Mood Swings: An application to track, understand and share emotions for people who need to control mood swings

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Master's Thesis
Communication and Information Sciences
Specialization Business Communication and Digital Media

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June 2014

Preface

I would like to express my gratitude to all the people who helped through this long and uneasy process of writing my thesis. It's been a long challenging time intellectually but also emotionally. I would like to thank all the participants of study for their time and effort and my supervisor Suleman Shahid for being attentive and understanding mentor, giving his feedback and guiding through the process. I am extremely grateful to Alexey Zunov for the invaluable technical help in developing the application. Further, the numerous discussions on the topic and advice on the application visuals as well as enormous moral support from Alexander Jurtan was of a great help for me and made it possible to finish this study. Finally, I was lucky to be supported by my family who eventually made it possible for me to come to this point.

Abstract

Emotions are a significant part of people life. We perceive life events and establish connections through emotions every day. However, mood is a changeable entity that is sometimes hard to control. Nowadays mood swings are affecting a large number of people and can have great influence on all sphere of life. It is estimated about 10% of the world adult population are suffering of various mental and behavioural disorders including an extreme development of mood swings and bipolar disorder (Gururaj G., Girish N., Isaac M.K., 2010). At times, it can be hard to control and understand ones emotions. Hence, it is important to keep record of emotions to be in control of them and to understand their nature. A mobile application can be a useful mobile substitution to a mood-diary in daily routine a beneficial analytical tool. A mood-tracking application designed in this paper provides support to people who need to understand and control their emotions in every day life. The initial prototype design of the application is a result of both qualitative and quantitative user research and a combination of several design alternatives corresponding to the needs of the users.

Key words: mood, emotions, tracking emotions, user interface, mobile application, user satisfaction

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1. Introduction

From the very first days of our lives every person experiences a variety of emotions. They can range from happiness to sadness, from excitement to anger. Some are hard to express verbally, some are difficult to understand and cope with. The variety of emotions expands as we grow up and gain more life experience. The emotions help us to learn more about ourselves. However, sometimes people get confused with their feelings and retire into their shell.

Studying human emotions has being a subject of interest for many years. For instance the term "melancholia" meaning a distinct mental disease can be traced back to Hippocrates' work in the 5th-4th centuries BC in Ancient Greece. (Taylor MA, Fink M, 2006). A lot of work has been done in this field since that time, however ordinary people still often have troubles understanding the origin and controlling their emotion in everyday life. Since emotions are a naturally-occurring response to a situation it's important to understand emotions and be emotionally aware in order to build healthy relationships and understand yourself better.

1.1 Target group

The problem is that even most confident and calm people can get overwhelmed with their emotions and may have troubles controlling their mood swings. This can lead to anger attacks, depression or hyper activity. The reason is that in modern society humans are a subject of a greater amount of everyday stress factors compared to hundreds and even decades ago. The heavy state of such problem has acquired its own name - "bipolar disorder" characterised as common and serious mental illness with severe mood symptoms such as an elevated mood known as mania, alternating with episodes of depression (Barnett & Smoller, 2009). Depressive periods can weaken the person's ability to live an ordinary life. Compared to other health issues, treatment of bipolar disorder is badly affected by misunderstanding and stigma. Recent research shows that as many as 5% of population are on the bipolar spectrum and those numbers are growing (Lam, Wright & Smith, 2014). In addition other than people with bipolar disorder, more ordinary people are suffering from ordinary mood swings or just have troubles understanding the origin of their emotions in certain situations.

One of the widely used ways to understand the mood swings nature, their origin and a way to master them is to track emotions (P.Perry, 2012). Mood diary is proved to be a helpful emotions-tracking instrument for coping with many emotional issues from mood

swings to dealing with depression (P.Perry, 2012). Monitoring emotions and thoughts that go along with them has proved to be helpful in understanding yourself, seeing a pattern of thoughts and moods or can reveal if feelings are related to an event or internal dialogue. Tracking mood changes is a safe way to express thoughts and feelings without fear to be exposed. Just like tracking physical conditions as blood pressure or blood test, tracking emotions can help to adopt ones lifestyle to their emotions, coping with ups and downs more easily. For a healthy ordinary person, mood diary can be a source of inspiration of how to make life happier and keep in under control if any anomalies occur (P.Perry, 2012).

However, since keeping track of any health indication require regular examinations and a high level of discipline, which ordinary people lack, healthcare industry triggered the creation of numerous digital-based tracking devices, interfaces and applications. Tracking mood is not exclusion. Using mobile electronic devices for tracking health statistics and keeping emotional record can be much more effective, since the recordings can be made easier, more regularly and are made in a more natural environment compared to a stressful therapist visit. Communicating mood reports with the help of mobile devices proved to be the most effective compared to other method like online diaries, automatic detection in online blogs, social network status updates (Church, Hoggan & Oliver, 2010). The accessibility of mobile devices in developed countries also leads to a clear advantage over paper mood diaries as well as adds to the quality of the data collected. Smartphone penetration reaches 72% in the Netherlands in 2013 (Telecompaper: Mobile&Wireless, 2013). It also makes possible not only collecting data about mood, but also make primary automatic analysis of the data by the smartphones.

1.2 Scope and relevance

This thesis focuses on the people who need to be aware of their mood changes, their origins and want to take control over their emotional health in everyday life, without visiting a psychologist regularly. The thesis is aiming to examine the information that those people require to fulfil their needs. As a result a mobile interface was developed that should target these needs and create a better tool for solving a problem of mood changes. Using mobile technologies in healthcare is not a new phenomenon. Recent studies shows that the variety of mobile applications exist that aim presenting, recording and analysing mood. However, the majority of them are developed without scientific background and are not supported by a scientific research and therefore cannot guarantee

the qualified help to their users. Moreover, some of them are lacking the engagement technics (Church, Hoggan & Oliver, 2010) to persuade the user recording his mood on a regular basis, which leads to an irregular data collection and inconsistent analysis of the mood data by the applications, therefore ineffectiveness of them. Given the steadily growing popularity of social mobile applications and smartphone social functionalities, sharing moods through a mobile device can be a factor that increases the engagement of the user into the mood tracking procedure.

Therefore, there is a need for a well-designed interface to support tracking emotions that would engage users and encourage using it regularly. This leads to the following research question:

RQ. *How can a mobile application make recording, understanding and controlling ones emotions an engaging and regular activity?*

The objective of the thesis is to analyze how to improve and stabilize the emotional health of people with the help of mobile persuasive technologies. This thesis broadened scientific research on how to raise the awareness of one's emotional health through analyzing, understanding and controlling their mood.

The answer to the research question was provided through researching and developing an application prototype and further testing iterations of the interface in order to obtain results. This was completed by the means of the diary study with following qualitative and quantitative data collection and analysis.

The current thesis add to the practical knowledge in the field of self-tracking and mood tracking mobile applications in particular. The paper might be of interest for the mobile application developers, user experience designers and people doing further research in field of mobile user experience, emotions and mood tracking. The results may provide insights organisations that operate in the mobile development industry, study quantified self methods or research ways of improving emotional intelligence.

1.3 Overview

This thesis is structured as follows. Chapter two introduces the existing theoretical framework regarding emotion tracking, self tracking technologies and mobile technologies related to the study The third chapter provides methodology of the user study. Further the considerations for the final design will be discussed. The following section covers the design section. Chapter six describes the results of the final prototype

design test. The paper closes with and the conclusion and discussion section, describing the limitations of the study and possibilities of further research.

2. Existing applications

The list of the smartphone applications for mood tracking is quite long. This might indicate demand in those on the market.

All the existing applications can be grouped into several categories. The first and biggest category provides a limited functionality of inputting the current mood, often using a limited simple scale of moods and viewing the history of mood check-ins of the past (e.g. Mr. Mood, iMoodJournal, MoodMe, MOOD) sometimes with a possibility to record notes and current thoughts (e. g. MoodTrack.com, Magic Mood). Another category of application involve the functionality of sharing mood. There are applications enabling users to do it anonymously (e. g. Mood – Share your mood) or openly within their social cycles (e.g. MoodPanda, Moodswing, InFlow, Facebook). Next category includes applications with several scales to track, such as not only mood, but energy, stress level and others (e.g. InFlow, T2 Mood Tracker) Finally, the last group of applications involves professional help of the specialist through the application (e.g. TalkSpace) There is also a number of mobile applications that include recording mood as a functionality of a bigger self-tracking applications together with weight, nutrition, medication and exercise tracking (e.g. TracknShare)

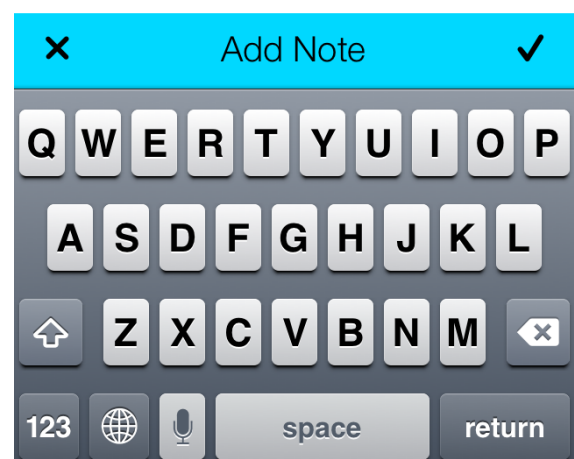Having a terrible headache!

Figure 1 Mr. Mood

Figure 2 Magic Mood

Figure 3 Mood – Share your mood
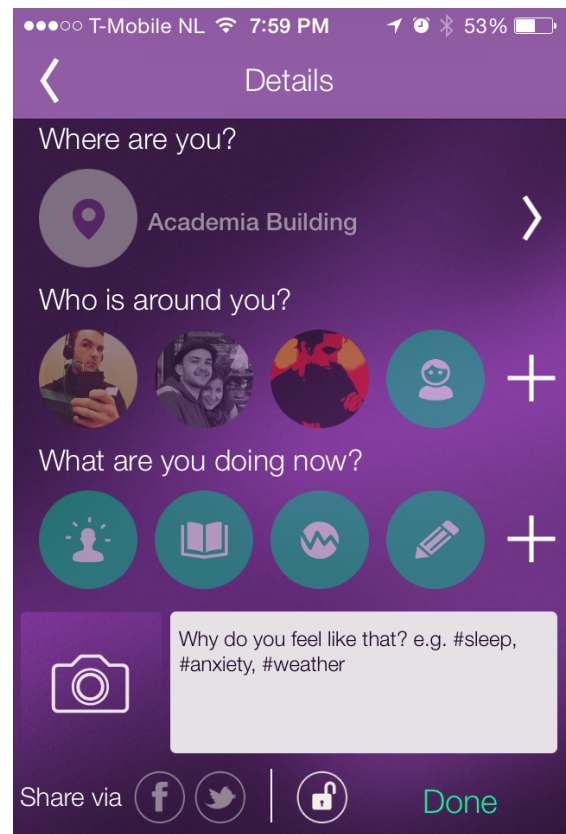
Figure 4 InFlow
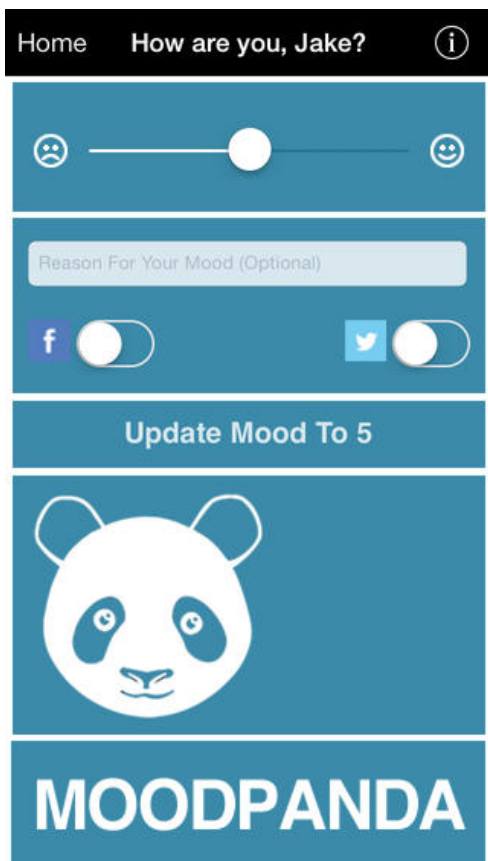
Figure 5 MoodPanda
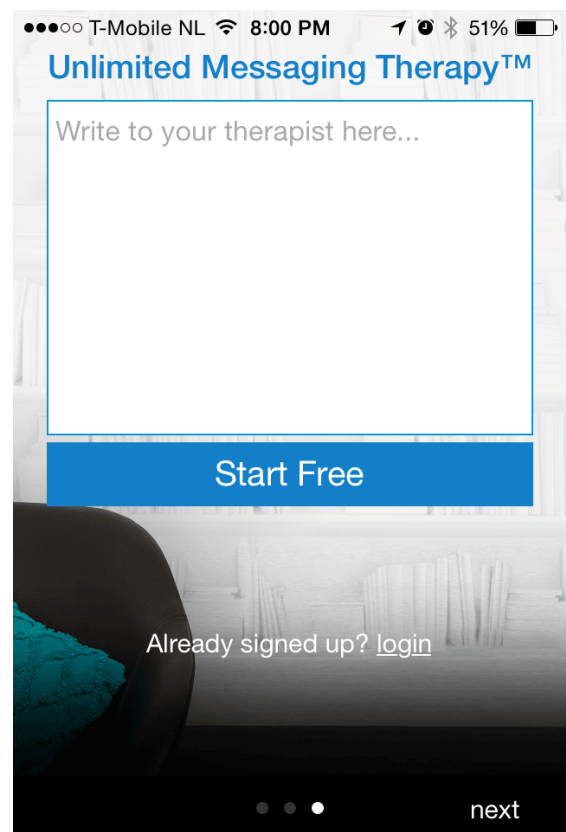
Figure 6 TalkSpace

In spite of the variety of the mood tracking applications, the quality and functionality of them are not consistent. A lot of applications have been developed with a commercial approach without scientific background. Therefore, majority of them do not intent to solve the problems of the users, rather than having an entertainment purpose. Developing the application with a scientific background eliminates unnecessary functionalities of the application, focusing attention of the user on research proved important functions of the application. This enables, consistent usage of the application, user engagement and satisfaction from using the application therefore improving effectiveness and quality of data collected and analysed by such an app. Finally, the main purpose of scientifically developed application is to help user solve their problem controlling mood swings, while commercial applications aim to attract as many users as possible to gain the commercial benefits from the amount of users.

3. Theoretical framework

With the rapid development of mobile application quantitative measurement of different aspects of human life including emotions has become a trend not only among scientist, but also among ordinary people. Therefore, academic studies in this area, digging into phenomena of recording and analyzing personal human data received a new strong impulse and relevance. Quantified self is an emerging field that promotes collecting data about person's daily life with the help of technologies (Swan M., 2013). Self-tracking allowed collecting biometric information about daily activity, sleep, diet and mood on a regular basis and derive conclusions from that data that may improve health and wellness of a person (The Economist, 2012). Collecting health data regularly may prevent progress of many illnesses as well provide a personalized medication for people (Swan, 2012) Tracking mood is not an exception. Recording mood daily, just as tracking biometrical parameters, helps to reduce the risk of mental disorders. (Bush, 2003) Additionally, regular mood recording may help people to understand the origin of their emotions and lead to self-realization and stimulate needed behavioral change in ones life. (Hattangadi S., Viswanathan M., Deshpande S., (2010)

However, since writing down emotions, analysing and interpreting results requires high level of discipline which ordinary people lack, using a smartphone application can be a good base for studying human emotions and behaviour. Moreover, given their role as personal communication devices, mobile phones are a natural source for sharing and communicating moods with other people. Hence, this study aims to explore the following research question:

RQ. *How can a mobile application make recording, understanding and controlling ones emotions an engaging and regular activity?*

3.1 Understanding and controlling emotions

Mayer J.D. and Salovey P. (1990) proposed that understanding and emotional self-control are essential skills contributing to Emotional Intelligence. Understanding the nature of emotions and controlling them can be reached through self-observation (Mayer J.D. & Salovey P., 1995). A study supporting this theory, showed that the group of US college students who were asked to perform a self-control exercise by keeping a diary of their mood aiming to improve mood during two weeks showed significant improvement in self-regulatory capacity compared with the no-exercise control group (Muraven, Baumeister & Tice, 1999).

Meanwhile, emotional self-awareness has been proved to contribute to controlling emotions and to positively influence effectiveness at a workplace and team effectiveness (Druskat V.U., Mount G., Sala F., 2013). Therefore, understanding and recording emotions should be a focus of the mood tracking interventions improving control over mental health.

3.2 Sharing emotions

Emotions are a significant aspect in both personal and social life. The main goal of emotion tracking application is to provide awareness and control over a person's mood changes. There are a number of scientific papers showing that social aspect of sharing emotions may contribute to emotional awareness and improving mental health. The hypothesis of a positive correlation between the amount of social sharing developed spontaneously after the emotional event and the degree of emotional recovery has been put to a test and proved to have a positive relation, even though not a very strong one (Rime & Finkenauer, 1998). Another experiment proved that non-shared events involved greater search for meaning and efforts to understand what happened, than those that were shared with social circles (Rime, Finkenauer , et al, 2011).

Sharing mood has been used in practical cognitive psychology as a treatment, being a part of a Cognitive Behavior Therapy (CBT) that is a form of the talk therapy addressing mental issues such as depression, eating disorders, or mental illness. A major component to CBT is tracking a patient's thought patterns to treat their disorders (Martin, 2007). Consequently, expressing emotions into words and sharing them within social circles will encourage self-understanding and emotional awareness, and therefore improve control over the mood changes.

3.3 Tracking emotions

In order to understand, control and share mood, the emotions have to be captured and tracked. Due to the intangible nature of emotions, it can be hard at times to capture them. Moreover, recording emotions require discipline and engagement of the subject. Therefore diary method self-reporting is a practical tool for tracking mood (Bolger, Davis, and Rafaeli, 2002). The diary method captures the experience in a way that is not possible using other traditional research designs (Bolger, Davis, and Rafaeli, 2002). However, diary studies as method also has its shortcomings. The diaries may lead to less reactivity than other forms of data collection because of a habituation process. For example, participants may develop a tendency to skim over sections of a diary

questionnaire that rarely applies to their experience and may omit responses even at relevant times. (Bolger, Davis, and Rafaeli, 2002). Nonetheless, another study shows that electronic diaries can be more effective in collecting data compared with paper diaries (Stone, 2003) and might eliminate the disadvantages they have. In fact the compliance rate of electronic diaries are as high as 94% (Stone, 2003). Hence, using a smartphone based diary method can be an effective way of collecting emotions and tracking mood changes since there is more technical opportunity for persuading the user to regularly update the electronic diary comparing to a paper one (Bolger N., Davis A., and Rafaeli E. (2003).

3.4 Scales for measuring emotions

However, to study the emotions and their ever-changing nature scientists would need the tools for their measurement. Several approaches have been developed and used for this purpose. A self-report responses to verbal questions in order to evaluate the participants' current state of mood is widely used in therapy.

Since recording gratitude and generally positive emotions and reflecting on them is proved to have a positive effect on the emotional state of the person (P. Perry, 2012) this thesis did not focus on the negative emotions scales, study them only in a context of general emotional scales and not separately. Therefore, since the scope of the current thesis is general emotions recording, the negative measurement scales will not be described further.

Positive and Negative Affect Schedule

The most commonly used measure of positive and negative emotional dimensions in research is the Positive and Negative Affect Schedule (PANAS) (Watson, Clark & Tellegen, 1988). The PANAS is a lexical measure developed in a North America and consisting of 20 single-word items, for instance *excited*, *alert*, *determined* for positive affect, and *upset*, *guilty*, and *jittery* for negative affect. However, some of the PANAS items have been found either to be redundant or to have unclear meanings to English speaking people from non-North American cultures. As a result an internationally reliable short-form of the measurement scale named the I-PANAS-SF has been developed. The shortened scale contains two 5-item scales: positive and negative. The scale was proved with internal reliability, cross-sample and cross-cultural invariance. For Positive Affect items are Active, Alert, Attentive, Determined and Inspired, with reported internal consistency reliabilities between .73 and .78. For Negative Affect, items are Afraid,

Ashamed, Hostile, Nervous and Upset, with reported internal consistency reliabilities between .72 and .76. The I-PANAS-SF was developed for research situations where either time or space are limited, as well as for use in international samples where English may not be the mother tongue (Thompson, 2007).

State-Trait Emotion Measure

An alternative measure of affect is called STEM, meaning State-Trait Emotion Measure. This one of the newly developed scales consists of five positive and five negative emotions including anger, anxiety, attentiveness/energy, contentment, envy, guilt/shame, joy, love, pride and sadness. (Levine & Xian Xu, 2005)

Circular Mood Scale

Another research by Rolf G. Jacob and others (1989) presents an alternative method of assessing and quantifying qualitatively different mood states, the Circular Mood Scale. This method is suitable for self-monitoring of mood and does not require the assistance of the researchers. It involves two parallel assessments, each based on one of two models of mood: the circumplex model and the prototypical model. In the main assessment, subjects record their mood states on a circular visual analogue scale, which can be scored for both quality and intensity of mood. The recordings on this circular scale are supplemented by an additional assessment in which subjects monitor a limited number of mood prototypes. The Circular Mood Scale was tested on four classes of mood stimuli: verbal mood descriptors, music, pictures of facial affects, and the subjects' own mood during hourly monitoring of mood for 2 days. Based on the results of the tests the Circular Mood Scale has proved to have acceptable reliability and validity (Jacob R.G., et al., 1989)

3.5 Self-tracking and mood-tracking application challenge

Since a human feelings and emotions are unreachable for objective examination by their nature, it follows that measurement of mood depends to a large extent on communication by the subject to the observer (Zealley & Aitken, 1969). Therefore, the challenge in tracking human emotions lies not only in the scales and methods, but also instruments the scientist can use.

In order to eliminate destruction and influence of the observer and to embrace the most natural atmosphere for tracking emotions and feelings scientist turned their efforts towards the technical support of computer-based applications. One of start-up project from the MIT Media Lab called Affectiva, is working on software that trains computers to recognize human emotions based on their facial expressions and physiological

responses. Another company called Beyond Verbal is working on a software tool that can analyse speech and, based on the tone of a person's voice, determine whether it indicates qualities like arrogance or annoyance, or both (The New York Times, 2013).

However, using software based emotion tracking systems can create other obstacles in conducting legitimate studies. Since this thesis is focusing on the mobile application software as an observer and recorder of human emotions it's important that the communication process between the user and the mood-tracking mobile application is transparent, and does not have significant destructions. In this sense the user interface experience and application content play an important role in assuring that the interaction between the user and the application is clearly provided.

3.6 Mobile technologies

In the recent years, the use of different mobile products such as mobile phones and Personal Digital Assistant (PDA) devices has increased rapidly. The number of smartphones in use worldwide is estimated by The International Telecommunication Union to be over the 1 billion mark (May 2014). Moreover, ubiquitous computing, computers, which can exist in many different forms - laptop, tablets, terminals, phones and that are used in various locations, situations at anytime (Consolvo et al. 2002) has become a popular topic in research and design areas. Nowadays, systems are more and more aware of their context of use. (Dey and Abowd 1999; Weiser 1991) In order to be useful especially for self-tracking, ubiquitous applications need to be designed so that the user's needs and preferences are fulfilled and the context of use have been taken into account (Consolvo et al. 2002)

Given that the use of mobile phones and smartphones is a commonplace, using mobile devices as a tool to improve self-awareness and control of emotions will feel natural for users even in public contexts. Moreover, using technology and mobile technology in particular has been already used in a number of studies related to mental issues (Flynn, Taylor, & Pollard, 1992; González, Costello, Valenzuela, Chaidez, & Nuñez-Alvarez, 1995). Hence, using mobile technologies has a number of advantages to be used for creating a mood-tracking tool for everyday use.

3.7 Overview

A number of factors influencing developing a mood-tracking intervention has been discussed in the current chapter. Initially the importance and influence of understanding

and controlling emotions on mental state of a person was discussed. Additionally, the social sharing factor was revealed to play a significant role in improving the emotional state of a person. Further, the diary method was identified as a suitable for capturing emotions especially when integrated with technologies. Supplementary a number of mood evaluating scales and their features were discusses in relation to daily mood-tracking. Finally, the prospective of tracking emotions with the respect to the mobile technologies was reported. This all leads to the following research sub-question:

1. Does the content of the application, its functionality and interactions affect the way people use the mood-tracking application?

2. Does social sharing of mood affects the frequency and quality of use of the mood-tracking application?

3. Does entering information about user's mood in a clear and simple way, using a mood scale, that reflects the actual emotional and energy state of a person influences the awareness of his or her emotions?

Those questions were address in the current research thesis.

3.8 Study objectives

The main objective of the study is to create an effective and convenient tool for self-tracking and understanding mood. The future design will aim to increase the emotional self-awareness and create support in having control over emotions. The following research aims to broaden the applied science in the area of mobile application user satisfaction and therefore research *how can a mobile application make recording, understanding and controlling ones emotions an engaging and effective activity*.

The paper might be of interest for the mobile application developers, user experience designers and people doing further research in field of mobile user experience, emotions and mood tracking. The results may be also applied to organisations that operate in the industry or that have other similarities with the mobile product developed in the study.

4. Methodology

In order to gather comprehensive insights about information users need for mood tracking and controlling emotions, a user study was conducted. The gathered insights will serve as a basement for designing an application to fulfill the requirements of the users. During the user research a variety of research methods have been applied: 1) written diaries including screenshots, photos and sketches, 2) follow-up online questionnaire. This set of methods was selected in order to understand different aspects of using the potential application, study and develop various insights on its user-interface design and functionality. In fact the diary study results allowed collecting a large amount of self-reported data over a period of 2 weeks, while the follow-up questionnaires provided rich data about required features of the future application and usage of its functions.

4.1 Requirements

An existing application was used as a tool to gain initial insights on how to design a new application for users. This provided the possibility to examine and evaluate the basic functions present in all categories of existing applications, to observe the user interaction with the present interface and priorities the functionalities of the application for the future design based on an applied study. The existing mood-tracking applications is intended to use as a tool to gain insights on how to design a new application usable to track emotions and fulfilling the needs of the user. In order to choose the existing application for the initial user test the following requirements were set:

- The application should be available for the users to download on their smartphone;
- The application should include the biggest variety of functionalities available in it's design (record the emotions, history of records, taking notes or pictures along with the mood record, recording energy, depression or any other additional scales, primary analysis of the data collected from the user records);
- The possibility of social sharing functionality in order to study
- The access to back data is desirable.

As a result, the InFlow application was chosen above other available applications as meeting all the requirements above and having additional functionalities interesting for user test. In addition the access to the back data of this application was s available as well as extra possibilities to record place, activity and friends together with the mood record. Finally the application has a developed possibility of social sharing of the records with

friends and community functions, such as commenting, and supportive reacting to the friend's check-ins, that is of a high interest for the current study. Eventually, the InFlow application has been chosen for user test as the one that has the most understandable interface for an inexperienced user with a maximum functionality.

4.2 Specifications

The application determined for the initial user test has the following main functionalities: recording mood and energy levels represented with the scrolling scale of seven smilie faces (**Figure 8**). The mood and energy representation is also doubled by the verbal interpretation of different mood states. The application mood recording process consists of two steps and includes the possibility to add place, activity or people to the record as well as note or picture (**Figure 9**). These functionalities are optional and can the user can avoid filling them in. Additionally the record can be shared through the social networks such as Facebook and Twitter with the friends of the user, but has also a possibility of making it private. The amount of records by the user in one day is not limited. As a majority of the mood-tracking applications, InFlow provides the mood chart representing the history of the mood records (**Figure 12**). The home screen (**Figure 7**) of the application provides access to four extra functional sections of the application: Friends, Bests & Worsts, Tips, and Predictions. The section Friends directs user in the feed of his/her friends mood records. The application provides the possibility to comment on the activity of friends as well as congratulate them on good and support on negative mood states though pressing a relative button or sending a song from the music data base of the application. Bests & Worsts section provide insight on the places, activities and people that the user feels the best and the worst with (**Figure 10**). This information is an automatic analysis of the user records. The Tips section provides suggestions on what place the user can visit in order to improve mood. This section is built based on the data collected from other users of the application and the geographical location of the user. Finally, the Predictions section presents the insights on how well the user is aware of what makes him/her feel good and what not. After every mood record the application questions the user between two options about what he thinks makes him feel better and automatically compares that information with the actual statistical result of the user mood records. This comparison reveals how conscious the user is about things that make him/her happier.

As described earlier InFlow application has one of the most wide range of functionalities and suited best for the initial user test requirements serving the purpose of gaining

insights on how the content of the application, usability and interaction affects the way people use the mood-tracking applications.

Figure 7 Home screen of InFlow application.

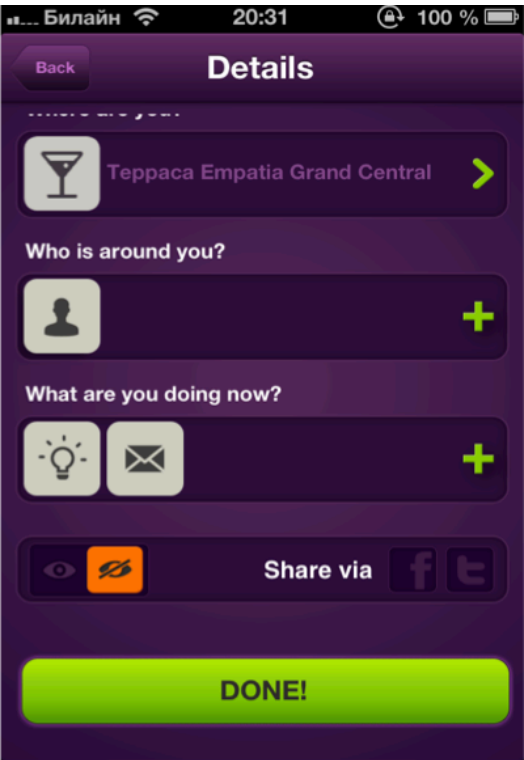
Figure 8 First mood-record screen of InFlow application.

Figure 9 Second mood-record screen of InFlow application.

Figure 10 Bests& Worsts screen of InFlow application.

4.3 Participants

A total of 30 English-speaking participants from several European region countries and USA took part in the study. The variety of participant allowed us to study the behavior of representatives of different cultures, still saving the priority of the target audience of the application. Participants were recruited against several criteria, including gender, age, education, characteristics of the device they were using the application on and their experience with their device. These criteria were guided by both previous research and the portrait of an active users of the mood tracking applications according to the data provided by the Google analytics of the InFlow application.

Of all 30 participants who took part in the diary study, 53% (16) were men and 47% (14) were women. They ranged in age from 18 to 35, with the following distribution across the different age ranges: 18-24 (73%, 22 people), 25-35 (27%, 8 people). All participants were divided into two categories: one (67%, 20 people) used a pre existing mood tracking application during the experiment. The second category (33%, 10 people) of participants completed the experiment by keeping the mood diary on paper and providing insights for the future interface creation. All the participants from the first category owned an apple device: 3% (1) owned an Apple iPod touch, 57% (17) owned an Apple iPhone and 7% (2) owned and Apple iPad. All the participants indicated themselves as experienced users of their devices, which means they owned their gadgets for more than three months at the time of the research.

After the diary study had been completed, only data of 25 participants was valid and relevant for analysis: 67% (20) of participants, who used the application on their device and 17% (5) of participants who participated in paper-diary research.

4.4 Procedure

In this section, details are provided about the research methods that were used.

Prior to the study the participants were divided into three groups. Two of those groups were using the InFlow application on their mobile device, while the other group was keeping the paper-based mood reflective diary. However, all the three groups study contained two stages namely: diary-study and a post-questionnaire stage. All the data was collected anonymously.

Each participant in each group was contacted periodically to check on their involvement and to remind filling in the diary with the help of e-mails or short text messages in order

to exclude the missing values and missing information in experiment.

4.5 Written diaries

4.5.1 Group 1 and group 2

The 20 participants were asked to download the latest version (version 2.49) of the mood tracking mobile application for iOS called InFlow chosen for the initial user study on their Apple mobile devices from the Apple App Store and use it daily two-three times a day for the period of two weeks. In order to study if social aspect of sharing mood influences the behavior of the user in the mood tracking applications the participants with the mobile device were divided into two groups. The first group of 10 participants was however asked to connect their profile in the application with their Facebook social account in order to share their mood with friends and to see their friends updates as well. While the group 2, was told that they are free to choose if they would like to connect their profile in the InFlow application with their social account in Facebook.

To uncover all of the activities that are carried out while using the application and to gain knowledge about possible improvement areas, participants were asked to complete a written diary whenever they used the application over the two-week study period. The subjects were given a choice to use Apple Notes application for recording written diary entries or to use the Evernote application template. Both applications were chosen since they are available for free on their mobile devices and can be easily collected via e-mail from all the participants. The diary questions were designed to record experience, feedback, thoughts, insights, ideas and problems the subjects were coming across while using the application. The diary questions included a set of open-ended questions about usefulness and enjoyment of the application functions and were meant to guide the participants in making their notes. They were also encouraged to share screenshots or any other relevant application information.

4.5.2 Group 3

For the reason to gain insights on the application possible improvements and ideas for extensions 10 participants in the 3rd group were asked to keep record of their mood during 2 weeks using diary specially designed for the experiment. Those participants have never seen any mood tracking application before and therefore are not biased by its functional possibilities, existing designs and restrictions. Hence, they could provide valuable design insights for the study.

The participants were given the choice to fill in the printed on paper diary or to fill it in digitally with the help of template created in Evernote application and shared with the subjects online.

The participants were told that the mood-tracking smartphone application is in the development stage and that they can take part in its design by participating in the study. They were asked along with filling in the mood diary to keep notes of their suggestions, ideas or thoughts related to the format of recording mood and emotions. They were asked to be creative about the form of recording mood and emotions as well as other information entered in the diary. There were no restrictions regarding the format of keeping the records and the participants were allowed to use both text and graphical materials as pictures, sketches, screenshots and etc for filling in their diary entries.

The six primary questions suggested in the diary template that were meant to guide and were intended to put the subjects into the environment of thinking about the mood and emotions tracking encouraging their creativity. The questions were collecting information about current emotions, reason of feeling this way, venue, activity, people around and desire to share the entry with friends. Those questions were suggested as the primary and were based on the existing fields used in the current version of the application.

4.6 Follow-up questionnaire

The diary-study was complemented with the follow-up questionnaires for all participants in three groups. However the survey for the first two groups differed from the survey distributed among the participants in the third group. The questionnaire aimed to collect data about particular function of the application and participants' experience with it. As for the third group of participants, the questionnaire was used to understand and learn about their attitude and user-impressions about the imagined by them mood-tracking application. Both questionnaires contained open-ended together with multiple-choice questions.

5. Results

Once the research was completed, 243 of written diary entries and 25 valid post questionnaires together with the 23 screen shots and 1 sketch had been collected. The analysis has been conducted in several stages: 1) qualitative analysis of the written diaries, 2) quantitative analysis of the post questionnaire and 3) triangulation of insights to develop a set of conclusions.

Over the two-week period, the participants in groups 1 and 2 had reported 914 incidences of the application use with an average of 45.7 per participant (min=18, max=96, SD=21.4). Followed from those numbers it can be concluded that there was a range in the number of application use incidences reported by each participant. It has to be noted that due to limitations of the diary study approach, it is unlikely that these numbers reflect the exact volume of actual application frequency use, but rather reflects the lower bound on their true usage.

While the two-week long paper-based diary research for group 3 has resulted in collecting data form only 5 participants, since the rest of the results were not valid and cannot be considered for further analysis. This result in 154 diary entries reported with an average of 30.8 per participant (min=18, max=39, SD=7.38).

Data collected with the diary study reports and questionnaire open questions was anonymised by assigning each participant with a unique ID starting with P-1 (using a different number for each participant) up until P-25.

The diary study data together with questionnaire open question responses were analyzed by using the constant comparison technique of the Grounded Theory approach for qualitative analysis (Christine J. Yeh, Arpana G. Inman, 2007). The data was read, selective-coded in terms of core and categorized to produce theoretical sampling, leading further to finalized theories.

There were six core categories that were found from the analysis, which will be used in reporting the user-interface issues emerging for the user study participants:

- Mood and energy: representation and expression;
- Additional information: reasoning of the mood;
- Tips and suggestions section: purpose and possibilities;
- Social aspect of the application: friends adding, interaction and sharing;
- Prediction and rating system: aim and development;
- General feeling from using a mood-tracking application;

5.1 Group 1 and group 2 results

Mood and energy expression

Quite a significant number of participants reported about their experience with the check-in process in the emotion-tracking application and the mood and energy expression in particular. Various aspects both positive and negative have been described in the diary entries of users including representation of the mood and energy, variety of options, linguistic and visual impression of emotional options.

In fact, a number of users noted that their mood and emotions often cannot be expressed within the scale that the application offers at the moment or does not match the suggested mood and energy terms.

> *Faces available don't always represent the way I feel, leaving much to desire for the way I would like to express my mood and the way I feel. Suggestion: Maybe use a slide-drag button (from 1 to 10. Being for example 'lower energy level') and let the app create a face depending on the amount given (mood, energy, etc.) (P-3)*

> *There are a few issues with English – sometimes just using a different word would be a bit better, other times there is a spelling error. Overall it's pretty minor and the English is flawless, but I caught a few mistakes here and there. Particularly, I think the descriptive words for describing how much energy I have could be better – currently the words do not perfectly reflect each different energy level. (P-11)*

It was also frequently registered that the users would prefer a different or greater emotional scale. Moreover several of them indicated that this could influence their activity and involvement into the application.

> *Feeling in-between emotions would be nice. More emotions, greater scale. (P-2)*

> *I was often not sure what to put down, which often made me reflect on how I was feeling. I think this is something that is good about this application. However, the options given are not entirely effective to be able to portray the reality of how the person is feeling. It is a difficult thing to do, and a difficult tool to get people to use constantly, especially if it tells people how THEY are doing. (P-3)*

In addition it was noted that the colors indicating different mood states not always match the expectations of the user about the emotion of the color. Therefore few participants claimed that they would enjoy the customization functions to adopt the colors of the emoticons and interface according to their taste and needs.

> *The colors of the energy confused me. I would think that dark green is the highest energy and yellow the lowest. Even better let people choose their own colors. Energy might have a different color for people. (P-5)*

Would like to be able customize the interface and emoticon colors. (P-9)

What is still confusing is the energy colors. For me dark green would have been highest energy and yellow lowest, but it's the other way around. (P-13)

Apart form the reports that the scale of the suggested emotion options is not enough. Several respondents informed that emoticons or words sometimes are not the best way to convey their mood state. Two participants offered a numerical scale as an alternative way to submit their emotional state to the application. Another participant claimed his confusion between mood and energy.

I am visual person, but I prefer to grade my emotions and energy (from 1 to 10 for example) and it would be easier to navigate between numbers than smiles.(smiles can go with grade or something).and for me energy doesn't associate with eyes, so I really prefer numbers (P-7)

I sometimes feel that there is not appropriate option to describe my feeling. What I mean is that the names given to certain emotional/energetic states do not comply with my ideas of those feelings. For instance, I would say that depressed is worse than awful and great and excited are not necessarily within the same emotional unit (one is general while the other is more situation specific). Also, calm and relaxed (to me) are not necessarily related to energy, but more to a mental state and thus I could not find an appropriate energetic state between tired and active. (P-14)

Don't understand the difference between mood and energy. (P-4)

However, just one participant mentioned the existing variety of options to express the mood and energy in the current version of the application, both visual and verbal, as a positive characteristic of the application.

What I really liked is the combination of mood and energy faces and text. At first I have selected the mood only based on the faces. Then I thought: 'Hm, different people can mean different things looking at the faces!' Immediately after that I found out the texts describing the mood and thought that it is good to be based on them. (P-16)

Simplification of the application interface and check-in process was named twice as a desirable attribute of the application in the experiment session.

The check-in process at first is confusing; I expected more options (P-17)

Entering additional information

Apart from mood and energy expression, the function of entering other additional information was tested. A significant number of participants of the experiment mentioned in their records that entering this extra information, such as what is the user's current activity and surrounding can be also improved in several ways. Often mentioned in the records that the check in process is not so obvious and transparent and therefore leads either to wrong interpretation or wrong reasoning of the current mood state of the user.

In fact, it was registered several times that the participants wished that the application had a more understandable or friendly activity and friends adding procedure.

Just discovered that you could add more then one activity, from now on I'll be doing this more, like that function. (P-9)

The other thing that would really improve this app would be greater specificity in the activities. Often I felt like I had to choose an option that was kind of like my current activity, but not quite.– making adding you own activities more obvious would improve it a lot. (P-11)

Yes, I felt confused when it asked me where I was, and I was driving. I also was confused when I was thinking about someone and felt happy – would I check in with that person as being present? (P-15)

A significant amount of test-users noted that they miss some additional functions in the screen of adding extra information. In fact, three of the participants mentioned missing the opportunity to add the reason of their mood or energy level such as some short "hashtag" word.

If consider this app as a mood-tracker would be nice to have the opportunity to write the reason of feeling this or the other way. (P-7)

Finally, maybe some spot where you can tag something that is on your mind that influences your mood? For example, when I am working, my mood can be good or bad. The activity of work does not influence my mood so much. But if I'm working and I am looking forward to seeing my girlfriend in a couple hours, then I am going to be happy and energetic. If I am working and I'm in a big fight with my girlfriend, then I'm going to be sad. So I noticed that the activity I am doing at that moment doesn't always reflect my current mood, rather, it is other things going on in my life. It would be nice if the app could capture that. (P-11)

I would love to see the opportunity to record also the reason why I experience these emotions. The best if it's some short way to record it, but not the whole explanation in 1000 words… (P-18)

Moreover, one respondent mentioned the fact that the user cannot edit his own records submitted in the application, among negative characteristics.

I checked in and misspelled the location, but it is not possible to edit any entries. (P-5)

However, some of the participants were also glad with the additional information options. One respondent emphasized flexibility of the application in this direction.

The fact that you can add anything that is not preset: places, people, and activities. It really gives this app the necessary flexibility. The fact that you can add people from your Facebook even if they are NOT using the app! Great stuff there too :) (P-14)

Suggestions and tips section

A number of notes recorded by the experiment participants were also devoted to the prediction section and suggestions function in mood-tracking applications that offers the user the options of activities and places in order to make them feel better. The both functions received a lot of critics during the user experiment. For instance, understanding of this feature of the application proved to be a difficult task for the users. Some of them realized the value of this function, but still reported that they could not use it in a helpful way.

> *I am not fully satisfied with emotional side of using the application, because I usually expect*
> *either the rewards (like in nike running) or useful tips (you feel sad-here are 3 things from bla-bla guy to cheer you up if you do them - go hug someone, go plant a tree and so on). I understood that this function is there but it is available only with paid account. (P-7)*

One of the respondents offered in their feedback that the application can offer not only the places and activities but other values, such as videos that can improve the mood of the user.

> *It could suggest things to do based on previous mood states that were good to improve mood. Or search for videos on YouTube that interest you/cheer you up. (P-9)*

Another suggestion from the experiment participants included more concrete tips in connections with date, time but not only location.

> *Get a tip should be more precise and should work with actual date and time, example today is a holiday and the museum is closed but I want go. Or suggest movies, which are playing that evening. (P-2)*

> Only one record reported the full satisfaction with tips functions during the experiment.

> *Like the tip function where you can get tips where to go or what to do, found bagels and beans tip useful. (P-9)*

Social aspect

Since the social part of the application is a significant distinctive feature of the mood-tracking application a number of records was devoted to this aspect. The social features of the mood tracking application could play a curtail role in the user's satisfaction and level of engagement in application, since number of studies (Pennebaker & Susman, 1988; Rime, Finkenauer, et all, 1998) claim the possibility relation between socializing activity of a person and his mood as well as relation between social activity in mobile applications and frequency of using this application.

Generally, a substantial number of records were extremely positive about the "giving a gift", "hugging" and "giving a hi5" feature of the application.

Like the Hi5 and hug things (P-9)

I like the fact that people can reply on a mood with a 'gift', enjoyed the song Julia sent, lightened my mood a bit (P-9)

I do enjoy the exchange with my friends. Send them songs when they need motivation to study or some relaxing tunes for when they are chilling at home. (P-13)

The feedback system is really nice, the hi5s and the hugs as well as the comments. Then the sending of pics and songs is just the cherry on top!! :) (P-14)

The mood graph is a really nice feature of the app. The possibility to react to friends check ins with comments is good, the possibility of sending them songs is simply awesome. This way you can send someone a song they like if they`re down or you want to excite them. (P-1)

However, the infrastructure of searching and adding friends could be realized better, according to the experiment results. Frequent records testified that it was either confusing or impossible to find friends within the application if they are not using Facebook.

Didn't get how to find friends without Facebook. Do I have a nickname in the app? If yes, what is it? Do my friends have nicknames to look for them? (P-7)

Right when I started the App for the first time and I couldn't add friends via email or Nickname. I had to connect it to Facebook, which I didn`t like at all. If I wasn`t taking part in the study I`d have deleted the App right away. (P-1)

I will be so happy if the app would allow searching friends within the app, not only Facebook based. What if my friend doesn't use Facebook, but I want to connect. My Mom and Dad for example? (P-18)

Additionally, the restriction of adding friends only through Facebook caused frustration and doubts from the users.

I also had concerns with using Facebook Consent to login. I would like to login without Facbeook. (P-15)

In addition there are records in evidence of errors in the process of adding friends and managing friends through Facebook connection.

Adding friends seems buggy. Still wants to add friend after adding. And some don't show up in my News feed. (P-2)

Over memorial day weekend I decided to delete my Facebook app and only keep Facebook messenger. I didn't realize that it meant it would log me out of my InFlow app. I forgot about it and after 2 days noticed that the app was not connected. This should be looked into! (P-15)

One user also claimed that choosing the circles or group of friends to share your current update in the application would be a helpful function.

> *I felt sad when I want to share my mood but not with all people but only some friends, but there is no option to choose them (P-18)*

In addition one of the study participants reported that the application character, called the "Happy Guru" was instantly in the friends list of the user, which was confusing.

> *About happy guru. Having instantly friends is a little strange feeling. (P-2)*

Finally, a lot of research respondents, however, said that the social component of the application in general is a valuable functionality and definitely adds enjoyment to using the application.

> *I like seeing how my friends are doing that are far away and I feel like this is a whole new platform to exchange and stay in touch. It may seem stalkerish to know what people are doing and how they are feeling, sort of like twitter, but it is not twitter. It is more harmless and less popularity. (P-13)*

> *I enjoyed the social component the app brings the most. It`s nice to see how your friends are doing, even while your are not around. (P-1)*

Nevertheless, some of the users would still prefer to add some certain social characteristics to the application, such as an opportunity of mood graph comparison with their friends.

> *I would like to see my friends graphs for comparison, but that is not a feature :(mine is starting to draw a nice picture for me and I find that quite exciting. (P-13)*

Best and worst and predictions

Additionally users' dissatisfaction was registered in connection with the rating screen (**Figure 11**).

Figure 11 Bests & Worsts screen of InFlow application.

This section of the application caused a noteworthy misunderstanding. At least six study subjects pointed that the rating section is confusing and its purpose was not clear.

I was confused why I had to wait to "unlock" certain areas of the app like "best and worst". Right now, 50% of my screen is "locked" ‡ I can't use 50% of the features of the app for some reason. See image. (P-15)

Best and worst: the system of rating is not understandable for me (arrows, numbers). Predictions are also not clear. (P-7)

Not very clear why you should compare where do you feel better in the end of check-in. What's the purpose? Also asks the same combinations (P-8)

The predictions are a little confusing. A lot of predicting and I still do not really understand why. (P-14)

I don't get the green loading bar in the beginning in my predictions. (P-2)

Predictions you guessed and you've got what is meant by that? (P-2)

I also did not think that the 'Best and Worst' was something that really made me consider spending more or less time in specific locations or with specific people because of how much time I spend with them, whether they are higher or lower in the chart. (P-3)

However the section caused some controversial user comments about it as well. In fact, several research participants were very enthusiastic about the function. Therefore,

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personal perception peculiarities of subjects, but not the application features could trigger those contrary opinions as follows and may require a more clear representation.

> *My Fav: the Best and Worst!! I love it, my friends love it! Even those that do not have the app (and trust me its only because they all have android phones). It's nice to see what is your favorite activity, where you feel good and where you do not, and who you have a good time with and who you do not. Of course, sometimes the feeling is independent of the person there but its overall a really fun aspect of the app! (P-14)*

> *I really enjoy the best & worst ratings. HOWEVER – I would like to see why I scored this way.*
> *Example: my least favorite activity was "looking at art". I can't remember when this happened. I'd like to click on this event and see what day I checked in and who I was with on that day. (P-15)*

Several subjects reported being confused when asked to compare the places or people. The comparison function of the application even emotionally influenced one of them.

> *Comparing people is difficult and make me feel not happy. The best of … Turns into a self competition, who I am supposed to like more. (P-2)*

> *So I thought maybe it would be cool if it said how many more check-ins are needed to finally get my predictions? (P-16)*

General feeling of the application

Another category of the records collected during the experiment includes the users general feeling about the application interface and its general purpose.

The majority of the participants of the experiment, recorded that they felt positively towards the application and found it useful and helpful to analyze their own emotional swings.

> *Besides minor technical annoyances I think it's a cute app. I enjoy checking in. Sometimes it takes some reflecting on how do I feel. Am I calm or relaxed? Do I feel good or ok? I find this an interesting aspect because it makes you more aware of your current emotional and energetic state in rather random moments of the day. Otherwise you would never reflect on it. The app picks up on this and to see it on a graph is quite a different experience. (P-13)*

> *It gives me the chance to take a second for myself. And if I realize I could be better than I am right now I can try to take action to change it. (P-13)*

> *Overall, in my opinion, a very nice app! It still needs some polishing here and there but the idea is great. The networking aspect allows you to keep updated with your friend's moods and I find that much more important than keeping up to date with what your friends have for breakfast (I hate instagram). Even more, it allows the user to consciously reflect on their own mood state and energy and, by doing so, keeping yourself up to date with how you feel.(P-14)*

Several study participants also submitted their records concerning the mood graph in the application and their feelings about it. The records testify that the graph generally arose positive emotions, though some aspects of understanding the mood graph caused confusion of the users.

> *Graph looks nice, but I would find some explanation or guide useful for it. I personally didn't know what to do with it other than just enjoy it fancy swings. Tap? Explore? And what does that paid version of graph gives me? Why should I purchase? If I knew more, I would consider buying it. (P-18)*

> *Finally, the graph: it's really nice that you can track your mood and energy and that you can somehow assess how your mood and energy swings over time. Overall it gives the user a chance to evaluate their mood and energy from a larger time scope, something that is hard to do without the app.(P-14)*

> *The mood graph is a really nice feature of the app. (P-1)*

Not many records have been collected concerning the notifications function of InFlow during the experiment. Moreover the received ones are quite diverse to make any certain conclusions. For instance one respondent pointed out that some customization setting as changing the time of notification or setting the silent mode period.

> *No opportunity to set the notification/reminder time or time when you shouldn't be reminded (destructing when the reminder goes off during a meeting or smth.) (P-7)*

In addition another study participant expressed some satisfaction and pleasure about the way notifications and reminders are formulated and addressed to the users.

> *I like the way it asks me to check in, by calling me "boss" and saying "hi there" (P-15)*

Some of the respondents specified that more customization options in the interface would involve them in the application more and could influence their frequency of using the application.

> *More friends using the app. Also different Themes to adapt the appearance of the app to my*
> *personal wishes would make me use it more often. (P-1)*

5.2 Group 3 results

As reported earlier for the reason to gain insights on the application features that users might need the 3rd group participants who have never used a mood-tracking application were asked to keep a paper mood-diary and notes. The of diary data as well as the open question questionnaire replies were analyzed by using the constant comparison technique of the Grounded Theory approach for qualitative analysis (Christine J. Yeh, Arpana G.

Inman, 2007). The data was read, selective-coded in terms of core and categorized to produce theoretical sampling, leading further to finalized theories.

Primarily this group of participants was quite skeptical and did not shot big interest in using a mood-tracking application if they would be offered to. Four (4) out of five (5) people said that they would not use it themselves, however know someone they would recommend it to.

Nevertheless, when asked to imagine the functionality of the possible mood-tracking application, several participants mentioned that the simple interface and functionality of a mood-tracking application would be a priority for them.

> *The app should be as simple as possible. Maybe only colors to click on reflecting your mood or whatever. I wouldn't want to spend a lot of time on it so it would be great to do it by just one click (P-22)*

> *If I would use an app instead of a mood diary, I would want something easy and quick to use. Something that would not take much time and effort. Would be natural. (P-24)*

On the other hand, few notes indicated that some additional features to the application could make it more appealing to the users.

> *Maybe a statistic section, where users can see during which time of the day/day of the week they tend to have certain moods. (P-21)*

In addition, one of the reports included a suggestion to include social features that would provide support to friends experiencing negative emotions.

> *In case you integrate the sharing with friends option, a chat or comment function, would be nice. In case the friends are not well, you can reply and talk to them. (P-24)*

Additionally, one of the contributors even offered that the application should have some game mechanics to be more attractive to him or his friends.

> *Make it a game or something like that, than also people who are not so interested in tracking their mood in the beginning are interested in it. (P-23)*

4.3 Overview of issues occurred

As follows, all questionnaire responses were coded using a bottom-up approach and further similar recordings been grouped, to be turned into frequency distributions. After the selective coding and categorizing the diary study analysis was reviewed to triangulate the findings with those from the data obtained from the questionnaire. This analysis process resulted in a set of insights about the overall problems about the application, its user-interface, functionality and productivity. This section further describes the details of

the findings.

Nevertheless, due to limitations of the diary study approach, it is unlikely that the following numbers (Table 1.) reflect the exact volume of issues experienced by users in the application, but rather a lower bound on their true usage.

Across all the records submitted of the application use, the most frequent feedback was collected on: social aspect of the application, mood and energy scale and perception peculiarities during the checking in process and the additional information during the check in process. However, it is vital to discover, whether the reported issues are common across all study participants or if just a few participants who came across them frequently claimed them. Hence, the issues were divided into four groups (see Figure 12): issues reported 1) by few participants with low frequency, 2) by few participants with high frequency, 3) by a high number of participants with low frequency, and 4) by a high number of participants with high frequency. Therefore, social component of the application, mood and energy scale, mood and energy interpretation and best & worst

Function	Records		Positive records	Negative records	Participants	
Social component	19	21%	9	10	14	70%
Mood and energy scale	11	12%	2	9	8	40%
Mood and energy interpretation	10	11%	2	8	8	40%
Best and worst	10	11%	4	6	6	30%
Entering additional information	9	10%	4	6	7	35%
Suggestions	9	10%	2	7	7	35%
Graph	6	7%	3	3	6	30%
Application feel and look	5	6%	4	1	3	15%
Profile	4	4%	0	4	3	15%
Check-in procedure	3	3%	0	3	3	15%
Notifications	2	2%	1	1	1	5%
Predictions	1	1%	0	2	1	5%

Table 1 Top Interface design issues   section are the topics that the users reported about most frequently.
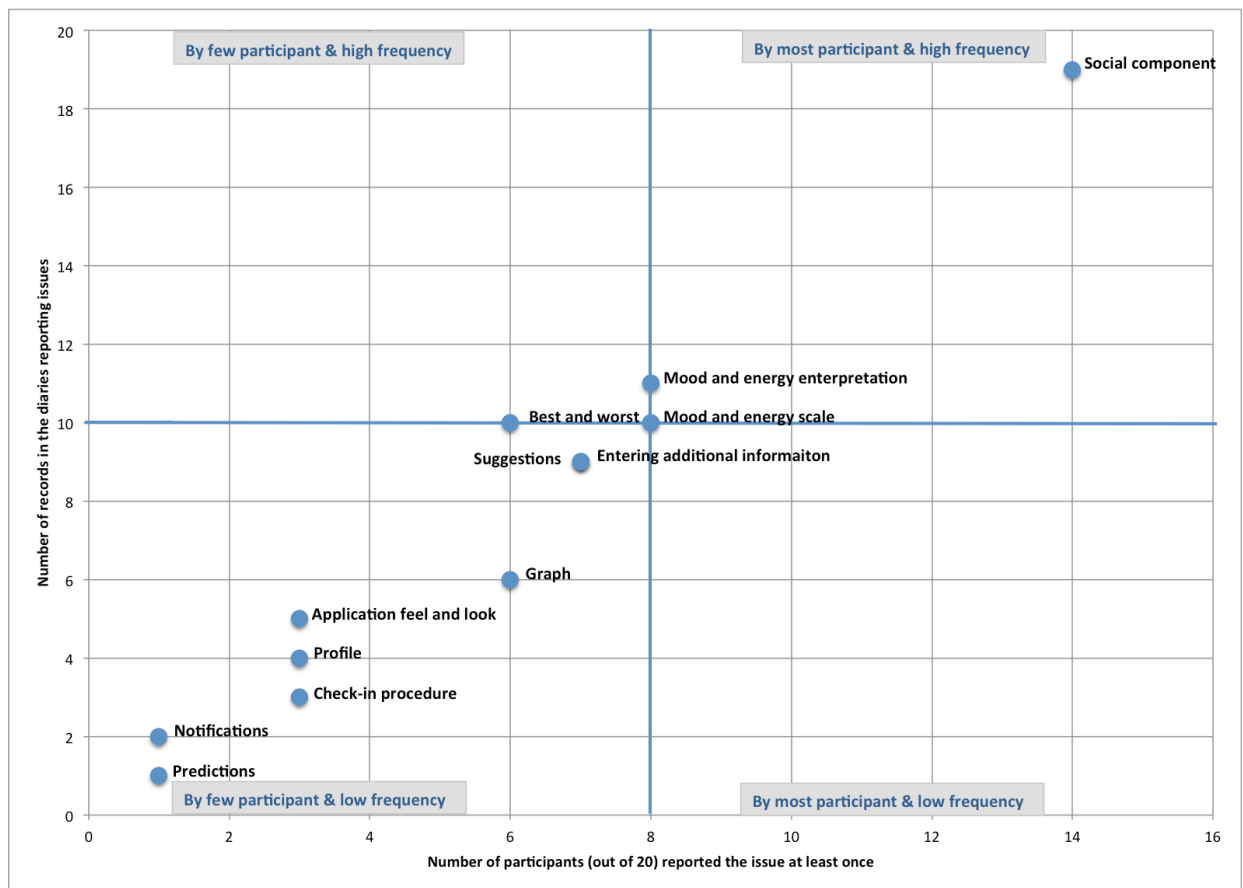
Figure 12. Top issues: number of records vs. participants.

Since the aim of the study is finding out the user-interface issues that could influence the users behaviour and engagement in the application, the further results reporting will mostly focus on the most commonly occurred issues of user experience, assuming that they have the major influence on the behaviour.

The most commonly occurred issues the users experience and reported in their diaries were concerning social component of the application, mood and energy scale, mood and energy interpretation and best & worst section. However, that should not be interpreted as a negative feedback towards the mentioned above functionalities. In fact, the records registered contained both positive and negative reports. Hence, the analysis also considered emotional semantic volume of the records submitted, sorting them into two groups: positive records and negative records. The Table 1 shows, that even though the most frequent issues were reported concerning social aspects of the application, then were almost equally distributed between positive (9) and negative (10) reviews of the study subjects. Looking further at the records itself, it was discovered that the majority of positive social component related reports concerned the functions of commenting, supporting the friends by giving virtual "hi5" and "hugs" and the idea of following the friends changing mood in the friends feed itself. While the negative records mostly concentrated on the Facebook integration in the application and issues connected to

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friends searching within the application. Furthermore it was discovered, that the number of incidents (466) of using the application reported by group 1 of users who had their application connected to the social networks did not significantly differ from the group 2 (442) who were not asked to share their mood socially.

Two other categories, mood and energy interpretation and mood and energy scale, both contain majorly negative records meaning that most of the participants found issues in those categories disappointing or confusing. Although most subjects also reported high level of satisfaction with overall look and feel of the application, a significant number if users still reported about their confusion in the perception of the 7-point scale of mood and energy expressed with faces or the desire to have a bigger scale with more variety.

As for the best and worst section, both diary entries and questionnaire results show quite controversial and non-constructive reactions of the users. Hence, they are hard to be categorized, and need to be tested more deeply for further improvements, since are based on individual perception peculiarities. A customization option for this section might lead to better feedback from the user and more positive responses.

5.4 Design requirements

Previously reported qualitative and quantitative analyses lead to a number of design requirements (**Table 2**) that should be implemented into the application design further. The research revealed that the major problematic issues causing the negative feedback arise in connection with:

- check-in process including entering the additional information, imputing the mood and energy of the user and editing the last check-in;
- social aspects of the application: adding and finding friends, sharing with limited circle of friends;
- tips and suggestions: the quality of the offered tips, their variety and frequency;

Further design and application prototyping should consider those categories as defining the application design.

Category	Design requirement	Characteristic
Check-in process	1. Simple and clear mood and energy recording process with a minimum amount of steps.	Leads to a greater user satisfaction and more frequent use of the application. Allows using the app not only by professionals but by people not skilled in psychology.
Mood and energy representation	2. The mood and energy scale should have not only visual but a verbal and scale representation.	Users are better aware of what mood or energy level they are selecting, since they better correlate their emotions with the options offered in the application.
Check-in process	3. Registering places, activities and people who might influence current mood.	Leads to a more detailed analysis of the mood history and provides better quality insights on the reasons behind the mood swings of the user.
Entering additional information	4. Inputting the reason of the current mood	Makes user aware of the reasons behind the mood swings. Gives an option to register side notes and thoughts that might come together with certain moods if it does not fin in the category of place, activity or people.
Check-in process	5. History of check-ins	Gives user an overview of this moods and energy levels. Provide the insights on emotions dependence on time of days. Gives the overall view on the user emotional intelligence progress.
Best and worst	6. Primary analysis of the factors influencing mood	Gives user the opportunity to see the reasons and connections behind certain emotions and creates the basis for making conclusions and advice for future behavior.
Social component	7. Sharing mood with limited friends circle	Creates awareness of friends' emotional state and whether they need support of user or user needs their support. Encourages user to check and use application more often.
Social component	8. Supporting friends if thy have a bad mood	Provides community support and feeling of attachment for the user when experiencing negative or positive emotions. Encourages user to check and use application more often.
Check-in process	9. Notifications to remind to enter the mood	Encourages user to check and use application on a regular basis.
Tips and suggestion	10.Good quality suggestions and advice on how to improve the current mood	Fulfills the user's need for advice when experiencing a mood or energy downfall.

Social component	11.Personal profile information	Provides personalized tailored experience.
Application feel and look	12.Engaging mechanics to keep interest in the application. Action-reward mechanics.	Keeps the user interested in the application over time, continue exploring different sections of the application. Encourages user to check and use application on a regular basis.

Table 2 Design Requirements.

6. Design and prototyping

6.1 Design alternatives

Several design alternatives were considered before the evaluation of the final prototype design. The design decisions are based on user needs described in the results section of current paper and are formed by both qualitative and quantitative research. At the same time the experience and knowledge accumulated by the relevant literature, existing successful applications and major interface design principles also have influenced the design process. However, the different alternatives are aiming to focus on various aspects of the mood-tracking application as follows:

Design alternative 1. Focus on recording the mood and energy level process.

The focus point of this alternative is the check-in process. This alternative brings the functions of the entering the mood, energy level, and additional information to the frontier of the application. Since the initial user test proved that the users value the simplicity as well as functionality of the application, the check in process will include opportunities to tracking a variety of reasons behind the mood: places, people and activity. Additionally, the user will be able to attach a photograph and adding a note with a hashtag or full description of the current thoughts or causes of his mood. The check–in process would consist of two steps, in case the user want to make a very quick record the additional fields can be avoided. The research also showed that users valued the primary analysis of the data collected by the application. Hence, the variety of the input data will add to the quality and detail level of this analysis. Finally, a number of study participants indicated that the more clear representation of the mood and energy levels would be very appreciated. Therefore, the mood and energy scale of 10 levels each will be chosen and a visual scale representation of a currently chosen mood will be implemented.

Design alternative 2. Focus on social component of sharing the mood.

This alternative focuses on the social functions of the application. Since social functionalities, as sharing mood with friends, supporting friends with a comment or virtual hug proved to gain a very positive response in the user test, these aspects will be of the focus in the application. In addition, the user test results showed that many users often opened the application just to check for their friends update, others said that they would enjoy the application more if they would be following their friends mood diaries in the application. Hence, to fulfill the user social needs the main screen of the application

will be presented as a friends' updates news feed with an opportunity to support friends by virtually hugging or liking their mood record.

Design alternative 3. Focus on tips and suggestions on how to improve the mood.

This design aims to provide good quality suggestions for the user how to recover his mood based on the data collected by the applications. This functionality aims to provide solutions to improving mood of the user in the downfall state. The application would use the history of user mood records as well as anonymous data of all the users of the application with close location or profile and offer places or activities that might change the mood of the user. This alternative also includes the graphical representation of previous check-in with a linear graph of mood on a 10-point scale. With the help of the graph the user will be able to see the patterns in his mood changes regarding time.

6.2 Final design

For the final prototype the combination of all three designs was selected. The final design considers all the design requirements identified in the previous chapter. However, the alternatives 1 and 2 will serve, as the main basis while the alternative 3 features will be implemented more in the background of the final prototype design. These alternatives were chosen because the users will be able to track of their emotions and energy level together with additional details that provide more insights on the reasons of mood swings and therefor the ways of controlling them. Moreover, social sharing of mood with other people has a relieving impact, while following and supporting friends mood updates encourages the regular use of the application, improving the self-discipline problem. Finally the regular notifications that remind to record current mood several times a day at the same times provides an accurate data for the medical specialist if one is involved with the user. However, the functionalities of the third alternative will be present in the background of the final prototype as well. Though, they will be accessible as an additional feature and used as an encouragement to use the application more actively, as the quality of the tips and suggestions will improve depending on the user activity.

The final mood tracking application prototype design is aiming to help users to read and understand their mood changes together with the reasons of that mood. In addition the interface should encourage the regular repetitive usage of the interface and be simple, understandable and positive interaction experience. The final prototype design is presented in Figures 15-24.

The final prototype is developed by an external programmer with the Objective-C language in Xcode environment based on the final prototype designs presented in figures 15-24.

Figure 13. Final prototype. Loading screen.
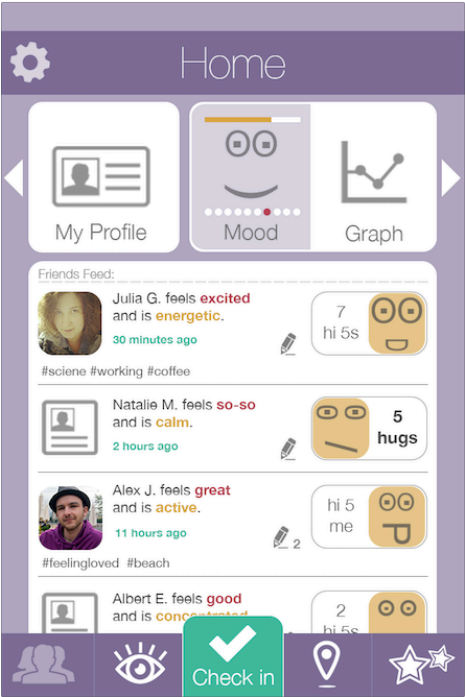
Figure 14. Final prototype. Main screen - friends update feed.

Figure 15. Final prototype. Check-in screen: mood and energy scale.

Figure 16. Final prototype. Check-in screen: additional information.
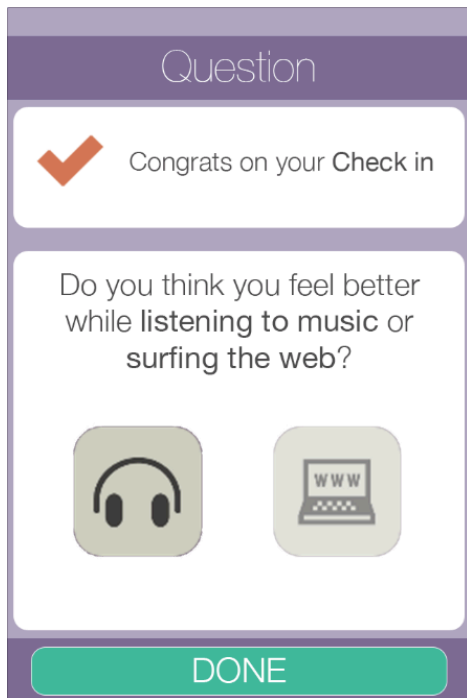
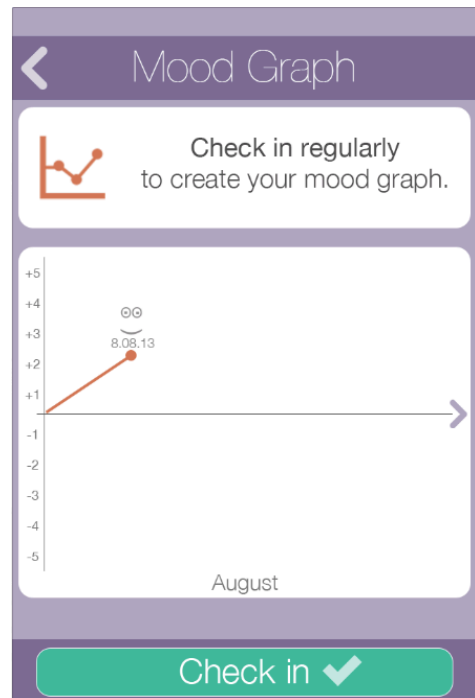**Figure 17. Final prototype. Question after check-in.**

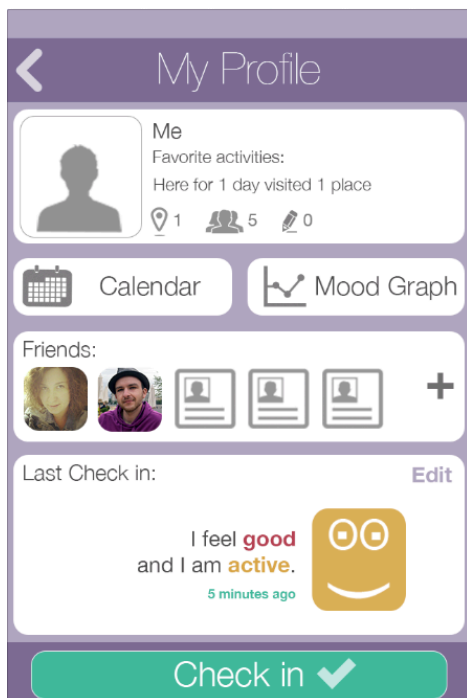**Figure 18. Final prototype. Mood graph.**

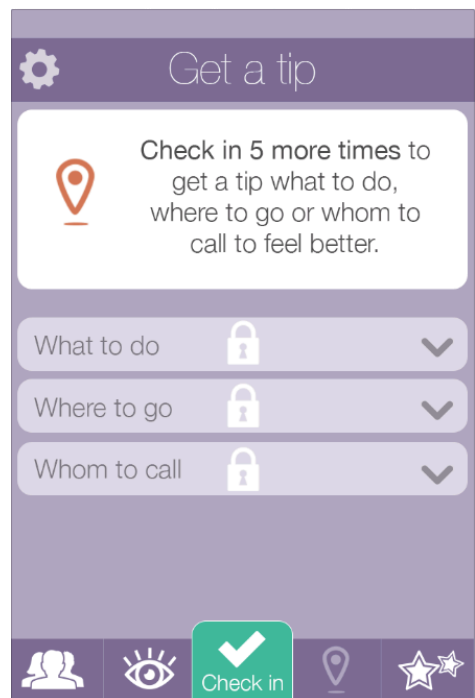**Figure 19. Final prototype. Profile screen.**

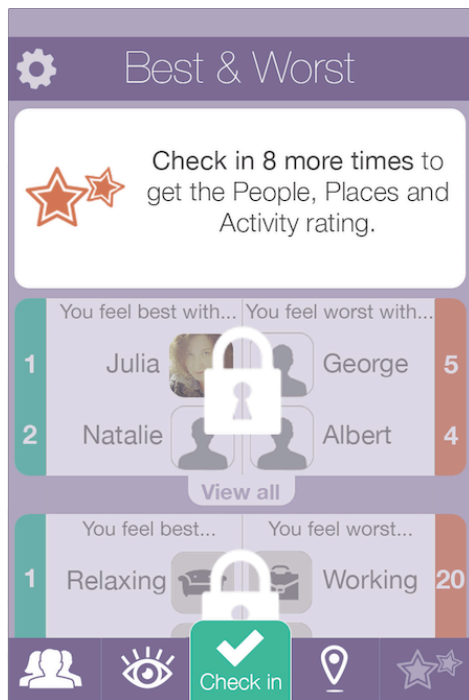**Figure 20. Final prototype. Tips and suggestions screen**

Figure 21. Final prototype. Venue, activity, and people rating screen.
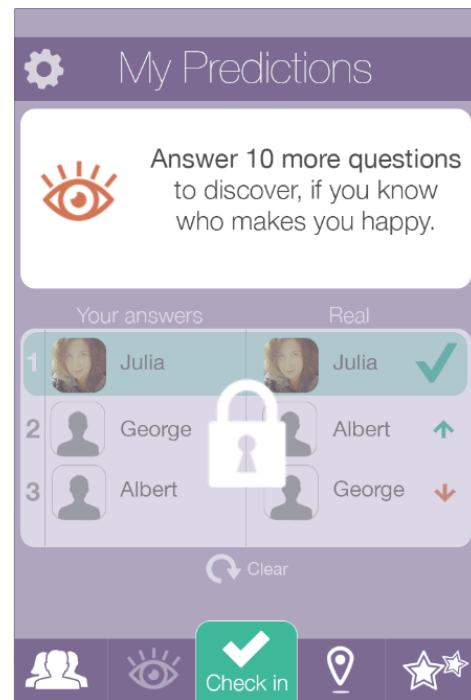
Figure 22. Final prototype. Predictions screen.

Interactions

Based on this user test the design of the main screen of the application has been created (**Figure 14**) that focuses on the social aspect of the application. The reason behind this decision is that a big amount of users claimed that reason for frequent application usage is checking their friends updates. Moreover, social interactions with friends, such as virtual hugs, "hi 5s" and comments were named as a very positive experience in the first part of the experiment, therefore those interactions should be saved and emphasized more in the new design. As a result the friends feed that includes the interactions named above has been placed on the main screen. At the same time the navigation to the other important parts of the application can be easily executed through the button in the bottom panel of the screen. Such practice is successfully used by a numerous world popular social application such as Facebook, Instagram, Whatapp and others, which creates a recognizing effect for the user and he does not need to learn the completely new navigation system. The main screen also contains information about last check-in of the user and buttons to access and edit his/her profile and mood graph. Finally to encourage the user's check-ins the check-in button in marked in a contrast color and is a larger than other buttons.

Application content

Another focal point of the final design is the mood record process. During the user test it was criticized for the lack of feedback of the currently chosen mood and energy and their interpretation. Based on qualitative data received from the questionnaires and diaries it was analyzed that users want and need some instrument, such as scale to interpret the currently chosen mood level. At the same time a lot of positive reviews were gathered about using smile faces (eyes for energy interpretation and mouth for emotion). Therefore, for the final prototype design the smile faces were used as, however adding the colorful mood and energy scales to them (**Figure 17**). Those interactive elements are supposed to reflect the chosen mood on a 10-point scale, and reduce confusion of the user induced by verbal interpretation of the smiles. The top bar gets filled with color together with swiping the eyes of the face and indicates how much energy is chosen. The more bars are filled with color the more energetic is the mood. The bottom dots indication bar reflects the mood. The appropriate circle gets red-colored when the corresponding mouth is chosen. The more positive the mood is, the closer to the right circle gets colored.

The complete prototype design layout together with the description of each interactive element and their purpose can be viewed in the Appendix 1.

7. Evaluation methodology

In order to evaluate the final prototype the following methodology was used. The methodology was developed considering the previous user test study. This would enable further comparison of evaluation results with initial user test.

Both research methods have been applied: 1) written diaries including screenshots and photos and sketches, 2) follow-up online questionnaire. This set of methods was selected in order to understand different aspects of prototype usage and user satisfaction with the application contents. The data will be collected during one week. Additionally, the follow-up questionnaires will provide rich data about specific features of the application and user satisfaction of its functions. The evaluation will focus on the features of the prototype that were most important to gain insight on how to design a new mood tracking application that would satisfy user needs. Since one of the most frequently referred by users in a negative in the initial user test was the process of recording mood and energy levels, entering additional information when making a record, the evaluation focus will be on them.

7.1 Participants

A total of 10 English-speaking participants with diverse nationalities took part in the study. The profile and background of the participants was required to be the same as in the initial user test. Participants were recruited against several criteria, including gender, age, education, characteristics of the device they were using the application on and their experience with their device. All the participants were required to have no experience of using a mood tracking application previously, to ensure that they were not biased or familiar with the prototype functions.

Of all 10 participants who took part in the diary study, 40% (4) were men and 60% (6) were women. They ranged in age from 18 to 35, with the following distribution across the different age ranges: 18-24 (2 people), 25-35 (8 people). All the participants owned an apple device: 10% (1) owned an Apple iPod touch, 80% (8) owned an Apple iPhone and 10% (1) owned and Apple iPad mini. All the participants indicated themselves as experienced users of their devices, which means they owned their gadgets for more than three months at the time of the research.

After the diary study had been completed, data of 90% (9) of participants was valid and relevant for analysis.

7.2 Procedure

In this section, details are provided about the research methods that were used.

Unlike the first experiment of the current study, the participants were not divided into groups. All the participants were asked to use the working application prototype for 1 week as a mood diary and to keep their impressions, thoughts and feedback about the application in their private diary.

The working prototype created for the test was available for participants to download through a link sent them in an electronic mail together with the experiment instructions. The prototype was developed for the iOS7 and was able to store user check-in history and information. The main navigation and check-in process were available for the full use, while the secondary functions, such as social networks connectivity, predictions, best and worst and tips were only available for preview. That is supported on the study objectives and results of the first user test, which pointed the focus onto improving the check-in process and main navigation.

Each participant in each group was contacted periodically to check on their involvement and to remind filling in the diary with the help of e-mails or short text messages in order to exclude the missing values and missing information in experiment.

7.3 Written diaries

The 10 participants were asked to download the working prototype of the mood tracking mobile application for iOS on their Apple mobile devices and use it daily two-three times a day for the period of one week. Prior to downloading the participants were asked to confidentially provide the UDID numbers of their Apple devices in order to be able to use the application. This was required since the working prototype was created only for the research purposes of this study and was not places in the Apple AppStore therefore the access could be provided over the UDID registration of the participants in the prototype. Prior to that the participants were explained how to extract the UDID number of their device.

To reveal the activities that are carried while using the application and to gain insights on user satisfaction, participants were asked to complete a written diary whenever they used the application over the one-week study period. The subjects were given a choice to use Apple Notes application for recording written diary entries or to use the Evernote application template. Both applications were chosen since they are available for free use on their mobile devices and can be easily collected via e-mail from all the participants.

The diary questions were designed to record experience, feedback, thoughts, insights, ideas and problems the subjects were coming across while using the application. The diary questions included a set of open-ended questions about usefulness and enjoyment of the prototype functions and were meant to guide the participants in making their notes. They were also encouraged to share screenshots or any other relevant information on using the prototype.

7.4 Follow-up questionnaire

The diary-study was complemented with the follow-up questionnaires for participants. The goal of this questionnaire was to broaden, formalize and collect extra insight on prototype usage and user satisfaction. Moreover, the questionnaire aimed to collect data about specific functionalities and aspects such as mood and energy recording process, main navigation menu and content of the application and participants' experience with it. The questionnaire contained open-ended together with multiple-choice questions.

8. Evaluation results

Once the research was completed, 87 of written diary entries and 9 valid post questionnaires have been collected. Similar to the initial user test the analysis has been conducted in several stages: 1) qualitative analysis of the written diaries, 2) quantitative analysis of the post questionnaire and 3) triangulation of insights to develop a set of conclusions.

Over the one-week period, the participants reported 182 incidences of the application use with an average of 20.2 per participant (min=13, max=25, SD=3.49). Followed from those numbers it can be concluded that there was a range in the number of application use incidences reported by each participant. It has to be noted that due to limitations of the diary study approach, it is unlikely that these numbers reflect the exact volume of actual application frequency use, but rather reflects the lower bound on their true usage.

Data collected with the diary study reports and questionnaire open questions was anonymised by assigning each user with a unique ID starting with U-1 (using a different number for each participant) up until U-9.

The diary study data together with questionnaire open question responses were analyzed by using the constant comparison technique of the Grounded Theory approach for qualitative analysis (Christine J. Yeh, Arpana G. Inman, 2007). The data was read, selective-coded in terms of core and categorized to produce theoretical sampling, leading further to finalized conclusions.

There were five core categories that were found from the analysis, which will be used in reporting the design prototype issues emerging for the study participants.

- Mood and energy: representation and expression;
- Additional information: reasoning of the mood;
- Application functionality sections and navigation;
- Social aspect of the application: friends adding, interaction and sharing;
- General feeling from using a mood-tracking application;

The categories majorly correspond with the categories from the initial user test for the convenience of future comparison and are based on the most important design decisions of the prototype.

8.1 Reporting results

Mood and energy: representation and expression

The majority of the participants were quite satisfied with the mood and energy scale they were asked to use in the design prototype. Few mentioned the usefulness of the scales and verbal equivalent of the smilie expressions of the mood or energy. They mentioned that it brought them more mindfulness of what mood or energy they are choosing and therefore more awareness in their current feelings and emotions.

> *The faces are funny and simple and I like that you also see what exactly they represent in words. Otherwise I would have hard time guessing… And the colorful scale itself is good. Makes it more vivid. (U-4)*

> *The indicators, or scales or what are they, on the top and bottom helped me to orient myself. I am often looking at them more than at the faces. They give a better view of how I feel relatively to other day or situation. (U-6)*

> *The faces with the word description work good for me. Maybe someone else would prefer different mood interpretation. Also the scales are helpful. You see where is your mood right now very well. (U-9)*

Most participants also mentioned that that the amount of options for choosing mood or energy level was enough, though one person wished there was a possibility to add extra moods him/herself too.

> *Sometimes I felt like I feel between the moods given in the app but I cant choose it. There are only 10 options available. Would be nice if it was possible to add your own or something (U-2)*

> *The amount of faces to choose from is perfect. Not too much to get lost, but also enough to choose from. (U-7)*

Additionally, the scrolling faces received quite good feedback from the users, thought were called to have a room for improvement. However, the improvement to the visual design of the faces can be done.

> *I like that it works like a sliding carousel. Its Fun to make your own faces. Though it would be nice if the faces were more expressive… I mean not like dots and brackets. (U-5)*

I really enjoy that mood is separated from the energy. I haven't thought about it before, but indeed you can feel both energy full and sad and the other way around and here is the perfect way to reflect it. (U-1)

Additional information: reasoning of the mood

This part of the application gained controversial feedback from the users, since it was not fully functioning in the prototype version of the application, however, some trends and expressions were mentioned in the post questionnaire.

The participants expressed positive feedback towards this functionality of the application, specifying that it might help them better understand the patterns and reasons behind their mood changes.

I understand it's a prototype, and the options to choose from are limited. Maybe in a full version of the app it will be really useful to add friends and places. I mostly used activities field only. (U-3)

I would like to have an option to look back at the reasons of why I feel certain way. (U-1)

One of the participants stated that at timed the mood recording process was irritating for him as it was to many fields to fill in and the user was forced to quite the process. Perhaps the complexity of that step prevented the user from completing the process and reflecting on his mood.

It is quite a lot of fields to fill in. I felt annoyed and quitted few times because was too much to fill. (U-2)

However, the comment field that suggested the users to type the reason of their mood as a hashtag received some positive reviews. They were evaluated as a good way to shortly explain the reason of the mood, making participants think not only about the emotions itself, but also reasons behind them. Even though the users expresses satisfaction towards this feature they also proposed a number of improvements.

When cheking in I sometimes used the hashtag suggested option, but could not see the statistics of something back. If it was provided like a hashtag cloud or some graph, I would like that. It would help me to reflect on my mood changes (U-8)

I liked the hashtag for the reason of your current mood. It's a good idea – short and understandable from Twitter. Very short and vivid way to record the reason of why you feel smth at the moment. Thought I could not see it afterwards anywhere. Adding a history might be a good idea. (U-7)

Participants were suggesting to add the history or some statistics functionality where they can look at their previously registered hashtags and see some trends.

Application functionality influence of users behavior

This category includes feedback from users about the variety of functionalities the design prototype was suggesting for the user as well as the impressions of the participants about the application. Prior to the start of the prototype evaluation users were informed that some of the functionalities are available only as a preview and are not fully functional. Therefore, users were reporting their impressions of what they think and imagine not fully functioning sections of the application would bring for them. The functional features of the prototype though were evaluated fully.

Almost all the users reported the increased mindfulness of their mood changes after using the application. They mentioned that registering the mood made them think of how they feel at every particular moment, as well as think more about the reasons behind their feelings and energy.

> *I felt like I started asking myself how I actually feel and why. It brings more consciousness in my emotions. (U-4)*

> *I can't say that it brought a lot of change in my life, but I definitely started being more attentive to my own emotions and reactions. I even sometimes notice when I become angry or sad before it's too late. (U-9)*

The general impression of the application were quite positive. Even though the users were not sure if they would be consistent users of such an application, they were eager to try and recommend it to their friends if the unlocked parts of the application would be engaging enough.

> *That could be useful as a personal diary or to follow your friends updates. Depending on how interactive it would be. But can't be sure. (U-1)*

> *Seems to be fun. Could be useful also, but probably in a longer time. (U-9)*

Additionally, it was reported that the application does not help to change the mood, but helps to be more aware of it, to understand yourself and to control changes as a result.

> *I didn't feel that the app helps me to stay happy or influences my mood directly, but it definitely taught me to think more about my feelings and to ask myself questions. It feels like if I would use it daily I would know myself better. (U-3)*

Social aspect of the application: friends adding, interaction and sharing;

Social functionality of the application was positively mentioned by the users as a good idea for further development of the prototype. They realized that the application is meant to be used with friends, but could not access this functionality fully. However the potential social functions were perceived as a support community creation and were desired in this context for support of each other.

> *It's a good idea that you can add friends in you profile. (U-2)*

> *As far as I understood the idea is that you can add friends and see what is their mood. I would like to support my friends in good and bad moments. (U-6)*

Furthermore, the subjects reported that they see the application as a social community they would like to belong to and would appreciate such functionality if it would have certain social privacy settings.

> *I like to see the timeline on the main screen. Reminds of a social network. (U-3)*

> *I would not want to share my mood in social networks. I would keep it more like a private diary for myself. Maybe share it with a circle of close friends but that's it. (U-8)*

> *It would be nice if I could comment on my friends mood status to support them in later version. Now it's more like my own history which I can't use. (U-1)*

In additions the participants reported that receiving support from friends might make them feel better and happier. In this connections the application might work as a mediator of proving support to each other.

> *We often chat with my best friend when feeling depressed. If the app gives an opportunity to see when one needs help without asking for it, it would be a good support in friendship. (U-9)*

On the other hand one of the users claimed that sharing his mood in the social networks would make him feel uncomfortable and he would prefer to keep it confident of just between close friends.

> *I would never user facebook sharing in the app. It would make me feel exposed and vulnerable. (U-5)*

In conclusion one of the participants mentioned that the questions after the mood check-in process were helpful in becoming more reflective about one's mood.

By the end of the week I noticed I already started thinking more about how I feel and why. Maybe it's the app :) Anyway, it makes you more aware of your emotions, especially if the history analysis would work well. (U-2)

I liked the questions that the app asks you. What you feel better about. It made me reflect on how I truly feel and why. Would be cool if the app would do it for you. (U-8)

General interface feedback

The easiness of the interface and understandable navigation were numerously mentioned by the participants.

The navigation is pretty straightforward. I didn't have any problems really. Curious how would the unlocked sections work. And would make the graph interactive. That you can click, zoom and etc. (U-6)

It has everything needed I guess. Also profile. I hope you can edit it in a full version. I liked the idea of the graph. (U-1)

The participant provided only two negative reports, that where mainly related to the limited functionality of the working prototype.

I did not understand what is My predictions and Best&Worst screens and what would be their difference. If they give some kind of rating than what is the difference between them. Some explanation or a tour might be helpful for a person who is new to such apps. Confusing. (U-3)

I am missing some settings button where I can set up my privacy, notifications and stuff like that. Also cant guess what is best and worse part means. (U-5)

The other user mentioned that prototype was fairly easy to understand and get used to, apart from Best & Worst section. He also left a possibility that such an application would attract his attention in the application store.

I like that it is not too complicated (if not consider the best and worst part which I have not idea about). For the rest it's a simple app that might be useful for some people. I would try to use it maybe but don't know how long would I stick to it. (U-5)

8.2 Overview of evaluation result

Further, all questionnaire responses of the evaluation participants were coded using a bottom-up approach and further similar recordings been grouped, to be turned into

frequency distributions. Similarly to the initial user test the selective coding and categorizing was applied. The diary study analysis was reviewed to triangulate the findings with those from the data obtained from the questionnaire. This analysis process resulted in a set of issues occurred about the application prototype functionality and content. This section further describes the details of the findings. Nevertheless, due to limitations of the diary study approach, it is unlikely that the following numbers (Table 3.) reflect the exact volume of issues experienced by users in the application, but rather a lower bound on their true usage.

Function	Records		Positive records	Neutral records	Negative records	Participants	
Mood and energy interpretation	11	19%	6	1	4	8	89%
Application functionalities and navigation	9	16%	2	3	4	6	67%
Social component	9	16%	4	3	2	5	56%
Mood and energy scale	7	12%	5	1	1	7	78%
Reasoning of mood and additional information	6	10%	5	0	1	5	56%
Application feel and look	5	9%	3	0	2	4	44%
Check-in procedure	4	7%	1	1	2	4	44%
Profile	3	5%	1	0	2	3	33%
Graph	2	3%	1	0	1	1	11%

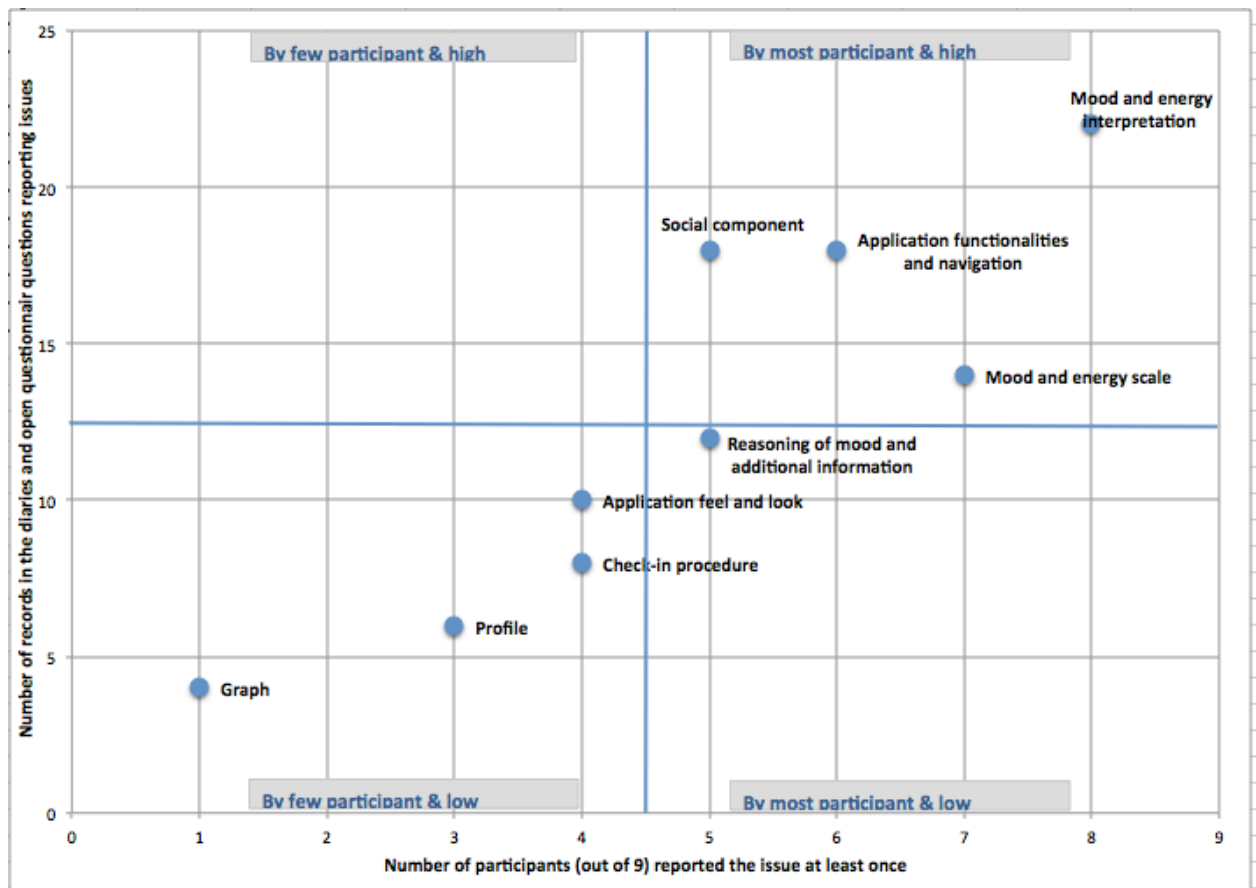**Table 3 Design prototype evaluation issues.**

Figure 23 Top issues in the final evaluation: number of records vs. participants.

Across all the records submitted of the application use, the most frequent feedback was collected on: mood and energy interpretation, social aspect of the application, mood and energy scale and reasoning of mood during check-in process. The frequency of issues about these topics is partly supported by the available functionality of the design prototype. Moreover, similar to the initial user test the issues were divided into four groups (**Figure 23**): issues reported 1) by few participants with low frequency, 2) by few participants with high frequency, 3) by a high number of participants with low frequency, and 4) by a high number of participants with high frequency. Therefore, social component of the application, mood and energy interpretation, mood and energy scale and application general functionality and navigation are the topics that the users reported about most frequently.

Since the aim of the study is underlining the functionality and content issues that would provide the best quality experience for the users, further results reporting will focus on the most commonly occurred issues of user experience, assuming that they have the major influence on the behaviour.

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Mood and energy interpretation

The most frequently mentioned topic in the participants' diaries was reported to be mood and energy interpretation. However, this does not mean the negative feedback toward this functionality of the prototype. On the opposite the users were rather positive about those functions and considered them useful.

However, that should not be interpreted as consistently negative feedback towards the mentioned above functionalities. In fact, the records registered contained both positive, neutral and negative reports with positive and neutral reports overweight. Considered emotional semantic volume of the records submitted, sorting them into three groups: positive, neutral and negative records. The Table 3 shows, that even though the most frequent issues were reported concerning mood and energy representation and interpretation, then were almost equally distributed between positive (6) and negative (4) reviews of the study subjects. Looking further at the records itself, it was discovered that the majority of positive reports are related to the mood and energy scales, the variety of options to choose and the existence of two components: mood and energy separately. Moreover verbal interpretation of the possible mood states was positively evaluated. Furthermore, a great number of positive feedback expresses the increased satisfaction in mood awareness and mindfulness while choosing the current mood. While the negative records mostly concentrated on visual part of the faces representing mood and personal preference of filling in the mood between the scale sections. Therefore, it can be stated that the functional aspect of mood interpretation has a successful solving in the current prototype and positively influences the control of the mood swings of the user, however the visual and beauty component should be considered in future together with the graphical artists.

Mood and energy scale

As for the mood and energy scale, considering importance and loud feedback during the initial user-test on this issue, particular attention was paid to participants' reports about it. As a result, the majority of positive records (5) and the equal number of neutral (1) and negative (1) records were recorded in this category. Users majorly appreciated the interactive colorful bars indicating the currently chosen mood or energy state. Additionally, users mentioned the optimal number of moods and energy levels comfortable to choose from.

Application general functionality and navigation

This group of issues is probably one of the most controversial. The reason for that is the

limited functionality of the design prototype available for the test. Even though the participants of the evaluations were explained that the application is not fully functional and is meant for the testing, some limited functionalities caused a number of questions and misunderstanding from the users. However, general navigation was evaluated majorly simple and understandable, supporting the mood reflection: 2 positive and 3 neutral records against 4 negative. While, the locked functions as Best&Worst, Predictions, Settings and Graph caused some confusion, complexity or required improvement according to the diary records which might complicate the mood controlling.

Social component

Finally, the social aspect of the prototype gained 9 total records, only two of which were negative and related to the privacy issues. In fact, most of the records reported positively about the idea of supportive community and timeline of friend mood records mixed with your own record history. Additionally, users claimed interest in commenting and supporting friends functionality, since it improves the mood of other community participants, however reported that they would act safely about their privacy and would not share the status updated in other social networks.

8.3 Summary

To conclude, the participants appreciated the mood recording application in general as well as some particular functionalities. They believed it could be a helpful hand in understanding ones mood changes and therefore control them in a long run and can be used to support friends in the down phase. Moreover, they see the application not only as a personal diary, but as an analytical instrument, social connecting instrument with an element of game and fun. The application can help to create personal emotional awareness and therefore lead to coping with overwhelming emotions more effectively. Participants also considered the application quite easy to learn and simple to use, needing little improvements and modifications.

9. Discussion

Current research examined the needs and preferences of people who would like to control their mood swings. The mood tracking application was aiming to support tracking of daily mood and energy changes and encourage users to control their mood swings through the emotional awareness. The user research results have formed several design requirements that the application should meet. Those requirements have been taken as guidelines for the final prototype and were evaluated on their effectiveness.

9.1 General discussion

The evaluation of the mood tracking application revealed a number of functionalities and interactions that influence user satisfaction from the application and helps the user in controlling mood changes effectively. During the initial user test and further evaluation of the final prototype, it was discovered that certain features can greatly influence user activities in the application (RQ 1-1). The user test showed that one of the most important functionalities that trigger user emotions and determine behavior relate to the check-in process including entering the additional information, inputting the mood and energy of the user and editing the last check-in. The simple and understandable scale of moods and energy supports users in being aware of their emotions, while the additional information and analysis provided by the application brings the understanding of the reasons behind those emotions. Therefore helping to get control over one's the emotional life.

Next to that, the user-test results indicated that the social component of the application has an influence of user behavior. "*It gives me the chance to take a second for myself. And if I realize I could be better than I am right now I can try to take action to change it.*" *(P-13)* Those results support the theory claiming that expressing emotions into words and sharing them within social circles can encourage self-understanding and emotional awareness, and therefore improve control over the mood changes (Martin, 2007). Additionally, a number of subjects reported that the social component of the application in general is a valuable functionality for them and definitely adds enjoyment and engagement into using the application. (RQ 1-2) *I like seeing how my friends are doing that are far away and I feel like this is a whole new platform to exchange and stay in touch. It may seem stalkerish to know what people are doing and how they are feeling, sort of like twitter, but it is not twitter. It is more harmless and less popularity. (P-13)* However, the suppose that the users connected to social networks would be more active in the application was not proved in the initial user test. Consequently, the social

functionalities of the application can bring satisfaction to users and slightly improve quality of the experience, however cannot influence their behavior significantly.

Furthermore, the implementation of emotions and energy scales when entering information scored positive feedback and was proved to be an important influential feature for user satisfaction as expected (RQ 1-3). *The indicators, or scales or what are they, on the top and bottom helped me a lot. I am often looking at them more than at the faces. They give a better view of how I feel relatively to other day or situation. (U-6)* The absence of this feature in the initial user-test caused multiple negative reports about check-in process, while implementing this feature in the final prototype increased positive perception and user awareness of their mood significantly. The scale interpretation of the mood and energy level therefore is a unique and important feature of the application.

RQ. **How can a mobile application make recording, understanding and controlling ones emotions an engaging and effective activity?**	
RQ 1-1	*Does the content of the application, its functionality and interactions affect the way people use the mood-tracking application?* Yes.
RQ 1-2	*Does social sharing of mood affects the frequency and quality of use of the mood-tracking application?* No.
RQ 1-3	*Does entering information about user's mood in a clear and simple way, using a mood scale, that reflects the actual emotional and energy state of a person influences the user awareness of his/her emotions?* Yes.

Table 4 Overview of research questions.

Final prototype testing also revealed what impact certain features of the application have on the user's experience and process of understanding and controlling emotions. As shown in the **figure 23** combined with the **table 3** mood and energy scale as well as mood and energy interpretation are among the most influential functionalities providing the user with awareness and understanding of his or her mood. It was numerously reported by the users of the final prototype that those functionalities helped them to overthink and recognize emotions more frequently, to analyze and see patterns in the

reasons behind mood changes, therefore leading to controlling those changes better (Perry, 2012). While the graph and profile according to the results of the testing do not cause significant interest, feedback and discussion by the user and therefore do not meaningfully support understanding and controlling of mood changes and can be considered as supportive and not priority functionalities.

The usability evaluation proved the main navigation to be understandable and easy. The users recognized all the buttons from the main menu and functionalities were easily found when needed. However, some confusion appeared around the settings button. Few participants did not notice it in the main screen and claimed they were missing the settings section of the application in order to personalize it. 'I am missing some settings button where I can set up my privacy, notifications and stuff like that.' (U-5) There is a possibility that the settings button was not clear to the users, since it is not situated in the main menu. Perhaps, a pale color of the button and the absence of the introduction to the application could cause the problem. Additionally, significant misperception was reported in relation to the Best & Worst section of the application. Users reported their confusion about the content of the section already during the user test. They indicated that they could not understand the value of information provided by that section of the application. Perhaps a small explanation could help to clear the meaning of the function otherwise a further study should explore the necessity of this section and its role in improving understanding of one's emotions.

9.2 Future improvement

Based on the obtained and presented results several suggestions for future improvement can be made. Manly the visual, verbal and scale interpretation of the mood and energy alternatives in the mood-recording process should be a focus of the application. While the social functionalities as sharing of the mood can be brought to the further screens of the application, as not playing a major role in helping the user solving his problem. The social aspect of the application might be transformed from social network sharing functionality, that threatens privacy of the users into a supportive community function as suggested by a number of users. It is also supported by the experiment proving that non-shared events involved greater search for meaning and efforts to understand what happened, than those that were shared with a supportive community. (Rime, Finkenauer , et all, 1998)

Another suggestion is to remove the Best & Worst section of the application as it causes multiple confusions. This way the interface of the application will be more clean and

clear. Additionally, mood reasons analysis instrument might be added. Since this functionality was not extensively tested in this study yet, but the users expressed interest in such feature is suggested to implement and test as it might improve user experience.

The study process conducted can also have a number of improvements. It is desired that the prototype is developed with fully functional features. Additionally, the users are suggested to ask to use the prototype for a longer period of time. This would enable a more extensive feedback on all the working functionalities and would make the improvements in understanding and controlling mood of participants more vivid and detailed for further analysis. Furthermore, the larger group of the subjects for the prototype test would increase the validity of the results. Finally, measuring emotional awareness and emotion understanding prior and after the test would provide valid quantitative data for analyzing the effectiveness of the application.

9.3 User research

Conducting user research was associated with a number of challenges. First of all, most of the users needed the personal reminders to use the application regularly. Secondly, a diary study suggests that the user has to be motivated and disciplined in filling in the diary daily, reflecting on his actions. Thirdly, the prototype for evaluation is compatible with the devices of certain hardware and software characteristics, which made the choice of the participants harder. Moreover, reaching participants for the follow up questionnaire was quite difficult in some cases since some of them were distant users and were not easy to contact in limited time. Besides, the content of the user diaries occasionally were hard to interpret. Since filling in the diary the participants are writing the way that is not always clear to the reader, and the researcher has no opportunity to ask clarifying questions during the process. Finally, the fact that the prototype for the evaluation was not fully functional provided restrictions in the user test and caused a number of questions from the users about full or future application functionality. Answering these questions had to be very limited as it could influence the results of the evaluation.

9.4 Limitations of the study

Current study is associated with a number of limitations. The type of the research method causes one of the main limitations. A diary study research method is a matter of mostly self-reported behavior. Therefore participants may have forgotten to record some of their activities or thoughts. This could lead to a reported lower activity frequencies of application use. Moreover, the evaluation period being just 1 week could cause not

completely reliable and consistent data, since the users need time to get used to the application and the time needed for adaptation is not determined. Additionally, the prototype with limited functionality used for the evaluation might have influenced the result by constraining the user activities to only available functions.

9.5 Future work

It is suggested that the future work should fist of all focus on illumination of the limitations of the current research. Ensuring not only the regular use of the application but also the diary filling-in can be one of the steps to improve data quality. Additionally, evaluation period is recommended to extended for more than one week in order to allow the adaptation period of the user. Furthermore an important focus for future work is a thorough and good quality development of the working prototype. The increased amount of working functions available for test can open opportunities for new research questions. The actual clinical influence of the application on the mood swings control was not a matter of this study, since the data on the actual registered moods of individuals was not gathered. However, it can become a possible future topic to research in case the emotion control progress of the user is tracked. Alternatively, the future research can be based on examining other than verbal and visual ways to express and interpret mood. For example physical indicators as pulse or blood pressure can become the basis for an alternative way of tracking emotions and creating an application interface.

Finally, in the current research among others examined the influence of user social sharing on his activity. However, the correlation between the amount of connections and updates from the friends of the user and application use frequency was not a subject of study and could be researched further in order to examine various technics to influence user activity.

Nevertheless, the importance of the mood-tracking application should not be underestimated. Considering the existence of only commercial alternatives on the market without scientific approach, the developed application prototype should be considered an important development. Moreover, the potential analyzing capacity of the application makes it possible to be used by medical professionals in curing the mood disorders. Furthermore, unlike other applications the developed application is using the wide variety of the mood options interpreting it through different means suitable for the user including visual, verbal and scale interpretations.

10. Conclusion

The current study researched how a mobile application can make recording, understanding and controlling ones emotions an engaging and effective activity. The application created as a result of the study is designed to help people cope with the frequent mood changes and understand reasons behind them in order to improve their emotional health. The application prototype created contributes to the increased emotional awareness of the users, helping in maintaining stability of everyday emotional health. In order to create such mobile application the functionality, impact and usability were examined. It was proved that the design of the application was effective and attractive for the users, however needing several improvements and future minor development. The research revealed that the application can increase users awareness and understanding of their emotions therefore helping to take control over them. The main contributing feature was proved to be a clear and simple way of registering mood and energy level of the user using visual, verbal and scale interpretation. However, no prove found that sharing emotions in social networks would improve user experience and influence their behavior significantly, although it has a positive effect. It is proposed for further study to examine weather the supportive community functionality instead would bring more satisfaction and reveal the actual change in user behavior as suggested by Rime, Finkenauer , et al (1998).
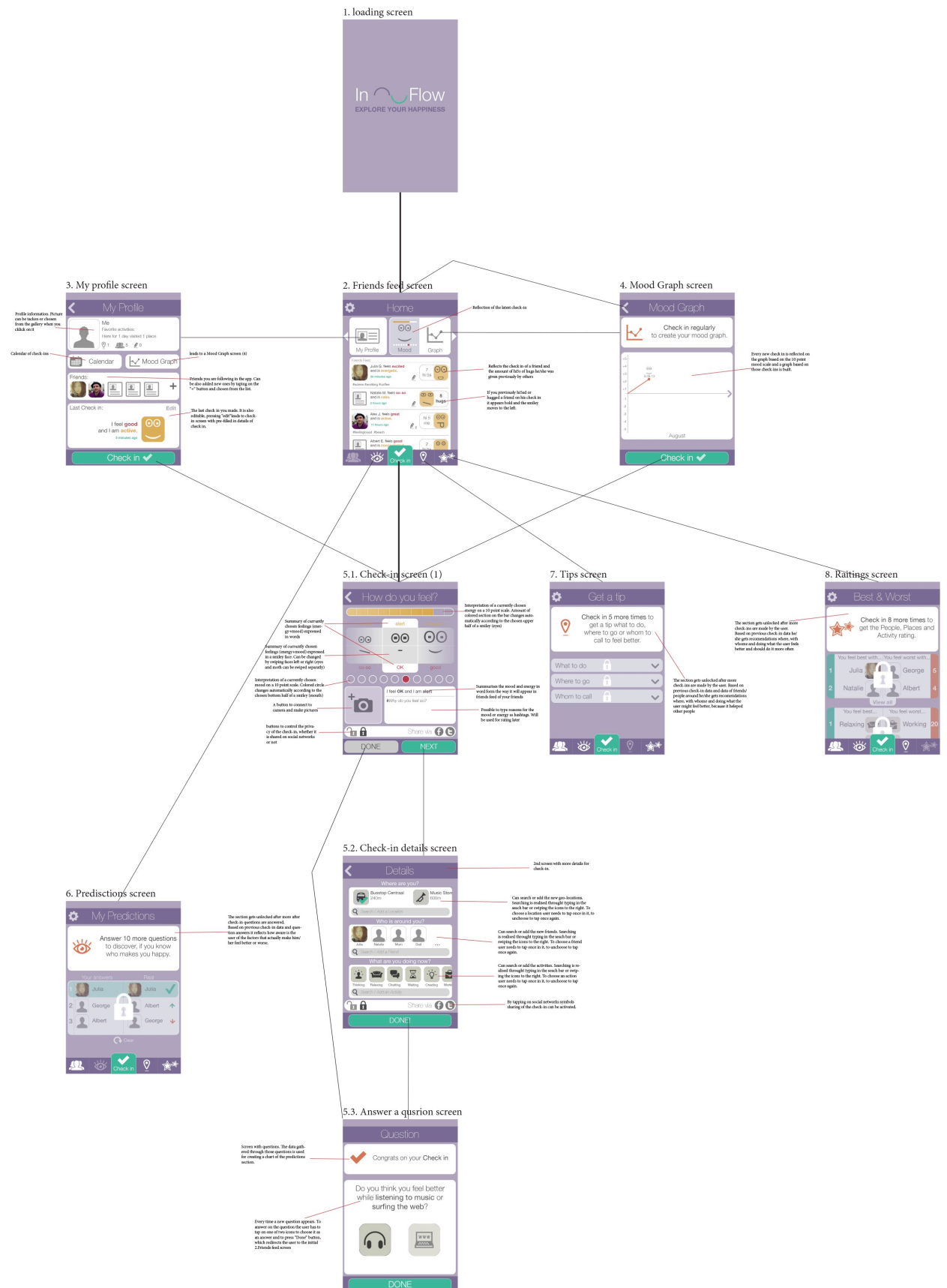
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Appendices
Appendix 1. Application prototype layout.

1. loading screen

In Flow
EXPLORE YOUR HAPPINESS

3. My profile screen

2. Friends feed screen

4. Mood Graph screen

5.1. Check-in screen (1)

7. Tips screen

8. Raitings screen

5.2. Check-in details screen

6. Predisctions screen

5.3. Answer a qusrion screen

Appendix 2. Electronic diary template for initial user test

My Mood Diary — Evernote

My Notebook ▾   click to add tags

Arial   13   B I U a ✏   ☰ ☰ ☑ —   ☰▾ ▦   🎤 ↻ 📎

My Mood Diary

Age_____ Gender_____ Nationality _____ e-mail_____

Day/Time	How do I feel right now and why?	Where am I now?	What am I doing now?	Who is around me?	Do I want to share my mood with friends?	Notes

Appendix 3. Instructions for the initial experiment group 3.

Diary Experiment Instructions

This is the experiment designed for the Master thesis research on user-interface design of a mood-tracking application for iPhone. I would like to kindly ask you to participate in this study and to fill in the following diary regularly in the coming 2 weeks.

Please read the following instructions carefully

The diary is designed to help you in daily tracking your mood in order to better understand yourself and your ever-changing mood. Imagine, there would be an opportunity to record your mood in your smartphone and later analyze what activities where and with whom bring more happiness and satisfaction to your life. You can help to develop this application, by filling in the mood diary and giving your insights on how the functionalities and features, you would like to see in such an app. There are two options for filling in the mood diary. You can either do it digitally by using the Evernote template in the following link

https://www.evernote.com/shard/s47/sh/aa1e0129-e35b-4831-b36d-fd2902cfd44d/d7a4a5e615d4c84da50115d33ae245f4

or you can do it on actual paper dairy which the instructor of the experiment can provide you with.

There are **no restrictions regarding the format of keeping the diary**. The suggested questions are just necessary but not sufficient enough and are meant to guide you and encourage your creativity. That means that **you are welcome to be creative** to record your mood and to suggest the format suitable for you. However, please recording your mood always answer at least the following questions:
- **How do you feel right now** *(you can use words, smiles, pictures, photos or any other way you think describes it best for you)*
- *Why are you feeling like this (you can words, picture, hashtags…. Etc.)*
- **Where are you now** *(you can use words, pictures, photos or any other way you think describes it best for you)*
- **What are you doing at that moment** *(you can use words, pictures, photos or any other way you think describes it best for you)*
- **Who are you with**
- *Anything else you find important to mention associated with your mood*

Please fill in the diary regularly **every day at least 2-3 times a day, or more during two weeks**. There is no time limit for filling in each question, so take your time and I will be very grateful if you approach the task with diligence and creativity.

The Notes section is designed for any of your suggestions, ideas or thoughts related to recording your mood. Feel free to share thoughts that come together with your mood, suggest other formats of recording your mood, or sharing insights that you would like to include in the report. You may write/draw and etc. there your ideas on the format of the

future app features, how to reflect your emotions better or the way how you want them to be analyzed.

All the data collected is anonymous and will be used only for the purposes of the research.

Appendix 4. Instructions for the initial experiment group 1.

Experiment Instructions

This is the experiment designed for the Master thesis research on user-interface design of a mood-tracking application InFlow for iPhone. InFlow is designed to help in daily tracking mood in order to better understand yourself and your ever-changing mood. I would like to kindly ask you to participate in this study regularly in the coming 2 weeks.

Please read the following instructions carefully

Please download the latest version of the app on your iPhone/iPad/iPod touch from the iTunes. The application is free of charge and can be found under the following link http://www.inflow.mobi

After downloading the app, get acquainted with it, and use it normally as you would use it in your everyday life exploring it for two weeks, recording your experience, thoughts, insights, ideas and problems you come across. Please add as a friend the user "Julia Gershfeld" by taping on the **Friends** button and than **Add Friends** in the right upper corner in order to allow me tracking the regularity of your app updates.

Please try to check in the application regularly ***every day at least 3 times a day during 2 weeks***.

Every time you use the application, please write down your experience, thoughts, insights, ideas and problems you come across.

Consider the following questions while taking your notes:
- What is/are the feature(s) of the app you really enjoy?
- What is/are the feature(s) of the app that confuses you?
- What is/are the feature(s) of the app you find extremely useful?
- What is/are the feature(s) of the app you find extremely useless?
- Was there a moment, when you did not know what to do on the screen or felt confused? Please describe the situation when it happened.
- Did you experience a moment when you wanted to quit the app before finishing the check-in? When and why do you think it happened?
- What would make you use the app more often?

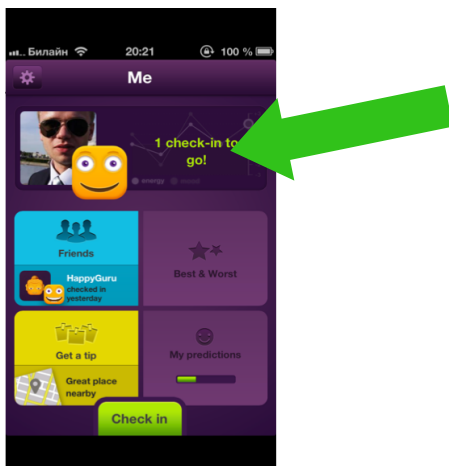You can write down your notes digitally in your computer/smartphone using regular Notes app for apple devices or Evernote template available with the following link: https://www.evernote.com/shard/s47/sh/c489e41b-8a5a-494a-b99e-17e40987f7db/5dfa1a99bc4b23b087676bd67915e43b

Share your notes file by sending it to e-mail (y.gershfeld@tilburguniversity.edu) with "InFlow experiment" in the topic field in the end of the experiment.

You can also share any user experience moment that came to your mind (good and bad) by making the screenshots and saving them in your notes file or sending them to the e-mail (y.gershfeld@tilburguniversity.edu) with "InFlow experiment screenshot" in the topic field. In case you don't know how to take screenshot with your iPhone, the following image can help you with that task:

In the end of the experiment, after 2 weeks of using the app, please make a screenshot of your mood graph and send it to the e-mail (y.gershfeld@tilburguniversity.edu) with "InFlow mood chart" in the topic field.

All the data collected is anonymous and will be used only for the purposes of the research.

Appendix 5. Instructions for the initial experiment group 2.

Instructions for the experiment

This is the experiment designed for the Master thesis research on user-interface design of a mood-tracking application InFlow for iPhone. InFlow is designed to help in daily tracking mood in order to better understand yourself and your ever-changing mood. I would like to kindly ask you to participate in this study regularly in the coming 2 weeks.

Please read the following instructions carefully

Please download the latest version of the app on your iPhone/iPad/iPod touch from the iTunes.

The application is free of charge and can be found under the following link http://www.inflow.mobi

After downloading the app, get acquainted with it, and ***connect your application with your FaceBook account***. Use it normally as you would use it in your everyday life exploring it for two weeks, recording your experience, thoughts, insights, ideas and problems you come across. Please add as a friend the user "Julia Gershfeld" by taping on the **Friends** button and than **Add Friends** in the right upper corner in order to allow me tracking the regularity of your app updates.
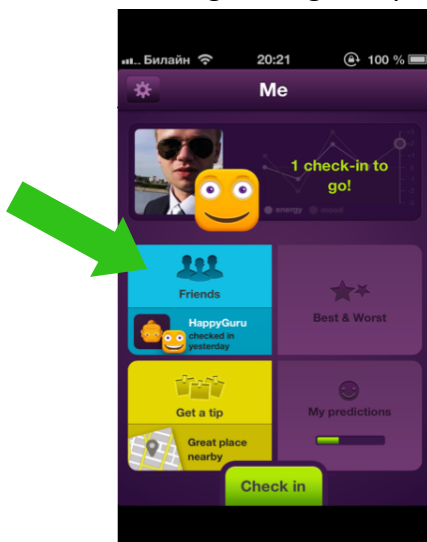
Timing

Please try to check in the application regularly ***every day at least 2 times a day during 2 weeks***.

Every time you use the application, please write down your experience, thoughts, insights, ideas and problems you come across.

Consider the following questions while taking the notes:

- What is (are) the feature(s) of the app you really enjoy?
- What is (are) the feature(s) of the app that confuses you?
- What is (are) the feature(s) of the app you find extremely useful?
- What is (are) the feature(s) of the app you find extremely useless?
- Was there a moment, when you did not know what to do on the screen or felt confused? Please describe the situation when it happened.

- Did you experience a moment when you wanted to quit the app before finishing the check-in? When and why do you think it happened?
- How often do you check your friends' updates when you use the app?

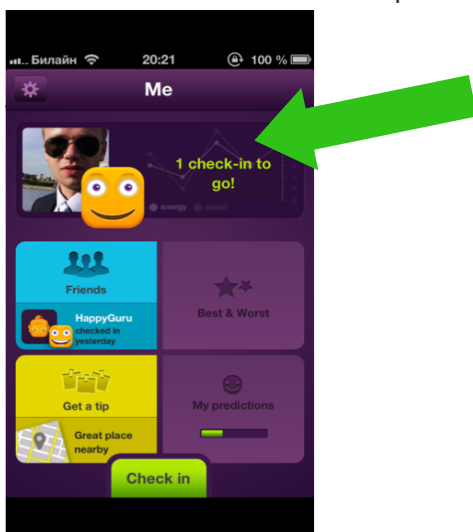You can write down your notes digitally in your computer/smartphone using regular Notes app for apple devices or Evernote template available with the following link: https://www.evernote.com/shard/s47/sh/c489e41b-8a5a-494a-b99e-17e40987f7db/5dfa1a99bc4b23b087676bd67915e43b

Share your notes file by sending it to e-mail (y.gershfeld@tilburguniversity.edu) with "InFlow experiment" in the topic field in the end of the experiment.

You can also share any user experience moment that came to your mind (good and bad) by making the screenshots and saving them in your notes file or sending them to the e-mail (y.gershfeld@tilburguniversity.edu) with "InFlow experiment screenshot" in the topic field. In case you don't know how to take screenshot with your iPhone, the following image can help you with that task:

In the end of the experiment, after 2 weeks of using the app, please make a screenshot of your mood graph and send it to the e-mail (y.gershfeld@tilburguniversity.edu) with "InFlow mood chart" in the topic field.

All the data collected is anonymous and will be used only for the purposes of the research.

Appendix 6. Post-questionnaire group 1-2

InFlow app experiment post-questionnaire

To complete your participation in the experiment, please fill in this survey.
It will take only 5 minutes to answer all the questions.

*Required

Did you ever consider to buy an extended version of the application? *

◯ Yes
◯ No

Did you connect the application to your Facebook account? *

◯ Yes
◯ No

If you did NOT connect with Facebook what would make you connect the application with your Facebook account? *

[   ]

How often do you check your friends' updates when you use the app? *

◯ more than 3 times a day
◯ every time I check-in my mood
◯ at least 2-3 times a day
◯ once a day
◯ once in 2-3 days
◯ never, I am not interested in their mood
◯ never, I didn't connect with friends in the app
◯ Other: [   ]

Thinking of the application as a whole, what rating would you give it on the scale from 1 to 6? *

              1   2   3   4   5   6

extremely dissatisfied ◯ ◯ ◯ ◯ ◯ extremely satisfied

How willing would you recommend the application to fellow iPhone users ? *

◯ Negativily
◯ Neutrally
◯ Positivly

What restricted you from using the application more often than you did? *

☐ my mood does not change so often

- [ ] the process of check-in is very long, takes too much time
- [ ] the process of check-in is very complicated/ confusing
- [ ] I forget to check-in unless I'm reminded
- [ ] Other: _____

What would make you use the application more often? *
- [ ] a different process of mood check-in
- [ ] different interface of the app
- [ ] another way of expressing my mood
- [ ] pop-up or sound reminders
- [ ] more recent updates from my friends
- [ ] useful tips from the app
- [ ] Other: _____

What is (are) the more favorable reason(s) for you to use the app? *
- [ ] keeping track of your mood and emotions
- [ ] sharing your mood and emotions with friends
- [ ] following your friends updates
- [ ] getting tips from the application

What is (are) the feature(s) of the app you really enjoyed? *
- [ ] the smilie faces to display my mood and energy
- [ ] an opportunity to express my energy, not only mood
- [ ] an opportunity to share my mood with friends on Facebook and Twitter
- [ ] attaching pictures to the check-in
- [ ] adding friends to my check-in
- [ ] tips that the application gives me
- [ ] commenting on my check-ins or check-ins of my friends
- [ ] giving hugs or hi-5s to my friends
- [ ] sending gift-songs to my friends
- [ ] the graph that shows the overview of my changing mood and energy
- [ ] rating of best and worst activities and venues and people
- [ ] questionnaire and predictions the app makes about your check-ins
- [ ] the list of activities I can choose from
- [ ] reminding notification the app gives to check-in
- [ ] Other: _____

What is (are) the feature(s) of the app that confused you? *
- [ ] the smilie faces to display my mood and energy
- [ ] an opportunity to express my energy, not only mood

- ☐ adding friends to my check-in
- ☐ tips that the application gives me
- ☐ commenting on my check-ins or check-ins of my friends
- ☐ giving hugs or hi-5s to my friends
- ☐ sending gift-songs to my friends
- ☐ the graph that shows the overview of my changing mood and energy
- ☐ rating of best and worst activities and venues and people
- ☐ questionnaire and predictions the app makes about your check-ins
- ☐ the list of activities I can choose from
- ☐ reminding notification the app gives to check-in
- ☐ Other: [   ]

Please describe what exactly confused you in those features?

[text area]

What is (are) the feature(s) of the app you find extremely USEFUL? *
Tick the features that add most value to the app

- ☐ the smilie faces to display my mood and energy
- ☐ an opportunity to express my energy, not only mood
- ☐ an opportunity to share my mood with friends on Facebook and Twitter
- ☐ attaching pictures to the check-in
- ☐ adding friends to my check-in
- ☐ tips that the application gives me
- ☐ commenting on my check-ins or check-ins of my friends
- ☐ giving hugs or hi-5s to my friends
- ☐ sending gift-songs to my friends
- ☐ the graph that shows the overview of my changing mood and energy
- ☐ rating of best and worst activities and venues and people
- ☐ questionnaire and predictions the app makes about your check-ins
- ☐ the list of activities I can choose from
- ☐ reminding notification the app gives to check-in
- ☐ Other: [   ]

What is (are) the feature(s) of the app you find extremely USELESS? *

- ☐ the smilie faces to display my mood and energy
- ☐ an opportunity to express my energy, not only mood

- [ ] an opportunity to share my mood with friends on Facebook and Twitter
- [ ] attaching pictures to the check-in
- [ ] adding friends to my check-in
- [ ] tips that the application gives me
- [ ] commenting on my check-ins or check-ins of my friends
- [ ] giving hugs or hi-5s to my friends
- [ ] sending gift-songs to my friends
- [ ] the graph that shows the overview of my changing mood and energy
- [ ] rating of best and worst activities and venues and people
- [ ] questionnaire and predictions the app makes about your check-ins
- [ ] the list of activities I can choose from
- [ ] reminding notification the app gives to check-in
- [ ] Other: [   ]

Please describe what makes you consider them useless?

Was there a moment, when you did not know what to do on the screen or felt confused? *
if there was such a moment, please describe the situation when it happened.

Did you experience a moment when you wanted to quit the app before finishing the check-in? *

if there was such a moment, when and why do you think it happened?

Is there any options you would like to add to the application *
For example giving tips to your friends where they would feel better or an opportunity to express your

mood in a different then the smilie faces form.

Who do you think would benefit the most from such kind of applications? *

Any other thought or notes you would like to make about the InFlow or the experiment itself?

Please indicate your gender *
○ male
○ female

Please indicate your age group *
○ under 18
○ 18-24
○ 25-35
○ 36-50
○ over 50

Please indicate you nationality *

The device you were using the InFlow app on *
○ iPhone
○ iPad
○ iPod touch

The start day of the experiment *
When was your first check-in

[Month ＋] [Day ＋]

[Submit]
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Appendix 7. Post-questionnaire group 3

Mood-diary post questionnaire

To complete your participation in the experiment, please fill in this survey.
It will take not more than 5 minutes to answer all the questions.

*Required

Did you find it useful to track your mood and emotions? *

○ yes, it was very useful to track my mood and emotions

○ I did not find it useful to track my mood, but I think there are people among my friends who would enjoy it

○ no, I find it completely useless

Would it be nice to have a smartphone application for those purposes? *

○ I would love to have a mobile app for tracking my mood

○ I do not think I will use such an application, but I know people who would find it useful

○ I think such an app is a useless idea

○ I think such an app can be used for corporate purposes only

What way of expressing your mood or emotions is the most suitable for you? *
Words, pictures, photos, smile faces, scale or anything else?

[_____]

Would you be interested in tracking your friends' mood and emotions daily? *

○ Yes, that sounds like one of the most important things for me

○ Yes, might be a nice additional option for the mood-diary

○ No, I'm interested only in my own mood-tracking and don't want to know my friend's activity

○ Other: [_____]

Would you be interested in sharing your emotions and mood with your friends in social networks? *

○ Yes, I would like to share my mood with friends in the social networks

○ I would prefer to share it only with friends who also use the app

○ I would prefer to share it with some friends who also use the app, but only if I see their mood as well

○ No, I would prefer to keep it private and not share it with anyone

How often do you think your would use the application? *

○ less than once a day

○ once a day

○ 2-3 times a day

○ 4-5 times a day

○ more than 5 times a day

Is there any features you could offer to the developers to integrate into the future mood-tracking mobile application? *

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Indicate your gender *

○ male

○ female

Indicate your nationality *

[   ]

Indicate your age *

○ under 18

○ 19-24

○ 25-35

○ 36-50

○ over 50

Submit

Never submit passwords through Google Forms.