
Engaging People to Participate in Data Collection

Patrick Tobien

VIS, University of Stuttgart
Stuttgart, Germany
patrick.tobien@web.de

Robert Krüger

VIS, University of Stuttgart
Stuttgart, Germany
robert.krueger@vis.uni-
stuttgart.de

Lars Lischke

VIS, University of Stuttgart
Stuttgart, Germany
lars.lischke@vis.uni-stuttgart.de

Paul Lukowicz

German Research Center for
Artificial Intelligence (DFKI) &
EI, University of Kaiserslautern
Kaiserslautern, Germany
Paul.Lukowicz@dfki.de

Marco Hirsch

German Research Center for
Artificial Intelligence (DFKI)
Kaiserslautern, Germany
marco.hirsch@dfki.de

Albrecht Schmidt

VIS, University of Stuttgart
albrecht.schmidt@vis.uni-
stuttgart.de

Abstract

Through smartphones and mobile internet connections, collecting data from a large number of users and sensors has become ordinary. Users share information not only through private messages, but also over public available services or in particular applications contributing to data collection projects. On one hand, sensors in modern smartphones enable us to collect a large amount of information without the need to directly interact with the user. On the other hand, users actively share all kinds of information in social networks. However, it is still challenging to motivate a large number of people to participate in collecting data when active contribution is needed. This is particularly critical, when the needed information is of personal nature. In this work, we discuss four approaches to actively encourage users to provide information. Furthermore, we present first results of an online survey evaluating which of the approaches would be appreciated by users to contribute to a health data collection.

Author Keywords

User Engagement; Collecting Data; Crowdsourcing;

ACM Classification Keywords

H.5.2 [User Interfaces]: Graphical user interfaces (GUI).

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Introduction and Related Work

Prediction of disease spreadings is the first, and perhaps most important, step in finding ways to alleviate their effects. In order to improve prediction of flu epidemics, information is retrieved from volunteers via regular surveys. A simple approach to do this is via a mobile application where participants report their symptoms once a week. One existing application, namely FluNearYou [2], stands out, as it utilizes user-collected data and as of August 2012 had over 9300 participants across the United States. However, the main problem with this attempt – and data collection in general – is motivating volunteers to contribute regularly. Previous research has been done on how to engage consumers with mobile applications by Kim et al. [8] and a survey on privacy issues with sensory data collection has been conducted as well [1].

This study specifically focuses on how to motivate people to contribute to data collection, particularly to report symptoms of disease regularly, so that flu epidemics or other disease spreadings can be detected early on. In order to build and compare user experiences that encourage active data collection, mock-ups for five different versions of a mobile application have been made, utilizing four different design methods. A survey has been conducted on these to see whether they appeal to people, and if so to what extent.

Methods to enhance participation

Four methods to engage volunteers are proposed to use as design techniques in a mobile application.

Gamification is the application of game principles and mechanics in design fields that are not games in order to improve user motivation and engagement [4]. Gamification is a very popular modern design technique and has also been tried as a method for data collection [3] and for tasks

that require human intelligence such as in Flatla et al. [6] and in Ahn et al. [9].

Stories have been an important part of human culture for centuries. As a design method storytelling is often used either as a way to involve and engage the user with a story that might include text, pictures, sounds, etc. or let the user tell their own stories via something like a timeline or a diary [7]. Storytelling is often used as a means to explain intentions or thought processes in an engaging manner.

Social networks are an important tool in modern society. The vast majority of people use some form of social networks. They allow users to share their experiences, build relationships, give or get feedback on virtually every topic imaginable and to stay in contact [5]. Modern applications often integrate social networks in order to advertise for themselves or build a specific community.

Another approach to motivate participants is to reward them for their contributions. One popular option is offering monetary rewards. Other options include providing access to more functions within the application, information, statistics.

Survey

We conducted a survey in order to evaluate the acceptance level for different participation enhancement approaches. We asked questions about smartphone and mobile application usage, followed by the introduction of the aforementioned design techniques. For each method, a few specific mock-ups were shown with a short description. A five-point Likert scale was used for statements to which the participant either agrees or disagrees. After an introduction of the application in general, design techniques were applied (supported by textual description and mock-ups) as follows.

Gamification was used by engaging the user in a virtual vaccine research. The idea was to make the user part of a research team that is trying to find a cure to a fictional disease. A level system was introduced, whereby the users gain points by reporting their (real-life) symptoms. For every three consecutive weekly reports the vaccine gets improved reaching a new stage. Additionally, rewards (i.e. badges) were provided for completing quests like filling out profile information or following health tips. An alternative version was proposed, where users are assigned to teams by area and gather points as a group in competition with other teams to find a cure for the fictional disease.

For storytelling, users were given the ability to create a story via journal entries that allow users to tell others or themselves about their health or what they do to improve it on a daily basis. Additionally, language was used stylistically to include the user as a character; creating conflicts and enabling users to solve them via reporting their symptoms.

Integration of social networks and interconnection, was proposed by allowing users to share their reports, statuses, talk to others about topics that relate to the app and possibly create some form of informative community that can help each other in case of an infection for instance. Thus, the ability to share various information was given, such as one's symptoms, one's general condition as well as the fact that the application was used by the user. Additionally, there was an option to create a friend list and chat rooms which allow users to create a group of like-minded people and also provide information about possible infections among real life friends.

Rewards were given not as payment but as information within the application. Two distinct approaches were suggested. The first consisted of a list of possible diseases, sorted by probability, for the reported symptoms. Thus, the

payoff for reporting these symptoms was a diagnoses as well as information on how to recover. The second suggestion for rewards was the ability to integrate fitness trackers or applications. This enables the user to see statistics about their health, their diet, their fitness and correlations in-between. The reward in this case was to see personal information about one's health as well as its progression.

For all of those proposals participants had to give a rating on how much they think it would improve the probability of them reporting their symptoms.

Results and Discussion

In the online survey, 51 participants provided feedback. The participants were aged between 15 and 77 ($M=27$, $SD=10.44$). The first results show that some techniques might indeed improve the probability of users participating in data collection and in reporting their symptoms, respectively. 53.0% of participants agree that one or more of the proposed designs would motivate them to contribute, while 27.0% disagree (see Figure 1). Out of the proposed methods, rewards were received best with 70.6% of participants thinking that fitness integration would be an improvement and 54.9% thinking a diagnoses would improve participation, followed by the gamified approach which 51.0% believed to be beneficial. Only 11.8% reported that none of the suggested techniques would be an improvement (see Figure 2). Integration of social networks, was the least popular approach with only 19.6% of participants reporting it would improve the application and 51.0% stating they would never use it, compared to 18% of participants never using the standard application. The reasons for that could be privacy issues, since 59.2% of participants stated to have not used some mobile applications because of privacy concerns before.

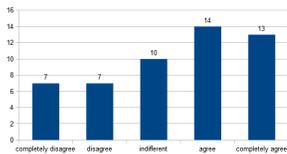


Figure 1: Replies of participants to the statement: "One or more of the proposed designs would increase the probability of me reporting my symptoms."

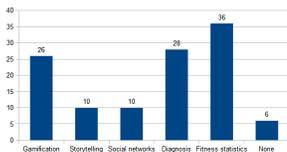


Figure 2: Replies of participants to the question, which of the designs would improve participation in their opinion.

It should also be noted that the integration of fitness trackers or applications would increase the frequency with which the application would be used, with 25.5 % of people claiming they would use it on a daily basis instead of 6.0% with the standard design. Gamification shows similar results with 17.6% of people reporting they would use it daily. Additionally, both reward approaches (diagnoses and fitness integration) would get primarily used when the user feels sick (68.6 % and 45.1 %, respectively) and during flu season (39.2 % and 31.4 %), while the gamified design would get mostly used when the user is bored (54.9 %) or waiting for the bus, train etc. (41.2 %). Similarly, a design with storytelling would primarily be used when the user is bored (47.1 %).

Implications and Future Work

Overall, rewards and a gamified experience would probably improve the amount of participation via respective application the most. A combination of both could be beneficial, if possible, since even though rewards are the most popular, gamification could engage users beyond merely contributing when they feel sick or during flu season.

For future work a prototype of the application should be developed which includes the most popular design technique(s). Further studies can then be conducted and a more precise evaluation will be possible.

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