# Designing social mobile interfaces: experiences with MobiMood, a mobile mood sharing application

**Karen Church**
Telefonica Research
Via Augusta 177, 08021
Barcelona, Spain
karen@tid.es

**Eve Hoggan**
Dept. of Computer Science
University of Glasgow
Glasgow, G12 8QQ
eve@dcs.gla.ac.uk

**Nuria Oliver**
Telefonica Research
Via Augusta 177, 08021
Barcelona, Spain
nuriao@tid.es

## ABSTRACT

The exploration of mood and emotions in HCI is emerging as an important field of research. Our moods are affected by many different factors and can change multiple times throughout each day. Furthermore, our moods can have significant implications on our social interactions and our willingness to interact with others. We have developed MobiMood, a novel proof-of-concept social mobile application that enables groups of friends to share their moods with each other. In this paper, we present some high level results of an exploratory field study of MobiMood and highlight key implications in the design of future social mobile interfaces.

### Author Keywords

Moods, mobile interfaces, social interfaces, context, visualization, mobile interaction, field study

### ACM Classification Keywords

H.5.2 Information interfaces and presentation (e.g., HCI): User Interface, H.3.3 Information Storage and Retrieval: Information Search and Retrieval.

### General Terms

Design, Experimentation, Human Factors

## INTRODUCTION

The exploration of mood and emotions in HCI is emerging as an important field of research. Our moods are affected by many different factors and can change multiple times throughout each day. Sharing our moods and learning about the moods and emotions of others is a common theme in conversations among friends, thus highlighting the extent to which mood plays an important role in our daily life [1]. Furthermore, our mood can have significant implications on our social interactions. For example, it has been shown that when we are happy we are more inclined to interact with others, while when we are sad we tend to distance ourselves from friends and family [8].

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A rich body of research has been generated to explore the challenges involved in establishing, monitoring and communicating individuals moods with physiological sensing, mood blogs and diaries, all offering a range of trade offs in terms of validity, accuracy and privacy [4], [2] [12], [13]. More recently, a variety of mobile services and applications have emerged that help users communicate status updates in the form of a short textual messages [7]. These status messages often convey mood information, e.g. "I feel fine".

Current mobile devices include a range of sensors that allow monitoring of contextual factors such as location, time and activity of users. Given that mobile phones are personal devices, always on and always with us, they provide a great opportunity to capture mood information and gather feedback from users anytime, anywhere, in addition to serving as an almost constant communication channel to friends and family. Mobile users may also be interested in sharing moods with each other and may actually be able to positively impact each others moods.

However, mobile environments present a number of key challenges. Mobile devices are inherently limited; their small screens and restricted input and interaction capabilities present a number of usability and interface challenges. Mobile users are on-the-move and as such their needs are affected by changing contexts, e.g. location, temporal, social. Designing social interfaces is also difficult. Social applications aim to increase communication, collaboration and awareness among groups. As such social media tends to be awkward because social interfaces are designed to be used by multiple users and are dynamic in nature.

MobiMood[1] is a social mobile application, combining both the social and mobile spaces. MobiMood allows users to submit and share moods and their associated mobile contexts with friends and others while on-the-move. It supports sharing moods in a similar way to microblogging services such as twitter[2], which allows status updates to be submitted and shared easily and quickly in the form of short snippets of text, however, mood input via MobiMood is much more visual in nature. In this paper we describe the MobiMood prototype and provide a high level overview of the results

[1]Note that the MobiMood prototype was developed while Eve Hoggan was an intern in Telefonica Research, Barcelona, Spain.
[2]www.twitter.com

obtained from a 2-week user study involving 5 different social groups. Using the lessons learned during the design and evaluation of MobiMood in the wild, we highlight key implications in the design of future social mobile interfaces.

## RELATED WORK

In this section we highlight two areas of related work to the MobiMood project. The first related to mood tracking and mood detection, while the second relates area focuses on visualization of mood data.

### Mood tracking and detection

The earliest research projects focusing on moods originated in psychology and investigated methods of mood detection [10]. For example, there have been several studies investigating the discovery of moods in blog posts, analysing large amounts of text to capture national responses to news or sporting events, e.g. [3]. This topic has generated a lot of interest online recently[3] with websites such as *We Feel Fine*[4]. The We Feel Fine project scans blog posts for the phrases "I feel" and "I am feeling" periodically. The project has been running since 2005 and over 12 million feelings have been collected to date.

Wanner et al. [14] explores the use of sentiment analysis with visualization to extract and convey the emotional content of RSS news feeds from the 2008 US presidential election. Others have applied machine learning to interpret the emotions of bloggers [6]. Such approaches which attempt to extract mood data from short pieces of text may eventually enable the development of innovative applications that automatically detect emotion and adapt to changes in users emotions. However, these approaches are limited in that they can only detect moods in text if bloggers use certain key phrases or terms to convey their moods.

Several mobile applications are already commercially available that use mood information obtained through manual user input. In particular, Nokia developed the ContextWatcher application [5] that associates mood information to context. The *My-Mood*[5] iPhone/iPod Touch application allows users to share their mood on the web with one of its unusual characters. Users can set their mood and publish it online to blog or other webpage.

Other methods of mood detection include physiological measurements such as heart rate, temperature, blood pressure and even posture. Gluhak et al. [4] used physiological signals to determine the moods of users and then proposed using mood as an additional element of context much like location or time for instant messaging style applications. In their application, physiological measures are displayed beside messages so friends know how the user was feeling at the time of the message.

There has also been some previous research with a focus on using mood detection in health applications. The Mobile Heart Health project by Intel [9] also uses physiological sensing to detect moods through the Mood Phone application and then combines this with mobile feedback for preventative cardiology. The goal of the project was to enable users to become more self-aware of their emotions and feelings so they may develop better coping mechanisms when they encounter stressful situations.

These applications attempt to provide accurate measurements of moods and some have made use of this information to promote awareness of the emotional state of user. However, they have not examined the impact of contextual factors such as location and social situations on the moods of users nor have they investigated the effects of sharing moods on users and their friends or the best way to present this information.

### Visualizing moods

Also related to this work is the visualization of moods. This is an interesting research area, and a particularly challenging one for mobile environments where screen real-estate and interaction capabilities are limited. The *We Feel Fine* project mentioned in the previous section includes dynamic visualizations that attempt to convey the collective mood of a variety of users around the globe. These playful and interactive visualizations include a montage of pictures submitted, detailed metrics by feeling, gender, age, location and weather, as well as a visualization called *mobs* in which colours, shapes and sizes are used to convey mood and intensity. The *We Feel Fine* project also provides an API designed to allow artists to access and explore these human emotions.

Similarly the MoodJam project[6] from the Human Computer Interaction Institute at Carnegie Mellon University provides a visualization of moods and other peoples moods based on color strips. The website allows users to keep a record of their moods, to learn about mood trends and to share moods with others. The goal of the project is to increase mood awareness among users and groups.

Using a more abstract approach, Boehner et al. [1] developed Miro, a prototype system that projected a representation of the overall emotion of workers based on responses to an online emotional survey through an animated abstract painting. Changes to the background colour, the number and cluster of dots in the painting, and the speed of animation reflected averages of the survey answers (e.g. happy or sad).

Although not incorporated in the current MobiMood prototype, the goal would be to provide interesting visual feedback to the end user regarding their past mood histories, the moods of their friends and the moods of their group. We will return to this topic at a later stage in this paper.

## MOBIMOOD

MobiMood is a proof of concept mobile prototype that enables groups of friends to record and share their moods with

[3]Mining the web for feelings: http://www.nytimes.com/2009/08/24/technology/internet/24emotion.html?_r=1&th=&emc=th&pagewanted=all

[4]http://www.wefeelfine.org

[5]http://video.yahoo.com/watch/3981791/10793640

[6]http://moodjam.org/


(a) Mood input screen (b) Custom mood (c) List of moods (d) Mood detail screen

**Figure 1. Screenshots of the MobiMood application.**

each other while on-the-move, thus increasing *awareness* within social groups. MobiMood is a visually rich and highly interactive iPhone application. The software architecture of MobiMood consists of two components: (1) an iPhone application that allows users to record and share moods as well as comment on the moods of others; (2) a server that synchronizes and stores all mood details in the MobiMood database[7].

The server feeds the mobile application with an up-to-date list of all moods. The server also comprises an email and SMS notification facility that informs members of the appropriate social network about new moods and new mood comments from friends. In addition, the server logs all the interactions between the user and the GUI of the iPhone application for off-line analysis of user behaviour.

### Mood Entry

When a user launches the MobiMood application, they are presented with a mood input screen. The mood input interface shows six different coloured buttons at the bottom of the screen, each representing a different mood. Users can choose from one of five standard moods (sad, energetic, tense, happy and angry) or they can input their own custom mood, e.g. 'bored', 'very excited', etc. The standard moods are all derived from a subset of moods found in Russell's Circumplex of Affect [10] and XMPP [11]. Russell's Circumplex is widely used in psychology and XMPP is a comon standard used in Web based social applications. Both contain a similar set of moods. The Circumplex model of affect proposes that all affective states arise from two fundamental neurophysiological systems: one relates to valence (a pleasure - displeasure continuum) and the other relates to arousal or alertness. Each mood can be understood as a linear combination of these two dimensions, i.e. varying degrees of both valence and arousal. We chose a set of standard moods from each of these dimensions. To increase the visual aspect of the user interface, each mood category is associated with a different colour based on those established by Wexner: blue-sad, green-energetic, purple-tense, red-angry, yellow-happy [15]. We chose orange to represent the custom mood (see Figure 1b).

Given that the application is iPhone based, we decided to focus heavily on visually rich touch-based input and interaction to allow users convey the intensity of their mood at a given point in time. To input a mood, the user presses one of the buttons at the bottom of the screen and a bubble will begin to grow in the rounded box in middle of the screen (Figure 1a). The longer the user holds their finger on the button, the bigger the bubble will grow. The size of the resulting bubble is mapped to the intensity of the mood (1 to 10, where 1 is represents the lowest intensity and 10 represents the highest intensity). The intensity is also displayed on a progress bar so that more absolute feedback is provided. For example, if the yellow button is pressed and held until the bubble grows to its largest size, the participant's mood is considered to be 'happy' with an intensity of 10.

### Contexts

Once the user has selected his/her mood and intensity level, (s)he clicks 'next' and is taken to the context-input screen. On the context-input screen users record their situational and social contexts. The *situational context* allows us to determine more about the location of the user and is given by selecting one of four options: *at home, at work, commuting, other*. The *social context* allows us to determine more about who the user is in the presence of when submitting a new mood. The social context is introduced by selecting

[7]We use Apache for the server requirements of the application and all data is stored in a MySQL database.

one of five pre-defined options: *alone, partner, colleague, family, other*. Both contexts are inputting using the standard iPhone picker input. In addition, the device ID, the date and time and the physical location (in latitude/longitude form) of each user, are logged with each mood. Storing the physical location of each user allows us to map meanings to the situational contexts.

### Mood Lists

After submitting a mood, a final screen is presented that lists the last thirty moods of their friends. The mood lists shows the name of the user who submitted the mood, the mood in both textual and colour format, the date and time and the situational context. By using the tabs at the bottom of the screen, the user can also view their own previous moods (*My Moods* tab) or the moods of everyone else (*Everyone* tab) (see Figure 1c). Users can view the details of any of the listed moods by double-tapping on the mood in question.

### Supported Interactions

This mood detail screen (Figure 1d) provides more complete details about the users mood. The detail screen lists the user's name, the mood, the date and time submitted, the intensity of that mood as well as any comments submitted by the users friends about the mood. This screen also includes 3 buttons that allow a user's friend to interact with the mood entry. Specifically the screen includes a button to add a comment, a button which initiates a phone call to the user in question and a button which initiates an SMS to the user in question.

## USER STUDY

In this paper we are interested in investigating the lessons we learned in terms of designing social mobile interfaces based on user experiences with the MobiMood prototype. As such we provide an high-level overview of the user evaluation we carried out and describe some basic usage results. Later we discuss more details of the user study in relation to implications for the design of social mobile interfaces.

### Participants and Procedure

In order to take part in the user study participants were required to own an iPhone and be part of a group willing to participate in a 2-week study where they input and share their moods with friends. We chose to study the use of MobiMood in five close-knit groups who lived, worked and studied in different countries around the world. In total 15 participants took part in the study (11 male and 4 female), ranging in age between 23 and 43 years (avg=28.6). The participants had a diverse set of occupations, including a journalist, solicitors, teacher, IT professionals and students. The participants were given a small incentive of £20 for taking part and a £200 raffle was held at the end of the study and given to one participant. Table 1 shows more details about each of the five groups: number of users per group, the ratio of males to females and the country of origin for each group.

Before the field test began, users were asked to complete a pre-study questionnaire and to install the MobiMood application. The pre-study questionnaire was used to gather basic demographic information, details about their use of online social network sites as well as information about their moods and the factors that contribute to their moods. The live field study took place over two weeks in August 2009. During the study, we collected a series of log data for post-task analysis which included: listings of the calls and SMS sent between participants[8], the time, location, type and intensity of each submitted mood (participants could choose to omit their location data), what moods were viewed, comments on moods as well as whom the participants were with at the time of mood entry. Finally, participants were asked to complete a post-study survey to gather subjective information on their experiences with the application.

| Group | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| # Users | 3 | 2 | 3 | 2 | 5 |
| # Male | 2 | 2 | 2 | 1 | 4 |
| # Female | 1 | 0 | 1 | 1 | 1 |
| Country | Scotland | USA | Italy | Scotland | Wales |

**Table 1. MobiMood participants: showing number of users per group, ratio of males to females and country of origin.**

In an effort to maintain the motivation amongst participants, the ability to view moods was restricted. MobiMood only allows users to view other moods and associated comments once they have submitted a mood. There is no other way to access this information. Furthermore, participants had to submit at least 15 moods before being able to see the submitted moods and comments of everyone in the study. Prior to this, participants could only view and comment on their own moods and those of their friends. At the end of study, we provided two visualizations of the submitted moods to all participants: one visualization at the group level and a second visualization showing the moods of all 15 participants over the 2-week period.

We used email and SMS notifications to keep users informed of the interactions of others within the study. Whenever a participant submitted a new mood, all of the participants friends received an email notification. When a comment was added to a particular mood, the participant who originally entered that mood received an SMS to inform her of the new comment.

## RESULTS

In this section we present some high level usage results from the field study.

### Basic Results

In total, participants submitted 311 moods over the 2-week period. 112 were standard moods (36%), while 176 were custom mood entries (56.6%)[9]. Figure 2 shows the distribution of mood entries per type.

[8]Note that we could only count calls and SMS message initiated from within the MobiMood application

[9]The type of the remaining 23 mood entries (i.e. standard or custom) is unknown. The type is unknown for mood entries where the user did not want the application to track their location. We will discuss this later in the paper.

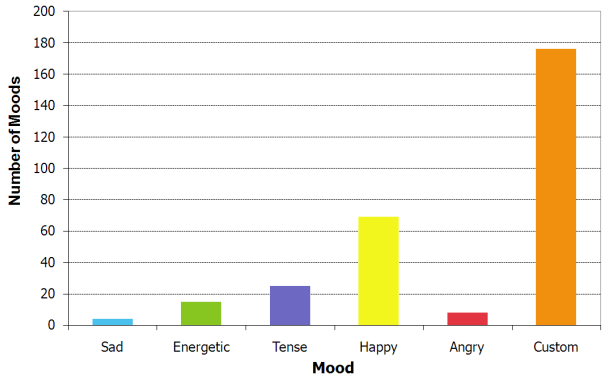



**Figure 2. Distribution of moods across custom and standard mood entries.**

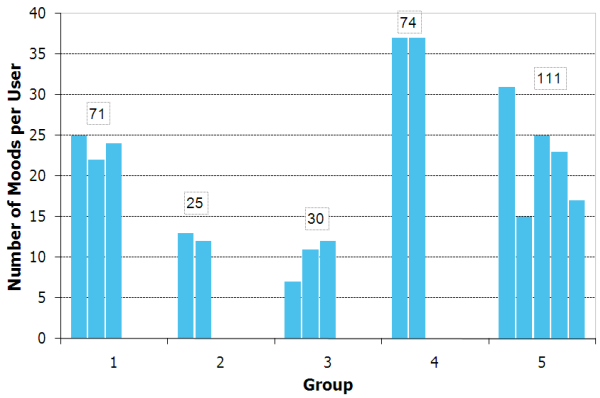



**Figure 3. Number of moods submitted per user per group.**

The most common standard mood was "happy" and the least common was "sad", suggesting that users tend to share their positive emotions more easily than their negative emotions. In future work, we plan to investigate why users are ready or not to communicate their moods with a view to understanding how users might be persuaded to share their mood even when they are sad.

Of the custom moods, 103 (58.5%) were unique custom mood entries, indicating that diverse sets of custom moods were submitted by participants. Interestingly, we found 3 types of custom mood entries: (1) basic moods, e.g. *"tired"*, *"excited"* and *"rushed"*. 77% of custom moods fell into this category; (2) status update moods (16% of the custom moods), e.g. *"hating busy hot slow bus in the rain"* and *"looking forward to yoga"*; and (3) combination moods, made up of a combination of a basic mood followed by a description of why the participant was in a particular mood: e.g., *"grumpy (about going back to work)"*, *"glad, Monday done"*, and *"bored (of big brother!)"*. 7% of custom moods fell into this category.

We found an average of 20.1 moods per participant and an average of 62.2 moods per group. Figure 3 shows the number of moods submitted per user per group. We can see that even groups with only 2 participants (e.g. group 4) generate a high number of mood entries ($>$ 70 moods submitted).

### Context and Mood

We explored two different types of context in the MobiMood study: (1) location and (2) social context. Note that the majority of previous research into moods has been static, i.e. it was not conducted using mobile devices as the primary recording mechanism. By conducting this research in a mobile setting, it has been possible to log users moods at different locations and in different social settings.

Table 2 shows the distribution of location contexts associated with mood entries. The most popular location context chosen by participants was "home", with 41.6% of moods submitted at this location. Our preliminary results suggest that location can affect the types of mood experienced by users, however, given the volume and diversity of "custom" moods submitted via the MobiMood application, this is difficult to evaluate fully. For example, when the majority of participants recorded their location as "at work", energetic, sad and angry levels were considerably lower (1.6% of moods at work were energetic, sad and angry), while "tense" (9.8%) was chosen more often. Whereas when location was set to "home", energetic levels were higher.

According to the answers from the post study questionnaire, users accessed the MobiMood application at home because there were often "at a loose end" and had more time to interact with their device.

| Location Context | # | Mood % |
|---|---|---|
| At home | 130 | 41.6 |
| At work | 56 | 18.3 |
| Commuting | 45 | 14.4 |
| Other Location | 57 | 18.3 |

**Table 2. Number and percentage of moods per location context.**

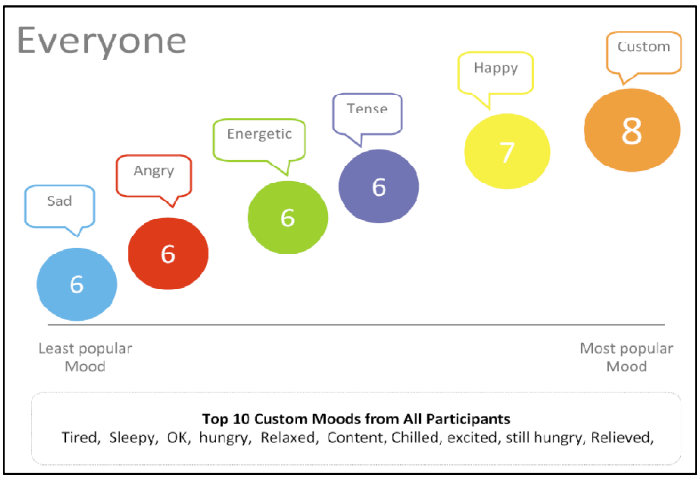
Table 3 shows the distribution of social contexts associated with mood entries. We found that users submitted most of their mood entries when they were alone (35.5%). Interestingly, there were absolutely no recorded sad moods when participants were with friends and no angry moods submitted with family. Furthermore, a considerably higher number of custom moods were submitted when participants were alone (49% of custom moods).

When we asked participants if the social context helped them understand more about their friends' moods, only 7 (46.7%) answered yes. Of the users who said no, some of these users reported *not noticing the social context* labels as one reason. This is perhaps due to poor interface design choices in representing and capturing context information. Overall, based on user responses, it appears that social context has less of an effect than location context in terms of understanding why someone is in a particular mood.

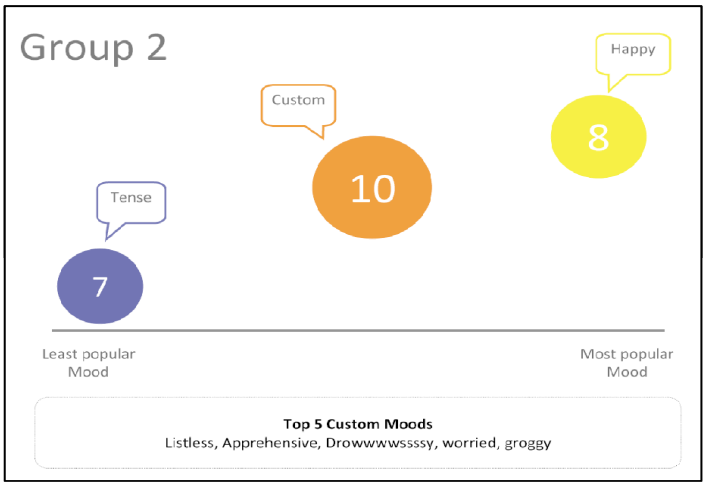
### Self-awareness of Moods

Another interesting issue in this research is that of self awareness. That is, what is the effect on the users' moods if we

(a) Visualization of the average moods of **everyone** in the study after 2 weeks




(b) Visualization of the average moods of participants of **Group 2** in the study after 2 weeks




(c) Visualization of the average moods of participants of **Group 3** in the study after 2 weeks


**Figure 4. Sample visualizations provided to participants at the end of the two week study. (a) represents the global visualization, that is across all users while (b) and (c) are group level visualizations for groups 2 and 3 respectively.**

| Social Context | # | Mood % |
|---|---|---|
| Alone | 111 | 35.5 |
| With friends | 38 | 12.8 |
| With family | 34 | 10.9 |
| With partner | 30 | 9.6 |
| With colleagues | 54 | 17.6 |
| Other social context | 21 | 6.7 |

**Table 3. Number and percentage of moods submitted at various social contexts.**

provide them with tools to visualize their moods and enable users to become more self-aware of their moods? One participant said: *"I think that we often dismiss our state of mind or our state of being because we're so used to it. Like not being able to see the wood for the trees. Having an objective device track moods might make for some interesting and unexpected revelation and patterns that can ultimately be used as a foundation for improved health and happiness."*

Ideally the MobiMood application would have included support for providing end-users with real-time, interactive visualizations of their moods and the moods of their group. However, this feature is not implemented in the current prototype. However, at the end of the study we did provide each participant with two mood visualizations. One visualization for their group and a second visualization of all users across the 2-week period. Figure 4 (a) shows this global visualization, while Figure 4 (b) and (c) shows the group-based visualizations for group 2 and group 3 respectively. When asked how they felt about the visualization, 13 participants agreed that it was useful.

Some of the comments regarding the visualization included: *"It was cool to compare it to the public one. Also interesting to see that we all used the custom mood the most"*, *"I think that this showed me that the notion of mood becomes complex when you try to think about it. Its hard to distinguish between mood and 'current status'."*, *"I liked the look of it, and it'd be fun to see how you fit in."*, *"It was a really nice report and quite interesting to read"* and *"I seen that the moods most used was custom and that suggested me that everyone likes to tell precisely how feels himself"*.

Users did express some issues with the provided visualizations that may have prevented them in getting as much value from the visualization as possible. We will return to this issue in the next section on design implications.

## DESIGN IMPLICATIONS

Designing social interfaces is a difficult task and when social interfaces are deployed in a mobile setting the environment becomes even more challenging. Our 2 week evaluation of the MobiMood prototype has taught us a number of important lessons when it comes to designing mobile social interfaces. In this section we outline a number of key implications and discussion points in the design of such interfaces based on the set of results presented in this paper. We try to focus in particular on the lessons that relate to interfaces and/or visualizations.

### Give users control

As mentioned earlier, a large proportion of mood entries were *"custom"* moods (almost 60%). The participants tendency to express their moods through the "custom" option suggests a need to express more information and to provide a more in-depth insight into the participants submitted mood. In terms of expressing moods, the post study questionnaire revealed that participants would have liked to have more control over mood categories. In the words of one participant: *"I found this a bit limiting"*. Therefore when designing social mobile interfaces it's important to provide end users with enough control so that they can interact with and use the application in the way they wish without them causing disruption to other users of the application.

Before deploying the MobiMood user study we made the conscious design decision to not allow users to view the moods of others' before submitting their own moods. One of the issues with evaluating social applications is that often they need to reach some mass level of usage before the system can be useful to users. Our study was relatively short and we wanted to ensure that enough mood entries were collected and shared. Given the natural imbalance that exists between producers and consumers of content within social systems its unlikely that these behaviours could emerge so quickly/naturally in a short time-frame. However, users did feel this was too restrictive and in the deployment of a real prototype, we would remove this constraint so that users have more control over the interaction and flow within the application.

Users also wanted to control the visual elements of the application. For example, one user commented on the colours associated with the custom mood category: *"you could be able to pick the colour of the other mood rather than it being the same colour all the time as most of the time you want to personalise your own mood and when you look at the results of friends/everyone it's mainly in orange"*, while another user suggested being able to submit combinations of moods, *"Allow users to select combinations of more generic moods. Remember often used custom moods and make these easier to enter, with their own random colour."*.

One approach in future versions of MobiMood is to increase the visual elements of the interface. We need to support more than 5 pre-defined moods, to allow users to submit a combination of moods and to enable users to include a description with each mood to enable users to explain their choice of mood. From a user interface and interaction design perspective, this presents a number of challenges, especially given the limited screen real-estate and interaction capabilities provided by mobile handsets.

### Increasing self-awareness through better visualization

We mentioned previously that at the end of the two week study users were presented with two visualizations to convey both the average moods of all participants and the average moods of people within their group over the 2-week study period. Most users enjoyed this visualization, however, it is also clear that participants would have liked additional in-

formation within the visualization. MobiMood is a novel mobile application and as such provides support for capturing contextual data such as physical latitude/longitude, situational context and social context. This information was not conveyed in the provided visualizations but it appears that some users would have liked to see their mood histories based on these dimensions. For example, one user commented: *"I thought it was interesting, but I was looking forward to seeing how location and company affected the moods, so I thought that ultimately, the visualisations were quite superficial and contextless."*, while another user commented: *"No grouping of moods via location.....Lots of potential for interesting visualisation though."*.

It would also be possible to increase self-awareness if the visualization's were conveying mood data over a longer time period. This preliminary study provided end users with details about the average mood of others over a 2 week period. However, there would be clear benefit to collect and aggregate mood details over months, years, etc. One user commented on this, *"Fairly interesting, will be more interesting over a longer period of time"*.

#### Integration other social systems

An interesting point that came out of this user study was the potential of integrating MobiMood with other, existing online social systems. For example, one user commented that Mobimood was *"cool but felt a bit like a supplement to Twitter; it might be cool to somehow integrate the two"*. Likewise when asked what could be improved with the MobiMood application, one user commented, *"Maybe add to the Twitter API so each update has a mood associated with it."*.

Integrating or utilizing MobiMood within existing social systems would present a number of interesting research challenges. For example how do we handle the extraction, integration and representation of mood information from various status updates? How do we design the social interface and handle the resulting social interaction surrounding such an integration. And finally, given the mobile environment in which MobiMood is deployed, additional contextual information should also be considered. We believe that there are a number of existing research challenges awaiting us and we have lots of food for thought for future work in this regard in the MobiMood project.

## CONCLUSION

In this paper, we have described a proof-of-concept research prototype called MobiMood. MobiMood is a social mobile interface which enables groups of friends to share their moods with one another. We carried out a 2-week field study (involving 15 participants split across 5 groups) and use the reported results of this study to outline a number of key implications for the design of future social mobile interfaces and visualizations.

We are currently investigating a few areas of future work related to the MobiMood prototype. We are in the process of implementing an improved version which incorporates some of the lessons we have learned. We plan to carry out a longitudinal field study involving more participants and more groups of friends. We would like to explore the social context of moods in more detail and investigate how to facilitate more fruitful communications and conversations among users. We also believe there is interesting work to be done in the area of visualising moods over time and providing such visualizations to mobile users to make them more aware of their mood.

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