Smartwatch – Facilitator with Privacy Risks?

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Abstract
Smartwatch producers promise the watch to be the next big thing enhancing our everyday life through receiving unobtrusive information. Being able to collect and provide accurate, personal, high sensitive data, those watches have the ability to improve privacy in terms of biometric authentication. However the existence of such private data engenders a necessity of protecting those and we were interested on the users view on those devices in terms of privacy, adoption and live improvements. To achieve that we conducted two focus group discussions with smartwatch users and non-users. Participants see great potential in various fields (e.g. e-health, remote control), received great improvements (less distraction), easements and do not want to live without their devices in the future. Privacy concerns were detected more on the possible attack through the connection between smartwatch and smartphone, more than data gathered by the watch. Participants believe that despite the small display; in the future smartwatches might be a powerful tool for elderly people in terms of health surveillance and reminding functionalities.

Author Keywords
Smartwatch; privacy; wearable computing; focus group

ACM Classification Keywords
K.4.m Computer and Society: Miscellaneous

Study flow diagram

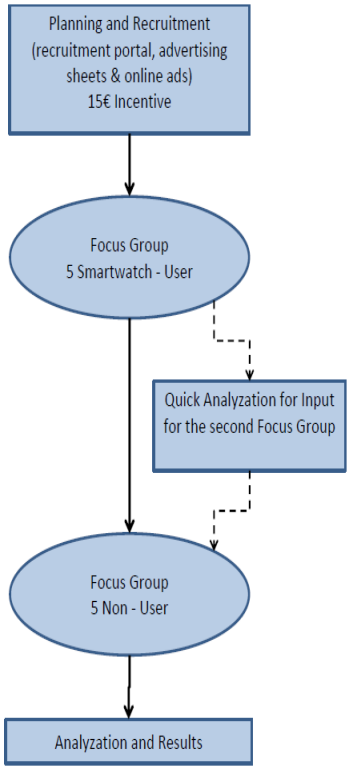

Figure 1: This figure shows the simple workflow plan of our study

Introduction

Wearable devices have the ability to change our everyday interaction in various ways. As technical development is improving, more wearables are rushing into the market and especially smartwatches, as the leading device in selling numbers (approximately 645.000 sold devices in 2015, which is an increase of 348% percent to the previous year [4]), are predestinated to bring innovation. Accessibility and providing unobtrusive information can be named as two major advantages in improving our mobile interaction, nevertheless a great number of other opportunities come up, e.g. measure body data, new secure authentication methods (gait-based [3], temperature, blood pressure and other biometric methods). Smartwatches provide the benefits of being able to save time and making processes more efficient and easier [6], however, earlier studies have shown that users were still confused about the real benefits of a smartwatch [2].

Most smartwatches and wearables contain sensors which for instance have the ability to tell a lot about activity, health or location and therefore contain a lot of data about one's wealth, identification – data that reveals a lot of someone's privacy [1]. As the health sector is a strong driver for selling smartwatches, those health data raised the interest of insurance companies into those devices. The flood of hyper sensitive information opens many new challenges relating to privacy and security [5]. To answer the questions of whether or not the users recognize the possible benefits from using smartwatches, and to assess their thoughts about privacy when it comes to smartwatches, we conducted two focus groups.

Procedure

We performed two focus group discussions in December 2015, consisting of five participants each. For the first group discussion we invited five people who are in possession of a smartwatch (in the following they will be called "User") and used it for at least three months. One day after the implementation of the first focus group, a second group discussion took place with five people who were neither in possession of, nor were current users of a smartwatch (in the following they will be called "Non-User"). As an incentive all participants received 15€ for a 90-minute group discussion. Recruitment was done through advertising sheets on pin boards around the university, using the study participant portal Prometei (proband.prometei.de/) from the TU Berlin and placing classified online adverts.

First the User-group took place to gain insight on why do people buy smartwatches, and what do they expect from buying wearable devices. Additionally, the main focus of interest was on how does the smartwatch change their everyday behavior: in what kind of everyday situations does it simplify their lives and make it easier, or even worse. Finally, the discussion ended with privacy issues, opportunities and threats that come with smartwatches. As smartwatches are still quite innovative devices, we want to match the experiences perceived by the Users with the expectations, ideas and threats seen by the Non-Users. In both group discussions we engaged the participants to be active, through writing bullet points on small sheets of paper before rushing into discussion. Using that technique, we gathered opinions and important ideas from all participants – even those who might have been forgotten in a discussion. In addition, in some cases we asked the whole group to rank all their

Participant quotes

P4: "*Well for example at work, I do recognize the vibration and a quick glance is enough to decide 'whether it is important or not' and therefore I may ignore it. If the smartphone vibrates all the time, then I am so curious that I cannot ignore it, take out my phone and see 'ah it is just some SPAM or whatever'. So I safe some steps. The watch gives me a quick preview and I can check the relevance. Or when I am on my bike and my phone rings, then I see who is calling on my watch and can decide to answer or go on bike riding"*

P5: "*I do not hear my smartphone neither when it is as loud as possible nor I feel the vibration, but through the smartwatch I feel the vibration every time, and don't notice later that I missed a call or a message*"

bullet points and ideas to receive some quantitative statements between that small sample.

Criticism towards smartwatches

Both groups expressed criticism towards smartwatches. While the Non-Users were at first skeptical why someone would need an expensive device that is *not really useful due to the small screen size*, the Users were annoyed that most watches were not as sophisticated as they expected them to be, however they still stated they do not want to miss their devices in the future as they profit a lot from them and receive a great benefit. Interestingly, the Non-Users' opinion changed during the discussion as they were confronted with Users' experiences and thoughts about how they might profit from a smartwatch, e.g. receiving unobtrusive information, displaying and surveillance of health data, reminding functionalities (they thought this might be especially interesting for elderly and forgetful people). Although smartwatches are on the market for many years now, many people do not seem to be informed well about their functionalities.

Dependence of receiving information

In the information age, increasing amounts of information have to be dealt with every day. Even though some of this information might be of little value, the feeling of missing something important is, according to the participants, the reason why most use their smartphone multiple times an hour. Almost all feel disturbed by constant smartphone checking of the majority of people (including themselves); the same applies to professional contexts. People feel disturbed or unimportant if the other person is interacting with their phone. Users stated that the smartwatch helps them to overcome some of those problems in both cases, on the one hand in not missing information e.g. an important call through the vibration via the watch on the wrist (P5: "*I do not hear my smartphone neither when it is as loud as possible nor I feel the vibration, but through the smartwatch I feel the vibration every time, and don't notice later that I missed a call or a message*") and on the other hand checking information through a quick glance on the watch display, if the information is in any way important and worth it to take out the phone. The Users feel that they make less use of their smartphone and the easy access to information helps them to stay more focused on whatever they are doing. Because they can decide what kind of information they would like to display on their watch they do not feel that they get more disturbed, and rejecting unimportant information is still quicker compared to pre smartwatch times.

Privacy: problems or possibilities?

Privacy and some security concerns were mentioned by Users as well as Non-Users. Privacy for both groups is strongly related to the question if the watch is a standalone device or just an add-on for receiving information you get on the smartphone. Participants expressed that on the one hand there exists the anxiety that if the smartwatch is in the possession of an adversary one's phone can get spied on if the watch is still connected to it, and on the other hand, losing the smartwatch is not such a big deal because there is no sensitive data stored on it. Moreover, participants are concerned if through the connection of many devices in the time of internet of things one hacked device might be able to attack all others or that the connection itself is a higher risk. As a smartwatch is fixed on the wrist the participants think it is harder to steal than a smartphone. Further they expect the smartwatch might

increase privacy due to new authentication methods; however, the participants did not mention this as a benefit, because they did not use such methods and only heard of those. Rather, they think new privacy risks might arouse. For example, smartwatches could be used to harm people as they do not notice them e.g. getting filmed or their conversations recorded by a smartwatch. Gathering of health and very personal body data through the watch was on the one hand seen as very interesting as it reveals a great potential of health improvements for all age groups, on the other hand the Non-Users were concerned more than the Users about what the big companies might do with the data, and not knowing who is in possession of it.

Discussion

In this short paper, we presented some results of our two focus group discussions, which dealt with Users and Non-Users feelings, experiences and expectations regarding smartwatches. They showed that wearables and especially smartwatches have the ability to dramatically change the way we interact with the world around us and deal with the flood of information. Non-Users were mostly not able to see the benefits of using a smartwatch, in particular in the beginning of the discussion. Further, they stated that an extra device might bring more stress, as the smartphone already claims a lot of time. Although the User thought the same before having a watch, that assumption got rejected while experiencing the watch. The most important benefit of a smartwatch was found to be the support in the everyday life in an unobtrusive way. Privacy issues do not play a big role for our participants which could potentially change if smartwatches were to be standalone devices. The increasing number of connected devices worries some participants (*"everything gets to technical")*, thus technology, their opportunities (ability to ease and support our lives) and possible increase of privacy need to be explained to the people to raise adoption. For broader acceptance of wearable technology for personal health data privacy policies should be mediated simple and clear for the participants, so that they are ahead of controlling their preferred privacy settings.

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