Listening to User Experience:
Integrating technology with proactive wellness management

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ABSTRACT

In the last part of the 20th century, societal forces and techno-logical advances have worked together to create populations that are living longer, but are less healthy. We eat more, move our bodies less, sleep less, and rarely find the time to quietly relax our minds. At the same time, medical and pharmaceutical advances have reduced mortality while allowing a host of chronic conditions and functional problems to persist. In short, we are living longer, while having the opportunity to experience the consequence of our unhealthy lifestyles. Traditional medical and insurance-driven practices have done little to address this problem.

BodyMedia is a lifestyle company that is in the process of developing a product that provides individuals with the ability to play a more proactive role in the management of their own wellness. The company's main offering is a wearable monitoring product, coupled with internet-based services, that allows users to keep track of their vital signs and daily health information. We propose a presentation of the BodyMedia user-centered product development cycle, which includes ongoing user involvement from initial product definition through first product release.

Keywords

user research, participatory design, interviews, self-documentation, relationships with users, design process, wearable computers, internet-based services

INTRODUCTION

Societal forces and technological advances have worked together to create populations that are living longer. Paradoxically, we are less healthy. We eat more, move our bodies less, sleep less, and rarely find the time to quiet our minds. Subsequently, the majority of common health problems are caused by an unhealthy lifestyle.

Rather than address these problems, current public health, pharmaceutical, and medical practices actually magnify them. In 1998, for example, more than $700 billion was spent on health care services in the US alone. [1] These practices have allowed us to reduce our mortality, while chronic conditions, problems, and maintenance situations continue to persist. We are living longer with the drawback of experiencing the consequences of our unhealthy lifestyles. Traditional medicine and insurance-driven practices do not have the time, the training, or the resources to address this need.

Currently, there are a growing number of individuals who are seeking information about their health and wellness online. In 1998, 22 million Americans went online for health related information compared to 3 million in 1995. [2]

BodyMedia is a lifestyle company that is in the process of developing products that provide individuals with the ability to play a more proactive role in the management of their own wellness. BodyMedia's main offering includes wearable body monitoring products (SenseWear™) and Internet services (BodyMedia.COM) that help an individual keep track of personal daily health information and vital signs. The products are comfortable, fashionable, accessible, non-obtrusive, and are able to generate dynamic automatic reports about the condition of a person's body.

We will present an overview of ongoing user involvement in the BodyMedia product development cycle, from initial product definition through first product release. We have involved users in all the phases of the design and product development process to ensure that the BodyMedia system will be accessible, usable and desirable. Our complex product offering — wearable computing integrated with internet-based personalized services — guaranteed we would be faced with many difficult decisions, best informed by users, during key phases of the product development cycle.

In the early stages of development, our team of shareholders (designers, developers, and venture capitalists) needed to create a shared vision of the product concept; discover and architect the value offer for the first release; define the primary target audience. The initial product offering, shaped by

user input, went through several iterations and continuous refinements.

Currently, as we test beta versions of the product, we are learning about the user experience of a system comprised of integrated physical and service-based components. More specifically, we are looking to users to understand issues of wearability, durability, manual and automatic data collection and transmission, short and long-term behavioral modification, and wellness management.

This presentation summarizes several methods of user involvement in our ongoing design and development activities, which will culminate in our first product release. These methods are presented in the order of the timeline of user-centered product design and development process used by the BodyMedia team. Where possible, we reference relevant research.

USER-CENTERED PRODUCT DESIGN AND DEVELOPMENT PROCESS

The user-centered product design and development process was originally created to help communicate to a multi-discipline team (software engineers, marketing, designers, psychologists, medical practitioners, and investors) the importance of the user's voice and integration as part of the development team. It explains when and where the user should be involved during the different phases of the process.
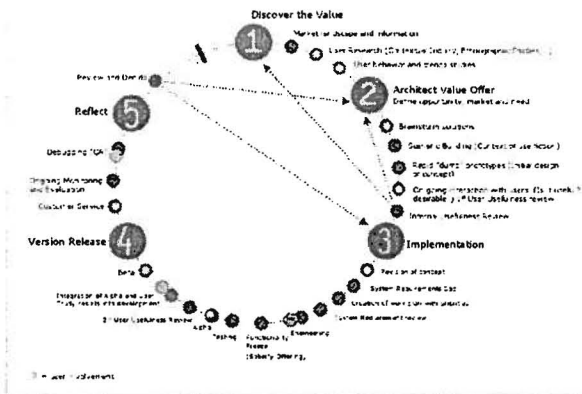

Figure 1. User-Centered Product Development Process

Phases 1 and 2: Discover and architect the value offer

In Phase 1 research, the project shareholders needed to reconcile the internal vision of the product. Our constraints were typical — budget, time to market, and technological limitations. We needed to prove our product concept, discover the key values that the product should embody, refine our target market, and collect reactions to early physical form studies. We appealed to potential users early, not only to discover valuable insights, but to ensure that users had a strong voice as part of the development team in initial phases of the product development process.

Phases 1 and 2: Methods

Constrained by time and budget, we felt that the best use of our resources would be to first cast broadly for data, then use additional techniques to obtain more detailed information on relevant findings. The activity of casting broadly for data about users, narrowing in on key points of interest as the product vision develops, is an activity we have witnessed through the explorations of other design teams [9]. Our Phase 1 user involvement plan was based on an initial participatory design session (PDS), supplemented by participant self-documentation exercises, observations, and intercept interviews.

PARTICIPATORY DESIGN SESSIONS

A Participatory Design Session (PDS) can address a number of objectives, including data collection, user-directed assistance with data analysis, concept generation, or concept evaluation. In our initial sessions, we gathered data about our audience and evaluated early product form prototypes.

We gathered inspiration for our PDS from readings in the field of Participatory Design (PD), a research method that examines the use of technologies in homes and workplaces. [7] Diverse in practice and theory, PD was first used in Scandinavia in the 1970s, capitalizing on the opportunity to allow workers to influence the experiences they might have when using new technology products. Gradually, methods were expanded upon, and brought to the U.S. [9] Currently, a number of methodologies have emerged to increase the direct and effective involvement of users in the design of computing and communications products. [1,2,6,10]

Our sessions were conducted as a one-time, extended activity session with a group of four to six friends and workout "buddies." We felt that the opportunity to interact with a group of friends over an extended time period would allow us to gather data through the stories that were shared about health and wellness routines and fitness products. In hearing the stories, we would gain an understanding of what kind of values our product would need to embody. In addition, we had participants evaluate some initial physical form studies, to learn which aspects of the forms appealed to the users' senses of wearability and desirability.

The first session was conducted with four skilled athletes (two male, two female) ranging from age 29 to age 43. The session took place in one of the participant's homes. This provided a comfortable environment where people could freely discuss personal health, fitness, and wellness issues. A session typically ran three hours in length, and was comprised of four basic sections: introduction, discussions of self-documentation exercises and products (to understand target market and lifestyle issues), interactions with prototypes (to understand desired functionality as a subset of feasible functionality), and wrap-up. The sessions were videotaped and product prototype interactions were documented with a still camera. An initial analysis was performed on the data using keywords coded into a relational database. PDS participants also completed self-documentation exercises.

Figure 2. Participatory Design Session

Figure 3. Self Documentation Exercises

SELF-DOCUMENTATION EXERCISES

Self-documentation exercises allow participants to record data that they find meaningful, through the use of disposable cameras and logbooks or audio recorders. By seeing what participants find important, researchers are able to learn about participant perceptions and behavior patterns. The use of these kinds of exercises, although new, has been valuable in identifying new product opportunity areas. [3] Design and development teams have found similar studies useful in providing data for what new products might be useful. [7, 8]

A total of 10 participants created logbooks. The group was comprised of males and females, ranging in age from 35 to 60, who exercised moderately but were not considered athletes. We asked them to document five life goals they wished to attain; define the terms health, fitness, and wellness in their own words; create a photographic story about experiences during the course of a day involving aspects of health, wellness, and fitness; and catalog products they used in their everyday lives.

OBSERVATIONS

In addition, we conducted observational studies at a local gym. On both occasions, we observed individuals participating in their workout routines with and without the assistance of a personal trainer. We also conducted informal interviews with gym members and personal trainers. Interview sessions ran approximately 30 minutes in length, and were comprised of four basic sections: introduction, walkthrough of website screen paper prototypes (to provide system context), interaction with physical form prototypes, and wrap-up discussion. Our observations were logged through digital snapshot images, journal writing, and an audio tape recorder.

A total of ten gym members were interviewed, (seven females, three males) ranging in age from 40 to 60, who exercised moderately but were not considered athletes. Half of the participants had a consistent relationship with a specific personal trainer, ranging from the minimum of one visit per week for a duration of six months to two visits per week for a duration of nine years.

A total of three certified professional personal trainers were interviewed, (two females, one male) ranging in age from 25 to 38. We interviewed the trainers for the additional perspective of a caregiver who would use or recommend the system for their clientele.
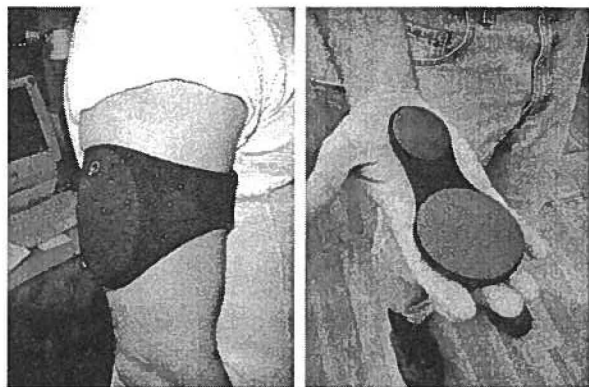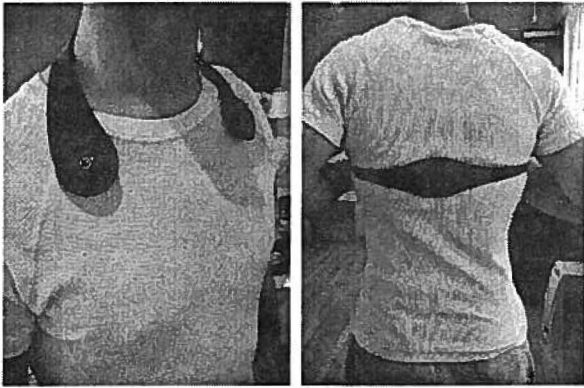
Figure 6. Prototype forms used during interviews

Phase 3: Implementation and testing phase
We are currently in Phase 3 — implementing our product vision, and conducting beta tests. The product and services have been refined, initial proof of concept prototyping is complete, system and functionality requirements are complete and our goal is to continue development of the beta versions of the product.

Users will be involved as we give them pre-release products to better understand how they might integrate them into their lives, and refine the user-product experience. In addition, the shareholder team will be performing additional benchmarking and rigorous testing of the product for issues such as durability, data transmission, collection and analysis.

Our user-centered design process incorporates the valuable insights from users into the product development process during implementation and testing phases through first product release. In order to understand how users will adopt the product we have defined three user relationships — long-term, short-term, and mini relationships.

Long-term relationships will be maintained with a group of four or five participants, ranging in age from 30 to 60 and committed to working out three to five times a week. They will wear the BodyMedia product for two weeks to two months, developing a special relationship with a researcher who will conduct regular interviews, observations in a variety of contexts, joint workouts, and debriefs to understand the experience that the product offers. Long-term relationships, sometimes called "deep hanging out", borrow heavily from the methods of anthropology, but are modified specifically to inform the design and development of products and services. [4, 11]

Short-term relationships will be maintained with a group of eight to ten participants ranging in age from 30 to 60 and committed to working out one to three times a week. They will wear the BodyMedia product for one to two weeks, developing a special relationship with a researcher who will

conduct an initial interview, an observation in two contexts (working out and downloading information), and a final debrief and exit interview.

Mini relationships will be maintained with a group of 20 participants, ranging in age from 30 to 60. They will wear the BodyMedia product for one to two days, communicating with a researcher through an initial interview, and a final debrief and exit interview.

The BodyMedia team has a clear commitment to the user-centered product development process. They also have a clear need to listen to the voice of the user throughout the product adoption lifecycle. The complexity of a wellness system and product offering that integrates physical wearable computing with internet based personalized services, introduced a number of potential barriers regarding initial product use and integration into daily routines. These barriers could arise from a number of different sources including technology, wearabiltiy, or behavior modification problems. [5] For example, a problem could exist with product sensors (technology), the product might be uncomfortable (wearability), or the user may express motivation or commitment problems towards achieving a healthy lifestyle (behavior modification).

Phase 2: Methods
Once again, we are conducting observations of product use, but extending the context in which we observe users interacting with the product beyond the health club to include many other aspects of lifestyle such as the home, transportation and office. We are interested in learning more about how people other than our participants will react to the functional and aesthetic components of the product. We are interested in learning patterns of use, and how users will incorporate this wellness system into their daily routines to proactively manage their health and wellness.

Online Use Patterns, Questionnaires, and e-Mail Correspondence
We are interested in learning about many aspects of online patterns of use. For example, how many times a day and at what times will many of our users choose to transmit data? We will collect and analyze data from logs and transmission files.

We currently use online questionnaires posted on our website to learn and track our users' interests. The team has found that analysis of over 550 surveys to be a useful resource for user feedback during the product development phases.

We will be engaging in email dialogs with our participants to track patterns of use, stages of product adoption, and general receptivity to the integration of the system into their daily routines.

Pager Studies
A group of users will be given pagers, and researchers will page them throughout the day. When a user receives a page, information will be recorded about the user's context, activ-

ity, and emotional state, as well as whether or not the device is being worn and why.

HOW USER RESEARCH AFFECTED PRODUCT DECISION AND OUTCOME

The user data we gathered has greatly influenced the final product, both product form and the online services chosen for development and release. We will briefly discuss the best way to approach data analysis, ways to integrate results throughout the development cycle, and new ways to involve users in product design and development.

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