



LIVING PROFILES PROJECT HEALTHDESIGN

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User Center-Design—Design Phase Report
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Statement of User Needs

Assessment Phase Design Challenge

“I do everything I hate to take care of myself, but sometimes I just don’t want to think of that aspect in my life.” —Julia, 17-year-old diagnosed with Lupus

User Needs

As teens with chronic health problems transition from pediatric care to adult medicine, they face a number of challenges that can impact their physical and emotional health.

For example, some parents are unable to fully transfer routines of care to their children, leaving an information gap for teens on taking medication, making medical appointments, etc. As well, teenagers face internal conflict between taking the medical steps necessary to protect themselves and their aspirations to live a “normal life” that is not overshadowed by their disease.

Our Preliminary Findings

Our preliminary findings show that teens with chronic conditions are highly responsible—more than we expected—yet they still rely on their parents particularly for key aspects of healthcare. For example, Julia is pretty independent when it comes to taking her own pills and drinking water; she even drives herself to her own doctor’s appointments. However, when it comes to tracking future appointments...

“When they [office] make my next appointment, they give me a little card and my dad takes it... I always give my dad the appointment card so he knows when they are—he puts them in the calendar in his office. He keeps track of the actual date and reminds me when I have a clinic appointment.” —Julia

When asked the question: “If you could bring something, one thing with you to make you feel better about managing your health when you move away from home, what would that thing be,” teens’ answers surprised us.

“My mom. ... I guess, like, it’s not really a thing, it’s a person. Just a caring friend, not a family member, but a friend who cares.” —Julia

On the other hand some teens do not like to be nagged – they have their own reminder systems.

“...I put a memo in my phone... Type it into my phone, have a reminder and it rings when I need to do something... Putting it in is enough, because when it rings I just ignore it, you know?” —Cate

“I got like one of those old lady Monday-through-Friday things, so I keep them all through that. So like it’s kind of like a daily reminder for me to make sure I take it.”
—Jill

And some teens simply leave it to others.

“My mom—she has it set up... because I will usually forget, my mom will have it set up when I come down for breakfast my pills will be right there...” —Micah

We also identified a need to engage teens on a broader scale than just their health as a way to support a sound transition. When asked how the definition of “health” is different from the term “wellness” we got this answer:

“Health is about your physical body, your blood work, and things that you can tell from a CT scan. And then wellness is your mind and body... how you’re feeling on the inside, your emotions, your spirit, your soul, and if you have well-being in your mind and soul then you can manage your stress and be happier—be productive... You have wellness not just in your body but in your mind as well.” —Jill

Teens often find it difficult to integrate concepts of health into their lives.

“No, because the more I talk about it [health], the more I start thinking about my own health issues, and the more I think about my own health issues, I get upset about it. Because sometimes I swear I’ve got a 70-year old woman’s body. I swear it.” —Cate

When asked “what age do you think a person should begin to think about their own health?” teens answered:

“When they get into like their senior years, when they’re like old and they really have to worry about it.”

—Jackson

“Maybe in their thirties or something.”—Micah

Teen interaction and experience with LIVING PROFILES

We’re discovering many gaps in the teen experience around promoting a healthy lifestyle. Many of these gaps present opportunity for design intervention. The following examples show how we map gaps with opportunities.

Major factors that make teen transition difficult	Design challenges and opportunities
A lack of understanding about their own disease and personal health history	Balancing the desire to live a “normal life” and owning one’s condition
Little or no knowledge of family health history or no obvious way to make sense of it.	Means of data collection and recording that is relevant for teens
A dependency on a parent who may be overprotective or not share all relevant information	Teens would like to take a friend or parent with them when they move out of the family house
Isolation: Few or no teen support groups who share same health condition	Sharing and openness between friends is an important social behavior, even if it goes against traditional definitions of privacy
A desire to live a “normal” life, that precludes informing others about their health conditions	Teens need to be aware of/given options to text their healthcare providers
The many other interests in teen life that distract from personal health regimen	Many teens like to be reminded by a caring person about taking medication and other daily responsibilities
A lack of personalized tools to help with the transition	Teens have a lot to say about what they’d like to include in their health records
Negative perceptions around the concept of “health” care. “Wellness” and “well-being” hold more positive associations than the term “health”	The concept of health must be integrated into that of wellness, as a way for teens manage their conditions and navigate a healthy life.
Teens are in transition to adulthood: their circumstances and interests are in flux	PWRs must be flexible and easily adaptive. Following trends in emotional and physical moods may play an important role diagnosis and management

Design Solution

Through our research, we're identifying topics and themes that relate to health and well-being, which are helping us to better understand "wellness" and "healthy living" from a teen perspective. We plan to include these insights in our Fall 2007 design brief.

The LIVING PROFILE design brief will outline PWR design opportunities based on user needs, aspirations, and behaviors. It will describe the teen audience and experiences in scenario formats. A design brief provides the criteria for evaluation as well as clear direction of design goals. It is a high-level road map for initiating the design solution.

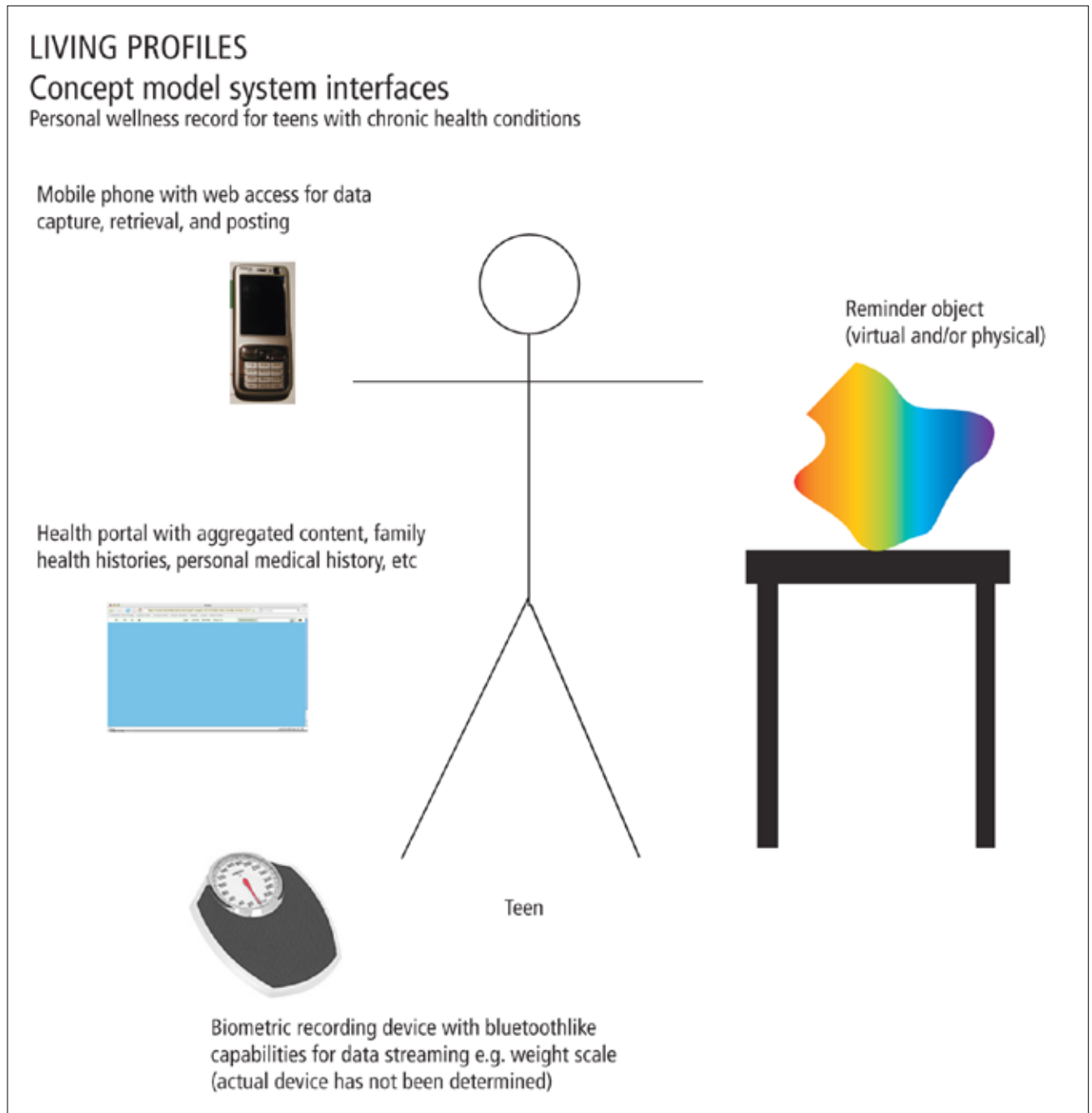
Evaluation of proposed design solution

Criteria for evaluation will be based on user need assessment, feasibility testing, user feedback, and design thinking. With each design, we are asking ourselves, "will it make a positive difference in one teenager's life? If one, then how can we scale it for more?"

LIVING PROFILES

Design Outline

The LIVING PROFILES prototype phase will explore potential entry points into a teen's life that will ultimately engage the teen in his or her own health and well-being. These explorations are based on the preliminary findings from our cultural probes and interviews.



Teen entry points and prototype systems may include the following:

- A wellness portal, System of aggregate content that reflects teen identity, shared health Wiki
- Individual controls to share private information, determined by each teen
- Family health and personal medical history
- Tools for record collection via mobile phone
- Personalization of health records
- Real-time streaming biometrics or data of interest, such as nutritional/calorie intake, Automated data collection
- Reminder objects, Virtual and/or physical emotional objects
- Pain scale and mood meter on mobile device, Visualization of emotional and physical trends

Questions we seek to answer through our prototype testing:

- What is the role of parents in data collection and release?
- What is the role of parent in a teen-specific wellness tool? What are the boundaries between parent and child in this instance?
- What look and feel will best sustain a teen's engagement with LIVING PROFILES?
- What are the ethical issues of teens potentially sharing personal health data with friends?

"Show stoppers" that could prevent us from developing a working prototype:

- Verification technology to support access to private information

Virtual testbed:

- Things we need to do: use the scalable approach of collaborative wikis as a way to build hybrid working / wizard of oz prototypes. This includes utilizing as many PHD core components that support our objectives.
- Things we hope to do with additional support: Build an end to end solution with the tools we list below in these categories
 - 1 Collaborative environment
 - 2 Requirements for the health records system
 - 3 Mobile Device Platform
 - 4 Lifestream Platform requirements
- We can assemble and customize existing open source platforms: Collaborative Wiki examples: twiki, docuwiki, mediawiki. Health records system example: Tolvin system. We would need to develop custom features to allow import export of data and also 3rd party widget structure.

Examples of pre-design research pointing to prototype design

Research probes solicit information and behavior that will inform the development of LIVING PROFILES.

For example, using the MoJournal (an activity that spans 7 days), teens capture photos on a NOKIA N73 cell phone—responding to prompts we have given them. The teens post these photos in a private blog, and then enter descriptive text for each photo.

Through this probe, we're learning a great deal, both from what the teens return to us, and from how they choose to use MoJournal. We have learned, for example, how well the teens understand the instructions and use the phone's interfaces, which will strongly inform our design process. We are also learning about the length of their attention spans, how they collect information and translate it into text, and their level of engagement with the activity over time. Perhaps most importantly, we are also seeing how the teens transform a common device into personalized device, and how they situate their own lives and health within a larger world.



A few behavioral observations:




- Most teens were excited by the phone itself and started their blogs the first day they got the probe packages.
- The teens have trouble staying focused over longer-term activities. Most lost interest or took a day or two off of the MoJournal activity after four days.
- They reuse images that they took previously and assign new meaning to them, using the phone as an image bank as well as a spontaneous capturing tool.

Something red	I do for myself	Keep track of music
<p>"My red ip0d nan0.. My parents bought f0r my bday last yir... I pickd this coz no one has it as far i can c and i pickd it c0z \$10 g0es to aids in africa i wantd to supp0rt n i like red c0z their co0l"</p>	<p>"I listen to music when ever i need to get inspired.. Or to start hw.. I like music a l0t.."</p>	<p>D"0nt use case f0r cd n stuff.. I like music a l0t</p>




- They devoted a specific time slot to the activity. Each day's blogging would begin when the teen got home from school, never before or during school, and they would usually do all the day's posts in a half hour or so.

Information gathered from blog content:



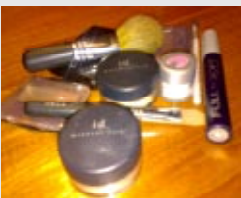

- The most sought after objects are phones and hand-held gaming devices.

Inviting	Something I want	Something I want
		
<p>"Its invitng for me bc0z i like playing with it than d0ing my hw first then hw.. Ds is fun bcoz its ad-dictng to play with n every0ne has it n0w a days."</p>	<p>"I want a sidekick 3. I think that they are so cool."</p>	<p>"I have.... In the past year realized how useful a cell phone can be and its one of those things that i wish i had."</p>

- They hide stuff in messy areas for safekeeping.

		
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- There are a range of things that they do for themselves, for their health and well-being.

I do for myself	I do for myself	I do for myself	Improves my health
			
<p>"Watching tv tv tv.. Usually ppl are like that they watch tv or c0mputer when theyre b0red."</p>	<p>"When im b0red i usually go online n play games so i w0nt get b0red.. I get b0red easily."</p>	<p>"I put makeup on every morning. I never leave the house without it."</p>	<p>"Tahitian hip hop fitness workout improves my health by keeping me fit in shape and it's fun to do."</p>

In interviews, several teens have mentioned using cell phones as reminder devices. Through probes like the MoJournal, we are learning how we could better design amenities within mobile devices to meet wellness needs of teens.

The cell phone, as we know, is central to the lives of many teens. They sleep with it, carry it everywhere, experiment with it, and use it to connect with their entire community: family, work, classmates, friends. It is an ideal technology to leverage around wellness issues; for example, it can be effectively used as a reminder tool. The cell phone is an emotionally-charged technology, just as health and wellness are emotionally

charged issues for the teens. A health related tool on cell phones must therefore go beyond the utilitarian, to have a personal dimension that enables each teen to have flexibility and control as he or she personalizes the device to fit his or her individual needs and personality.

All of this information will assist us in designing a prototype that is both appealing and user-friendly for teens. It is critical to understand teens' attitudes towards, and uses of, technology. Teens see technology as a flashpoint for connection/communication, as a comfort, and as a 24/7 part of their lives. Our knowledge of teens' relationship to technology guides us as we create new tools for wellness, because we can meet the teens where they are and communicate our tools to them in a common language.

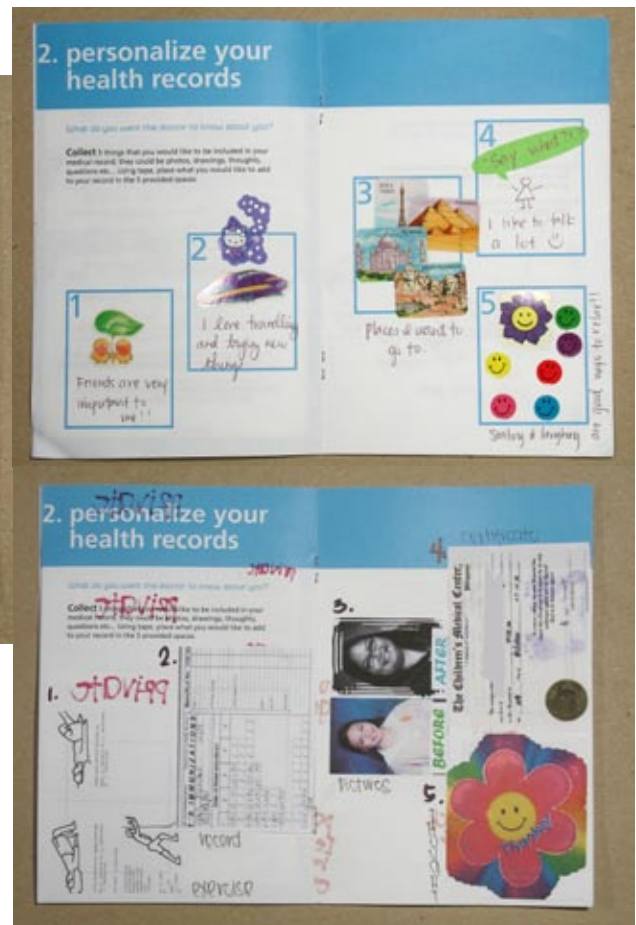
Content Outline

How our approach informs content

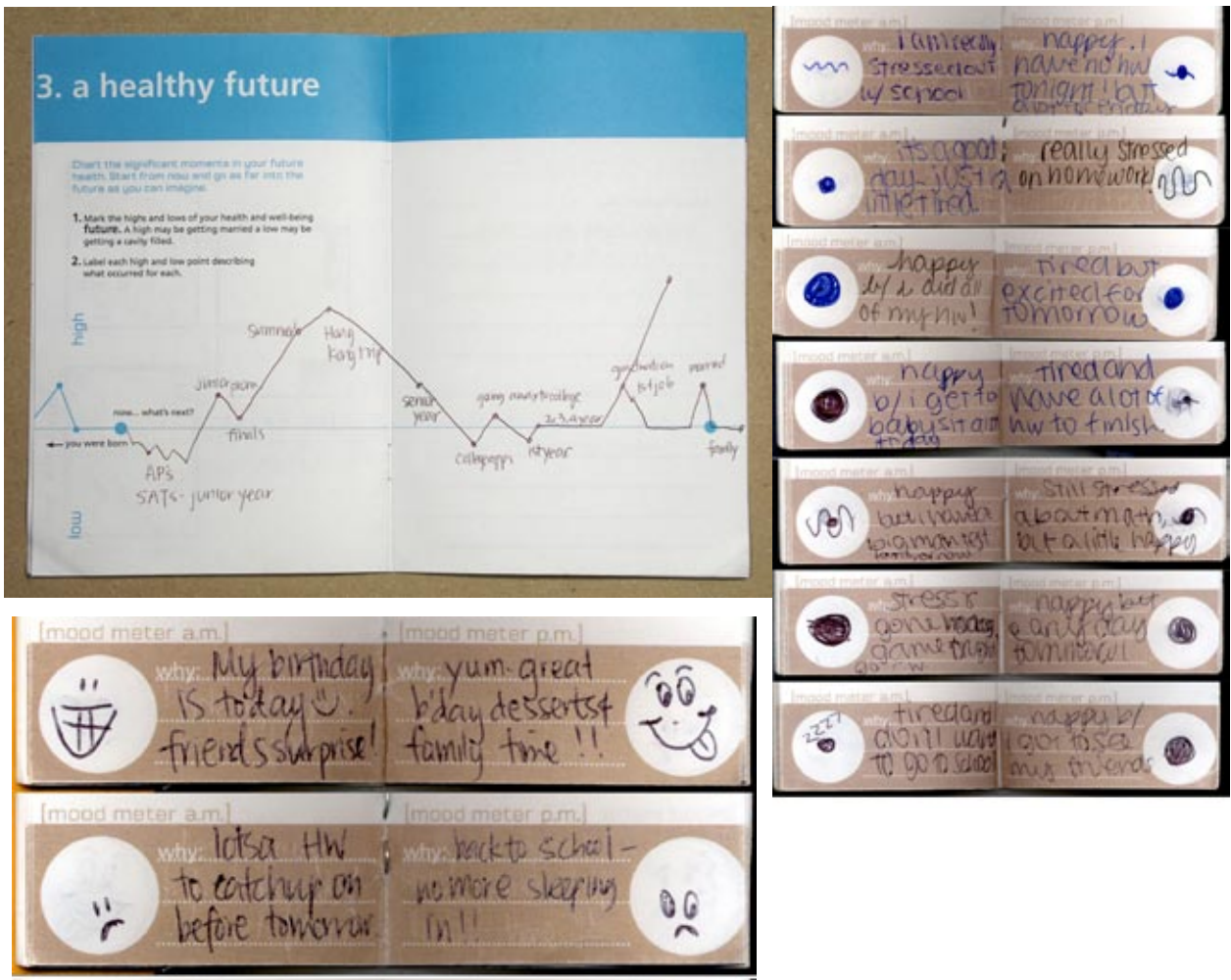
Based on preliminary research analysis, there are several content entry points—opportunity spaces—that appear to be relevant to our population. The following descriptions include evidence from our teens that sparked and helped to define our potential content. Through user testing, we can assess which entry points or combination will truly capture teen enthusiasm. Based on feedback, we will then hone in on a single “concept model” direction for development.



Left: A blank CD cover lovingly personalized with a self portrait. Right: Responses to the question “What do you want the doctor to know about you?” range from personal achievements, to goals, to attitudes. Respondents wanted their health records to be about more than symptoms and prescriptions.



- **Family health and personal medical histories.** This dynamic tool will serve as a way to personalize health for individual teenagers as well as illustrate the implications of family health history on the teen’s current and future health decisions. Capturing genetic history and personal recollection of past medical events will be an emotional gateway to personal wellness recording for this population—a premise we plan to test throughout the research phase. We want teens to remember and draw from previous experiences and feelings surrounding their initial understanding of disease or illness and how it is a part of who they are without judgments of good or bad.

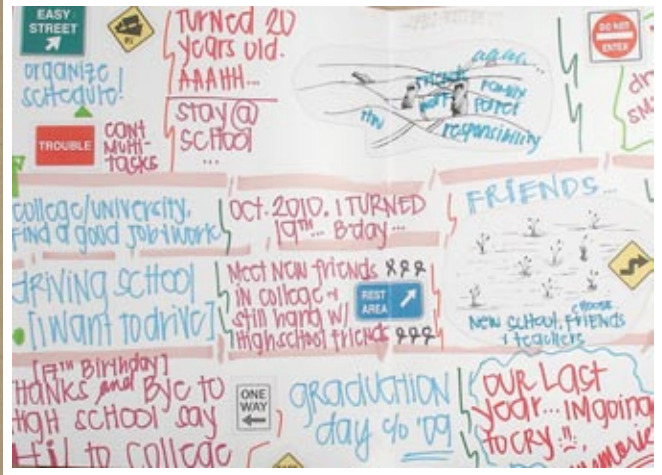


Left: Teens maps of their future where overwhelmingly positive. Though asked to map their future health, they responded with the milestones of life (graduation, marriage etc.) and not health specific events. Right/below: Asked to record their mood twice a day for a week, the teens responded in expressive ways. Even with limited data points trends already started to appear.

- **Biometrics.** Although we do not intend to prototype a futuristic “tell all, know all” device, we are interested in responding to teens’ desire to have something that indicates a change in body function. It is possible to create a biometric stream of data as a way to better understand how a teen may integrate this type of information into their PWR. Also tracking emotional and physical mood swings through a mood meter may contribute significantly to seeing personal health condition trends and trouble shooting.



Teens live their lives in many arenas including: school, friends, pop culture, technology, religion, and the future. Left: An example of what a teen fed their mind, body, and soul in one day. Right: One teens map of there next six years, including college, making new friends, and driving school.



- Wellness portal with aggregated content.** There is a culture shift that's occurring with teen behavior, specifically around personal openness with online activities. Teen perceptions of social networking and "shared privacy" is something relatively new and is seen by some as creating the biggest generation gap since rock-n-roll. Since personal health records are meant to be private, we are concerned about the dilemma of designing a private system for an audience with the ability and desire to share personal information with others. Part of our research will be exploring this tension and finding ways to enable limited sharing while maintaining security and privacy for teenagers.

Through aggregating content from existing sites that teens already use such as myspace and facebook we can create a "wellness portal" that combines their general and health related interests into a single space that a teen can control.



Teens used Calendars, Phones, Day Planners, and White boards as reminders.

- **Reminder objects** are in response to our teens expressing a desire to be reminded—not nagged—about taking their daily medication. Objects can be metaphoric, poetic, and informative and we plan to explore ways to remind a teen if they've taken their medication through a physical and/or virtual object. A reminder can take many forms such as a string tied around the finger, only the owner of the finger knows it's meaning.



How much will be functioning vs wizard of Oz?

Our intent is to create a scalable PWR system that may grow into a more robust system, thus we are creating a “concept model” system to demonstrate ways teens can interact with LIVING PROFILES.

We imagine that our prototype will be a combination of features that function and others that will be mocked up through wizard of Oz tactics. It will most likely include distributed technologies that can be integrated into a single interface on web-enabled devices such as mobile phones and computers.

Art Center College of Design has a rich history in design and culture of concepting and prototyping ideas. We will assess the best approach to making our prototype during the research analysis phase when we determine which experiences we need to test feasibility.

User Interaction & Experience

Cate

SCENARIO: Cheerleader to drama queen
Issue: Managing health condition in changing contexts

No longer able to participate on the cheering squad due to hip joint inflammation, Cate chooses drama because it offers her a pathway to stardom and it's a low impact activity.

Cate has high aspirations for herself and doesn't let a health condition, which she refers to as living inside of a 70-year-old body, get in her way. She doesn't always do what her doctor tells her to do; for example, dancing is off limits, yet Cate is often seen "locking and popping" around the house. Ignoring the side effects of low energy and painful joints, she wants to be active on stage and make new friends in high school drama class.



Areas that PWR could help:

- Requires self-input of some medical info to help Cate appreciate and learn more about her condition and its role in her activity choices and risks
- The wellness portal may help Cate to integrate her life passions with youthful perceptions on well-being, responsibility, and fun. It may also help Cate during recovery from her pending kidney transplant by providing related medical info in context of her life goals.
- Texting questions to healthcare providers on her mobile phone enables Cate to stay informed and text message PMD/rheum to alert of incident
- Ability to store last dialysis treatment data, important contact numbers in mobile device.
- Sharing music and health tips with her friends keeps Cate in contact with her friends while in the hospital.
- Build confidence in meeting new people in new social situation and knowing what to share and what not to share about her medical condition.
- Bring life activities into the doctor's office and see the benefits of incorporating "wellness" into "health."

Micah

Scenario: Mom as my pill dispenser

Issue: Disconnect between act of doing and role of managing

Micah dutifully takes the pills his mom sets by his plate at the breakfast table. He's proud of the fact that he administers his own shots, but is not about to leave home or go away to college and leave his mom. Micah is growing up and sees a future for himself that includes finding a wife and starting a family, yet is unable to map out the next five years of school or career.

He often feels fatigued, but sometimes stays after school to play Dungeon and Dragons. He's an active gamer and his equipment is top of the line. He's also into reading Manga, learning new things, and meeting new and interesting people. He's working at changing his perspective and being more open.

Areas that PWR could help:

- Mom can transfer medical information into his PWR format so Micah can have the information in a manner he knows and understands.
- By getting the information in a format he is comfortable with, his stress and anxiety about this transition could be lessened.
- Increased ability to review medical history will help him to understand personal risks given arthritis history
- Understanding of how to integrate family history into PHR
- Connecting historic and current, medical data in a way that integrates into Micah's future aspirations will provide a new wellness perspective
- Creation of a virtual "mom", with methods of reminders based on associations to tasks, individuals, or concepts



Shawna

Scenario: Sickness avoidance

Issue: Catching a common cold could mean a trip to the hospital

Each day, Shawna journals everything she eats and how she feels afterwards as a way to better understand her energy and mood swings. She doesn't want to be sick and dreams of a technology that will tell her immediately if something has gone wrong inside her body or if a doorknob has "bad" germs before she touches it. While Shawna socializes with friends, she misses being able to participate on the school soccer team and often spends time alone (as well as feels alone.)

Two years ago, Shawna broke a leg which resulted in her gaining a significant amount of weight. Now she has an early stage of diabetes and is doing what she can to track her caloric intake along with managing her other health conditions.



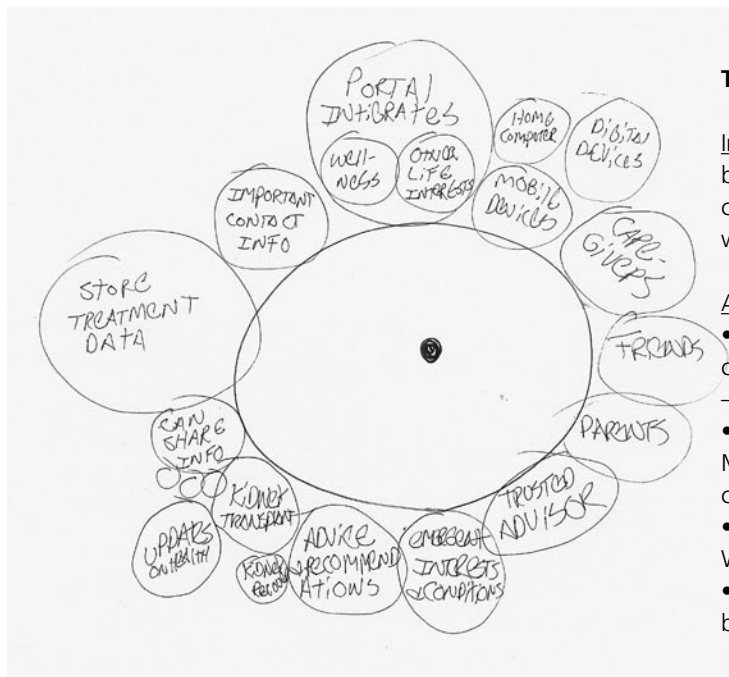
Areas that PWR could help:

- Biometric tool that streams health data in real time into her wellness portal for trend tracking.
- Mood meter to track her physical and emotional well-being.
- PWR goes to portal with reliable medication information, allowing her to learn more about possible side effects and interactions
- Collecting daily symptom (including physical and emotional) information to help better understand condition and how it impacts and affects her lifestyle, and vice versa. Through this, she can come up with better answers for friends' questions, have more confidence and comfort with condition as a part of self-concept, and start to integrate it into lifestyle and health.
- Daily well-being self assessment, with possible reminders for medications or other acts of wellness
- Ability to create a dynamic regimen that adjusts by knowing moment-by-moment health info, including providing calorie guidelines when she is eating meals and snacks
- Ability to track appointments and other scheduling issues tailored to her condition (i.e. routine screening labs or diagnostic studies)

User Interface Sketches

Interface Metaphors

The following are “dream technologies” visualized by our participants during each of their in-home interviews. We’ve related each of these to a persona and look to them as metaphors with which to envision future interface and interaction design that will be explored in our Design research phase.



The Bubble is inspiration for a teen wellness portal.

Interface may include: text message, image capture/ blogging, video, sensing, touch screen, data streaming, calendaring, data sharing, portal customization, and wiki collaborations.

Application of technologies may include:

- Wellness portal incorporating a system of aggregated content that reflects teen identity, Dashboard concept – easy to use.
- Tools for family health history record collection, Mobile phone as camera, video, tape recorder to collect information about family.
- Mobile phone interface and/or web interface, Widgets and dashboards
- Controls to share private information, determined by each teen, Wiki and pagelet functions.

The Bubble

Cate looks at her health and the changing contexts of her life through the lens of the bubble. She sees her chronic health condition as contained within a bubble. She explains that by doing so she is able to not let herself be defined singularly by her health but rather as a part of the many other elements that make her who she is. As her life changes and different situations present themselves she may change the bubble's perimeter to situate her illness within different contexts. For example, as she moves from cheering squad to drama her bubble or interface with health can accommodate new schedules, relationships, activities and aspirations. In this way, it is integrating itself into her changing world.

(Interfaces include functionality and features such as text message, image capture/blogging, video, sensing, touch screen, data streaming, calendaring, data sharing, portal customization and wiki collaborations)



The Ring is inspiration for real-times monitoring of both self-monitoring and biometric data streaming.

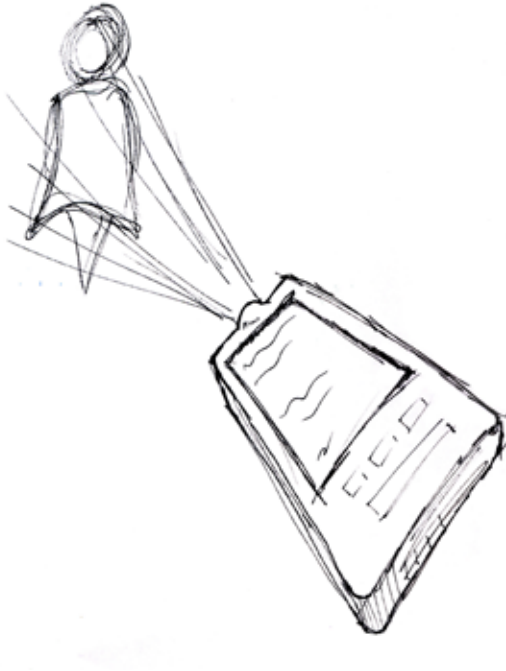
Interface may include: Data seamlessly streamed from device to relational database or program that communicates trends in highly-visual UI design, search, time-based and contextualized data.

Application of technologies may include:

- Connection via internet to collaborative environment
- Real-time streaming biometrics, Event bus
- Pain scale (mood meter), to help visualize trends, include both physical and emotional trends, Widget that integrates multiple sensor datasets on a dashboard.

The Ring

With Shawna's dedication to independence and framing her health within larger contexts, came a desire to be told in real-time how her health was doing. Her emphasis was not on an interface that told her that she was maintaining good health. Rather this interface would tell her when she was about to experience a significant drop in health condition, real-time and immediately. The specific physical interface of the device that would deliver this warning was explained in a spirit similar to that of the bubble. As the bubble integrated its thinking about health into the larger events and interests of Cates life. The invisible interfaces were described as "not obvious" interfaces that visually integrated themselves seamlessly as accessories into her expanded and changing wardrobe and personal style.



PWR Holographic Projector serves as inspiration for a reminder object.

Interface may include: reminders using the language of metaphors to prompt teen memory, audio, poetic object, virtual object, video, text messaging. Calendar, goals, and personal health history.

Application of technologies may include:

- Mobile phone (either built into object OR as a data collector)
- Remote sensors that communicate back to phone
- Mobile phone interface and/or web interface, Widgets and dashboards
- RSS feeds

PWR Holographic Projector

The past, present and future come together in Micah's PWR Holographic Projector, a scenario.

In this futuristic scenario, there is a hand-held, mobile device, containing PWR, Health Histories, and Reminders that have been programmed by the user, doctors, and mothers. The device can both project images of people and scan people in to be used as projections. The device can connect to computers and the internet to gather more information from trusted sources. It is a calendar, reminder, consultant, and historian who can present itself as the people the user trust the most (or finds the most interesting). For more dependent users it provides training wheels to managing their wellness; for less dependent users it is a great tool for staying organized.

Loving technology, he bought the mobile device both for its coolness but to also help him take more control of his life, something others have been telling him to do. After purchasing it and scanning his mother in, he hands it over for her to enter all the reminders and schedules he needs. From now on, when he needs to take a pill or remember to do something a holographic image of his mom appears and reminds him of it. While he likes the reminders and very quickly develops new habits, he doesn't care for seeing his mom so often.

His first alteration to the device is to scan in his friends and pets, then he downloads the scans of a few celebrities. He then assigns different kinds of reminders and tasks to different people. Now throughout his day a variety of people materialize to help him along.

At his next clinic visit, he scans his doctor—whom he trusts—and together they add more health information and reminders, as well as deleting some over-zealous ones his mom had added. At home, the Device's PC interface now knowing his health history, makes suggestions of information he might need. Through the computer he subscribes to several Informational Texting Robots (or RSS feeds if you like.)

After six months of having the device, he has reminders of when to do things, a repository of his health history, and a way of getting new information, and through all that is taking more responsibility for himself.

Overview of LIVING PROFILES technology

Potential core components to support teen PWR on virtual testbed for enhanced user experience

- Content management
- Backup
- Data capturing such as real-time feeds, time, medical info
- Structuring data such as address book, medications, lab results, diagnoses, symptoms list, date and time, personal information, weight, food, self-observed and reported data (pain history), and self-observed and reported (feelings and mood)
- Annotating such as meta tagging, comment on data element, labeling an image, link different data elements
- Exporting (data transport protocols) such as SMS,
- Algorithms such as goal setting, healthcare data analysis, calendaring, trend algorithms, alerting and reminders, validate data captures automatically or manually
- Information security such as access control, authentication, authorized/access control, identity management, information access audit trail
- Reference work databases such as drug interactions and side effects, provide advice to an individual based on their stated goals and condition

LIVING PROFILES technology areas

Collaborative environment with following requirements:

- Allow assembly of interactive documents and applications (let's call these Pagelets a combination of applet and page). Support common web multi-media formats for user interface development (Flash, JavaScript, HTML, Flash video, etc)
- Secure permissions based system that gives the user ability to control who can see / edit their private namespace and pagelets.
- Features that allow for the automatic collection of data streams like emails, instant message streams, voice messages, data recorded from sensors. These data sets are can then be accessed and viewed via pagelets
- Ability to assembly dashboard (e.g. netvibes) like assemblages of widgets(or pagelets) that combine views to a variety of 3rd party services like flickr or last.fm
- Ability to share and distribute the paglets independent of the private personal data source in an individuals namespace so that others can use, improve and share the tools.
- Ability to distribute pagelets in the form of widgets to be included in other 3rd party systems including a PHR system. Libraries in the collaborative environment and the 3rd party system would establish a secure communication path and also verify that the user has given permission to access data.

Requirements for the health records system

- Ability to present information in a dashboard (netvibes) like manner where widgets showing different data sets and user interfaces can be assembled into a customized user view.
- Ability to include 3rd party widgets on these dashboards. This is to facilitate the formation of aggregated digital identities that combine secure health data and 3rd party widgets within the secure health records system.

- API to provide verified access to health records from a known 3rd party web application (like the collaborative environment above). This would be facilitated by libraries running on both sides of the system.

Mobile Device Platform

- Phone that is consumer (nokia, danger, sony-ericson) focused instead of enterprise focused (palm, rim, windows mobile)
- Device with multiple net connection options: WiFi, mobile phone, Bluetooth, USB (on-the-go)
- Standard Features: camera with optical zoom and macro to facilitate magnification, video recording, keypad, j2ME
- Smartphone OS – symbian, windows mobile, linux. This is to allow application development and access to libraries that allow reading of barcodes.
- A phone widget like system like Opera Widgets to facilitate the distribution, recording, and display of information from collaborative environment on phone. This would need to include support for secure transfer and verification of credentials.
- Connection to low power RF networks (e.g. Wibree).
- Biometric sensors that connect to the mobile phone via low power RF network. (e.g. Nike+ / ipod system) Sensors might include: heart rate, cadence, motion, emotional state (EMG, ECG), blood pressure, pulse ox, etc. Sensors should not have to be charged like with BT.

Lifestream Platform requirements

- Ability to have secure access to real time data events from devices / sensors distributed over the network.
- Ability to filter and do pattern recognition of data event stream.
- Work with mobile phones over mobile phone networks.
- Work in home networks (Wifi)
- Low

Prototype Architecture

1. A list of goals for each user of the solution

Cate: Cheerleader to drama queen—managing health condition in changing contexts.

- Help Cate appreciate and learn more about her condition and its role in her activity choices and risks
- Help Cate to integrate her life passions with youthful perceptions on well-being, responsibility, and fun.
- Enables Cate to stay informed and text message PMD/rheum to alert of incident
- Ability to store treatment data, important contact numbers in mobile device.
- Keep Cate in contact with her friends while in the hospital.
- Bring life activities into the doctor's office and see the benefits of incorporating "wellness" into "health."

Micha: Mom as my pill dispenser—Disconnect between act of doing and role of managing.

- Help Micah to acknowledge and links concept of wellness to his condition
- Reduce stress and anxiety about transition. Provides the ability to take control of information and responsibilities in a way that is private and understandable to him.
- Help him to understand personal risks given arthritis history, Mom can transfer medical information into his PWR format so Micah can have the information in a manner he knows and understands.
- Understanding of how to integrate family history into PHR. Connecting historic and current, medical data in a way that integrates into Micah's future aspirations will provide a new wellness perspective
- Creation of a virtual "mom", with methods of reminders based on associations to tasks, individuals, or concepts

Shawna: Sickness avoidance—Catching a common cold could mean a trip to the hospital.

- Ability to track biometric data through streaming (effortless) technology through trend visualizations. Ability to create a dynamic regimen that adjusts by knowing moment-by-moment health info, including providing calorie guidelines when she is eating meals and snacks
- Mood meter to track her physical and emotional well-being illustrates integration of life for optimal health. Daily well-being self assessment, with possible reminders for medications or other acts of wellness to help improve daily life experience.
- Reliable medication information, fosters confidence. Through this, she can come up with better answers for friends' questions, have more confidence and comfort with condition as a part of self-concept, and start to integrate it into lifestyle and health.
- Ability to track appointments and other scheduling issues tailored to her condition (i.e. routine screening labs or diagnostic studies)

Parents

- Help parents help their children transition to independence

Physician and Health caretakers

- Ability to see a broader perspective of a patient's life
- Provide effective tools for pediatric patient transition

2. A list of significant events users need the solution to support

- Daily adherence to activities of wellness and prevention.
- Health flare ups (recognition, ability to communicate to appropriate people).
- Emergency health situations.

3. A list of resources (people, databases, web sites, etc.) users will want the solution to interact with

- Parents
- Physician
- Friends
- School
- Personal websites
- Condition-specific health portals

4. A list of locations where users will want the solution to operate

- Home
- Bedroom
- School
- Work
- Anywhere the teen is at (Portability is crucial)

5. A list of processes users will want the solution to support

- Programmable, individualized reminder system
- Interface capabilities with different devices for data capture and presentation (i.e., teen mainly uses cellphone but is able to present information to MDs office, pharmacy with various level of security).
- Magical quality of data collection and sense that the technology “knows” the teen

6. A list of the things (data sets) necessary for solution to provide the value users need.

- Multi-layers of security and access-control.
- High level of customization and open-ended usage patterns
- Must feel young—many teens with chronic conditions feel trapped in an old person's body

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