

MOHE: Mobile Health for Moms, Kids, Adults and Elderly

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Abstract. This paper presents a creative process aimed at developing innovative scenarios for mobile health. In detail, within the entire “MOHE” research framework, the paper is focused on a creative workshop performed in order to realize four movies of 2 minutes each describing next future scenarios. 20 participants, divided in 4 groups, were involved in 2 days intensive-work that has produced 4 storyboards of scenarios. The four groups were composed by designers and bioengineers with collaboration of medical specialists. Each group has focused their attention on a target-user (mothers, kids, adults and elderly people) in order to create new concepts for everyday healthcare services through mobile technology.

Keywords: mobile technology, healthcare, digital service, creative process, persona, scenario, storyboard, moodboard

1 Introduction

Innovative medical technologies offer a range of solutions to address the early detection and diagnosis and the efficient treatment of many diseases. Today, almost all widespread chronic illnesses can be treated successfully if detected and diagnosed early enough.

Modern health Information and Communication Technology increases the accessibility of individual citizen-patient information and supports clinical decision-making.

Medical devices are a product group ranging from simple items such as sticking plasters to complex devices such as heart by-pass (Martin, 2008). According to the European Medical Device Directive (93/42/EEC): “Any instrument, apparatus, appliance, material or other article, whether used alone or in combination, including the software necessary for its proper application intended by the manufacturer to be used for human beings for the purpose of:

- diagnosis, prevention, monitoring, treatment or alleviation of disease,
- diagnosis, monitoring, treatment, alleviation for or compensation for an injury or handicap,

- investigation, replacement or modification of the anatomy or of a physiological process
- control of conception and which does not achieve its principal intended action in or on the human body by pharmacological, immunological or metabolic means,
- but which may be assisted in its function by such means.”

2 Aims and Objectives

MOHE, Mobile Health for mothers, kids, adults and elderly people, is a project aimed to develop new scenarios of use of medical devices, based on mobile phone technologies. The project was focused on 4 specific target groups; pregnant women, kids, adults and elderly people.

The aim of this paper is to evaluate the effectiveness of the method applied to the creative phase and its impact on the concept design results.

3 Methodology

The project was structured in three steps:

- Research on future product-service systems for eHealth, the market of mobile healthcare products, existing technologies suitable to be applied in mobile phones and users’ needs
- Co-design workshop involving designers, bioengineers and healthcare specialists
- Video scenario production

The different design tools were used in the co-design workshop to stimulate collective creativity (Leonard Burton and Swap, 1999) for the generation process of new scenarios.

The overall research and development process is shown in the Fig. 1.

MoHe General Diagram

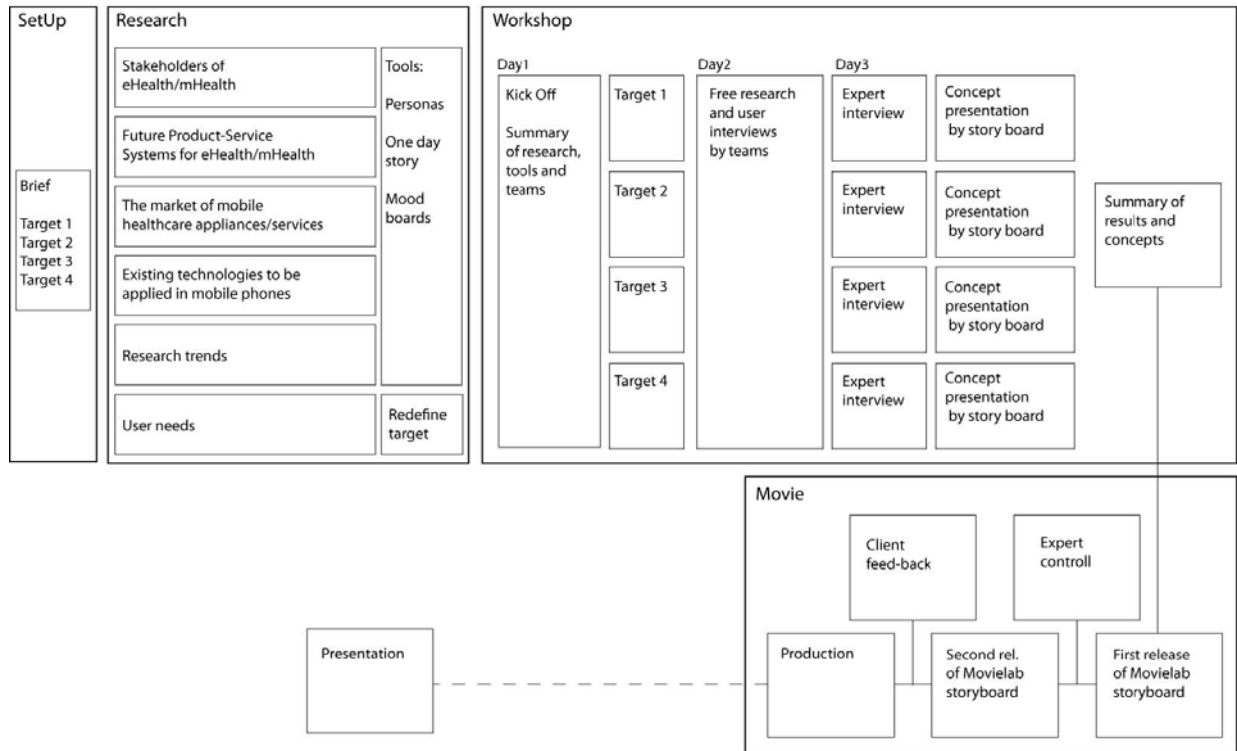


Fig. 1. The diagram of the complete research process

In the initial brief, the target user groups were defined as:

- Mothers/Fathers and babies
- Kids
- Healthy adults
- Elderly people

The research phase, conducted through the review of literature, surveys and previous research(including questionnaires, interviews and observation) guided the project to precisely consider unsatisfied needs and potential market niches. The target user groups were consequently specified as:

- Pregnant women with kids with focus on psychological support
- Preadolescents with focus on autonomy gaining in everyday life and long term management for chronic disease
- The elderly over 75 years old with focus on technology trade-off and memory aid, for example, medication management
- Healthy adults with focus on overall wellbeing and family dimension

We chose scenarios(Carroll, 2002) to develop the co-design phase considering that it is an appropriate method for designing services. Actually,

scenario-based design focuses on the description of users and how the users perform tasks in order to extract users’ demands; and provides a tool to design products with high usability. This design approach helps developing ideas that involve interactions with multiple users over a period of time. It is also very useful when a service with a defined goal has to be achieved.

Different scenario formats were used in the development process according to the actors concerned in the different phases: a narrative format in the beginning to facilitate communication with real users, storyboards in the workshop phase and movies as the final output suitable for the industrial partner and public communication. The different scenario formats were based on:

Personas(Pruitt and Adlin, 2006) are fictitious characters created to represent the different user types which are useful as a design tool considering the goals, behaviours, desires of a group of real users.

According to Pruitt and Adlin, the use of personas offers several benefits in product development. They are synthesized from interview data in order to guide decisions about a product, such as features, interactions, and visual design. Such inference may be assisted with brainstorming, use case specification, and features definition.

Moodboard is a type of poster design, collage of materials that consists of images, text(quotes, keywords), colours, textures, materials and samples of objects in a composition. It is to get visual stimuli and inspiration in order to develop design concepts, to get a picture of what a design team wants to accomplish and to communicate with other members. This mood board may be used as a frame of reference during the design process in a variety of abstract disciplines, as advertising, fashion design or trend research but the authors could not find any references about applications in the health care design field.

Storyboard(Vertelney and Curtis, 1990) is a tool derived from the cinematographic tradition. It is the representation of use cases through a set of drawings or pictures, which is put together in a narrative sequence.

3.1 MOHE Workshop

3.1.1 Workshop Progress

The aim of the workshop was to explore new applications for mobile phones technologies in healthcare by creating 4 scenarios related to 4 different users.

The preparation of the workshop included also participant recruitment and interdisciplinary team building. Each team was consisted of one tutor, two designers and one bioengineer. The participants were recruited and arranged to each team on the basis of previous experiences regarding scientific and empirical knowledge on the target users.

The workshop lasted for three days:

- the 1st day when the research and tools were presented and concept development began;
- the 2nd day when participants deepened the topics through further research and user interviews;
- the 3rd day dedicated to the final storyboard development and presentation.

All the teams could take advantage of the consultancy with medical and sports professionals.

The outputs of each team were storyboards and concept summaries. These outputs were presented to the movie designers who translated them in a new storyboard format usable as reference for shooting and producing videos(narrative tricks, shots, scenery, actors, visual effects and infographics, soundtracks, etc.). The movie designers also developed a communication strategy, including image treatment consistent with the brand image of the industrial partner. The 4 stories were connected to create a social network(Charles is Stella(a 12 years old girl)'s

grandfather; Bob(a 40 year old professional worker) is Nicole(a pregnant woman with a three year old son)'s husband).

3.1.2 Workshop Input Materials

The following tools were used to summarize the specifications of each user group emerged in the research: a **persona** resuming users' characteristics and condition, a **moodboard** representing their emotional status and desires, and a **"one day life story"** developed together with possible characters from the user groups(i.e. a grandfather, a pregnant mother with a 3 year old daughter, a 40 year old professional worker and a 12 year old girl jointly with an endocrinologist) (Fig. 2).



Fig. 2. Personas / One day Story / Moodboard

One day story helped the participants of the workshop to confront everyday possible health problems and behaviours of the targeted user groups. As an example, the one day story of a healthy adult started from defining the lifestyle of the user: his place, job, age, family and hobbies. Then, his daily routine of the work, sports, social activities and the consequences of these outline possible healthcare problems or situations.

The concept ideas drawn from all groups were synthesized in a chart using post-it in the two discussion sessions of the workshop(Fig. 3).

3.1.4 Workshop Output Materials

As the final result of workshop experience, each group produced one storyboard of their proposal. According to the requests from video producers, each storyboard and its frames(Fig. 4) were composed with movie attributes.

MOHE: Mobile and Health for the future				
POLITECNICO DI MILANO				
	Baby, Mom & Dad	Kids	Healthy Adult	Elderly
Character	Ginevra & Teo 32 years old	Stella Bianchi 11 years old	Julia Rossi 41 years old	Carlo Lucas 80 years old
Feelings	Anxious, tired...	Boredom, shy	Stressed	Alone, active
Health conditions	Ginevra is pregnant	Diabetics	Cronic constipation. One of her children has atopic dermatitis	Cataract, hypertension
Purposes				
Proposed solution				
Technologies				
Advantages for the user				
Advantages for company				

Fig. 3. Group chart for the discussion sessions

As an outcome, each single frame with a 16:9 format as a was sketched with a detailed description on the idea. Then, each single frame was compiled in a 20 frame storyboard as a result of the proposal in order to be compatible with movie production. The participants of each group also presented their opinions for the mood of music, voice type of narrative speakers, 3D models and 2D visualizations of the possible scenarios.



Fig. 4. An example of single detailed frames

3.1.5 Proposed Concepts

Four concept scenarios were produced and presented to the movie production team. A brief description of each concept proposal is shown below.

Group 1: The concept developed for pregnant women is a device which gives them trust, safety and joyful feelings during pregnancy. The device connects the mother and fetus with medical professionals, friends, family and social groups, and allows an emotional and clinical support.



Fig. 5. An example concept frame for pregnant moms

Group 2: According to Lang, medical devices have been primarily designed for adults, and resulted in

problems to other user groups like adolescents with chronic conditions as the devices have been made with little or no consideration for their specific needs (Lang et al. 2010). The concept for kids is an object with special features for the kid users. It also provides instant messaging and short range communication in order to enable a less expensive social interaction. This is also applied to improve the quality of life of kids with chronic diseases.



Fig. 6. An example concept frame for kids

Group 3: The central point of the concept for healthy adults is "Self care to encourage active life style and monitor the health status of family". The application makes it possible to keep the connection among family members and social networks continuously and instant exchange of information.

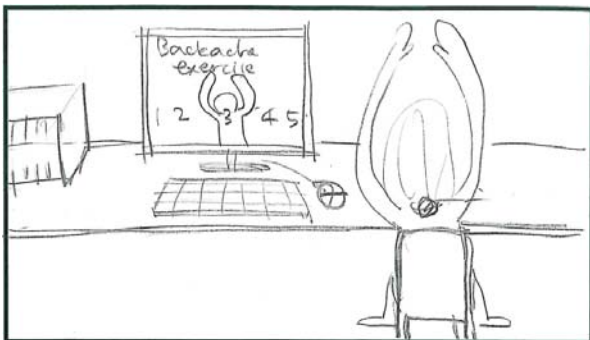


Fig. 7. An example concept frame for healthy adults

Group 4: The concept for the elderly is to support them to manage everyday's healthcare activities and to improve information exchange between doctors and patients.



Fig. 8. An example concept frame for the elderly

4 Results

As the results of the research, interesting conclusions about the used methodology were drawn. Some conclusions of the experience and recommendation are summarized below:

- Input materials, as the synthesis of the research, is an important starting point for warming up the teams. It is important to provide reports of the research which are well structured but summarized, in order to help the team to be quickly tuned to problems and opportunities in the specific field of interests. A normal power point presentation was used to explain the preceded research for example the state of the art of mobile technology. In the workshop, inevitably some lacks were found in the transfer of the information because of the complexity of the research.
- The creative tools must be suited to the team participants. Some tools like "moodboard" were evaluated as less useful for not design-oriented participants. On the other hand, the most used tool in all the teams was "one day life story".
- The role of workshop director who is in charge of improving the creative process of each project team is important. Actually, workshop director is the pivot to integrate whole teams maintaining each team's characteristics and dynamics. The role is also useful for reducing creativity gaps of each team with tools (input materials).
- The storyboard method was used to present the final proposals to the movie production team. It should be integrated with a brief contents of ideas and a description of would-be-used technology for functions and applications. In the process, the movie producers evaluated that the presented stories in the storyboards were

too complicated for the movie length. To divide sections without decreasing quality, it was necessary to study the used technologies of the design proposals carefully. For this reason, an accessory document called “technology behind the concepts” was devised. The material made it easier to choose the functionalities to be presented in the movies.

- The movie design team produced 7 draft storyboards before the final storyboards were approved for shooting.



Fig. 9. An example of final movies

5 Conclusion

The creative workshop was useful but demanding to set it up and analyze results. It could have been more effective if lesser information had been provided in more than 2 working days to the workshop participants. This condition would reduce the organizer’s hardship, and give more time to the participants for searching, analyzing and discussing information. In addition, it could be useful to involve

final users not only in the research phase but directly in the working groups.

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