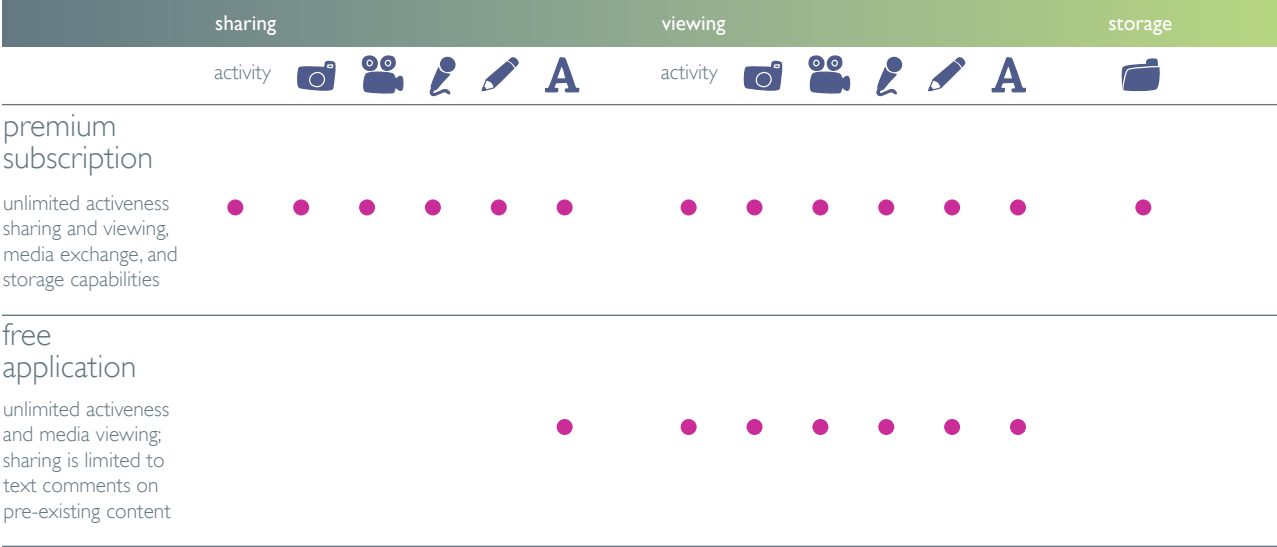
percentage of U.S. population with a cell phone



SUBSCRIPTION SERVICE

The primary revenue stream for aura derives from subscriptions to the service, which may be purchased individually or in family packages. Membership in the network is based on a two-tiered structure: a premium version with full viewing, media sharing, and unlimited storage capabilities, and a free version that is available

for download and is prepackaged with certain Microsoft products. The free version is intended to provide connection with family members who may not be able to subscribe, as well as to encourage premium subscription once free members see how the system can enhance family connections.

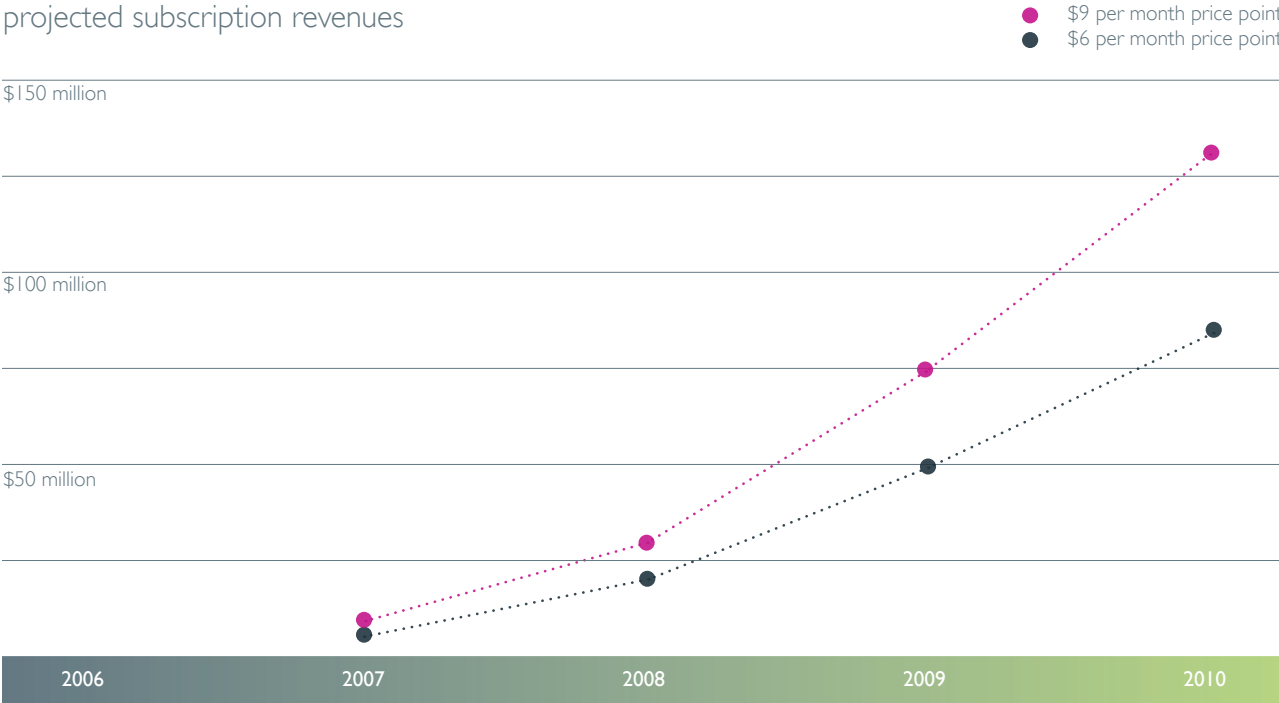


SUBSCRIPTION REVENUES

Based on a conservative estimate of adoption growing by 0.04 percent each year, **aura** will have more than one million subscribers by the year 2010. Competitive subscription prices are estimated to fall between \$6 and \$9 per person per month—about the amount that an

individual might pay for a premium option on a standard cell phone plan. At the \$6 price point, revenues in the year 2010 would total \$86.2 million. At \$9 per person per month, this would rise to \$129.3 million.

projected subscription revenues

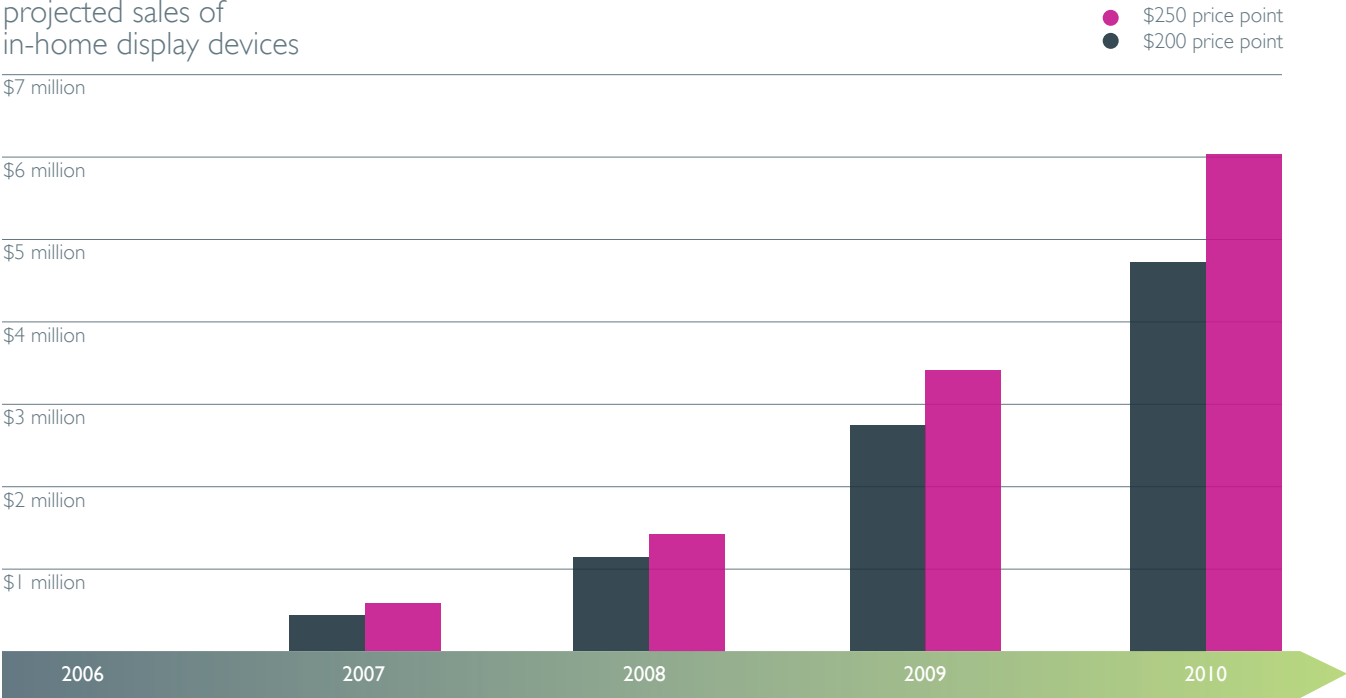


DEVICE REVENUES

In addition to the major revenue stream created by subscriptions, purchases of *aura* in-home frame displays also contribute to the bottom line. These devices integrate seamlessly in the home or work environment, adding emotive dimension to spaces where a computer or mobile platform may not be appropriate. These devices are also

designed to appeal to individuals who may not own a computer. Based on pricing for existing digital photo frames and services, these would cost between \$200 and \$250 each, resulting in revenues totaling between \$4.7 million and \$5.9 million in the year 2010.

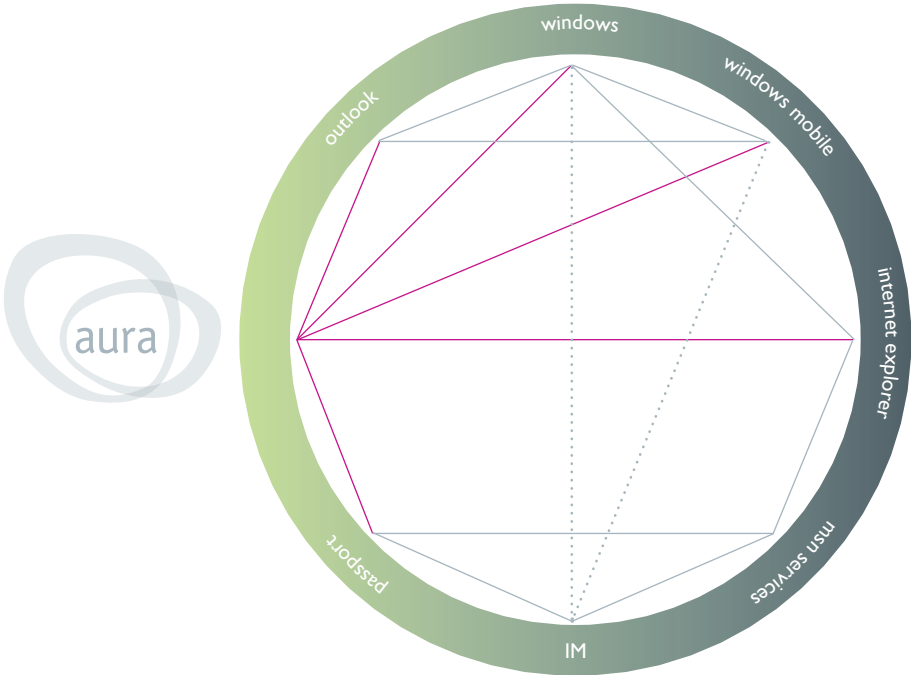
projected sales of
in-home display devices



WHY MICROSOFT

aura was designed to integrate seamlessly into Microsoft's existing suite of products and services. Running on Windows and Windows Mobile platforms, a click of a button takes subscribers directly to their Outlook e-mail.

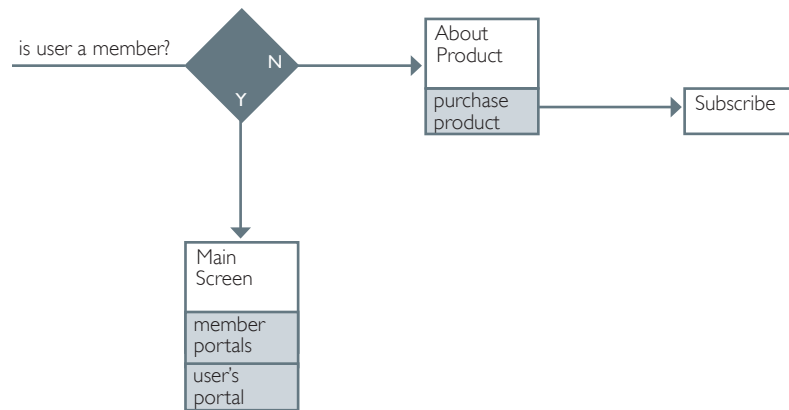
In addition, research shows there is a growing market for family connectivity products. aura will allow Microsoft to reach beyond business applications and into family life.



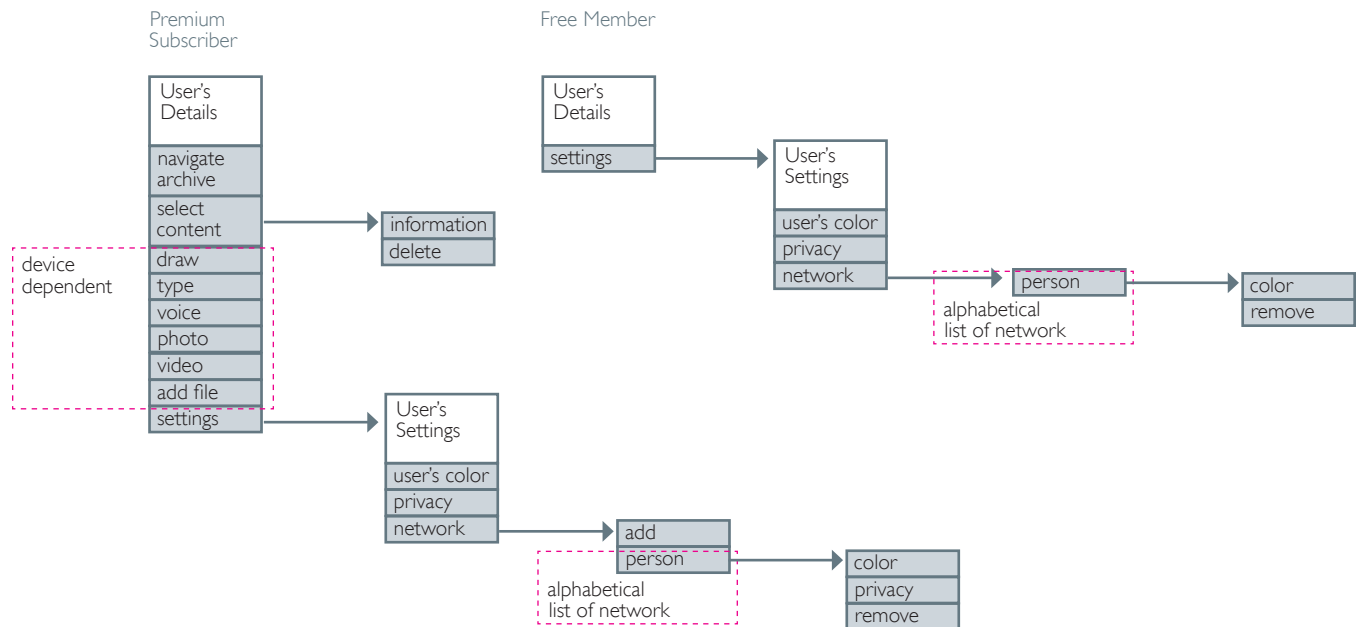
aura works in harmony with Microsoft operating systems, services, and products.

APPENDIX A: FLOW DIAGRAMS

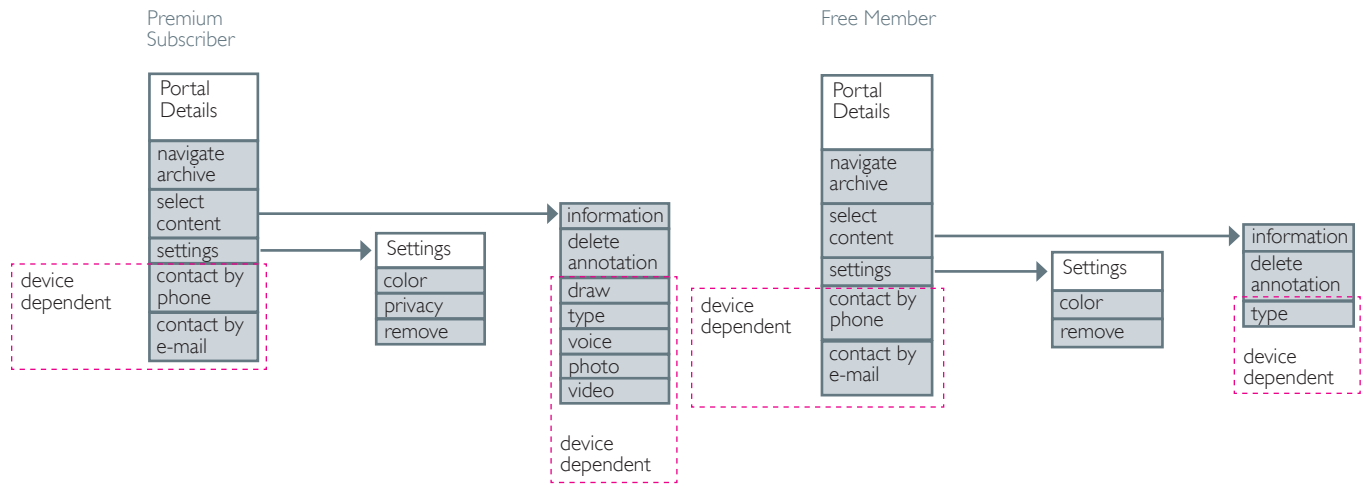
OPENING THE APPLICATION

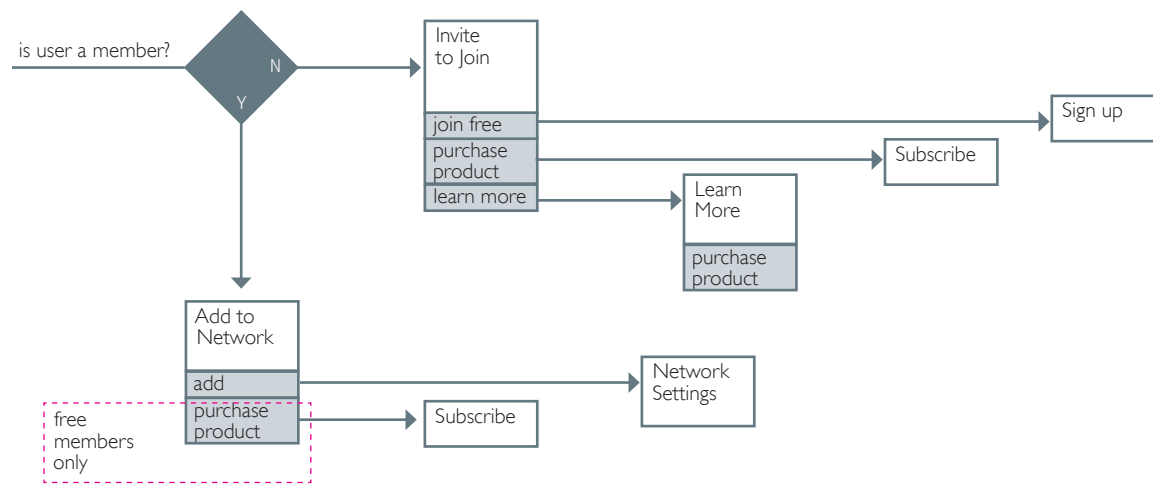


NAVIGATING THE USER'S OWN PORTAL



NAVIGATING OTHER MEMBERS' PORTALS



RECEIVING AN INVITATION TO JOIN A NETWORK

APPENDIX B: OUR FAMILY

THE REAL GIGABIT CONNECTION



clockwise from top left: Min and K.C. working hard; Min taking out some aggression on Jason; K.C. having an idea; Min and Susan laughing blurrily; Jason and Rebecca taking a beverage break

