

# Use Smart Phones to Promote Diabetes Self-Management: Robust Elderly in Urban and Rural China

## Phase 2: Design, Prototyping, and Testing

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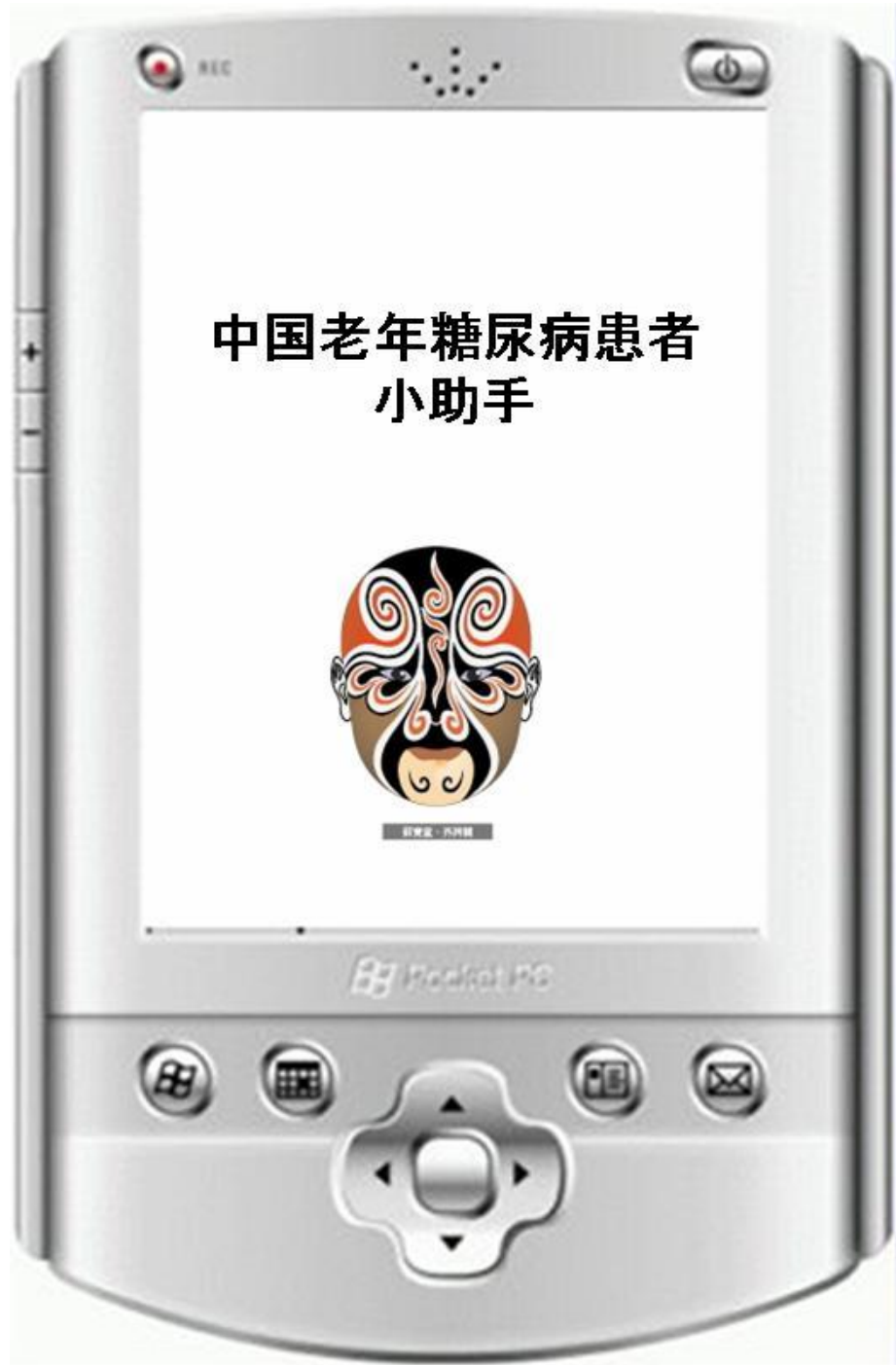
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The user requirements gathering activities carried out in China during summer 2008 highlighted the most urgent needs from both the patients’ and physicians’ perspectives. The smart-phone tool, Chinese Aged Diabetic Assistant (CADA), that we are designing and prototyping has two main goals: the first one is to provide a self-monitoring tool for things such as the glucose levels, the diet, and exercise habits of elderly diabetics. The second goal is to increase the knowledge regarding diabetes and healthy living among the population under investigation. To enhance persuasion for behavioral change and appeal, we decided to investigate the possibility of using a gaming approach in our tool instead of developing a tool that provides monitoring in a standard fashion and education by using text and graphics alone. A game is a set of activities involving some aspects of competition, even if that is competition with oneself. It has goals, constraints, payoffs and consequences (Dempsey et al., 1996). Game-based learning takes place in an artificial environment with rewards for choices or cognitive/motor skills. The goal of the game is for the players to win, and learning can be a by-product of this experience. Games could make excellent education and training tools in this project as demonstrated by gaming potential highlighted in many studies (e.g., Garris, Ahlers, & Driskell, 2002;Anderson & Schunn, 2000; Chi, 2000; Ryan & Deci, 2000).

#### SURVEYS

We are currently conducting a patient survey and a provider survey through the help of Department of Geriatrics at Peking University First Hospital and Sichuan University Huaxi Hospital. The patient survey seeks to assess the potential acceptance of CADA (and gaming specifically) and technology barriers to use for the target population using pre-existing measures from the Unified Theory of Acceptance and Use of Technology (UTAUT) model (Venkatesh et al., 2003) from the information systems domain. It will attempt to identify segments of the targeted population most likely to use and accept CADA by including a diabetes robust physical scale, diabetes self-management assessment measures (e.g., capabilities, lifestyle), and general health care valuegraphics (e.g., beliefs and values related to healthcare). The provider survey will seek to assess the potential acceptance of CADA and technology barriers from the provider perspective and assess potential barriers or facilitators of the existing network of diabetes care (i.e., diabetes policy environment, community, health care organizations) in the context of CADA serving a role in the Chinese diabetes chronic care model. Our target is to obtain 300 patient responses and 200 provider responses from urban and rural areas near Beijing and Chengdu to illuminate contextual differences in perceptions, beliefs, and possibilities.



#### DESIGN & PROTOTYPING

A variety of games have been successfully implemented in diabetes education and self-management for kids and teenagers, primarily (e.g., Brown, 1997; Hutter, 2001). Video games are found to empower elderly people in addressing their cognitive, social, and healthcare needs (Gamberini, et al., 2008). We propose to create a persuasive technology environment by using: a) the entertainment value of games for routine entry and education and b) the convenience afforded by a mobile smart phone. Gaming draws on the persuasive technology design principle of liking and attractiveness, while the use of mobile technology draws on the design principle of timeliness (a.k.a, kairos factor) (Fogg, 2003).

User-centered Design (UCD) methodology is guiding us to design and prototype culturally appropriate and age appropriate diabetes games for the target population. In the CADA system, we will use a set of three interactive games to provide patients assistance with diabetes self-management. The first role playing game will allow patients to input and trend their affective state (e.g., happy, sad), exercise activity, and general health trends on a regular basis. These data will also be useful to share with providers. The inspiration for the “role playing game” is from the masks used in Peking Opera and Sichuan Opera (“face change”), which are both folk arts loved by Chinese, especially elderly Chinese. A diabetes knowledge trivia game and a visual tile matching game will promote learning about diabetes and self-care, particularly food and diet.

Our prototype phase will start with quick, throw-away paper prototypes designed according to usability principles (Nielsen, 1994). An ultimate model will be rendered at the end of three rounds testing into a mid-fidelity prototype that include some visual treatment and content. Iterations resulting from evolving mid-fidelity prototypes will serve as inputs to high-fidelity design (closer to the look and feel of the actual end product with detailed content and pseudo-functioning functionalities). For mid-and high-fidelity prototyping, intended users will be asked to attend a session in which they will be asked to perform a series of tasks in a simulated setting (i.e., usability lab). High-fidelity prototypes will be iterated based on quantitative and qualitative data collected in usability testing. Patient participants in this study are primarily China-based elderly diabetes patients from urban and rural areas of Beijing Medical Hospital and Sichuan University. A small number of U.S.-based Chinese patients (<= 15) for initial interactive prototyping and low-fidelity usability testing will include qualified patients of the St. Louis Chinese Christian Community Service Center (a.k.a. Olive Clinic). CADA implementation should help Chinese elderly diabetes patients no matter where they currently reside.

