Designing Social Features for Mobile and Ubiquitous Wellness Applications

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ABSTRACT
This paper presents research findings on designing social features for mobile wellness applications. The focus is on opportunities to support and motivate wellness by utilizing and enhancing social interaction between users. New knowledge is created using a 'Research through Design' process. The process combines findings of the user studies performed in India during the year 2008, existing research knowledge on mobile communication technology that provides social features to support wellness activities, and technological possibilities provided by the mobile devices available in the market at the time of the research. New design knowledge is presented in the format of design findings and concept descriptions, as well as concept evaluations. These can then be used by practitioners as inspirational material for product design, and by researchers for exploring the domain of wellness applications.

Categories and Subject Descriptors
H.1.2 User/Machine Systems: Human factors. H.5.2 User Interfaces: Evaluation/methodology, User-centered design.

General Terms
Design, Experimentation, Human Factors.

Keywords
Wellness, mobile application, social interaction, user experience, participatory design, concept design.

1. INTRODUCTION
This paper explores 'the wicked problem' [7,22] of the design of technology that would support people in their pursuit for wellness. Wellness-related activities are usually intentionally planned actions for achieving better quality of life and wellbeing. They require awareness of personal wellness-related problems or challenges, and of how they could be tackled by behavioral change. Examples of these wellness activities are conducting physical exercise and following a healthy diet. The definition of wellness can vary between individuals, and is affected by the cultural background and surroundings of the individual [2].

In this paper, we describe the findings of our research project on user centric design of wellness application concepts utilizing mobile and ubiquitous technology. Designing applications that could actively support users in achieving a better quality of life by increasing their wellness is challenging. Wellness is strongly affected by everyday choices and routines, which are hard to change. Design decisions of wellness applications affecting motivation and behavioral change may be difficult to formulate. User goals may sometimes be conflicting, and their weighting and relationships can be difficult to model and predict. The motivation of an individual to use wellness applications is a complicated mixture of motivation towards wellness activities in general, awareness and satisfaction towards the applications, external pressure, and the perceived and actual effect of the use of the applications on wellbeing.

Many studies show that social features can be effective in supporting wellness activities, and especially wellness-related motivation, such as motivation related to doing physical activities [4,8,30]. This paper explores the specific design problems and new opportunities related to the features of mobile wellness applications that would utilize social interaction. We concentrate on preventive wellness applications, i.e. applications that intend to motivate people to different kinds of wellness activities before their health deteriorates. Applications for healthcare and medical purposes are out of the scope of this paper.

The fieldwork presented in this paper has been performed in India. We chose to explore these issues in India primarily for two reasons:

- The research and design of wellness applications has been strongly focusing on studies done in the context of the western and developed world, such as in Europe and the US. Our

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hypothesis was that exploring culturally different contexts could reveal new design knowledge and requirements that could be used to make existing wellness technology concepts more useful on a global scale.

• The Indian culture and everyday life is essentially driven and constrained by social interaction and social structure [11,24,25,27,31]. For example, the large population density, familism and caste system have formed rich social structures and practices that balance the everyday life in India. Therefore, our hypothesis was that India could provide a fruitful research environment for studying social features and give new inspiration for an application domain that has typically been explored from a western viewpoint.

In this paper, we present findings from a research project that explored the design of wellness applications and services supporting social interaction between people. The research has been organized to follow the principles of the 'Research through Design' methodology [33], which produces new knowledge by combining three sources of information: (1) field data, (2) existing theories and models, (3) and knowledge of opportunities, advancements and limitations of technology. The contribution of this research is not to design concepts for the Indian markets as such, but to use this specific cultural context for learning about the richness of society and culture that could be deployed not only in the Indian context, but also elsewhere for supporting wellness through social features.

2. RELATED WORK

This section provides the theoretical basis for our research by explaining the theories and models we have used. First, we summarize the findings of previous studies on the role of social interaction as a motivating factor towards wellness activities. Then, we provide an introduction to the field of existing wellness applications that utilize social features. Finally, we give a summary of the role of social interaction in the Indian culture and specific wellness issues in India.

2.1 Social Interaction as a Motivator for Wellness Activities

In their theory of motivation, Ryan and Deci [23] suggested that social facilitation is one powerful factor in increasing intrinsic motivation. Intrinsically motivated people engage in activities for the pure satisfaction caused by the related behavior. Satisfying the need for relatedness is one of the factors to nurture intrinsic motivation. Moreover, according to the theory of intrinsic motivation by Malone and Lepper [17], social factors, namely competition and cooperation, are powerful social sources of motivation. The principle of social facilitation suggests that people perform better when other people are present, either participating or observing [3]. Performing with others provides social support, a feeling of team spirit, an opportunity for social learning and a pressure to begin and continue with the activities. In general, comparing one's performance with that of others (benchmarking), works best when the others have similar qualities [29].

Social interaction, including peer-support, cooperation, competition and belonging to a group has been found to be a clear motivator for wellness activities, such as physical activity. Studies have been conducted in different contexts and with different age-groups. According to a survey conducted by Gockley et al. [10] most young women (83% of respondents) preferred to exercise with a friend and share their personal status and goals with other persons (76%). Ståhl et al. [28] studied the different factors affecting a physically active lifestyle in a cross-cultural study in Europe. The strongest predictor of being physically active was social environment – those who perceived low social support from their personal environment, i.e. family, friends, school or workplace, were more than twice as likely to be sedentary compared to those who reported high social support from their personal social environment. In addition, Leslie et al. [15] found in an Australian study with college students that lower social support from family and friends was one of the strongest predictors of being insufficiently active. Similarly, Laverie [14] studied motivators for participating in aerobic lessons and found the following social factors influential: forming social connections, social support, companionship, being part of a group and social comparisons. Similar results have been gained in a study with children [32].

2.2 Existing Social Features of Wellness Applications

Within the area of mobile and ubiquitous technology, mobile communication devices provide a promising platform for applications that support social interaction in order to increase motivation towards wellness activities. They offer synchronous as well as asynchronous connectivity possibilities, and they are currently almost ubiquitously present in people's everyday lives. In the developed world, mobile phone penetration is near 100%, while in the developing areas it is shaping up to be a "leapfrog technology" that will provide many with their first platform to access communication technologies and the Internet.

In the domain of wellness application design, "support social influence" is an often recommended design principle [8, 10]. This principle has been taken into account in some existing concepts and products, and user studies have provided positive results about their effectiveness and user response. For example, encouraging results have been gained with mobile phone prototype applications for sharing step count or other type of activity data with a community of friends [4,8,30]. In those studies, the sharing data of physical activity with peers with the help of a mobile application increased the weekly average activity. Anderson et al. [4] report that in their study, two out of three user groups started competing over who got the highest daily activity level. They also enjoyed the competition. On the other hand, in a study with teenage girls, Toscos et al. [30] found an unhealthy competition factor – competition sometimes caused hurt feelings and discouraging behaviors among the members of the user group. In their study of the Fish'n'Steps mobile game, Lin et al. [16] found that the competitive aspect of the game elicited mixed reactions in the participants. Many participants compared the progress of their own virtual character to those of their team members and became aware of their comparative performance. However, some participants did not want to compete against the team members.

In another kind of system, and the related study, presenting auditory cues of a friend "jogging over distance" in other geographical location [21] was found to be encouraging and successful in supporting the need for socializing. Bickmore et al.

[6] report that sharing information of a physical activity even with a PC-based animated conversational agent that acted as an exercise advisor increased the motivation to exercise. Web communities for sports enthusiasts like Bones in Motion[1] and Map My Run[2] provide possibilities for sharing sport session data with like-minded persons. In many studies, for example in [1], it has been found that exercise data sharing usually happens preferably with familiar persons.

2.3 Snapshot of India as a Research Context

In the traditional Indian social structure, a person is first a member of a family, caste and village – not an individual in the society [24]. Familism has remained a strong value in India, even though many other social values have changed along the evolution of the Indian social system [31]. India is often referred to as a collective society [11,27], even though some observations indicate that both individualistic and collective orientation can be found co-existing in the modern Indian society [31]. Social relationships and the community structure are vital in the everyday life. For example, recruitment is traditionally done on the basis of contacts from a "known circle" [24] and personalized relationships between colleagues are preferred over contractual relationship [27]. In addition to the importance of family and other surrounding communities, a remarkable aspect of the Indian culture is that the society tends to follow role models, be it cricketers, politicians or film artists [20].

India is home to a rich history of traditional wellness practices related to mental, spiritual and physical wellbeing, eating and healthcare. Yoga, martial arts, meditation as well as breathing exercises have combined the mental and physical aspects of wellness since ancient times. Guidelines of appropriate diets for different occasions and times of day and year also exist. Ayurveda, a holistic approach to people and treating illnesses, is a traditional Indian healthcare practice [26]. When it comes to raw facts, one of the lifestyle-related curses of the modern world is overweight. Current statistics show that the western trend of overweight is nowadays also prevalent in India. According to the World Health Organization (WHO)[3], 21-22% of Indians are overweight (Body Mass Index more than 25kg/m2). WHO estimates that by the year 2015, 29% of Indian women and 31% of Indian men will be overweight. The burden of obesity and overweight tends to shift towards the lower income group as the country's gross national product increases [18].

3. RESEARCH PROCESS

In this chapter, we describe the rationale for the selection of specific data collection methods in the field studies, and procedures for ensuring the rigor of the methods and processes. The research and design process was the following: (1) the field data was collected in two separate user studies that were conducted in the urban areas of Bangalore, India. The field studies were part of a larger research framework that explored wellness application design across different cultural areas. Hence all participants belonged to the higher economic classes of India as they could be best compared with participants in western studies. After the field studies, (2) concept-creation workshops for ubiquitous and mobile wellness applications were arranged. Finally, (3) scenarios and visualizations of the concepts were sketched, and (4) evaluated with individuals from the target user group. Informal observations took place in the field during the whole process.

3.1 Explorative Field Study

The focus of the first field study was to gather cultural understanding on the topic of wellness in the Indian context. We wanted to identify trends and opportunities in the area of wellness applications and recognize influential design factors from a cultural perspective. The explorative field study included eight voluntary participants. The study process consisted of the usage of the Wellness Diary[4] mobile application for a two-week period. User experiences related to the application were collected in three rounds of interviews: before using the application, in the middle of the usage period, and at the end. The Wellness Diary application was used as a technology probe [12] to give the participants an idea of what a wellness application can be, to evoke their opinions, attitudes and ideas towards wellness applications in general, and for collecting wellness-related data during the trial. The voluntary participants' profile was as follows: three males and five females, between 25-50 years (mean: 37), living in urban areas, sedentary workers with an interest in wellness management, e.g. desire to reduce weight or stress level, or to increase physical activity.

The data types collected in this phase included interview and observation notes, audio and video records, self-report data collected with the Wellness Diary, and still images. The data was analyzed by the research team consisting of both Indian and Finnish researchers with backgrounds in design, technology and psychology. The findings consisted of themes related to wellness definitions, ways to keep up wellness and the main concerns related to wellness, and themes related to the use of the technology probe, the Wellness Diary. The explorative field study had a very wide focus, because the context of India was new in this research domain. We did not want to limit our thinking to some themes under the wide topic of wellness.

3.2 Participatory Design Study

After the explorative study, we arranged a second field study to get further insight into the issues found most important in the Indian context. This phase focused mainly on the role of social interaction in wellness-related activities in general. The participatory design study included six voluntary participants. There were three females and three males in the age-range of 24-30 years (mean: 28).Their profiles were similar to the participants of the first field study in other respects.

The participatory design study consisted of initial interviews that were conducted over the phone to ask background questions, e.g. how the participants defined wellness, in what kind of wellness activities they actively engaged, and what motivated them in their wellness activities. Firstly, we wanted the participants to define a place they associated with wellness activities, where we arranged participatory design sessions with them. The wellness activities and places chosen by the participants were the following: three participants did yoga at home, two participants did gym activities in the sports club or gym, and one participant did a mixture of

[1] http://bonesinmotion.com

[2] http://www.mapmyrun.com/

[3] www.who.int/chp/chronic_disease_report/media/india.pdf

[4] http://betalabs.nokia.com/betas/view/wellness-diary

running and gym activities in the residential area and its immediate neighborhood.

Figure 1. Conducting field study sessions.

The participatory design (PD) session included tasks that were used to get the participants involved in the design process: magical gadget (mGadget) task and sketching. The first task, mGadget was adapted from the SPES method [13]. The participants made a selection between five different mockups, i.e. different forms of "magical devices". The participants selected the one that they thought was the most useful. They were asked to imagine that it was a device that would be able to do all the tasks that they wanted it to do. They could attach the mGadget somewhere by using the strings and tape provided. The participants were asked to do their wellness activities while simultaneously imagining using the mGadget (see Figure 1). They were asked to "think aloud" during the session, i.e. to talk about what the device was doing and what kind of interaction there was between the user and the device. If the participants seemed to forget the existence of the gadget, we prompted them by asking questions like "Is the device doing something right now?" or "Would you like the device providing some information at the moment?" After the mGadget session, the participants were given a sketching task: they were asked to sketch the device that they had imagined to use during the wellness activity. Typically, the participants drew either a picture of the screen and/or the way the device looked (form factor, shape, etc). In-depth interviews were done during the sketching session.

The sessions typically lasted around two hours in total. Two researchers were present in each PD session – one native Indian and another with a European background. The data types collected were interview and observation notes, audio and video records, still images and sketches. All data was transcribed word by word, and converted into affinity notes [5]. An affinity wall was then constructed by the research team consisting of both Indian and European researchers (see Figure 2).

Figure 2. Building the affinity wall.

3.3 Observations in the Field

In addition, the researchers got immersed in the cultural influences of every day life in India by continuously observing ordinary people, events and places around them. Observations were made in naturalistic settings by the researchers who observed and took part in the everyday activities of the participants. The researchers lived in the context for an extended period of time (six months), used informal observations of people by actively participating in a wide range of different everyday activities, and by recording the experiences in field notes.

3.4 Generating Design Drivers

Based on the field studies described above we generated a set of design drivers to inspire the concept creation. Design drivers were elaborated based on the initial issues that were pointed out as interesting during the analysis phase. We wrote down all initial drivers on post-it notes next to the affinity wall, and after the analysis was finalized we went through all formed categories and looked for the interesting issues, which could be utilized on the concept design, more specifically, implicit and explicit user needs and requirements rising from the user study data. This paper focuses on the drivers that relate to creating concepts with social features.

3.5 Concept Creation, Scenarios and Visualizations

Concept creation work took place in several iterative workshops that were arranged throughout the study process – we had initial brainstorming sessions with people from the research team as well as outside the team even as the data collection and analysis were still ongoing. Proper concept creation workshops were arranged immediately after the data analysis. A multidisciplinary and multicultural team consisting of user experience specialists, interaction designers and technology experts was involved in the workshops. When the concepts were ready, a graphic designer sketched the final scenarios and visualizations of the concepts.

3.6 Concept Evaluation

The concepts were evaluated with participants from the target user group by conducting two focus groups in India including eight participants. There were five participants in the first group (two females, three males). Their age-range was from 30-34 to 50-54. The connecting factor between them was that they had formed a

physical exercise routine and were actively participating in exercise activities. The second group consisted of three participants (two females, one male) who all were aiming at weight loss. Their age-range was from 25-29 to 40-44. The sessions were conducted in a health club. The visualizations of the concepts were presented to the participants with a data projector. An overview of the scenario was first shown and explained, followed by a detailed step-by-step description. The participant feedback was collected during and after the presentation with the help of a semi-structured discussion guide, including questions about, e.g. the usefulness and acceptability of the concepts. The participants were asked to rate the concepts in the order of importance for them in the end of the focus group session. The analysis was done by a group of multicultural researchers and designers.

4. RESULTS

This section presents the main findings of the studies, illustrated with novel wellness application concepts that combine the findings from the field with existing knowledge and models, and technological possibilities described for each concept. We found several opportunities for supporting social interaction with wellness applications. The results are divided into three main themes: (1) passing it forward, (2) re-connecting for wellness, and (3) utilizing ad-hoc communities. Technical implementation of the concepts can be realized in several ways. In this paper we present some examples of these.

4.1 Passing it Forward – Gift of Good Health

Increasing awareness. It was observed in India that the concept of wellness applications was not widely known. The observed problem was that even if there was a wellness application on a mobile phone, but the users did not know that it was there, it was obviously of no use. Moreover, even when users knew about the application, in order to get interested, they would need information about the value of the application and what it can do. In the following quote, a participant expresses her concern about becoming aware of applications and features on the phone:

"One should be tech savvy, especially for finding new features. On my own I wouldn't explore [the features on phone] much." (female, 43)

In general, the participants stated that in making a decision to adopt wellness applications, the benefits should be easy to perceive and the applications should be perceived as reliable, as one participant commented:

"Even if it [the wellness application] is free [of charge], people need to be aware and see the value." (female, 26)

So, the first design challenge is to make people aware of and interested in the applications.

Trusted sources of information. At the same time it was found out that the transfer of wellness information relied strongly on social relationships. Especially traditionally, the information has been passed from the elders to the children (more detailed discussion on this topic in the section 4.2: 'Re-connecting for wellness'). What is more, the best method for staying updated with advancements in technology was found to be 'word of mouth'. Therefore, it can be assumed that social relationships play an important role in spreading wellness information as well as information on wellness applications – the trust and perceived value comes from the recommendation and knowing the person who is providing it. The participants also talked about peer-pressure: when another person set a challenge, they had more motivation to work towards the target, as was commented by a participant:

"When somebody gives it [wellness application or information] to you, you are like, oh let me check it out and see if I can do this." (male, 30)

Figure 3. Gift of Good Health. The initial motivation and first push to start using the wellness application is given by a familiar person.

Gift of Good Health concept. The above-mentioned findings led to the concept called "Gift of Good Health" (see Figure 3). The idea is that the awareness of the application comes from people you know: the wellness application is sent to the other person's mobile phone as a gift. Receiving a gift provides the first motivation and the first push to start using the application. The sender of the gift can personalize it for the receiver, for example by setting some suggestions for goals and targets, or even passing on own training program. The receiver of the gift can select whether to keep the targets that the sender has set, or define new ones. Finally, the receiver may want to pass the gift forward to other persons.

From a technological viewpoint, there are several approaches to implement this. In one approach, the application given as a gift may, in principle, be any type of application. The crucial issue then is how to compile an updated executable version of an application on a mobile device, sign it, share it with other mobile devices, and let it operate in another device. This would require the implementation of a software-development environment on a mobile platform, which is very unlikely to occur. In another approach, the gift could be sent as a message to the other phone as a self-provided service. The "gift message" could consist of a personal message from the sender, and a link to download the application. The service could also be formed around the idea of the wellness gift, where service providers would generate different wellness applications for different purposes, and those could be ordered as gifts for mobile devices. This approach seems possible by utilizing, e.g. mobile Web server, JavaScript, and XHTML/CSS technologies. When thinking about the service concept, at the end when the user achieves the set goals, these gifts could be converted into tangible gift options from the service provider, which would act as surprises and motivation to reach the goals.

The benefit of the application is that the awareness of wellness applications on mobile phones increases, and people are more likely to start using the application to help them in their wellness

activities, because the application is recommended by a trusted source. It is easier to see the value of the application, if a trusted person recommends it.

4.2 Re-Connecting for Wellness – Photo Frame of Health

Scattered family units. The concept of the extended family has lived strongly in India [25]. When family members were living as physically close units, wellness-related issues were also discussed in the family. Family members could then motivate each other, and wellness information was passed from the elders to the younger generations, as the following quote about the past and present describes:

"There is no clear demarcation between wellness and unwellness. It is not learnt from books but from stories that you hear as a child. But now we are becoming nuclear families so this is changing. We are no longer large joint families… Rural masses still live in joint families and learn about wellness that way." (male, 50).

Nowadays, in the urban areas, more and more people live in nuclear families instead of extended families [25]. Despite this change, the role of the family in spreading wellness-related knowledge was highly valued by our participants. Family members were usually considered the best information and motivation source for wellness related issues, as can be observed in the following excerpts:

"My mom is a way to get wellness related knowledge." (male, 30)

"*I have basic knowledge of healthy eating; I eat fruits and milk. I got this from my parents, learned as child growing up and incorporated it into my family also."* (female, 35)

"Every morning my father used to make us drink a large glass of water kept overnight in a copper vessel. Father is very health conscious, he is 75+ years old and still does yoga, walking, drinks a lot of water." (female, 48)

A lot of mobility was observed among the participants because of their education, career, etc., which led to the situation where the family members were living apart from each other and were meeting only rarely: it could be as infrequent as once or twice a year. Long distances, even thousands of kilometers, between places of residence and the lack of longer holidays has made it complicated for family members to meet frequently. Especially the youngest participants of the study (about 30 years and less) were concerned about the absence of wellness-information sources. According to these participants, the motivation for wellness was now perceived to be more difficult to maintain.

The increasing mobility has also caused friends and loved ones to often be separated by a distance, and the role of the modern communication technology has become important in maintaining social relationships. One participant, whose girlfriend was studying abroad, described how his wellness device could be a link between them (mGadget task). His mGadget connected him and his girlfriend emotionally by showing what kinds of activities they have done:

"It can connect with my girlfriend abroad. I know she also goes to the gym. Maybe it could connect both of us, me and her, maybe she is somewhere else, I am somewhere else." (male, 30).

Importance of the role models. Another main finding, which affected the concept to be presented at the end of this section, relates to the observed importance of role models. As expected, the participants reported that they were motivated when they saw other people succeed, e.g. carrying out wellness related activities and achieving positive results, such as decreased weight and increased happiness. It was found that the role model could be, for example, a friend who had achieved a challenging result or just someone who is healthy and good-looking, as in the following quotes:

"My role model is everyone who looks gorgeous. More specifically, my friend who has recently lost 20 kilos." (female, 27)

"You are suspicious when people are trying to sell you something. I would rather be attracted to something, than it being promoted to me. If I see you looking healthy then I will come and ask you the reasons for your healthiness." (male, 50)

"I use other accomplished people as a role models and targets." (male, 28)

Our observations, in line with [20], showed that there was also a strong tendency of idol worship, for example celebrities, politicians and gods. Media played an important role in creating role models. It was commented that nowadays celebrities were more and more connected with the fitness domain, and they could be used as wellness messengers:

"Stars and celebrities are getting into fitness. When you want to spread a message, you use stars." (female, 26)

Cooperation and competition. Ideally, the participants wanted to do workouts as a group, to share their positive experiences and success in pursuing wellness. The following kinds of comments about peer-support were commonly stated by the participants:

"And you kind of chide yourself that you are lazy, that sort of thing becomes a driving force for a group session of physical activity." (female, 27)

"First thing [to know from mGadget is] whether we achieved the target. Maybe one of us is lagging [behind], who we can pull up." (male, 24)

On the other hand, competing with others was in most cases not considered a motivating factor towards wellness. Most participants preferred competition with themselves rather than others, as discussed by them:

"I was never a person who trained. The idea of competition with others has never really appealed to me. Competing with myself is more [for me]." (male, 30)

"I prefer competing with myself – not with other people." (female, 43)

"It is not in the philosophy of yoga to do it competitively." (male, 28)

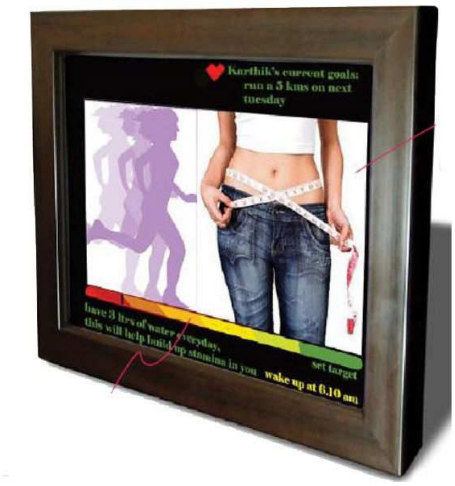

Figure 4. Photo Frame of Health displaying a view with the user's own and another person's goals, the progress towards the goal, and a picture of a celebrity as an inspirational factor.

Photo Frame of Health concept. Inspired by the findings of the scattered family units, cooperation & competition, and the importance of the role models, we drafted a concept called "Photo frame of health" (see Figure 4). The concept supports cooperation between family members, couples and close friends who are living apart from each other, and utilizes role models as motivators. It allows the users to share their health-related information with other people, like the new goals set, personalized status messages, greetings and health tips. The goals can relate to all aspects of wellness, for example "to do half an hour physical activity everyday" or "drink 6 glasses of water daily". Obviously, it can display this information sent by the other person. The information is shown in the digital photo frame, which works together with the mobile application. The frame is placed in the home, office or any other meaningful place and the mobile application is always with the user. The frame has a big, clear and visible screen for presenting each other's information. A photo frame is also a traditional way to reminisce those that are significant in our lives.

There are different kinds of views in the frame. On the "main view", own goals and the goals of the other person (family member, friend, loved one) are shown. On the main view, a photo of the close one and/or selected celebrity (chosen by the user) is used to remind and motivate the users to maintain the selected lifestyle changes. Photos can also be sent to the photo frame. When the users achieve the target, some rewarding elements appear on the screen. They can be, for example, animated Bollywood figures dancing and celebrating the success (see Figure 5). This feature is meant to support the fun factor for motivation, and is inspired by the observed importance of the role models.

Another view is the "training program view" that shows the training programs and goals created by the user, a close one or a celebrity. In the last case, the training program is ordered from the related service, which offers training programs created by famous people. This view also has a small clock at the bottom, which displays the times of the regular workouts of the user and another person. It also notifies with sound when the time for exercise approaches. This feature can be used to match the exercise times. The third screen is the "relaxation view", which shows a relaxing picture (chosen by the user), on those days when the training program recommends the user to take it easy.

Figure 5. Animated Bollywood dancer figures appearing to celebrate the success when the users achieve their wellness targets.

The mobile device is used to set the goals, training programs and messages and also to collect wellness data. Goals and messages are set manually by the user. The data collection happens from all available wellness data sources on the mobile device: accelerometer and GPS, and with accessories, e.g. a heart rate monitor attached to the mobile device. The interpretation of the wellness data and processing of wellness summaries is done by the mobile device. The information in the frame changes continuously as the user's own and other person's wellness data keeps changing. The frame has both local area ad-hoc connectivity (Wi-Fi, Bluetooth or alike) and long range wireless data connection (3G or similar) to enable seamless wellness data communication between the mobile devices and frames. In order to process and present multiuser wellness data, the frame also has capabilities to store and personalize wellness data. This requires some amount of embedded electronics.

The benefits of the concept are the following: it connects close-ones and motivates by showing them each others' wellness statuses and pictures. It also recommends relaxation when needed, i.e. the user "is given a permission to take it easy". In addition, the solution keeps up the interest level by providing small surprises every now and then, for example the dancing Bollywood figures.

4.3 Utilizing Ad-Hoc Communities – Web of Avatars

Shared goals. Research on the cultural characteristics of India indicates that India is a culturally cooperative society [11]. According to expectations, most of the participants preferred doing physical activities in a group or together with somebody, as the following comments reveal:

"There is energy in the group." (female, 27)

"I do physical activities, such as walking, together with my wife and use that time for talking." (male, 42)

"When you work as a group, you share your information, you do your best." (male, 24)

Sharing goals with others was observed to be a good motivator. The participants shared goals with other persons with similar goals, and wanted to work together towards achieving them. This is illustrated in the following case of two participants who had common goals with their friends:

"Three friends of mine want to quit smoking and we are constantly trying to do this." (male, 30)

"When I am with friends, we have a single target, and we strive to achieve that." (male, 24)

However, actually doing wellness activities together was often difficult due to practical issues like schedules and arrangements. Small slots of free time due to long working days and the time spent in commuting made it complicated to find shared time slots for wellness activities. Moreover, as it was common to move from one area to another quite often, for example in search of a job, the lack of social network in the new place was considered a problem. As the social support traditionally provided by the big family unit had also been decreasing, there seemed to be a need for forming substitutive social groups.

Ad hoc communities. On the other hand, places in India, i.e. streets, coffee shops and parks tend to always be crowded. This means that there always is a changing set of persons around. Roughly, two types of temporary groups were observed and recognized. The first type was dynamic groups, for example when a person was exercising on a jogging track or park, using public transport or was stuck in a traffic jam - people around in close proximity kept changing all the time. The other type - relatively static groups - existed, for example, at workplaces or residential areas, where people were usually in the same locations within certain time frames. Due to the close proximity of a great number of people, it is probable that among them there are people who have similar wellness profiles and targets. Ad hoc communities and connections between new people could be used for exchanging information and motivating each other, as one of the participants commented (mGadget task):

"Maybe there could be some option of also uploading some new [exercise] combinations which you have discovered, and you want to share with other users." (female, 27).

Web of Avatars concept. "Web of Avatars" concept combines the opportunities that ad-hoc communities and shared goals provide (see Figure 6). The idea behind the concept is to connect wellness enthusiasts with similar profiles, targets and interests. The possibilities that crowded places bring to motivating for wellness are utilized.

The system is built on a mobile application and uses close proximity connections. The users can create a wellness profile with an avatar, wellness goals, interests, activities, status messages, etc. Each avatar is presented as a neuron cell with as many dendrites as the user has different types of profile information. With the avatar, the users may, e.g. represent their current status of wellness (see Figure 7). The system keeps looking for matches between profile information and connects persons with similar profiles with the metaphor of an axon. The users are notified by a pop up on the mobile phone screen when the system finds an avatar with similar profile information. If the user accepts the connection, an axon grows between the avatars. Once two avatars are connected, the users are able to start viewing each other's wellness profile even after the close proximity connection is lost. The more actively they keep viewing each other's wellness activities and sharing information, the more sheaths are added onto their axon, which symbolizes the strength of the connection. In the beginning, the wellness network exists only in the virtual world, but as the users' relationships evolve and if they wish so, they can start communicating with other means provided by the mobile phone and become wellness motivators for each other in real life, too.

Figure 6. In the Web of Avatars, persons are connected with each other by means of close proximity connections, and represented as neuron networks. The thicker the axon between neurons, the more active the connection between the avatars.

Figure 7. Avatar with a personalized message to be shown for other users. An authentic result of the design process.

From the technical viewpoint, the core of this concept is local area ad-hoc connectivity such as Bluetooth, Wi-Fi or alike. On top of that operates the device discovery with group finding and match-making according to the wellness data and personal profile. The basics of the Social Clique method [19], for example, could be used in the group finding and the client-server based match making could utilize the Social Serendipity [9]. Currently, with mobile Web servers match making according to wellness profiles can be carried out locally without expensive GPRS/3G data connections.

The benefit of the application is helping users to be motivated towards wellness tasks by getting connected with people who are in a similar situation. Cooperation and peer-support, i.e. aiming for similar targets, can increase the motivation towards wellness activities.

4.4 Evaluation of the Concepts

Out of the three presented concepts, six out of eight participants rated "Web of Avatars" as number one. All participants in the group 1 rated it as number one, and in the group 2 there were two participants who rated it as the second best – they rated "Photoframe of Health" as number one. All participants in group

1 rated “Gift of Good Health” as number two, and “Photoframe of Health” as number three. In group 2, “Gift of Good Health” was rated as number three by all participants.

Web of Avatars. The participants were consistent in with whom they would like to use the application. All participants stated that they would not like to use the application with strangers but with the existing social network. According to them, a potential use case for the application would be to search for persons with similar aspirations, for example, inside a big residential area. Tasks like searching for potential squash partners could be done with the help of the application. The factors that create social motivation were identified in the concept, i.e. boosting, peer pressure and competition. However, it was also commented that networking for special issues, in this case wellness, might not work, but it should rather be made as a part of a general profile. Participants in group 2 also commented that they would not like to familiarize with people because of matching health profiles because health was considered a very private issue.

Gift of Good Health. The general response towards the Gift of Good Health was that the relevance of it depends on what is inside. However, especially the participants in group 1 commented that receiving the application as a gift from people that you know would probably have a positive impact in taking new things into use. They also said that it would important to be able to send the results back to the sender of the gift. One possibility to make the gift more tempting would be to include some kind of description of how the application has affected the sender, i.e. what kinds of results she has got towards her health by using the application. Group 2 was more suspicious towards the idea of gifting applications. They stated that it does not have an effect on the probability of taking it into use whether or not the application is sent as a gift.

Photo Frame of Health. The main feedback concerning Photo Frame of Health concept was that the participants did not want to have an additional device for providing awareness related to wellness. Instead, they wanted to have the information displayed on the existing device, for example on the corner of the PC or television screen. They liked the idea of visualizing wellness in several ways and wished several different types of icons and other visual material to provide inspiration and motivation. They said that the application felt like a message from the persons they care.

5. DISCUSSION AND CONCLUSION

This work was conducted to gain inspiration for designing new kinds of mobile and ubiquitous wellness applications to support social interaction between users, which has been found to act as one of the most important motivators in increasing the level of physical activity [14,15,28] and other wellness activities. Especially, we chose to look at the Indian user perspective, thus differing from earlier research dominantly concentrating on the western cultures. The field data was collected in India by a multidisciplinary and multicultural research group with a set of methods that aimed to collect a rich variety of data directly from the users. Through the research process, effort was made to “listen to the voice of the user” and interpret the findings with local researchers.

Our observations indicate that inspiration from the traditional attitudes towards wellness and the social structures of Indian culture provides possibilities for supporting the kinds of social interaction currently not well addressed by wellness applications that have been designed with western users in mind. The following findings have been discussed in this paper:

• Re-connecting with traditional sources of wellness information, i.e. scattered family members and loved ones, to motivate each other in the pursuit of well-being.

• Using communication technology to spread wellness-related information and applications as gifts within a network of trusted of people. This gives the initial motivation and push to start using wellness applications and working towards better wellbeing.

• Building connections with other persons with similar wellness targets from surrounding dynamic and static communities within short physical distances. Peer-support from people with similar targets can increase motivation towards wellness activities.

• Using role models as a source of inspiration for wellness. Role models can emerge from own social networks or among celebrities.

As the field data collected was qualitative and descriptive in nature, and the data collection methods were very effort intensive, the amount of users participating in the study is too small to make generalizations on wellness practices and preferences of Indians in general, especially since there is great diversity of cultures, population and geographical settings in India. However, the goal of this study is not to provide a generalized account of Indian wellness culture, but to draw inspiration from the rich social culture of Indian society. Based on our observations and wellness related studies made in the other parts of the world, e.g. [1,2] we believe that the results presented here can be also be useful in designing wellness applications for global markets. For example, crowded places are common not only in India, but also in the big cities of the western world. What is more, the need for relatedness acting as a motivating factor applies to people in general [17,23], not only to Indians. However, more research is needed to find out about the usefulness and acceptance of the presented concepts both in India as well as in other cultural and environmental contexts.

To conclude, our research revealed interesting knowledge in the domain of social interaction and wellness, which, together with the existing knowledge of the specific qualities of Indian culture and role of social interaction in supporting wellness, played an important role in designing new concepts of wellness applications utilizing mobile or ubiquitous technology. All presented concept ideas are results of a research process [33] and as such, incomplete in several ways. Their purpose is to present the research findings in a concrete and illustrative manner so that practitioners and researchers can better grasp the findings, and continue building design knowledge further. Our future work will include concept evaluation in several cultures, and building and testing prototypes. We want to know how these designs will be accepted both in the settings where the research material was collected as well as in other cultural areas.

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