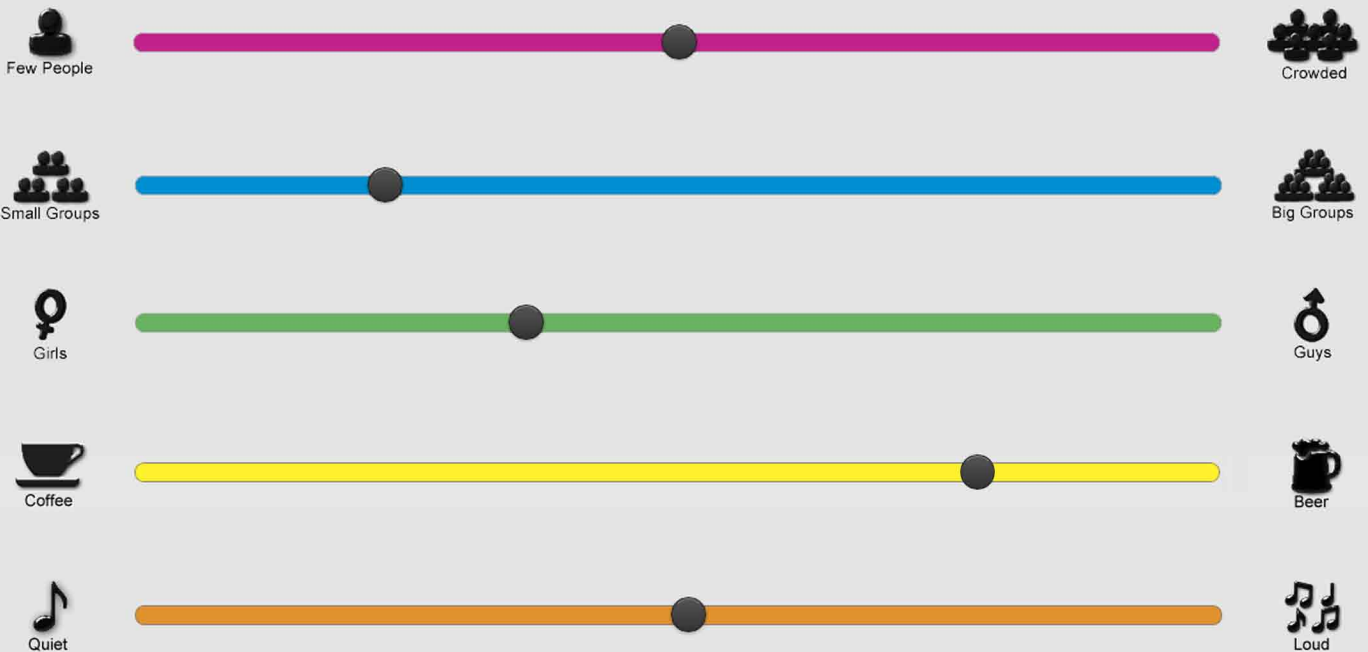


# Context is all

## Exploring Digital Representation of Ambience



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Master's Thesis

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# Abstract

The focus of this thesis is on how ambience (or atmosphere) of venues can be digitally represented through the help of mobile technology and situated displays. In doing so we explore mediated context-awareness, where context is the content, and let mobile technology and situated displays provide resources for people to create and maintain impressions of ambience through their own interpretation of contextual information. Exploring this approach we develop a system prototype that lets users experience a digital representation of the ambience at venues by mobile phones and a situated display. The system utilises a novel approach by letting people be the providers of contextual information about the ambience through use of a tablet computer interface. We conducted a case study where the system was evaluated in-situ at a venue. Our main finding is that although ambience is socially constructed and highly subjective, it can be digitally conveyed by representing ambience as a set of distinct parameters that together encapsulates the ambience. Additionally we have found that humans can be providers of contextual information and that such an approach allows for a digital ambience to be represented.



# Preface

The work described in this thesis was carried out during the spring semester of 2011, from February to June, by two informatics students at Aalborg University, Department of Computer Science.

The purpose of this project was to try to get an understanding of how representations of ambience can be created and conveyed digitally, with humans as providers of context information. This is done by implementing a prototype, which utilises mobile platforms and situated displays to present people with information allowing them to get an impression of mood at a venue.

We would like to thank our supervisor Jesper Kjeldskov for providing valuable input and support during the project period. Additionally we would like to thank Dimitrios Raptis for offering a helping hand throughout the semester. Last, but not least, a special thanks goes to Studenterhuset and their volunteers for their collaboration and support.

Aalborg, June 6<sup>th</sup>, 2011

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# Reading guide

Here follows a brief run-through of the structure of the report.

We start out by introducing the project, after which we look closer at the overall Concept developed for this project. This is followed by a look at some Related Work. Next we describe the Case that was chosen for the implementation of the concept just described. Following the description of the case we go into to detail with the actual design and implementation of the system. We then switch focus to the process of collecting and analysing data, by first looking at the method we intend to use, and then looking closely at the Findings we have discovered in the collected data. We finish off with Discussion and Conclusion in which we look closer at the most important findings and answer our research questions.

## References and citations

When we reference publications we use one of two practices. If the names of the authors are part of the actual content we have written the year of the publication follows immediately after in parenthesis. Example: Schilit et al. (1994). If the names of the authors do not appear in the text, they will instead appear together with the publication year in parenthesis. Example: (Oulasvirta et al., 2005). The complete list of references appears last in the report complete with additional details about each individual publication.

Footnotes are used for references elaboration on the given content. This can for example be a reference to the URL of a web service being described.

When using direct quotes the quoted text will appear in double quotes (“ ”) and will be italicised. If the quote is longer than two lines it will appear as an individual paragraph otherwise it will be part of the surrounding text if suitable. Quotes are always reproduced as they appear in the original source. Grammatical and typographical errors are indicated in by inserting [sic] immediately afterwards, to indicate that the error appears in the original source, and is not the result of a faulty transcription.





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# 1 Introduction

The motivation behind this project was a curiosity for how one can make novel use of mobile devices in urban environments. New challenges in software design have been introduced since computers have evolved from being mostly stationary objects in homes and offices, to being small ultra-portable devices in the form of laptop computers and mobile phones. Additionally recent years have seen an increased focus on situated displays being used for various, often advertising-related, purposes around urban environments. Both mobile computing and situated displays represent kinds of computing, which are quite different from the more classic desktop based version. Combining the increased use of mobile devices and situated displays provides opportunities for exploring how these kinds of technology can supplement each other and work together in an ecosystem and in a multitude of use contexts, an area which is increasingly being explored.

One popular way of dealing with many possible use contexts is the practice of context-awareness. In recent years there have been many examples of how mobile devices can make use of contextual information in urban environments. Commercially there are systems such as Google Places<sup>1</sup> and Layar<sup>2</sup>, which allow users to explore a variety of information in their vicinity. These kinds of systems generally recognise the position of the users and adapt information about e.g. places to their location. An issue of interest to us was that the information in such systems is mainly static. By static information we mean that once content is created it remains in that form. There can however still be added new content, or previous content can be altered if the information is wrong. This describes very well the content of e.g. Google Places, where people provide the information about a particular place, but once created it remains unaltered until obsolete.

Our interest in context-awareness lies on how one can create and make use of dynamic information. Environments and especially urban environments are hugely dynamic. That being said, one stroll through a busy street at different times, the localities will most likely be the same, but the people and their doings will be very different. It is possible to create a very long list of things being different such as the weather, traffic and sounds.

Recently more and more commercial services that provide dynamic information in urban environments are gaining success. Services such as Foursquare<sup>3</sup> and Facebook Places<sup>4</sup> combine location-based information with social networking and lets users 'check-in' to places as they visit them and share this with their friends. They can give tips about or receive offers for places they have visited as well. The social element complements these kinds of services by providing more dynamic information.

The concept for this project emerged from the notion that urban environments are dynamic and therefore mobile systems for urban environments should be able to provide more dynamic information to users. The concept was to present users with dynamic

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<sup>1</sup><http://www.google.com/places/>

<sup>2</sup><http://www.layar.com/>

<sup>3</sup><http://foursquare.com/>

<sup>4</sup><http://www.facebook.com/places/>

information about different venues in the city. The dynamic information should represent the ambience at these places and try to unveil what people previously had to set a foot inside to experience.

Because of the ambiguous nature of the term ambience we want to specify what ambience means in the context of our project. We look at ambience as the character and atmosphere of a place. Ambience refers to something intangible that is created socially among people in a relationship with the given environment.

We thought it would be ideal for these venues to be bars and cafés, as the ambience at such places change rapidly and is an important factor for people wanting to go there. Ambience is however a rather subjective phenomenon. We explain our concept in further detail later in this chapter and take account for this subjectiveness. This chapter continues with a brief account of the field of context-awareness, needed to understand the underlying principles of the concept.

## 1.1 Context-awareness

Context-awareness has been a field of interest in HCI even when desktop applications were still the primary focus of attention. The notion of systems being able to grasp the context of use seems to have a lot of merit when dealing with the challenges of mobile computing and dealing with a multitude of contexts. However, a glance at the field of context-awareness reveals there are different perceptions of what is context and thereby many different approaches to context-awareness.

Schilit et al. (1994) first introduced the term context-aware. Since then there has been some debate as to what defines context-awareness, originating in defining a term as ambiguous as context. They formalized that *“three important aspects of context are: where are you, who you are with, and what resources are nearby”*. Although these three questions together encapsulates a lot of what context can be and are easily understood, we believe that a more general and thereby less constricting definition is needed. Furthermore it seems heavily weighted towards context being only the environment.

A more generic definition of context is proposed by Dey and Abowd (2000). It states that context:

*“is any information that can be used to characterize the situation of an entity. An entity is a person, place, or object that is considered relevant to the interaction between a user and an application, including the user and applications themselves.”*

This broader definition we believe is helpful in not thinking of context simply as the environment. As stated by Schmidt et al. (1998), early applications of context-awareness have been focused on sensing and using location. This is a tendency that seems to have continued and grown since then, especially after the increase in mobile phones and devices with GPS capabilities embedded.

The challenge in trying to reach a common definition of context-awareness is that it requires a mutual understanding of context. Oulasvirta et al. (2005) argue that there exist two contrasting approaches to context. They identify these two different schools of thought as Realism and Constructivism. Realism builds on the views from natural sciences and presupposes that contexts exist. Therefore computers should be able to

correctly recognise and adapt to contexts given the right set of instructions to capture and process such. Constructivism perceives contexts as socially constructed, contingent on convention, human perception, and social experience. Unlike Realism it allows for multiple interpretations and understandings of contexts to exist. Table 1 shows the two approaches compared according to three different levels of understanding.

	Realism	Constructivism
Ontological	Context is real, it is structured and the structure can be modelled by a learner. Contexts share properties (or universals) that exist independent of human interpretation.	Contexts are constructed socially in interaction with other agents in the world, and psychologically, in making sense of sense data.
Epistemological	Computers can perceive (i.e., recognise based on sensor data) context universals	Interpretation of context is always constituted within a frame of reference.
Pragmatic	If correctly recognised computers can adapt their behaviour to the requirements of the context.	Instead of labelling contexts, computers can provide resources for people themselves to create and maintain contexts in their action.

**Table 1 - Comparison of Realism and Constructivism, based on Oulasvirta et al. (2005)**

It is clear that Realism and Constructivism are contradictory philosophies to context, and therefore when designing for context-awareness, one simply cannot be eclectic in the matter of what ‘is’ context. For this project we deliberately take a Constructivist approach to context, in order to explore how ambience digitally can be conveyed to people.

Figure 1 shows an illustration of how Realism and Constructivism can be understood on different levels. The illustration is divided into four parts horizontally as well as two parts vertically. Vertically the illustration is divided into “Realism” and “Constructivism”. Horizontally we start at the bottom with “Context” which is present on both sides vertically. This is also the case on the next level, “Context-awareness”. So both “Context” and “Context-awareness” exist equally in both approaches. Where they differ is in how they make use of the available information. Systems that fall into the Realism part of the illustration we categorise as “Traditional context-aware systems” whose main purpose is to *recognise and adapt* to the context. As described, we take a different approach, focusing on the constructivist paradigm. In the illustration this is manifested by *our concept* being categorised as *representing* the context information, rather than recognising and adapting to it.

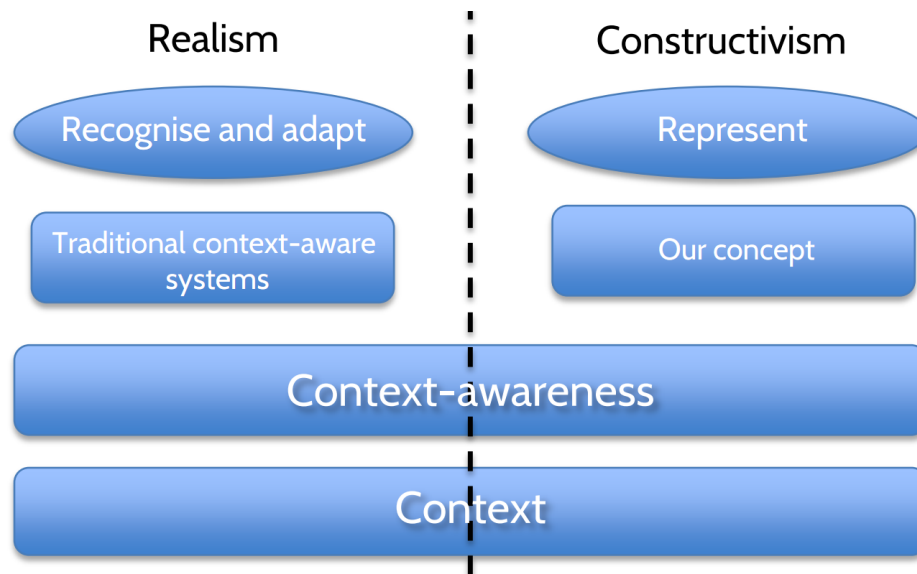


Figure 1 - Overview of our concept compared to traditional context-aware systems

## 1.2 Research Questions

As mentioned, in this project we will be taking a Constructivist approach to make the ambience of venues available to people from anywhere. More specifically what we want to examine is:

*How can ambience be represented and conveyed digitally and what can such a representation facilitate in regards to user experience?*

*How can humans be the providers of contextual information about ambience to context-aware systems?*

To be able to answer these initial questions we formulate a concept and implement a working prototype. The next section goes into detail with this concept.

## 1.3 The Concept

As briefly explained earlier, the concept for this project was to make the ambience at venues, such as bars and cafes, available to people on their mobile devices. Inspired by Constructivism (Oulasvirta et al., 2005) we wanted to make a system that allowed people themselves to create their own interpretations based on a simple representation of the ambience. Seeing that context is socially constructed and thereby highly subjective, it is our belief that systems should help humans by presenting context information rather than trying to add meaning to context themselves. This approach, where context is the content, has been classified as mediated context-awareness (Kjeldskov et al., 2011). Although the term is new, applications falling into this category have existed for a number of years. We describe some of these later in Related Work.

One aspect where our concept differentiates itself from other studies of mediated context-awareness is that we wanted to use human beings as providers of context information, instead of the traditional approach of machines capturing context based on various sensors. This choice was made because we believe, in light of our constructivist

approach, that human can potentially provide context-information more accurate and nuanced than machines. Imagine asking a person the simple question: “are you busy?” The person could without much hesitation provide the answer. Contrary to this, for some computer system to determine whether a person was busy would require a multitude of contextual information to infer an answer and even then there could be a high degree of uncertainty whether the answers was correct or not.

Having explained the theoretical framework underlying our context, we will now go into more detail with what comprises the concept. For registering the context information the concept includes a tablet computer to be used by the staff at the venues. Using the system shouldn't introduce a significant time overhead on the staff, meaning that registering the context information should be simple and straightforward. The tablet form factor allows people to quickly interact via a touch interface. Its size makes it unobtrusive and it can easily be mounted almost anywhere or used as a mobile device. The argument for letting staff be the supplier of context information is that they have knowledge about the venue, are present over long periods, and they are able to follow changes in the ambience. A disadvantage is that it is uncertain whether the staff will be completely honest in their assessments of the ambience.

We have chosen for the ambience to be represented as a set of parameters. These parameters we see as highly dependent on the actual venue, which is why they are not conclusively defined as part of the concept. Examples of parameters could be amount of people, gender, and the sound level. We have decided that these parameters should not indicate an absolute value, but should instead be represented by a more approximate scale, leaving more interpretation to both the people setting the parameters and the people reading them.

In practice it works in the way that the staff sets the parameters to match what the actual ambience is like at the time. This is done on-going as the ambience of the venue changes. Along with setting the parameters the staff can also send contextual information in the form of shouts. E.g. shouting a message informing about what is currently going on at the venue.

Mobile phones and situated displays are our choice of technology for presenting the contextual information representing the ambience. Mobile phones allow users to have access to the ‘ambience’ of venues from anywhere. The ambience represented on the mobile phone is based on the data from the tablet computer. For each venue the user can then read the latest parameter settings, in the same approximate way as set on the tablet computer, and thereby get an impression of the ambience. Additionally mobile phones are an ideal medium for socially linking users and venues. This is made possible in the concept by giving users the opportunity to send public, but informal, messages from their phones. We have dubbed this form of messaging “shouts”, as they should be thought of as somewhat spontaneous thoughts shared with the public, like a real-life shout could be. Shouts can also be posted by the venues from the tablet computers. At the venues situated displays will function as anchor points for interacting with the system. On the situated displays the latest settings from the tablet will be displayed, as on the users’ mobile phones. Additionally shouts posted will be shown on the displays, and they will thereby help encourage interaction.

The concept described above requires multiple venues to be participating and have the system installed. For this project we have chosen to focus on the concept running at a

single venue, as evaluation at a grander scale would require more in terms of equipment and manpower than is available within the scope of our project. For these reasons the concept will be evaluated in the form of a case study, where the concept is implemented for use at one particular venue. The case chosen for this study was Studenterhuset located in the centre of Aalborg.

A more in-depth description of the case will be given in the next chapter. Next follows a presentation work relating to this project.

## 1.4 Related Work

A large part of the concept described in this report is the representation of context, in the shape of representations of the mood at a given venue, to the users of the system. Kjeldskov et al. (2011) introduce the term Digital Urban Ambience, which they use to describe “*the user experience of mediated context-aware mobile devices used in metropolitan areas*”. Kjeldskov et al. work with the term Digital Urban Ambience in connection to a context-aware system, eSpective<sub>2</sub>, which, using Augmented Reality, provides various context dependent information based on the users current position. An example of information shown could be the next arriving busses at the nearest bus stop. While the concept described in this report does not meet the definition of what we can call “classic context-awareness”, i.e. systems, like eSpective<sub>2</sub>, utilising sensors like GPS built in to modern smartphones to take advantage of the users current position, it still is context-aware. In contrast to the classic types of context-aware applications, what we have done is to focus on representing the context *somewhere else*. And as mentioned earlier, humans instead of digital sensors provide the context information.

As we have mentioned the concept additionally focuses on a constructivist approach to context. As also pointed out by Kjeldskov et al. this is a popular approach in context-aware products and research, especially when coupled with the concept of using context as content. Context as content is exactly what is one main focus of this concept. Instead of presenting content based on some contextual factors, the mobile system presents the actual contextual data as the main content. This is not a brand new idea, besides Kjeldskov et al., which we have already mentioned, there exist a variety of examples of these kinds of systems based on constructivism and context-as-content on mobile devices. One such example is “The Familiar Stranger” by Paulos and Goodman (2004), in which they explore the idea of making people more comfortable around the city by letting them know which of their “familiar strangers” (people they don’t know personally but who are often present where they are, and therefore present a certain familiarity) have frequented the current location. By concept of virtual “smells” they developed so-called “Jabberwockies”, small mobile devices (or an application on a mobile phone) carried around by people emitting a unique “scent”. In addition to the mobile devices, fixed devices were mounted at bus stops or similar. This allowed the Jabberwockies to keep track of a user’s familiar strangers wherever she went, and as such provide a certain familiarity to a given location.

Another example is Ferris et al.’s OneBusAway (2010) project deploying real-time information about bus arrivals in the city of Seattle and exploring how such systems can improve people’s perception of public transport. The developed system was available in a variety of ways mainly focussing on access from mobile devices, including mobile



websites and apps for Android and iOS. Their findings include a higher satisfaction among passengers when making real-time context-based arrival information easily accessible on mobile devices. Lemmelä and Korhonen (2007) investigated ways of visualising location-based messages posted by users. What they wanted to do was create a solution that would allow displaying the density of messages on a map without obstructing view of the map at the same time. Like our concept one of the ideas behind this project was that the context information should be accessible remotely and provided by humans (i.e. the people writing the messages). They used the concept of a heat map to show certain keywords that were highlighted depending on their usage in messages. The density of messages would then present the popularity of a given location.

Part of our concept includes a situated display, which can be interacted with via mobile phones, as part of the overall concept of context-as-content. This is also a field that has been previously explored, for example by Cheverst et al. (2005) and Taylor et al. (2007). Cheverst et al. looked at facilitating interaction with a situated display via Bluetooth equipped mobile phones. They created a system, which let users send or receive pictures and contact details from their mobile phones via Bluetooth to a situated display. One of the main motivations is the immense advantage mobile phones provide in making interaction with situated displays possible. This advantage is even more pronounced today when mobile phones have turned into smartphones that provide so many more possibilities. One example of this is Cheverst et al.'s usage of Bluetooth to facilitate the interaction with the display. Their main argument for using Bluetooth is that it does not entail any financial overhead for the users, as opposed to other kinds of connectivity, which goes through the carriers. Data plans, which are almost unavoidable and vital when owning a smartphone, and widespread access to wireless internet, to a high degree renders this consideration moot in today's world of smartphones allowing interaction to happen via e.g. a web based solution as described in our concept and which allows for a much more versatile solution.

Taylor et al. engage in the study of how digital displays can help support communities. Their approach was a situated display in a small village to which inhabitants could submit pictures relating to the geographical area. The display was located at a central point in the village where as many inhabitants as possible could enjoy it. As with Cheverst et al., Taylor et al. (Cheverst was also involved in this project) focuses on interaction via mobile phones equipped with Bluetooth connectivity. In the village project a web service was additionally deployed allowing users an alternative to a Bluetooth equipped mobile phone. The reason for this was actually described as a wish from users, because the Bluetooth approach was not satisfactory. As the project was carried out before the advent of smartphones capable of handling real webpages, the developed web application was presumably being used from desktop or laptop computers rather than mobile phones, though this is not specified. Again the rapid spread of smartphones today allows for a different, and in some ways less complicated, approach to interacting with situated displays.

Another essential part of our concept is the shout functionality allowing users to post short messages visible to everyone who access the site. In some ways this is similar to what is known as microblogging. The most popular microblogging service today is Twitter, on which users can post short messages of up to 140 characters and follow each other's updates. While our shout functionality is even simpler than that of Twitter, for instance there is no login required and no concept of "following", we still expect there to

be similarities in how people use the feature. Zhao and Rosson (2009) explored how people can use microblogging for informal communication at work. While 'people at work' is of course a different case than the one in our project, they do arrive at certain conclusions regarding usage and motivation, which are not limited to a specific situation of use. One of the major benefits they uncover is the advantage of real-time information. Because of the relatively low barrier of writing messages and the limited length, people are likely to engage in doing so. This could be an interesting aspect when it comes to representing the mood, as people's messages present a kind of augmentation of the other settings.

## 2 Case – Studenterhuset

As mentioned previously when describing our concept, the system we end up developing is centred on a single venue, namely Studenterhuset in Aalborg. This means that our case for this project is to implement the described concept so that it makes sense for Studenterhuset specifically. In the following we provide a brief introduction to Studenterhuset to highlight the characteristics relevant for developing the system.



Figure 2 - Studenterhuset in Aalborg

Studenterhuset (in English: The Student House) in Aalborg is a combination of café, bar, and music venue located in the centre of Aalborg. Studenterhuset is open for everyone, but as the name suggests it is widely frequented by students at Aalborg University and other local places of education. Studenterhuset is run primarily by volunteers, with four fulltime employees handling the administrative side of business. Figure 3 shows a basic overview over the layout of Studenterhuset.

The activities at Studenterhuset vary widely. Free wireless internet connectivity is offered making it possible to go to Studenterhuset during the day and work on one's

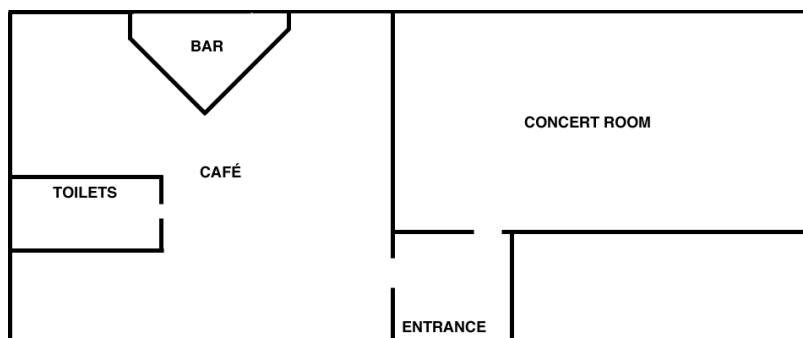


Figure 3 - The layout of Studenterhuset

studies in an atmosphere and surroundings different from one's daily routine. It is also popular to go there to have a relaxing beer with friends. On Wednesday evenings Studenterhuset has what they call International Night, a night dedicated to the many international students who come to Aalborg to study for a semester or more. On other evenings and nights Studenterhuset is used as a party place, a bit different from the discos and bars found elsewhere in the town. Aside from the café area in which the daily activities take place, Studenterhuset also have a concert room in which larger music events are held. Usually payment is required to gain entry to these events, but the café is in general always open with free access.

Studenterhuset lists it as their vision to be “*the natural meeting place for students in Aalborg*” and “*a natural part of Aalborg’s identity as a city of culture and studying*”. Their set of values furthermore underscores the importance of the volunteer basis at which Studenterhuset is run, and the versatility of use Studenterhuset offers.<sup>5</sup>

For this project Studenterhuset is ideal as a case, because it is a place frequented by different kinds of people and these people come for very different reasons. Some want to relax and concentrate on work while others want to have a good time and entertainment. This versatility is an obvious advantage in the scope of a system representing the current mood, since this means there is a chance of the mood changing widely during the day and week. The fact that Studenterhuset has many tie-ins with the university and the study community in general, also was a good starting point for collaboration on a university Master’s Thesis. Additionally part of the vision of Studenterhuset is to appreciate and support good ideas<sup>5</sup>.

We approached Studenterhuset with the project idea and were greeted with much enthusiasm and openness. It was obvious that they were interested in helping out university students and that they liked the project idea and could see it being valuable for them as well as us. They were also very forthcoming with regards to letting us mount and install the hardware necessary for the project at Studenterhuset. During our talks with them they actually mentioned that they had been considering having situated displays. In that way this project can also be a way for them to see how such a display will appear in the context of Studenterhuset. With regards to promoting the system, they were also very forthcoming, offering to send messages to members of their Facebook group, and letting us put up posters and distribute flyers at Studenterhuset.

As previously mentioned, volunteers are a large part of making Studenterhuset function. This means that a lot of different types of people, with varying IT experience, are potentially going to use the system we are building for setting the mood. This of course sets requirements for the usability of the system, needing it to be very easy to understand at first glance. We will go more into depth with this subject later in the report.

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<sup>5</sup><http://wiki.studenterhuset.dk/Public/VisionValues> (Danish)

## 3 The System

This chapter describes the system implemented for use at Studenterhuset. We distinguish between three primary parts, which together make the system. These parts are:

- An administrative interface running on a tablet computer
- A mobile website intended for use on smartphones
- A situated display interface

Figure 4 shows the location of the tablet computer and situated display as configured at Studenterhuset. For the sake of simplicity we reference the administrative interface running on a tablet computer merely as ‘the tablet interface’.

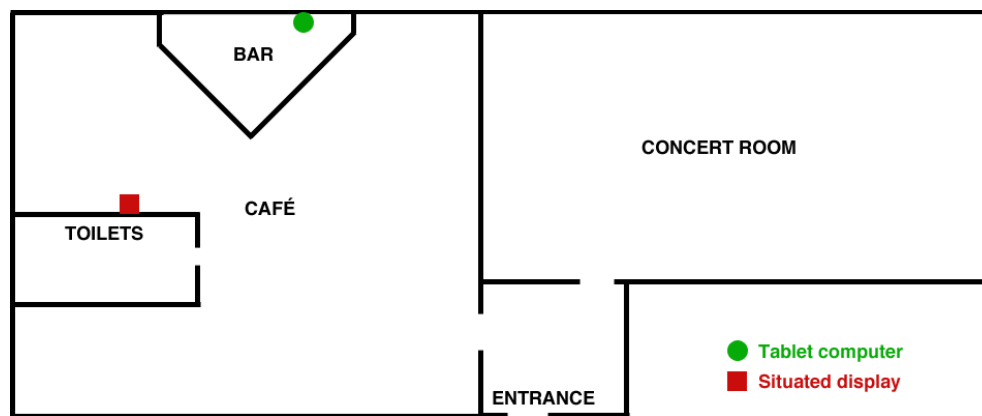


Figure 4 - Location of tablet computer and situated display at Studenterhuset

In this chapter we go into further details describing these parts.

In the process of implementing the system for Studenterhuset we had to decide on a URL which could be used for the mobile website. We ended up choosing the domain <http://themood.at/studenterhuset>, which plays on the fact that the pronunciation matches an actual sentence: “The mood at Studenterhuset”. We are aware that the term mood has a slightly different meaning than the term ambience. We choose mood, as it is more user friendly. Due to this domain name, in the following we will use the word “mood” instead of “ambience”, but mood should be regarded to have the same meaning as ambience.

### 3.1 Design

At first we are going to look at the design of the part of the tablet interface used to ‘set the mood’. The tablet computer is going to be used behind the bar, and should be very easy to comprehend and interact with in this environment. In other words, the system shouldn’t take away time from the other duties of the bartenders, the primary of which of course is serving the customers. Further underscoring the need of the tablet interface to be easily comprehensible and easy to interact with, is the venue chosen for this project. At

Studenterhuset in Aalborg, many different people are carrying out the bar duty, as explained in the case.

In addition to the above-mentioned requirements it is also of utmost importance that the tablet computer is easy to install physically at the venue. It should not be an overly complicated process and should not take up too much space, and thereby obstruct the normal processes taking place behind the bar.

Using a tablet computer is ideal in a situation like this. It takes up very limited physical space, and the interaction is simple and straightforward through a large touch screen. While the tablet form factor and input method allows for intuitive interactions, it also adds to the requirements of the design of the tablet interface to ensure and enable these intuitive interactions. Later on in this section we look closer at the implementation of the tablet interface, and here we will also go into further details regarding the specific tablet computer chosen for the project.

The main screen of the tablet interface can be seen in Figure 5, and consists of two main parts. The top part of the design is dedicated to setting the different mood parameters, whereas the bottom part focuses on the feature that allows for shouting out messages to users of the system.



Figure 5 - Main screen of the tablet interface

Starting with the topmost part we see five different parameters visualised by the same number of coloured sliders. As previously mentioned when describing the overall concept the parameters were not defined as part of the concept because of how closely they depend on the actual venues. So the five parameters used in the system were chosen with Studenterhuset in mind, but were still kept rather general and not exclusive to Studenterhuset. The parameters were: 1) Amount of people, 2) Size of groups, 3) Gender of patrons, 4) Types of beverages being consumed, and 5) The overall sound level.

Each of the sliders are enclosed by two icons, with accompanying labels, representing the two extremes of the given parameter and at the same time providing the overall way of

identifying the given parameter. This way of representation was chosen to keep the interface minimalistic and easily understood, and to ensure that the interface elements did not take up too much space. It is important that the entire interface can fit on the screen of the device. This way of representing the parameters requires that the icons are very clear in their expression so that it is possible to deduct the meaning of each slider by looking at the corresponding icons and labels. This means that the icons should be very simple to understand at first glance, and they shall at the same time be very clear in what they are representing. Simple, almost pictogram-like, icons were chosen to accomplish this. For instance the universally known symbols for male and female gender were used, as was simple representations of human beings. In addition to the icons alone, brief labels were added below each icon, describing their meaning, to ensure clear understanding.

To further differentiate the parameters the individual sliders representing each one were given an individual background colour. These colours were chosen because they are used on Studenterhuset's website<sup>6</sup>, and do not as such have any particular relation to the parameter they are representing. Rather than trying to pick colours that would somehow support the meaning of each individual parameter, which could have been a complicated task, since the meaning of colours is somewhat individual between people, we opted for the colours that would perhaps generate some recognisability among the users of the system. Additionally the colours are sufficiently varied that they make differentiating between the sliders representing the parameters very easy and quick.

The slider handles are made black to ensure that they are sufficiently visible atop each of the coloured sliders. Additionally the slider handles have a size that makes them usable on a touch screen.

The bottom part of the main screen is dedicated to the shout feature. On the left two buttons are displayed. One allowing the bar staff to shout out a new message, and one allowing for the deletion of the latest messages from both the bar and people from the outside using the system. To the right of these buttons are listed the latest three messages shouted by the bar staff on the current day. This is to give a reminder about what has been shouted earlier in case this might be relevant for further shouts. The shouts are displayed as speech bubbles to add to the feeling of "shouting".

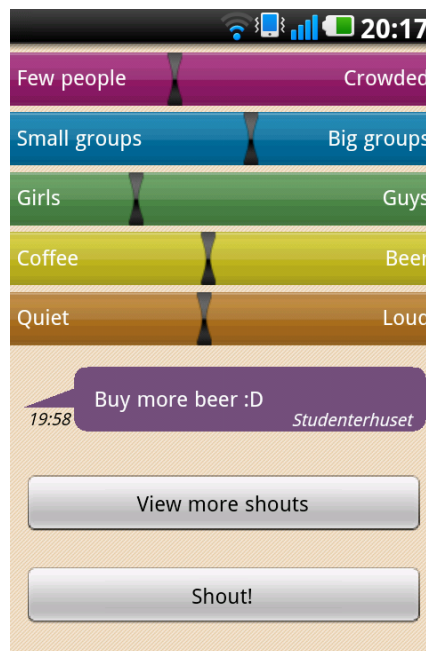


Figure 6 - Excerpt of the 'Delete shouts' interface

<sup>6</sup><http://studenterhuset.dk>

Pressing the 'Delete shouts' button opens another view as seen in Figure 6. It follows the speech bubble style of displaying the shouts. The colours and style of these speech bubbles are additionally in accordance with the colours and style used on the mobile website, which we describe later. To keep interaction simple only the latest six shouts are displayed on the delete screen. This eliminates the need to somehow navigate multiple pages of shouts, and is sufficient since only up to the latest six shouts are displayed to the public at any given time. The length of these shouts is limited to 160 characters. This limit is introduced to underscore the fact that the system is meant for "shouting" i.e. posting quick, brief messages, as well as to ensure that the design does not break due to excessively long paragraphs of text.

On Figure 7 the main screen of the mobile website is shown. To keep the interface simple and taking into account the limited screen real estate available on smartphones, the primary content starts at the very top of the page. Hence the very first thing on the page is representations of the five different parameters set by the bar staff on the tablet interface.



**Figure 7 - Main screen of mobile website**

Each parameter is represented as a horizontal bar, each of which has the same colour as the corresponding sliders used by the bar staff to set the values. In this way an element of consistency is introduced between the tablet interface and mobile website. The reasoning for choosing the five colours has already been covered earlier in this part. As with the slider handles on the tablet interface, the current values of the parameters are represented on the smartphone system by black indicators which are easy to differentiate from the coloured backgrounds of the bars. Furthermore, the shape of the indicators has been chosen, to not look like something that can be interacted with, but instead as something representing already set values. To create an element of surprise and enjoyment, and to make the page seem more dynamic and "alive", animation has been



added to the indicators. When the mobile website loads, the indicators are all located in the middle of their respective bars and one after the other they slide into position. Labels representing the two extremes of each parameter are located inside each bar. This is done to allow as much room for the bars as possible, since the mobile website is running on relatively small screens. Only labels and no icons were chosen for the same reason. Icons would take up a lot of space, and could potentially be hard to decipher when scaled down to fit the mobile website design.

Below the representation of the five parameters are shown the latest shout registered in the system on the given day. The message may have been shouted by either Studenterhuset or any user of the system. A button allows the user to expand the list to show up to a maximum of the latest six messages shouted on the given day. The messages are stylised as speech bubbles, like they are on the tablet interface, with messages from Studenterhuset and other users “originating” on opposite sides. Additionally the colours of the speech bubbles are different depending on who shouted. As with the system used to set the values, the speech bubble metaphor helps create the idea that people are “shouting”. Below the list of recent shouts is a button, which lets users shout a new message from a simple interface, which only allows for entry of an up to 160 characters long message and optionally a name. If no name is provided the message is posted as “Anonymous”.

The design of the interface for the situated display is very much like the one for the smartphone site, making the general design as consistent as possible. The design for the situated display is shown in Figure 8.

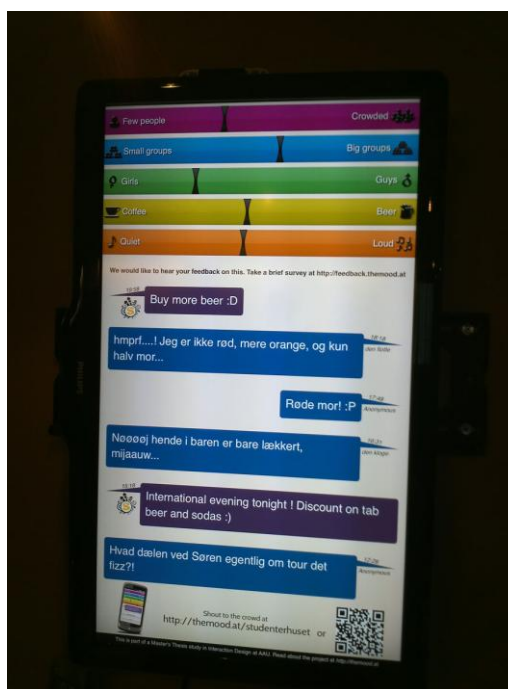


Figure 8 - The situated display at Studenterhuset

One key difference between the mobile website and situated display is that on the situated display there has no option to shout and up to the latest six shouts of the day are displayed at all times. Additionally the same icons as used on the tablet part of the system were used to represent each parameter on the situated display. Because of the

larger size of the bars on the situated display, it was possible to add the icons without making them so small, that they would have been obscured. At the bottom of the interface is a URL to the mobile website and a picture of a mobile phone running the website. This is to suggest to people that the way to use and interact with the system is through a mobile website. Additionally there is a 2D barcode that, if scanned by a phone, navigates to the mobile website.

## 3.2 Implementation

As mentioned in the Design part of this chapter, the part of the system to be used by the bar staff is running on a tablet computer. More specifically the tablet chosen is the Apple iPad 2. The iPad was chosen because it is now in its second iteration and therefore has a relatively well-proven track record in an otherwise new and very much evolving category of products. The iPad was mounted on the wall where it was easily accessible to the bar staff and not easy to dismount. Figure 9 shows the iPad mounted on the wall behind the bar. The system on the iPad was set up to store the mood values and shouts in a MySQL database, which could then be accessed by the other parts of the system as well.



Figure 9 - The iPad at Studenterhuset

In addition to the iPad mounted on the wall behind the bar, the system also included a situated display. For this we used a 42" LCD TV, which would work well as an eye catcher and provide a sufficiently large surface for displaying the necessary information. As shown in Figure 8, the display was mounted vertically on the wall, and hooked up to it was an Apple Mac Mini. The Mac Mini was sufficiently small to make mounting it behind the display relatively easy. The Mac Mini was then hooked up to the display and setup to display the specially designed webpage showing the current mood settings and latest shouts, as previously described. The page displayed on the situated display was continuously updated to ensure the data displayed was the most current. AJAX<sup>7</sup> was used to make the updating of the page more unobtrusive and elegant. AJAX allows updating only parts of a webpage without doing a complete refresh of the page. In this way we

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<sup>7</sup> AJAX is short for "asynchronous JavaScript and XML", and is a combination of various web technologies

were able to continuously update the stream of shouts without affecting the representation of the mood parameters, and vice versa.

The mobile website pulls data from a database in which the values for the mood parameters set on the tablet were stored along with the messages shouted by people. Choosing the web as platform for the system has its benefits and drawbacks. One benefit of doing web apps is the complete independence from various kinds of distribution channels, such as the Apple iOS App Store and the Google Android Market, and the limitations they may bring with them in the form of for example prolonged validation processes. On the other hand doing web apps in some ways do not offer the same flexibility as doing native phone apps, and just as you don't get the limitations of the distribution channels, you don't get the advantages either. The major benefit of doing web apps, though, is the fact that you do not limit users to a specific platform. Doing a web app allowed us to reach users of the two major smartphone platforms used today, Android (various manufactures including HTC, LG, Samsung, and Sony Ericsson) and iOS (Apple's iPhone devices), and other platforms featuring modern mobile web browsers. This makes the potential user base considerably larger than, if we had chosen just one platform to develop for. Figure 10 shows the mobile website running on an Android device.

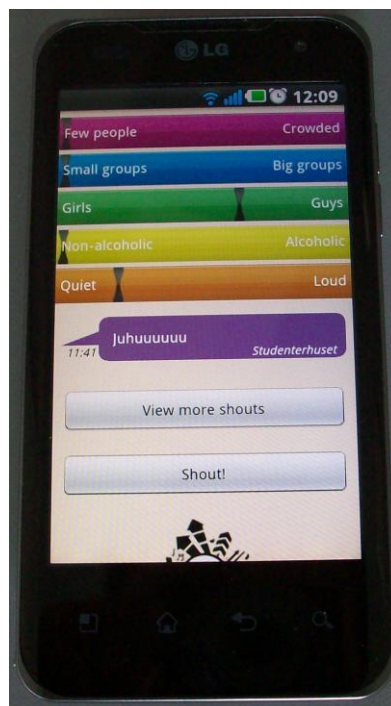


Figure 10 - The mobile website on an Android device



## 4 Method

As indicated by our research questions our focus in this project lies to a great degree on User Experience and how IT systems can affect users' decisions and augment their everyday life.

The term User Experience has grown to become a large part of HCI today. User Experience, or UX, is a much broader term than the related, and older, Usability. As Hassenzahl et al. (2006) describes, what the classic concept of Usability concerns itself with the most, is the instrumental part of using a computer system, i.e. solving a given task in the most efficient way. User Experience concerns itself with much more than just the instrumental. Hassenzahl et al. (2006) describes UX as *“a consequence of a user's internal state, the characteristics of the designed system, and the context within which the interaction occurs”*.

As mentioned previously, one important aspect of the developed system is the fact that it was intended for actually being used by real people in real settings, and not in a more made-up situation, like typical usability testing in a lab or out in the field. This requirement means that the testing of the system will take place in a natural setting, i.e. the system is being set up at Studenterhuset and used by the bar staff and patrons there, and by people checking out the mood from elsewhere. This enables us to make sure that the system is being used by people who have actually chosen to use it themselves, rather than people who were “hired” to participate in a classic usability test. All of this makes the use of the system more realistic, and thereby makes it possible to focus the study on User Experience, something that would have been harder in a typical Usability Testing setup.

Setting the system up to run in a natural setting of course presents another challenge with regards to collecting data from the people using the system, than does the more controlled usability testing methods. We don't expect to have any actual control over which people will be using the system, how many they are, or how they use the system. This is especially the case for the users of the mobile website and situated display. To reach these users we set up an online survey. The survey will be promoted through the mobile website, and the situated display at Studenterhuset. Additionally Studenterhuset has been kind enough to sponsor two tickets to an event as extra incentive for people to take the survey. The user survey is described in more detail later on in this part. As for the tablet interface, the volunteers working the bar of course will be using this part, and through Studenterhuset we have access to these people and can perform interviews with a selection of them. We get into the details of this interview later in this part.

As another way of getting an impression of how the developed system is used at Studenterhuset, we are planning on going there ourselves on multiple occasions to do some observations giving us an idea of both how the system is being used by the bar staff and by patrons.

Besides getting data from the people using the different parts of the system we also use various types of data logging to get an impression of the usage of the system. These logs span from records of the messages shouted to analytics data about the visitors of the system and will be described in further detail later.

Another challenge of having the developed system being used in a natural setting is getting people to know about the system and to use it. This means that we have to promote the system in various ways. We go into further detail on this promotion later in this report.

## 4.1 The user survey

To collect data from the users of the mobile website we use a quantitative survey. Due to the nature of the test of the system, running it in natural settings and “for real”, it is difficult to get in direct contact with a representative sample of the users for doing interviews.

The goal of the survey is to get an idea of the users’ usage of the system, how well they like the general concept, and how they experience the use of the system. To accomplish this we have questions focusing on the usage in a broader sense as well as questions asking more specifically about features and usage.

The first part of the survey focuses on collecting basic demographic data and additionally consists of some broad multiple-choice questions about usage of the system and Studenterhuset. Later on Likert<sup>8</sup> scales are used to get a bit more specific. Likert scales have the advantage of being easy to fill out by the respondents and they make the data relatively easy to analyse because it is represented in a very consistent way. Figure 11 shows examples of some of the Likert scales.

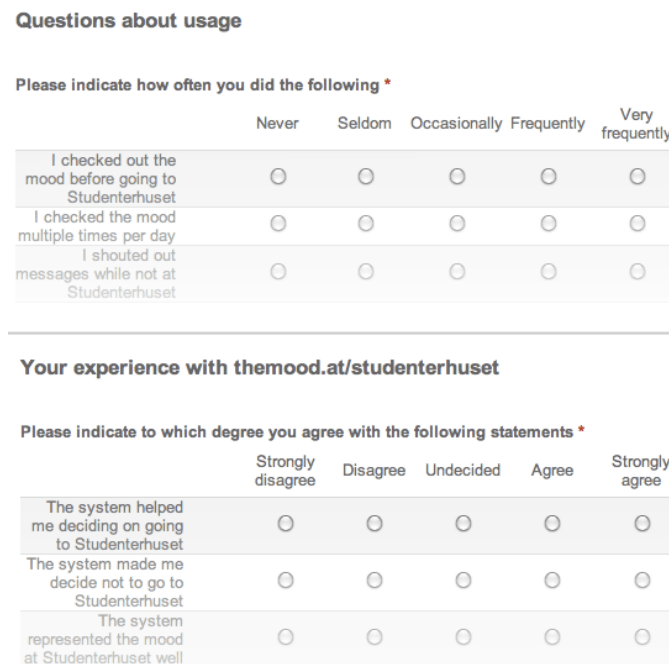


Figure 11 - Examples of Likert scales in the survey

Though Likert scales provide an easy and consistent way of collecting data, they are in some ways limiting. To take advantage of the fact that people using the system might

<sup>8</sup> A Likert scale is an interval-based multiple-choice style of arranging an answer to question

have ideas and thoughts we had not covered in the survey, we added the ability for respondents to provide more general negative and positive feedback in the form of free text fields.

The complete survey is found in Appendix E.

## **4.2 Interviews with the bar staff**

Since it is more limited which people will be using the part of the system used to set the parameters they are easier to reach directly. Because of this we want to carry out interviews with a sample of them. The main focus of the interview will be for us to get an idea on what the bar staff thinks of the system in general, and how they feel it fits in their daily work behind the bar. It is also important for us to get an impression of how honest the bar staff themselves feel they are in setting the parameters, since this can have an effect on the way users of the mobile part of the system experience the system, i.e. how precise does the system represent the mood? We will of course also be inquiring into their experience of the system in other ways.

The interviews will be carried out as semi-structured, meaning that we will have a series of questions prepared, but we allow a certain degree of freedom in the interview as well. In this way we have certain predefined questions we want answered to ensure we get useful data, while we also have the opportunity to let the interviewees tell us their own thoughts, which may not have been covered by our questions. A semi-structured interview additionally allows for a more informal, and thereby more relaxed and comfortable conversation.

We will take notes to document the interviews. These notes will consist of two main parts. Firstly we of course write down the responses to the questions we ask and any other comments the interviewees may have. In addition to this we will also write some more general notes regarding the interview. This could, for example, be anything interesting that happens during the interview and that may have an influence on the interview. This different kinds of notes should hopefully enable us to get a good and usable impression of the bar staff's opinion of and experience with the system. The interviews will take place at Studentarhuset to ensure the greatest convenience for the staff we are going to interview.

The interview guide used can be found in Appendix D.

## **4.3 Data logging**

In the process of collecting data for analysis we are also going to utilise types of mediated data collection primarily in the form of data logging. The most obvious form of data logging available to us is database entries. The system is set up to store changes made in the mood parameters as well as shouts indefinitely, allowing us to go back through all the entries made in the system and get an idea of how the system is being used based on the raw data. This coupled with the data we get from our interviews and survey should enable us to get an idea of how the system is being used. Besides the database entries we also deploy various analytics solutions to get data about the users of the mobile part of

the system. This data includes, but is not limited to, general data about amount of visitors and the platform they are using (e.g. what type of mobile phone).

## 4.4 Promoting the system

This being a system evaluated in a natural setting, it requires a certain amount of promotion to let people know about the system and get them to use it. Additionally the users should be incited to provide feedback. As part of this promotion we set up a website explaining the basic concept of the system and how it could be used on a smartphone. The website incorporated elements encouraging people to share it with their social networks on Facebook and Twitter. On Facebook was also set up a page which people could “Like”, providing another method of having people share the system with their social networks. A screenshot of the website is shown in Figure 12.



Figure 12 - The website

Promotion was also thought into the design of the system. The situated display can function as an eye catcher, making customers at Studentehuset curious. Displaying shouts on the display further has the possibility to encourage use of the system. In this manner the situated display is more than another medium, besides the mobile phone, for representing the mood. It is our intention that the situated display can function as a gateway for users to experience the system.

The design of the system on the situated display has already been described, but we will briefly mention some elements central to the promotion of the system. At the bottom of



the situated display the URL for the mobile website was displayed along with a 2d barcode, of the QR Code variety, which, when scanned using an application on a smartphone, linked to the mobile website.

In addition to the described digital means of promoting the system, we also put focus on promoting the system offline. This was done by posters and flyers, which we distributed at Studenterhuset, on the University, and elsewhere around the city of Aalborg. The text on the poster and flyer was short and to the point to quickly grab people's attention. Additionally clear colours were used to create an eye catching design. The design of the poster and flyer was kept in the style of the website, as to create an obvious connection between the two. The poster and flyer can be seen in Figure 13. As on the situated display both a written URL and a 2d barcode was used to guide people to the mobile website.



Figure 13 - Design of the poster and flyer



## 5 Findings

This chapter presents the findings found in the data that was collected during the in-situ evaluation of the system at Studenterhuset. The data was collected during a period of a little over three weeks for which the system was installed and running at Studenterhuset. Out of the three-week period there were 16 days where Studenterhuset was open. The remaining days they were closed due to holidays and the fact that they are closed on Sundays. As described in the Method chapter a wide range of different data was collected of both quantitative and qualitative nature. This chapter describes the findings for each set of collected data. First however, we provide a general overview of the datasets.

### **Site Traffic**

The traffic of the mobile website was monitored, allowing data to be collected about people's visits to the site.

### **Shouts**

The system logged all the messages shouted by both users and Studenterhuset. Along with the message the timestamp and name of the 'shouter' were logged. Any shouts by users not providing any name were aggregated as 'anonymous'. All in all about 450 messages were 'shouted' during the period.

### **Mood settings**

The values of each of the five parameters were logged upon change. This means that any time someone updated the mood on the iPad we were able to track this event and the timestamp of it. During the period about 230 updates to the mood settings were made.

### **Observation at Studenterhuset**

Sessions were held where we discreetly observed people at Studenterhuset. The goal was to observe how people reacted to and used the system. The focus was both on observing patrons' usage of the situated display and mobile website and how the staff at Studenterhuset used the iPad for setting the mood and shouting messages.

### **Interview**

Five interviews were held with staff at Studenterhuset, who had been tending the bar and using the iPad.

### **User survey**

Users were encouraged to take an online survey framed around collecting data about people's usage of and experience with the system. In total 30 people took the survey.

## 5.1 Site traffic

To monitor the traffic to the mobile website we utilised an analytics service called Woopra<sup>9</sup>, which provides rather comprehensive visitor statistics. Even though we have a variety of statistics it is important to note in this regard that such analytics data can never be 100% accurate, and therefore we use the data presented in this part merely to

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<sup>9</sup>Woopra can be found at <http://woopra.com>

get an impression of the visits to the website, and not as the definitive truth. In addition to Woopra we also used an analytics service called Clicky<sup>10</sup> to validate the statistics. Both services show very similar results with only a few differences and we therefore assess that using Woopra's data is sufficiently accurate.

Woopra tracks what they call Visitors, Visits, and Pageviews. Visitors represent unique visitors, i.e. people who have visited the page; Visits represent visits to the page made by the visitors; Pageviews is the total number of pages viewed during visits. Especially the Visitor statistics are encumbered with some uncertainty because of the way these are tracked. Visitors are tracked using cookies, and this means that people who clear their cookies or visit the site from multiple devices will count as unique visitors multiple times<sup>11</sup>.

The mobile website had a total of 770 Visitors and 1339 Visits over the testing period. Subtracting these two numbers gives us the amount of Returning Visitors, 569, which is equivalent to 42% of Visitors. This means that a rather large portion of the Visitors have visited the website multiple times, though over half of Visitors have only visited the site once. As mentioned earlier, the number of unique visitors is impossible to get 100% right, and therefore the number of returning Visitors is of course encumbered with the same uncertainty.

The platforms from which people accessed the website were also tracked, showing us that a slight majority were using mobile devices, while a good chunk of Visits were actually made from personal computers running Mac OS, Windows, or some flavour of Linux. A small portion of visits were not able to be identified and show up as Unknown, but this is such a small amount that it can be disregarded without compromising the data. Even though the website was built with mobile platforms in mind, it also works on desktop browsers, so people who visited the site from their personal computers could still have use of the site, and are therefore still relevant. Figure 14 shows the distribution of visitors by platform

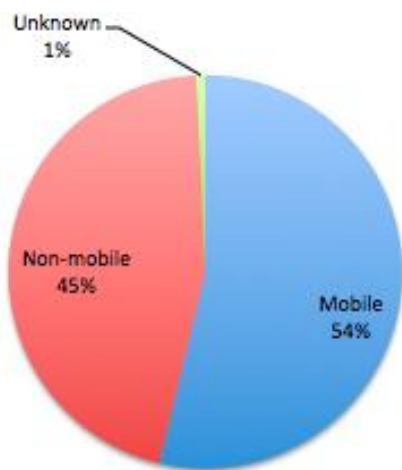


Figure 14 - Visitors by platform

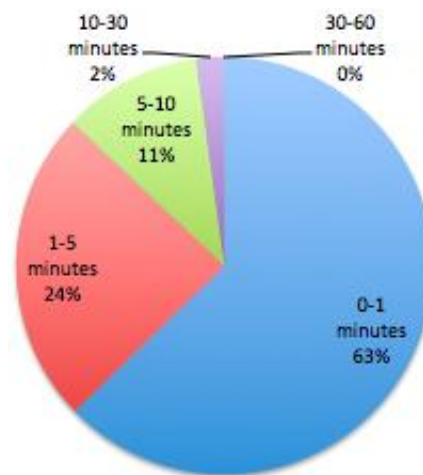


Figure 15 - Duration of Visits

<sup>10</sup>Clicky can be found at <http://getclicky.com>

<sup>11</sup><http://www.woopra.com/faq/#defineuniques>

Another point of interest in the analytics data is the referral statistics indicating the sources who led people to the website. A vast majority, 88%, of the Visits were direct hits, meaning people went straight to the website not following links on other websites. These visits include people who entered the URL manually and people who scanned the QR code, which was present on the situated display, the poster, and the flyer. 11% of Visits came from social media sites, such as Facebook and Twitter, on which we have shared the link ourselves, and other people have as well. Finally 1% came from links from other sources.

Looking at the total Pageviews to the website allows us get an idea of how the site has been used. The site is pretty basic, and as such consists of only two pages, namely the home page and the page that lets users write new shouts. Of the total Pageviews, 77% went to the home page, and 23% went to the new shout page. The obvious conclusion here is that the home page has been viewed quite a bit more than the new shout page, indicating that the website has been used more often to check out the mood and shouts (or just checking out the system to understand what it is about) than for shouting. This probably corresponds with the number of shouts written compared to the number of visitors. We go into further detail on this topic later on in this report.

The amount of time people have spent on the website confirms what we saw regarding the Pageviews. As seen on Figure 15, 87% of Visits lasted between 0 and 5 minutes, which is not too surprising when looking at the purpose and functionality of the website. Checking out the website and shouts or shouting short messages are all actions which are expected to not take very long time. The fact that 0-1 minute has the largest share probably indicates that, many Visits were made just to quickly check out the mood or latest shout, which also corresponds with the Pageview statistics.

## 5.2 Mood Settings

In this section we present the data collected from the iPad about updating the mood. Because updating the mood can take a variable number of actions, e.g. adjusting one parameter followed by another, we outline an update of the mood as actions of adjusting parameters using sliders within a two-minute timeframe. This means that for example, if somebody had adjusted one slider and one minute later adjusted another, this is only treated as one update. The two-minute timeframe was chosen because it was evident from the data that the staff often did many intermediate adjustments to sliders before reaching the final settings.

During the evaluation period there were a total of 227 updates to the mood. This makes an average of 14 times per day the mood had been updated. The average time between updates was 1 hour and 4 minutes with a standard deviation of 1 hour and 23 minutes. From this we can determine that there is a somewhat high spread in amount of time between updating. Table 2 shows these key figures together.

Number of updates	Average number of updates per day	Average time between updating	Standard deviation of time between updating
227	14	1:04	1:24

Table 2 - Key figures for updates to mood settings

From the data it is possible to see what time of day has the most mood updates. Figure 16 shows how many times per hour the mood was updated, starting from 0 meaning from midnight to 1 and ending at 23 to midnight. From this graph it is apparent that the frequency of updates rises steadily from afternoon to evening and peaks at 19. Furthermore there are times, where Studenterhuset should normally be closed, where the mood is still being updated. This is due to the opening hours not always being followed rigorously.

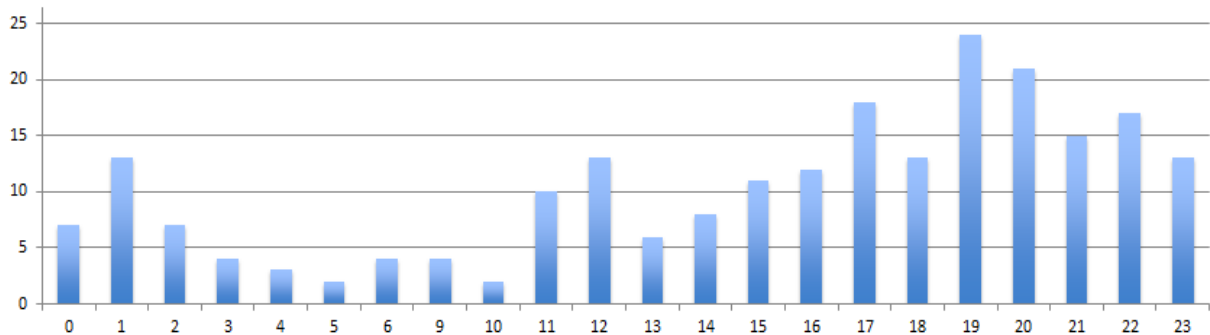


Figure 16 - Mood updates per hour

## 5.2.1 Parameters

This section presents statistics of use for each of the five parameters representing the mood in the system. These parameters are referenced People, Groups, Gender, Drinks and Sound, but in the actual system consisted of two poles of e.g. few people and crowded.

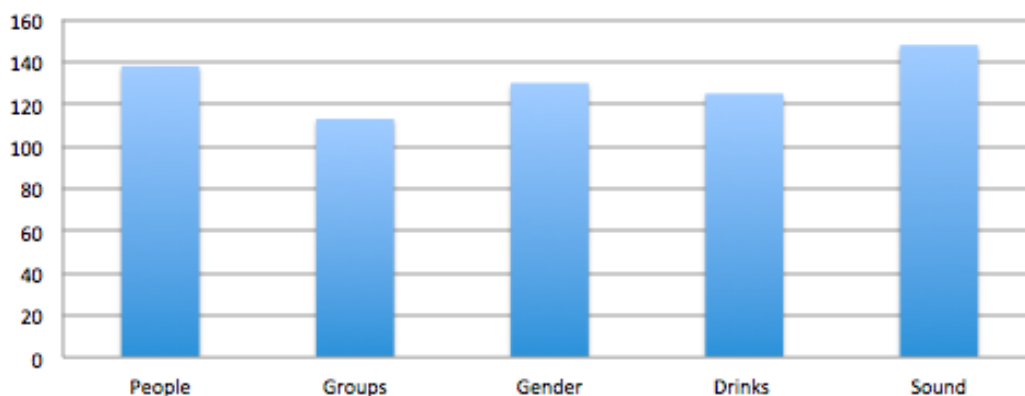


Figure 17 - Updates per parameter

Figure 17 shows the count of updates for each of the parameters. It is evident that certain parameters are more popular to update than others. Sound is the most popular closely followed by People. Groups and Drinks has been the least popular. Generally however, there is not a huge variation in how much each parameter has been updated.

It is evident from the discrepancy in updates that the staff has not always been updating the mood by adjusting all the parameters, meaning sometimes they adjust maybe only one parameter or two.

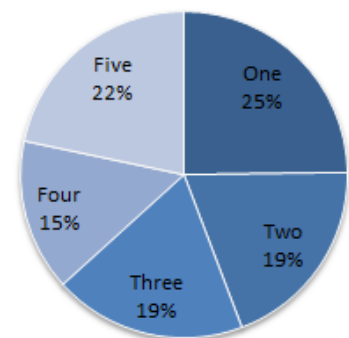


Figure 18 - Number of parameters per update

Figure 18 shows the percentages for the amount of parameters adjusted in updates. The figures are approximately evenly distributed with one parameter and five parameters being the most popular. The figures suggest that a lot of the time only one or two parameters are being adjusted for reasons unknown. It is however good to keep in mind that an update to the mood has a high variation in the number of parameters updated.

If we look at what parameters are popular when only adjusting one in an update, People and Gender are most popular with 27% each, followed by Sound (20%) and Drinks (19%). Groups only stood for 7% when the update was on one parameter.

### 5.3 Shouts

In this section we present the data collected from user’s usage of the shout feature. All shouts by users and by Studenterhuset were logged. Table 3 shows key figures from these logged data. Supplementary graphs to logged data of shouts are found in Appendix C.

Total number of shouts	Shouts by Studenterhuset	Shouts by others	Shouts by “Anonymous”	Shouts with name	Deleted shouts	Deleted shouts (rectified)
454	82	372	241	131	30	19
100%	18%	82%	54%	28%	11%	4%

**Table 3 - Key figures from logged data**

The data logged from the database shows us that in total 454 shouts have been posted during the test period. We see a clear tendency of the amount of shouts increasing in the last part of the week, starting Wednesday, and then keeping relatively steady over the following days with 25% of shouts being posted on a Thursday. In total approximately 92% of all shouts have been posted on Wednesday through Saturday. This leaves less than 10% for Sunday, Monday, and Tuesday. Since Studenterhuset is closed on Sundays, shouts posted on a Sunday are not as such relevant, as they are not available to anyone but the people present at Studenterhuset. Only two shouts were posted on a Sunday during the period, so discarding these will not skew the data.

Looking more specifically at the senders of the shouts the picture is changed a bit. A total of 82 shouts were sent by Studenterhuset from the iPad. The day with the most shouts was Friday with around 29%, followed by Thursday with 20%. The general tendency is still towards most shouts in the last part of the week (Wednesday through Saturday: 81%), but Tuesday has a share here of 12% which is a quite larger share than when looking at the total statistics, indicating more activity on Tuesdays by Studenterhuset than by users.

Shouts sent by users of the mobile website, i.e. not by Studenterhuset, amount to 372 in total. These shouts form a pattern very similar to that seen for all shouts, peaking on Thursday with 26%, with Wednesday, Friday and Saturday following closely, making Wednesday through Saturday responsible for at 94% of shouts. Monday and Tuesday is then left with 6% collectively, which they share almost evenly. Since shouts from users make up 82% of all shouts, it is not surprising that the statistics for these shouts alone are so similar to the overall statistics.

### 5.3.1 A more in-depth view at the shouts

When we look closer at the time of day at which shouts were posted, Figure 19, it is clear that a majority of the shouts were posted in the evening between 18 and midnight. This is especially the case on the days, which have the most shouts. More distinctly it varies a bit which of the intervals 18-21 and 21-24 have the greatest amount of shouts. The former is bigger on Wednesday and Thursday, whereas the latter dominates on Friday and Saturday. On Monday and Tuesday there is a tendency towards shouts being posted earlier, with the intervals from 15-18 and 18-21 dominating. Focussing on shouts from Studenterhuset alone it is noteworthy how few of their shouts are posted between 21 and midnight, the timeslot that was one of the largest when looking at the general statistics. On the other hand Friday after midnight represents a comparatively large amount of shouts from Studenterhuset. Again the shouts from users appear very much alike to the overall statistics when it comes to what time of day shouts have been posted. This makes sense since users have posted the majority of shouts, and these shouts are therefore bound to have a heavy impact on the overall statistics, as mentioned earlier.

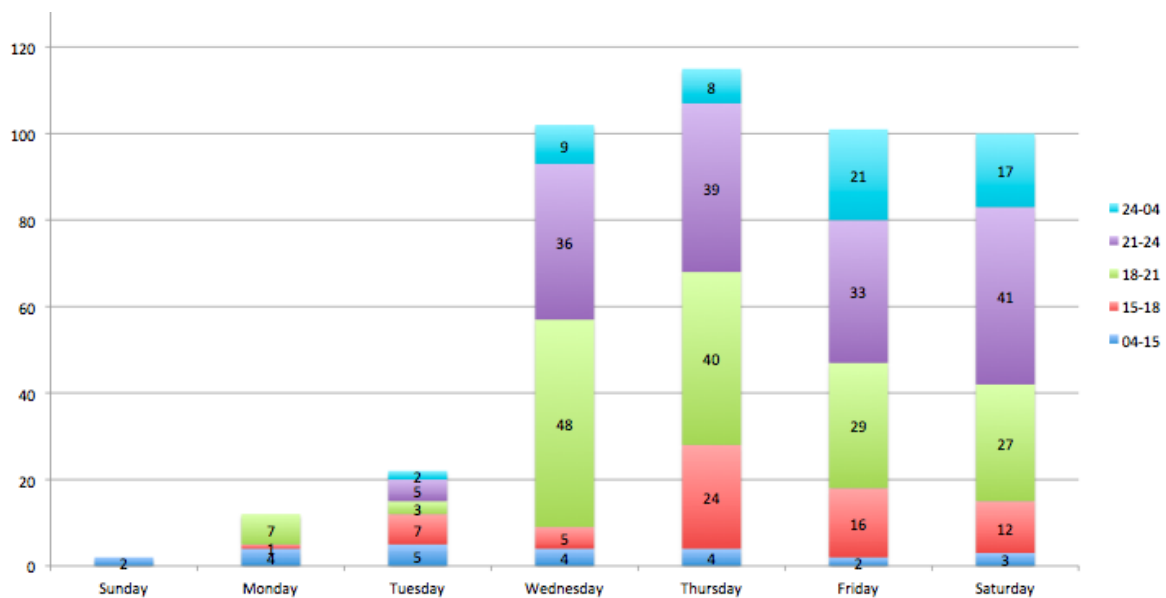


Figure 19 - Shouts per hour interval from all senders

Talking about the source of the shouts it is very clear that a majority, 65%, of users have not put in a name when shouting from the mobile site, hence showing up as “Anonymous”. That said a fair amount of users, 35%, actually have written something as a name, whether their real name or a made-up moniker.



### 5.3.2 Categorisation of shouts

To get a better idea of how people used the shout feature and what they were ‘shouting’ about all of the 454 shouts were categorised. For the sake of simplicity each shout could only be assigned one category. From a preliminary examination of the messages eight different categories were identified. Table 4 describes these categories and provides some basic examples from the collected data. A part of these examples has been translated from Danish.

Category:	Description:	Examples:
Statement	A general purpose categorisation for shouts that have a more or less arbitrary message.	”Fantastic – I am at the house without being there!”  “It’s gonna be a good day :D”
Mood	Shouts that state something about or comment on, the current mood at Studenterhuset	“The balkan thing sounds great...”  “ Awesome poetry slam!”  “Bass is pumping !”
Request	Shouts that propose or desire some kind of action.	“Buy more beer :D”  “Play DURAN DURAN!”
Question	Shouts that are questions directed at Studenterhuset or other users.	”Hey is there anything happening tonight?”  “What are you listening to up at the bar?”
Response	Shouts that are direct responses to one or more previous shouts	”Wanted to go to games night, but no one of my friends wanted to go. :-) Sounds nice.”  ”We are having a nice time”
Joke	Shouts that are obvious jokes.	“Finland is the capital of Scandinavia - right?”
Informative	Shouts that provides information about events or offers at Studenterhuset. Only messages from Studenterhuset can be categorized as Informative.	“Great offer on ice cold draught beer”  “COME COME COME!!! Beat Torrent and Kenton Slash Demon are playing tonight!!!
Other	Messages that fall into neither of above categories	“Juhuuuuuuu”  “Woopwoop?”

**Table 4 - Categorisation of shouts**

The categorisation of the shouts from users show that the general Statement is dominating, especially shouts from others than Studenterhuset. 40% of shouts from others have been categorised as “Statements”. Next in line comes Other with around 17%. Question, Response, and Mood are all at very similar levels, at around 10 – 14%. The remaining categories, Joke and Request are both pretty low, at only 3% each. Figure 20 shows how shouts in percentages fall into categories divided by users and Studenterhuset.

The purpose of this categorisation is not to prove that Statements are overwhelming in the shouts as that category is very general. Instead it is much more useful to examine and compare the remaining categories. Here it is evident that people corresponded with each other a great deal, seeing that Questions and Responses together made up 25% of shouts. It should be mentioned though, that a Response is not necessarily in relation to a Question, but could be to e.g. a Statement.

Shouts categorised as Mood makes up 12%. These shouts we see as particularly interesting as they directly complement the parameters in creating an image of the actual mood. Joke and Request have a very small share of the total shouts. We find it odd that not more requests have been made, as it could be easily imagined that people would use shouts to suggest certain songs or ideas.

Studenterhuset have used the shout feature quite differently, which was expected. In particular they have used it for promoting events and offers, but also telling about the current mood, which can be seen by the amount of Informative (29%) and Mood (15%) shouts respectively. There has been some interaction between users and Studenterhuset supported by the fact that 16% of shouts from Studenterhuset were Responses to shouts from users.

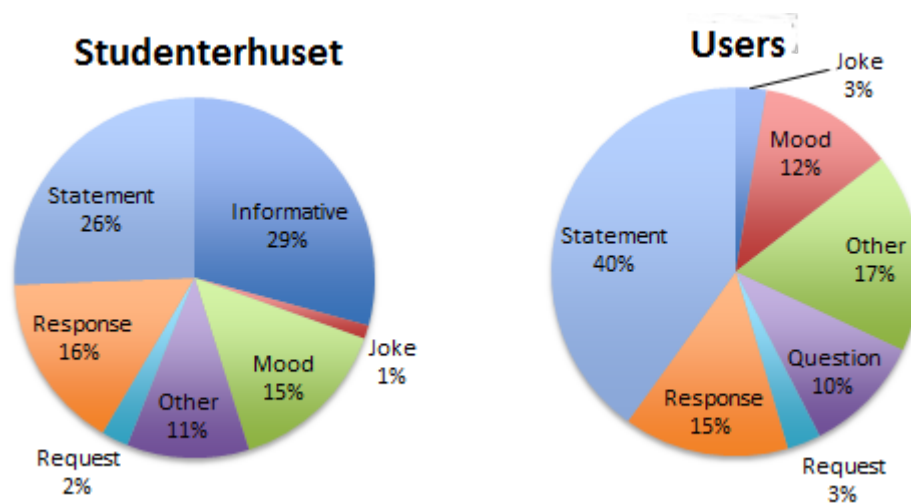


Figure 20 - Categorisation of shouts

### 5.3.3 Deletion of shouts

The staff deleted a total of 49 shouts, equivalent to approximately 11% of total shouts. Of the deleted shouts 37 (75.5%) were posted by users of the mobile website. However, there is a caveat to these results. 30 of the deleted shouts were posted on the very first day of testing. That is basically all the shouts posted on that day. This can be attributed in part to the fact that we posted some test shouts ourselves, which we later deleted, and to a much greater degree it can be attributed to a bug that was present during the first days of deployment. The bug is described in further detail later in this report in relation to other data points.

If we instead look at the remaining 19 shouts (approximately 4% of the total shouts), 15 are written by others than Studenterhuset. This is equivalent to around 79% of the deleted shouts. Quite a few of the deleted shouts seem to use some sort of foul language, being it actual swears or more subtle inappropriate statements. Additionally Studenterhuset have deleted some of their own shouts. This seems to be primarily due to typographical errors. Furthermore, some of the deleted shouts in this batch are also ones we have deleted as part of testing the system.

## 5.4 Observation

During the period of our data collection we carried out different kinds of observations. At multiple occasions we went to Studenterhuset and observed how the system was being used there. Three times we went to Studenterhuset and observed for a longer period of time, around 2 – 4 hours per session, and additionally we went there for shorter periods of time on several occasions. These in situ observations gave us an idea of the bar staff's usage of the system in addition to the usage by patrons at Studenterhuset, and the effect of the situated display and iPad on patrons and bar staff.

In addition to the in situ observations done at Studenterhuset we regularly kept an eye on the system remotely. This was done both in the form of looking at the mobile website, and checking the data stored in the database. These types of observations allowed us to get an impression of the use of the system at varying times of the day and week, since doing these kinds of observations required very little effort and could therefore be done almost at any time and at any location. We have combined our various observations into some main observations focusing on different topics regarding the use of the system.

### 5.4.1 The situated display

A major observation we did is regarding the situated display at Studenterhuset. The situated display appeared to function as a great eye-catcher, grabbing the attention of several patrons as they visited Studenterhuset. The location of the display meant that it was only visible to people in the area around the bar, but since the bar functions as a central point it leads many patrons by the display. The display did not always seem to keep people's attention over a longer period. Some people seemed to notice the display when they saw it for the first time, and they checked it out to see what it was, but the display didn't keep their attention afterwards. This was especially the case at times during the day when there weren't posted any shouts on the given day making a portion of the display appear empty.

### 5.4.2 The bar staff's usage of the iPad

About how the staff used the iPad to set the mood parameters and to manage and post shouts we noticed that it varies quite a bit how the system is used depending on who is on duty. This was reflected in how and how much the shout function was used. At some occasions it was used heavily to promote events happening on the current day at Studenterhuset, and on other occasions it was used to respond to questions from other users, and on yet other occasions it was barely used at all, even if there were questions from users, which could be answered. This was dependent also on the time of day in addition to the people on duty. The difference in use was also reflected in the frequency with which the mood parameters were updated. It seemed there were different factors triggering the updating of the parameters depending on the bar staff on duty. At some occasions this led to some obvious mismatches between the conveyed mood and actuality.

As another note of interest, at several occasions we observed volunteers not on duty in the bar hanging out at Studenterhuset as patrons. It is clear from our observations, and from talking to some of the volunteers, that this is a pretty common occurrence, and

additionally a good amount of the volunteers who have used the system behind the bar have also used the system as users.

### **5.4.3 The patrons' usage of the shout feature**

One observation that we have made regarding how the patrons at Studenterhuset used the shout feature, is that there seemed to be an increase in shout activity when people were in more of a "party mood". This is reflected in a rise in activity during the evenings of Wednesday (International Night at Studenterhuset), Thursday, Friday, and Saturday, where Studenterhuset is used for partying and the beverage consumption is more towards beer than coffee.

### **5.4.4 Observing in a natural setting**

Doing observations in situ as we have done at Studenterhuset has its challenges. The fact that the system is running in a natural setting and is being used "for real" makes it harder to control how it is used and what happens while it is used. Therefore it is challenging to do observations, because you have to choose at what time you want to do your observations without knowing with certainty how the usage is going to be at the chosen time. By going to Studenterhuset at different times of the day and week to do our observations, and by augmenting our observations by keeping an eye on the system itself, we feel that we have done our best to compensate for the uncertainty that is inevitably connected to doing observations in a natural setting.

### **5.4.5 Early bug in the system**

As a different kind of observation there was a bug in the system during the first couple of days of testing at Studenterhuset. The bug was related to the system's handling of opening hours and only displaying shouts from the current day. This bug led to the system displaying shouts that should have been hidden because they had been written the day before. The bug was quickly fixed and the system worked as intended afterwards. As described earlier this bug is the likely the reason why a lot of shouts was deleted by staff during the first day of the system running.

## **5.5 Interviews**

As part of the data collection we did interviews with some of the volunteers working in the bar at Studenterhuset. In total we did interviews with five volunteers. The interviews covered various topics regarding the system and its use. In this part we set up some general trends found across the interviews as well as the more individual feedback we have gotten from the interviewees.

The interview guide can be found in Appendix D.

### **5.5.1 Introduction to the interview data**

All interviewees had a predominantly positive attitude towards the general concept of the system. Everyone reacted positively towards the idea, and praised its potential. At the same time there was some scepticism to be found regarding the system's use. Some of the interviewees mentioned how they were not sure that the system was being used to its full potential. This was attributed to the fact that people, especially patrons of Studenterhuset, have to get used to the idea of using the system. Additionally, the fact that the system was in use at only one venue was mentioned as a limiting factor when it comes to getting people to use the system. Everyone agreed that it would be interesting to have the system implemented on a wider scale, i.e. at more venues, and one interviewee in particular mentioned that Aalborg might not be the ideal city for a system like this. The logic behind this was the relatively unique way in which venues are located in Aalborg. Most bars and similar venues in Aalborg are located in Jomfru Ane Gade or the surrounding area, and this makes it relatively easy for people to go to another place if they are not satisfied with the mood where they are. The interviewee mentioned Aarhus and Copenhagen as cities in which a system like ours could potentially work even better, because of how venues are spread more across larger areas, and it may not necessarily be easy for people to just go somewhere else if they don't like it where they are.

Our interviewees were generally satisfied with the ease of use of the system. The iPad interface was easy to grasp, and it made sense what to do. There was however a few comments about issues from some of the interviewees. The issues experienced were mainly associated with the part of the system having to do with the shouts. Several interviewees mentioned that it would have been nice to be able to read all posted shouts on the iPad interface in an easier way than opening the 'Delete shouts' panel. As mentioned in our description of the system, only the latest shouts by Studenterhuset were displayed on the main interface of the iPad. This was mainly a concern due to the fact that it could be difficult to read the shouts displayed on the situated display, because of its distance to the bar. One interviewee actually pointed out that the situated display was a good way of noticing when a new shout was posted, because the speech bubbles were very distinct and easy to notice, but the text was hard to read. If the messages had also been shown on the iPad it would then have been easy to take a closer look when he saw a new shout appear on the situated display. Another interviewee mentioned that she had had to delete multiple shouts that had been posted the evening before and weren't really relevant anymore. This was likely due to a bug that was present in the system during the first couple days of use, since it was not how the system was supposed to function. As mentioned when we discussed our own observations the bug was quickly fixed, and we didn't receive any other feedback regarding old irrelevant shouts showing up.

### **5.5.2 Setting the parameters**

We received some quite different responses as to what triggered updates of the parameters. One interviewee expressed that she sometimes during low peak hours used the system out of boredom. This interviewee also mentioned that the iPad was an effective eye-catcher behind the bar, ensuring that the staff was reminded to update the parameters. A couple of interviewees also mentioned that the interactivity of the system made them update the parameters. In other words, people writing shouts were also an

influencing factor in reminding the volunteers to set the parameters. Additionally it was also mentioned that volunteers who were at Studenterhuset but not on bar duty would point out if they thought the parameters were not set correctly. Also the fact that it was something new and interesting was mentioned as a contributing factor.

Speaking of setting the parameters, we also asked the interviewees which parameters they felt were most important out of the five that were part of the system. There was a general consensus that the parameter representing the amount of people was one of the most important. Drinks and gender were both rated high by some of the interviewees. As a fun fact worthy of note, the Gender setting seemed to appeal more to the male interviewees, while the Drinks setting was rated higher by the female interviewees. The Groups parameter generally received the lowest importance rating. One interviewee actually mentioned that he had been unsure what exactly the parameter was representing while he had been using the system, and we heard from others as well that Groups was harder to set than the other parameters. One interviewee argued that Drinks says a lot about what people are doing and how the mood is, because when people drink alcoholic beverages it is often to get drunk and party rather than to relax.

The interviewees all felt that they had been honest when setting the parameters. One mentioned that she had been dishonest at one time when not much was happening at Studenterhuset, so she set the scales to indicate all girls drinking beer. According to her it didn't yield much of an effect, though. Another interviewee mentioned that he felt he had been maybe too careful, and that he had undervalued the parameters to not give an impression that more was happening than actually was. Additionally it was mentioned by interviewees that setting the parameters is a highly individual matter; not everyone was doing the same estimates, and not everyone had the same feelings towards being honest. All interviewees did however to a great extent agree that for a system like this to work a certain level of honesty is needed. Not only will setting the parameters completely skewed provide the wrong picture to potential customers, it might also hurt the venue's reputation if they lure people into something completely different from what they were promised.

### **5.5.3 Using the shout feature**

With regards to the shout feature several of our interviewees expressed that they used the shouts to augment the mood parameters by either specifying what the mood is like in some way or by writing about events happening at Studenterhuset, i.e. promotion. It was further mentioned that shouts had been used for different kinds of fun, for example shouts like "See the hot bartender" and similar. A couple of the interviewees hadn't used the shout feature. One hadn't felt he really had anything of interest to write. One note here is that this interviewee had only had shifts between noon and 15:00, which is not the busiest period at Studenterhuset.

Some of the interviewees expressed concern about the shout feature, because of the need to keep an eye on what was being posted, and deleting inappropriate content. What people shout becomes part of the image of Studenterhuset, because it appears on the site representing Studenterhuset. In addition to making it easier to read all shouts from the bar, as mentioned earlier, it was suggested that utilising some kind of profanity filter to avoid the most common obscenities would probably be a good idea. It is important to

note with respect to this that none of the interviewees saw this as a major issue as not a lot of profane shouts had been posted, which also corresponds with our findings when looking at our logged data, but it is of course a very valid point and should be addressed.

#### **5.5.4 Usage of the system by customers**

Another factor that was seen as important for how the system was updated was how busy Studenterhuset was. All interviewees expressed that there was a clear tendency towards the system being used more often when there were many patrons present, which was generally during the evenings and nights. Wednesday nights were pointed out as often being particularly busy, because of the fact that it is International Night at Studenterhuset. So the increased activity at Studenterhuset was also seen to have an impact on the usage of the system. On the other hand several interviewees also pointed out how the system would in some cases be given a lower priority when the bar was very busy potentially leading to fewer updates and shouts from Studenterhuset. Meanwhile it was also mentioned by several of the interviewees that the activity among the users of the mobile website was at its peak during the periods of time where Studenterhuset was busiest. It was further specified by interviewees that the rise in consumption of alcoholic beverages, which typically occurs at night as well, was often also related to the patrons posting shouts.

The situated display has been a critical factor in people's usage of the system. All of our interviewees agreed that the situated display was a very effective eye-catcher and got people's attention and got them interested in the system. It additionally facilitated the use of the shout feature while at Studenterhuset because people could see their shouts appear on the display. In continuation of this, all interviewees had observed patrons using the system while at Studenterhuset and in conjunction with the situated display. One interviewee mentioned how he had observed the system being used primarily internally in groups of patrons writing messages to and about each other, and not really to communicate with other patrons, i.e. strangers. We also asked the interviewees if they had any impression of whether or not patrons had been using the system outside Studenterhuset. This is of course hard for the bar staff to know, unless patrons explicitly told them, and this didn't appear to be the case. None of the interviewees had heard from patrons having used the system from outside. There was however a couple of interviewees who knew that some volunteers had used the system from the outside, both to check out the mood and to post shouts. In continuation of this, it is worth pointing out that multiple interviewees also told that many volunteers often hang out at Studenterhuset when they are not on duty. Therefore some of them have also been using the system as users while they were at Studenterhuset.

#### **5.5.5 Suggestions for improving the system**

Several of the interviewees agreed that a system like this one would be very useful if it was in use at more venues, so that it would allow for some comparison instead of just viewing the mood at one single venue. And speaking of the single venue, it was mentioned that one drawback of Studenterhuset as a place of testing the system could be the fact that there was a risk of the system being used too internally because, as mentioned earlier, many of the volunteers are also frequenting Studenterhuset as

patrons. One interviewee also pointed out that many people would probably go to Studenterhuset no matter what because of the kind of place it is. It caters especially to students, and has relatively low prices et cetera.

One drawback of the system potentially being used at multiple venues that was mentioned was the fact that indicating number of people could potentially be seen as too negative for the venues, because they can get in a situation where they actually end up “frightening” people away from their venue and lead them to competitors instead. In this regard it was also mentioned that there could be a risk of dishonesty among the venues using the system, but as previously mentioned, dishonesty could lead to disappointed customers.

When asked if they had suggestions for additional parameters that would be relevant for representing the mood, some of the interviewees had suggestions. One suggestion was exemplified as “How many laptops are there?” and more generally referred to some way of indicating what kinds of activities patrons were engaging in (for example were they studying or partying?). Involving the users in setting the mood was also discussed and one major point here was that there would be a great risk of the system being close to useless if anyone could just set the parameters freely. Instead some kind of system for adding importance to the submitted data would be needed. It was suggested that the bar should probably have higher importance than patrons and there should of course be some kind of way to weigh the importance of the individual patrons’ settings.

Another approach that was discussed for involving users in the process of setting the mood, was adding separate parameters that could be set by users as a supplement to the parameters set by the bar staff. Then the patrons could have the ability to indicate for instance how cool the place is at the moment.

## 5.6 Survey

The survey got a total of 30 responses. The purpose of this survey was to evaluate the user experience of the system. While the number of respondents seems relatively low for a survey it is understandable when looking at the criteria to participate in the survey. To be eligible for the survey, respondents would have to have been using the system during the period of testing to a high degree, e.g. more than having seen the mobile website once or twice. Furthermore the participants should ideally own or have access to a smartphone to use the system, or alternatively have used it on e.g. a desktop or laptop computer. Given that these criteria limits who can participate in the survey we believe 30 participants to be satisfactory for evaluating the users’ experience using the system.

If we look at the number of visitors the mobile site got, 30 responses is not a very large share. Of total visitors it is around 3% and of returning visitors it is around 5%. The survey was mainly promoted through the mobile website and the situated display, to reach people who had actually used the system. We had to make certain considerations regarding the promotion of the survey on the mobile website. On one hand we wanted to make people aware of the survey, and on the other hand we didn’t want to obstruct the usage of the system, as that would potentially pollute our usage statistics. This meant that we had to promote the survey in a discreet manner. As we saw when looking at the statistics for the mobile website, many visits were of brief duration (between 0-1 minutes). Getting people’s attention on the survey during such a short timeframe is hard



so most respondents would probably be found among the visitors spending longer amounts of time on the site. Getting people to notice the survey is also just part of the deal. They also have to actually take it, and since a lot of people were using the system while they were at Studenterhuset doing other stuff, they may not have felt a strong incentive to take the survey. We did include an option to get emailed the link with situations like this in mind. With these considerations in mind, and in continuation of what has already been mentioned, we argue that 30 respondents are indeed satisfactory.

Our survey can be divided into four parts, namely questions about usage (how the respondents used the system and to what degree), questions regarding experience, questions regarding the parameters, and finally general feedback in the form of open-ended questions. This section follows the same structure. Appendix F contains a complete overview of the survey data containing graphs of the answers for all questions in the survey. This section only presents a subset of these graphs.

The age of the participants ranged from 17 to 38 with an average of 26 years. Of the participants 19 were male and 11 were female.

When looking at how the survey respondents first heard about the system the absolute majority have indicated that they heard about the system on social networking sites like Facebook and Twitter. 48% of respondents chose this option. By breaking up and categorising the responses from the “Other” option we see that the second most picked source was “Saw it at Studenterhuset” or a variant hereof, representing 26% of responses. At 19% “Friends (word of mouth)” takes the third place. “Email”, “Flyer”, “SMS”, and Studenterhuset’s website follows at a few percent each. The option “Poster” was not selected by any respondents.

It is worth noting that was possible for respondents to select multiple options on this question and therefore the total percentage adds up to 113.

### **5.6.1 Usage**

We have divided the usage into two separate parts. The first part explains people’s general use during the test period, such as for how long and how much people had been using the system. The second part explains in further detail how people had been using the system in regards to certain activities, such as “I checked out the mood before going to Studenterhuset”.

#### **General usage**

Regarding the location at which people used the mobile website, we see from the survey that a majority of respondents have indicated that they used the system while they were at Studenterhuset. At the same time it is also worth noting that collectively “Out on the town” and “At home” makes up almost as large a part as “At Studenterhuset”. It was possible for respondents to select multiple options when answering the question about where they used the system. Therefore it is expected that there is an overlap between people who have indicated that they have used the system outside Studenterhuset and at Studenterhuset. The percentage of replies indicating usage at Studenterhuset is 53 while it is 50 for “Out on the town” and “At home” combined. This obviously adds up to more than 100%, showing that there is in fact an overlap. An additional 7% of respondents

chose the “Other” option. In the Other option was mentioned “School” as a location where usage had taken place. This makes the share of respondents using the system outside Studenterhuset about as big as the share that used it at Studenterhuset – both a bit more than 50%.

From the survey we additionally saw that there was a pronounced split between having used the system for “Approximately two weeks” (37%) and “Less than a week” (43%). These statistics are especially interesting when seen in connection with the question about how many times people used the system during the period. 70% indicated that they used the system fewer than 5 times during the period they specified earlier. So by sheer logic both people who have used the system for a short period and people who have used it for about twice as long seem to not have used the system very often. The second largest chunk here is “5-10 times” at 20%, and this chunk does have a larger representation when looking at the respondents who have the system for “Approximately two weeks”, but “Fewer than 5 times” does still have the majority in this segment.

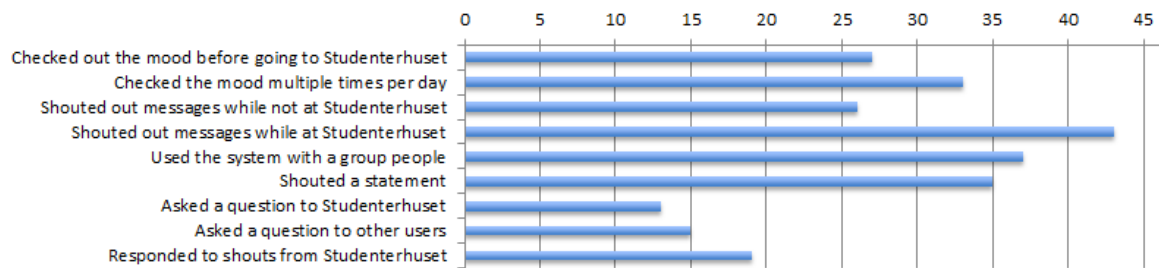
We see the same trend when looking at how many times the respondents visited Studenterhuset during the specified period. A majority of 63% of respondents indicated that they went to Studenterhuset “Fewer than 5 times” during the period. 20% of respondents never went to Studenterhuset during the period. The distribution is almost the same between the various periods of time.

We also inquired about the frequency at which the respondents on a more general basis visited Studenterhuset. Most of respondents indicated that they went to Studenterhuset “Sometimes” or “Often” at 43% and 30% respectively.

## **Activity**

This part is based on data from the survey where participants were asked to state how often they engaged in certain activities. The options for these questions were on a Likert scale consisting of Never, Seldom, Occasionally, Frequently, Very Frequently. The resulting graphs of numbers for each of the questions can be found in Appendix F. While these graphs and numbers are useful for examining tendencies for each individual activity they are not easily comparable across the board. For this purpose we have calculated a usage factor for each question. The usage factor was calculated by giving the question options a range of values starting for 0 for ‘Never’, and ending with Very Frequently with a value of 4. The sum of these numbers, for each question, constitutes what we call the usage factor and gives some comparability between the frequencies of each activity. Figure 21 shows a graph comparing these usage factors. It should be made clear that the value of a usage factor is only intended to bear meaning when compared to other values.

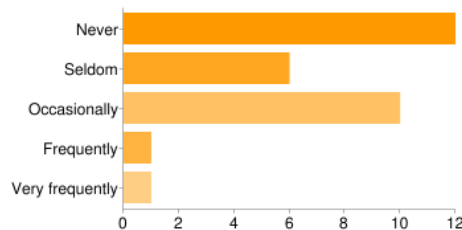
From Figure 21 it is evident that people to a large degree used the system to shout out messages while at Studenterhuset. Additionally people very much used the system in groups. We believe that the high tendency to use the system in groups is hugely because people liked to have fun in groups by communicating with each other using shouts on the situated display. This was a tendency also mentioned in our findings from the interviews.



**Figure 21 - Usage factors**

Compared to the activity of using the shout feature from other places, it is much more prevalent to use the shout feature, while at Studenterhuset. Still, the rate for using the shout feature from outside is relatively high in comparison. From the logged data of site traffic and shouts we were not able to really tell if shouts were from people at Studenterhuset or not. Likewise for the observation sessions it was not possible to get a clear picture as to how much people used the shout feature from outside. This finding suggests that while using the shout feature at Studenterhuset was predominant; using the shout feature from elsewhere was still popular.

From all the other data collected it was not really possible to gauge how much people used the system to ‘check out the mood’ before heading to Studenterhuset. From Figure 22 we can see this was done to some degree, although somewhat overshadowed by the tendency to use the shout feature. In combination with the tendency to check out the mood multiple times per day it suggests that people liked to keep up to with the current mood at Studenterhuset.



**Figure 22 - Checked out the mood before going to Studenterhuset**

Figure 22 shows the spreading of people’s answers to “Checked out the mood before going to Studenterhuset”. While a lot of people did do this, most of them only did so on occasion and only very few did it frequently. From this we argue that it is not evident that people have been ‘checking out the mood’ regularly in connection with visiting Studenterhuset. However the fact that a lot of people had been checking the mood multiple times per day and that there had been a lot of traffic to the mobile site suggests that people have been using the mobile website for other reasons than checking it before heading to Studenterhuset.

Examining how people used the shout feature it is clear that people predominately used it to shout out ‘statements’. The same tendency is present in the logged data about ‘shouts’ that was collected from the system.

## 5.6.2 Experience

This section is based on the part of the data from the survey about people’s experience, when using the system. There were 15 questions, consisting of statements, to which the participants could answer either 'Strongly Disagree', 'Disagree', 'Undecided', 'Agree', or 'Strongly Agree'. The resulting graphs of numbers for each of the statements can be found in Appendix F.

As done in the section about usage we calculate a factor to be able to compare across the 15 statements about experience. However for the experience we have calculated two factors, namely an agree factor and a disagree factor. The disagree factor was calculated by giving answers of Strongly Disagree and Disagree a value of one and two respectively. Likewise this was done for the agree factor. Figure 23 is a graph showing both the agree and disagree factor for each statement. Answers of Undecided are not included in the graph, but generally one can assume that the lower the numbers for both agree and disagree factor are for a particular statement, the more people answered with Undecided. E.g. for the statement “The mood represented in the system matched the actual mood” had the highest number answers of Undecided with 16, which is also reflected in its score of agree and disagree.

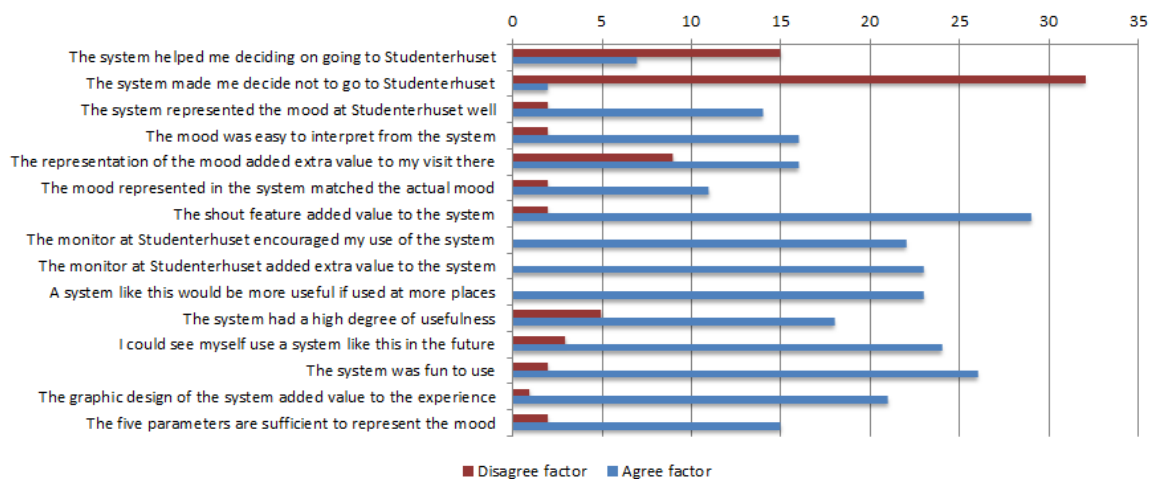


Figure 23 - Agree factor and disagree factor

We interpret the answers of Undecided as if the participants were not able to provide a clear-cut answer or simply did not understand the statement or what was referenced in the statement. This harmonise well with the fact that the statement “The mood represented in the system matched the actual mood” received so many Undecided answer, whereas the statement “The system was fun to use” received the least with only five. The last mentioned statement is arguably easier to take a stand on. In Appendix F on Appendix page 52 is a complete graph showing the number of Undecided answers for each statement. One interesting tendency noticeable on the this graph is that the top four statements for most answers of Undecided all have to do with the representation of the mood. So apparently there is some reason that participants found it hard to give a precise answer to these statements.

Going back to Figure 23, we see that the participants generally agreed with the statements. The statement getting the highest agreement factor was “The shout feature added value to the system”, so the shout feature has most definitely played a central part in people’s experience with the system. For a better overview of what participants agreed and disagreed with Table 5 shows the 15 statements sorted on both agreement and disagreement.

Agree	Disagree
1. The shout feature added value to the system (29)	1. The system made me decide not to go to Studenterhuset (32)
2. The system was fun to use (26)	2. The system helped me deciding on going to Studenterhuset (15)
3. I could see myself use a system like this in the future (24)	3. The representation of the mood added extra value to my visit there (9)
4. A system like this would be more useful if used at more places (23)	4. The system had a high degree of usefulness (5)
5. The monitor at Studenterhuset added extra value to the system (23)	5. I could see myself use a system like this in the future (3)
6. The monitor at Studenterhuset encouraged my use in the system (22)	6. The system represented the mood at Studenterhuset well (2)
7. The graphic design of the system added value to the experience (21)	7. The mood was easy to interpret from the system (2)
8. The system had a high degree of usefulness (18)	8. The mood represented in the system matched the actual mood (2)
9. The mood was easy to interpret from the system (16)	9. The shout feature added value to the system (2)
10. The representation of the mood added extra value to my visit there (16)	10. The system was fun to use (2)
11. The five parameters are sufficient to represent the mood (15)	11. The five parameters are sufficient to represent the mood (2)
12. The system represented the mood at Studenterhuset well (14)	12. The graphic design of the system added value to the experience (1)
13. The mood represented in the system matched the actual mood (11)	13. The monitor at Studenterhuset encouraged my use of the system (0)
14. The system helped me deciding on going to Studenterhuset (7)	14. The monitor at Studenterhuset added extra value to the system (0)
15. The system made me decide not to go to Studenterhuset (2)	15. A system like this would be more useful if used at more places (0)

**Table 5 - Statements sorted on agree and disagree factors**

From Table 5 it is evident the participants mostly only disagreed with the two statements about whether the system influenced their decision to go to Studenterhuset. The only other statement with a significant disagreement factor is “The representation of the mood added extra value to my visit there”.

It is interesting that so many people disagreed with the system having influence on their decision to go there. We can state that it almost never influenced participants to not go, while it to some degree influenced people to go. It is necessary to keep in mind that there could be many other reasons to ‘check of the mood’ and we only questioned if it influenced their decision to go. It is easy to imagine that people ‘checked the mood’ out of general curiosity.

Looking at what the participants agreed the most with, we can derive that the shout feature definitely added value to people’s experience. Likewise we can state that people have a positive attitude towards using systems such as this in the future, and that the

usefulness is dependent on the amount of places running such a system. That these two statements received such high agreement factors suggests that the overall concept behind the system has high viability in practice if established at numerous places.

Statements regarding the situated display received substantially high factors of agreement with no participants disagreeing at all. This leads us to believe that the situated display plays an essential role in the usage of the system.

As mentioned before statements about the representation of the mood generally received lower agreement factors, than other statements. This was mostly due to many participants choosing Undecided for the statements. The statement "The representation of the mood added extra value to my visit there" was disagreed upon by several participants.

### 5.6.3 Parameters

From the survey it is possible to estimate how important the users think each parameter is in representing the mood. They were asked to indicate the importance of each parameter. There were five options ranging from 'Not important' to 'Very important'. To compare the importance of the parameters an importance factor was calculated for each parameter. The calculations of importance factor were done in the same fashion as usage factor in the section about Activity. Figure 24 shows the importance factors of the five parameters compared.

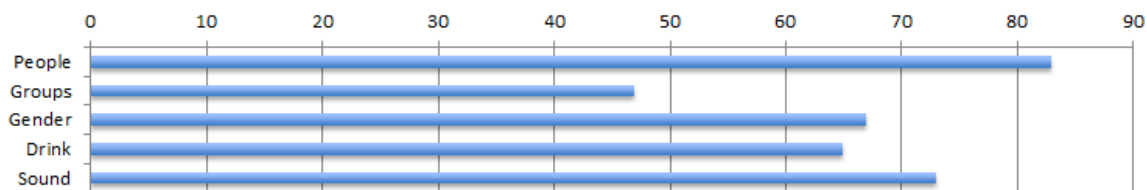


Figure 24 - Importance factors of the parameters

Figure 24 reveals that the participants rate People as the most important parameter for representing the mood, followed by Sound. The size of Groups parameter had a significantly lower importance than the rest of the parameters. A bit surprisingly the graph in Figure 24 is very similar to the graph in Figure 17 that shows how many times each parameter was updated during testing. The only difference being that Sound has a higher value than People in the latter.

We examined if there were any difference in what males and females regarded as important parameters to represent the mood. From this we can determine that Gender was predominately more important for males, and that females generally regarded Sound more important. Otherwise no noteworthy tendencies were present. It is worth noting here that there was a larger amount of male respondents than female. This of course has to be taken into account when looking at the results for either group, but we argue that the amount both male and female respondents is significant enough to allow for the kinds of statistics presented here.

#### 5.6.4 General feedback

As the final part of the survey we let respondents write some free-text feedback. Three text fields were present, one for positive feedback, one for negative feedback, and one for any additional general thoughts and comments.

In the department of positive feedback we got several responses praising the concept. A selection of statements includes: *“Surprising that it hasn’t been done before and isn’t implemented all over Gaden (Jomfru Ane Gade, Ed.)... And CPH ;-)”*, *“Often it's difficult to decide where to go when going out, so a service like this one could be helpful”*, and *“I use the system primarily at home, its [sic] very cool to interact with people being at the stuenthouse.”*

In the field for negative feedback we received comments like: *“It should be making itself more aware to people”*, *“The service could potentially fuel a negative spiral in terms of the number of visitors to a venue, because instead of attending to get a firsthand [sic] look people just check the mood from a distant location”*, and *“I forget about it the second I exit the studenthouse”*.

Not many respondents wrote in the field for general feedback as had written in the previous two fields, but we did get some responses: *“It would be nice to know who were responsible for the assessments and how assessments were made”* and *“The success of a service like this i [sic] highly dependent on the amount, quality and reliability of mood information if it were to be deployed on a larger scale.”*





## 6 Discussion

The purpose of this study was to examine how mood could be represented and conveyed digitally using a constructivist approach to context, in context-aware systems for use in urban environments.

In the previous chapter we have presented a great amount of findings from an in-situ evaluation of the system. From these findings we have established seven more profound findings, which will be presented and argued for in this chapter. For the sake of simplicity we use the term 'findings' for these more profound findings.

Some of the findings we present in this chapter directly relate to answering the two research questions presented in the Introduction. Additionally we present other findings that does not directly relate to answering the research questions, but still are significant discoveries.

We present and discuss these findings below. Each finding is presented under a headline, which indicates an overall theme of the finding.

### **Representing mood as a set of parameters**

With an underlying basis in Constructivism we have been able to create a digital representation of mood, even though mood is highly ambiguous and both mentally and socially constructed. Our approach to this has been letting mood be represented by a set of discrete parameters, each consisting of two poles (e.g. empty and crowded). The parameters that were used in the system were: People, Groups, Gender, Drinks, and Sound. We have found that people regarded these parameters as being sufficient in representing mood. Of the parameters we have found that respondents generally regarded People as a more important parameter than others. This does not come as a huge surprise, as the number of People present is a very good indicator about mood. Least important was Groups. This can largely be attributed to the fact that size of groups is not very telling about mood, but also to the scale used for this parameter. The parameter was on a scale from 'small groups' to 'big groups'. This is highly ambiguous and interpreting this parameter is difficult. Although the other parameters used can also be said to be ambiguous, for the Groups parameter it becomes harmful. Imagine the parameter to be set right in the middle. This can be interpreted quite differently from person to person. It could mean that people are in groups of a medium size or that people are in a mixture of small and big groups. What this tells us is that one needs to pay careful attention to how these parameters are constructed. They need to be ambiguous in the way that no exact value is displayed, but still be clear in what they represent. Also there is a limit to what 'parts' of mood can be represented as a parameter. The parameters used in our system are quite general, fairly objective, and observable characteristics of the mood. If one tried to use more subjective and specific characteristics of mood as parameters, like 'amount of happy people', there would be a high risk that the parameters would lose all meaning because of the greater ambiguity to be expected in people's interpretation of such a parameter.

It is our belief that the approach of representing mood as a set of parameters works because the system only encapsulates parts of the mood (the parameters) and presents this to users. Thereby the impression of the actual mood gets individually constructed in people's minds by them adding meaning to the representation. In adding meaning they

can draw on previous experiences from the venue and supply other information about the context they may have, such as the day of the week or time of day.

The question remains, whether people experienced that the mood represented by the system matched the actual mood. From the user survey we have seen that respondents agreed that the system was able to represent the actual mood at Studenterhuset. There was a more than 5 to 1 ratio of people agreeing compared to people disagreeing. There is however some uncertainties to this finding, as about half of respondents were undecided to this question. A high number of 'undecided' answers were also present for all other questions in the survey that had to do with representation of mood. There could be any number of reasons for this. E.g. respondents simply could not recall or the representation of the mood had not played a large role in their use of the system.

Having argued that our approach to representing mood has merit, another factor that comes into play is whether humans, instead of machines, can provide information about context. This theme is discussed next.

### **Humans as providers of contextual information**

In the introduction of this report we stated that we viewed humans as better providers of contextual information than machines. Based on the results we have gathered from evaluating a prototype of our concept, and the experience we have earned from interviewing staff and observing people's use of the system, we argue that this is true.

We have found that people are excellent at sensing the mood and translating it into the parameters in the system. Generally the portrayed mood in the system, maintained by the staff, has been accurate of the actual social setting at Studenterhuset. The times we have observed it being clearly wrong, it has not been due to the parameters being set inaccurately, but instead it was the mood changing and the staff not updating it to match. We have found this barrier to relate mostly to people's work habits. On average the settings representing the mood were updated with an interval of approximately an hour. A quite high standard deviation does however indicate that there was a large variation in the amount of time between these updates. We argue that some of this variation can be attributed to the fact that humans were providing the input, and rather than updating with a predefined interval as machines does, humans can relatively easy estimate whether there is an actual need for change.

Since the mood at Studenterhuset at certain times of day is not changing that often, something which we have observed, there can be drawn a parallel to the varying intervals. Now, we are not trying to say that this is the exclusive reason for the high standard deviation. There are other possible causes, but this is a very relevant one. Looking at other causes also brings us to an observation of ours regarding the accuracy of the mood settings. We did notice at some points that there was not a very good match between the represented and the actual mood. A mismatch so notable that it cannot be attributed to the fact that mood is subjective. These observations indicated that not every member of the attending staff have had the same focus on the tablet and setting the mood parameters, which is of course also a likely factor contributing to the varying intervals between updates. From our interviews it was also confirmed that not every one of the volunteers had the same focus on updating the parameters.

Looking at this data one could perhaps argue that humans are not good as providers of contextual information. We would, however, instead argue that the fact that people have

different foci does not necessarily impact their ability to sense the mood. There might be several reasons why not everyone is equally keen on using the tablet. During the interviews it was mentioned that the process of informing the volunteers about the system and its functionality might not have been as streamlined as it could be, and this could possibly have an impact on the volunteers' usage of the system. Another trademark of Studenterhuset is that there are a lot of different people tending the bar because of the large number of volunteers. This might also influence the fact that not everyone uses the system equally. Some people might have had more shifts during the period than others, and might have gotten more comfortable using the system.

As we discussed earlier the Groups parameter was rated as least important by survey respondents. There is an interesting match here when looking at the data for how much the staff updated the parameters. Here Groups is also the least updated. We already mentioned possible reasons for groups being less popular than the other parameters, and these reasons also apply when looking at the staff side of things. Interestingly, the trend continued when looking at how the parameters were rated by survey respondents and the number of updates on parameters by staff. For instance the parameter rated most important was People, and it was also one of the most updated parameters. So in general there seems to be a trend towards the parameters, which are expected to be the easiest to register, being rated as the most important and being the most updated.

### **Shouts as contextual information**

The shout feature has in many cases been used to augment the representation of the mood by providing additional details, which could not necessarily have been conveyed through the mood parameters. This augmentation has been present in two primary ways. The first and most obvious connection between the mood parameters is the cases where people have shouted messages, which directly relate to what is happening at Studenterhuset. These kinds of shouts have originated from both Studenterhuset and users of the mobile website. The second connection is kind of the reverse of the first one, in that it comprises shouts sent from outside Studenterhuset as reactions to the mood parameters. These types of shouts are often of the kind asking for further details on what is happening, and are logically always sent by people outside Studenterhuset.

This tendency has been evident both from comments made by the staff during interviews and from our examination of the logged data. Even though the categorisation showed us that shouts relating directly to the mood were not dominating, they did make up a good percentage of the total shouts. In addition to this it is important to remember that just because a shout was not categorised as "Mood", it does not mean that it could not have indicated something about the mood none the less. For instance it is not hard to imagine that some shouts in the "Statement" category could have functioned as indicators of the mood, because they can say something about the people who are at Studenterhuset. Likewise many of the shouts sent by Studenterhuset categorised as "Informative" have very much been related to the mood in that they tell what is happening at Studenterhuset.

### **Mood as a decider for action**

It was one expectation of ours that the system could provide people with context information, which could help them decide whether or not to go to Studenterhuset. Although it is entirely possible to use the system in such a way we have not found it to be

the dominating way people have used the system. We found that only a small percentage of respondents indicated that the system had been a deciding factor when going to Studenterhuset. Furthermore many respondents indicated that the representation of the mood had not added extra value to their visit. From interviews with the staff we learned that a possible cause for these opinions was that Studenterhuset is a quite unique venue with low prices that cater to students. This means that many people do not need to be convinced by e.g. 'the mood' to decide to go there.

Although it was not evident that the mood settings had been a deciding factor in the case of Studenterhuset, we have results from both interviews and the survey that indicate that people think that the concept would have a greater potential if used at more venues. This would allow for comparison of venues and thereby decision-making based on the portrayed moods. The aspect of comparison could be an incentive for using the system as a deciding factor.

Even though it has not been clear that the mood settings have made people make decisions about going to Studenterhuset, the settings have functioned as a decider for a different kind of action. Both from observations and from data logs we have noticed that some people have written shouts as reactions to the settings of the parameters. This includes shouts asking questions about what is going on as well as comments to the settings. This further relates to the fact that interaction has proven an important factor in the usage of the system, which we discuss in this next theme.

### **Interaction is essential**

As we discussed earlier the system has to some degree been used differently than to help people decide on going to Studenterhuset. In relation to this, what we have noticed from especially analysing the responses to the survey is that the interactivity added by the shout feature played a large role in people's usage of the system. The situated display also was an important factor in this interactivity, as indicated by the staff members we interviewed and by our observations. The fact that people could see their own messages show up, and that they knew that their messages would be shown to more people than just those using the system on their smartphones, seemed to be an important factor in this regard.

We believe that the usage of the system would have been very different had the shout feature and the situated display not been part of the setup. Even the situated display alone not being there seems to could have yielded a very different usage pattern.

Seeing how interactivity really seems to add value to a user's experience, there is reason to believe that the concept should allow people to interact with the represented mood in some way. Suggestions to how this could be done will be treated later in Future Work.

### **Possible consequences of the system for venues**

In shaping the concept and implementation of the system we have primarily been centred on how contributions can be made to people's experience when 'going out', and therefore we have not paid too much attention to the potential negative consequences it might have for venues. We have found that some aspects of the concept could potentially be harmful. In the interviews it was mentioned that having such an open channel of communication as shouts provides can provide a challenge in that it can be difficult to control. But control is important as abuse or inappropriate content could hurt the public image of a venue. However, during the in-situ evaluation such behaviour has not been a

notable problem as only a few offending shouts have been deleted during the evaluation. In spite of this it is however still a very valid point, and especially if a system like this was implemented on a wider scale it is something that would need to be considered.

Another and more important aspect that potentially could be harmful is competition between venues if the concept was established on a wider scale. Although venues would benefit from being able to promote offers and events, something that was mentioned in the interview and also by survey respondents is that there is a risk of creating a vicious spiral. The way this vicious spiral should be understood is that if a venue for instance does not have a lot of patrons on a Friday night it might “scare” people away and thereby making it hard for the venue to actually get people to come and thereby be able to change the mood.

### **Digital Urban Ambience?**

To round off the discussion we put our findings in this project into perspective with the term Digital Urban Ambience as described by Kjeldskov et al. (2011). We argue that our concept does share some similarities with Digital Urban Ambience while it is not as comprehensive in creating “the ambient feeling or experience in an urban environment” as the eSpective<sub>2</sub> application described by Kjeldskov et al.

It is possible to observe certain similarities between our concept and the elements of Digital Urban Ambience. Based on three ways to characterise Digital Urban Ambience we examine how it relates to our concept. The three characteristics are:

- The quality of the situation as a whole
- A catalyst for action
- A sensory background

Provided that our concept was implemented across multiple venues the system would be able to provide users with a certain impression of the ambience in different areas of town. What we mean by this is that the mood settings and shouts of different venues could together make the city seem alive and “buzzing”, by having a dynamic overview of the ambience of venues in the city. Furthermore this overview would allow for an aggregation of the mood settings and thereby the system could provide an idea of the overall mood or ambience in a given part of town adding to *‘The quality of the Situation as a Whole’*.

We discussed earlier how the mood representation in our concept could function as a decider for action in various ways. This corresponds well with the principle of Urban Ambience, and thereby Digital Urban Ambience, being *‘A Catalyst for Action’*.

The third way of characterising Digital Urban Ambience is *‘as a Sensory Background’*. This is a bit more abstract than the other ways, and is not as easily coupled to our concept. One could argue that the parameters and shouts do create some kind of sensory background in that they do not alone create the feeling of ambience or mood, but this is a bit more far-fetched.

In general we argue that our concept does indeed have elements of Digital Urban Ambience, but on the other hand it also does differentiate itself from Digital Urban Ambience. The main differentiator is the fact that our concept’s main purpose is to

represent ambience at certain venues, and therefore it is not as such facilitating creation of Urban Ambience like for instance eSpective<sub>2</sub> is.

## 6.1 Future Work

Naturally we haven't been able to cover every possible aspect of the concept and the developed system in this project, and this allows for several possibilities for developing the concept further. Our findings indicate that people in general have a positive attitude towards the concept, and this further encourages looking closer at the future potential of the idea.

Of course the most obvious addition to the developed system would be to expand it to more venues so that it would match better with the overall concept, and the element of comparison would be introduced. This would accommodate what we have heard from several people, namely that the system would be even more useful if deployed on a wider scale. Of course there is also some overhead to this, which should be taken into consideration. Multiple venues need to be in on the idea, and much more hardware (tablets and situated displays) would be needed for this addition to be realistic. Of course it is also necessary to take into account the possible negative consequences we mentioned earlier. This is especially relevant for getting venues to want to participate. Perhaps it would be possible to adjust the developed system in some way as to minimise the potential negative effects. This would of course need to be investigated further if the idea of multiple venues was to be pursued.

Since the interactivity seems to have played an important role in people's usage of the system, one possibility for adding to the system could be to try and include even more interactivity than was already present in the form of shouts. An obvious way to do this is to somehow make the parameters interactive, for instance by allowing patrons to have an influence on the settings of the parameters. This was actually a topic discussed during some of the interviews, where it was suggested that such interactivity would require some rather sophisticated way of valuing the settings based on their origin. It is obvious that if any user of the system could freely set the parameters there would be a high risk of degrading the usefulness of the system. But if some kind of weighed voting system or similar was utilised it could possibly make sense to have patrons contribute to setting the mood parameters as this would provide even more "sensors" and thereby potentially even more precise representation of mood. As we did notice varying attention from the staff for the system depending on how busy the venue was, it could be an interesting option to allow for patrons to help provide the settings.

Finally we want to mention some future work relating to the findings presented. It would have been interesting to have been able to get different kinds of feedback from the users of the mobile system. The survey we put out, while it did provide us with some very useful data, was not able to capture every aspect of the users' experience and opinions. In this regard it would be interesting to get some more qualitative feedback, for instance in the form of interviews or perhaps a more in-depth study. Where this would have played the biggest role is in regards to the high degree of undecidedness we observed about the actual representation of the mood through the parameters. The big challenge that present itself when wanting to get additional feedback from the users, and the primary reason why we chose to focus our attention on the survey, is to actually get a hold of the

users of the system, since they are ordinary people using the system as part of their everyday life, and not in any way tracked or preselected. In spite of this challenge there is no doubt that it would be very valuable to get additional feedback from users.





## 7 Conclusion

In this project we have explored how the mood of venues can be digitally represented and conveyed through the help of mobile technology and situated displays, with humans as the providers of contextual information. Inspired by works in the field of mediated context-awareness we formulated a concept and implemented a system prototype, which allowed people to experience mood of venues wherever they were and communicate with venues and each other.

We conducted a user experience study using a local establishment as the case, where the system was evaluated in-situ. Numerous sets of data were collected, including log data of use, interviews with staff, and a survey of users' usage and experience with the system.

We have found that mood of venues can be digitally represented as a set of discrete parameters. Humans' interpretative qualities allow them to add meaning to the digital representation and thereby get a good impression of the actual mood. Furthermore we have seen that humans can provide contextual information for representing the mood in a way that machines cannot.

By giving user's the possibility to 'shout' small informal messages, we have seen how this can both add value to the overall experience and becomes an augments for the represented mood in the system. Shouts contributed to the interactivity of the system and functioned as a supplement of dynamic here-and-now information to the mood. Additionally we discovered how interactivity is a key element for engaging people in a concept as ours and from this we conclude that the concept would hugely benefit if the users interactively have influence on the portrayed mood. In continuation of this we have found that interplay between smartphones and the situated display in the system is an indispensable part of our concept.

Lastly we have looked at our concept in relation to the term Digital Urban Ambience. We have seen certain similarities between our concept and Digital Urban Ambience. Our concept does concern itself with ambience in an urban area, and does match certain characteristics of other Digital Urban Ambience systems. The main idea behind the concept does however take a different approach to ambience, than that described when defining Digital Urban Ambience, in that it focuses on presenting ambience elsewhere rather than adding to the ambience for the user where he or she is.



## Epilogue – New Usage Findings

The log data used in our findings is based on a four-week in-situ evaluation at Studenterhuset. After this it was decided that the system might as well still remain installed and usable at Studenterhuset, as a lot of people liked and used it. This has allowed us to keep logging data about usage. In this epilogue we do a brief comparison of the usage we saw during the first period of testing and the period after the in-situ evaluation officially ended.

What we can tell when comparing the usage for these two periods is that the general usage has fallen about 50% across the board. This is both for visits to the website, number of unique visitors, number of shouts made by users, and number of times the staff has updated the mood. Furthermore the average between the staff making an update to the mood and the standard deviation for this has increased by 50%. Table 6 shows an overview of the numbers.

	First period data	Second period data	Change
Mood update: Average Time	1:02	1:55	52% increase
Mood update: Std. Dev.	1:23	2:05	50% increase
Number of Shouts	455	193	58% decrease
Number of Mood Updates	227	130	43% decrease
Visits	1339	632	53% decrease
Visitors	770	415	46% decrease

**Table 6 - Overview of changes between datasets**

What these numbers tell us is that the system appears to have had a high novelty factor during the first period, engaging many users because it was something new and exciting. In the second period the usage is much lower, but it is however quite steady. Figure 25 and Figure 26 on the next page show graphs of shouts and mood updates for both the first and second period. We find it as a positive result that the system is still being used quite a bit and that the usage seems to be steady, if keeping in mind that nothing was done in ways of improving or promoting the system in the second period. A little bit more worrying is the high average amount of time between the staff updating the mood, but again we have not been doing any initiatives to engage the staff in updating the mood on the tablet computer. It has been entirely up to their own volition.

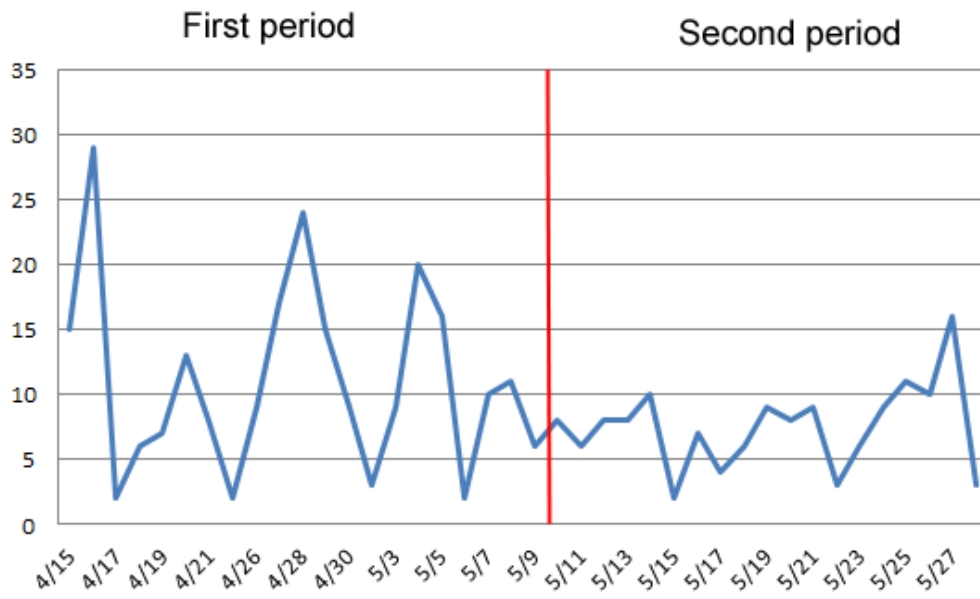


Figure 25 - Mood updates during first and second period

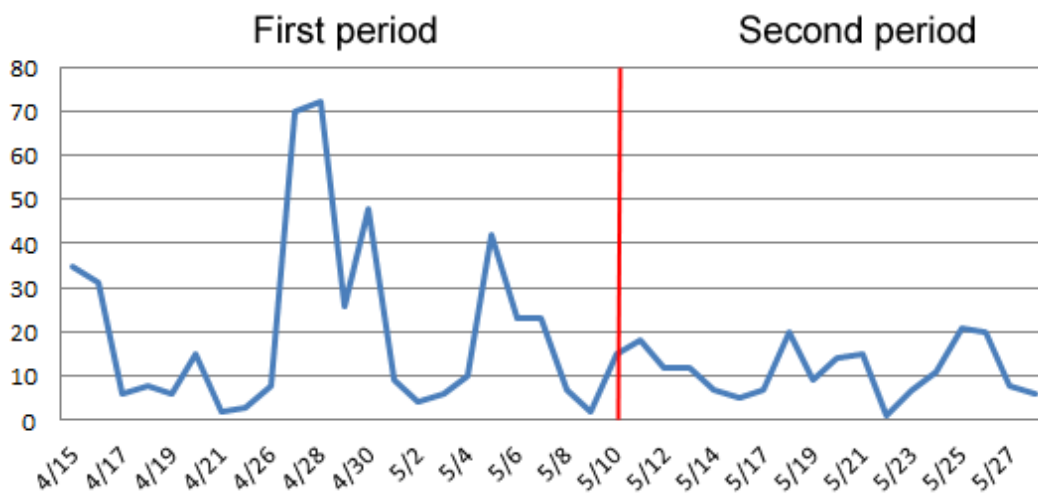


Figure 26 - Shouts during first and second period

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# Appendices





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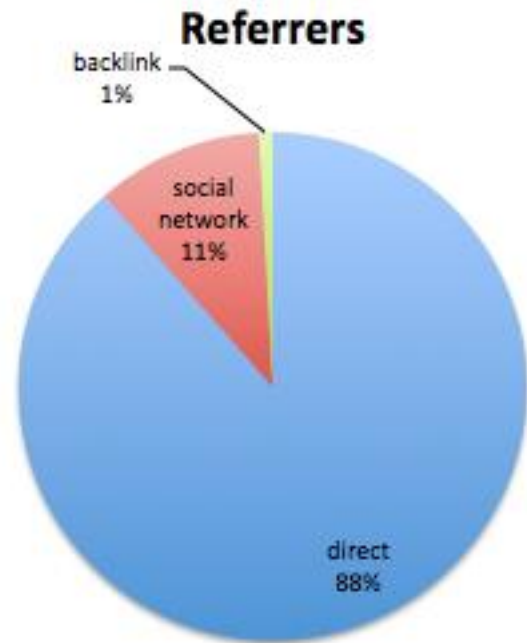
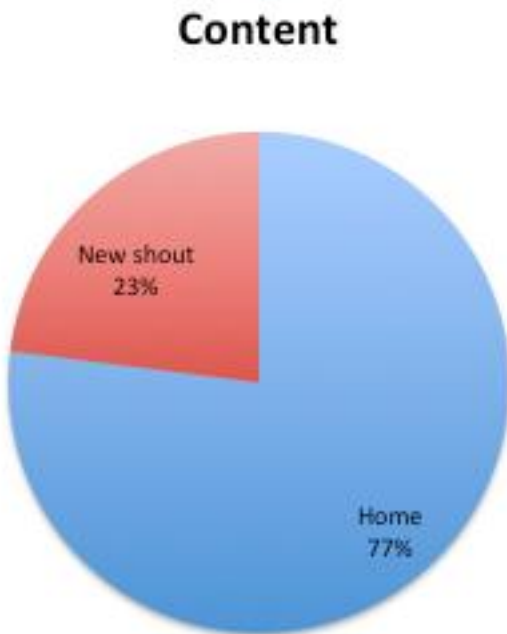
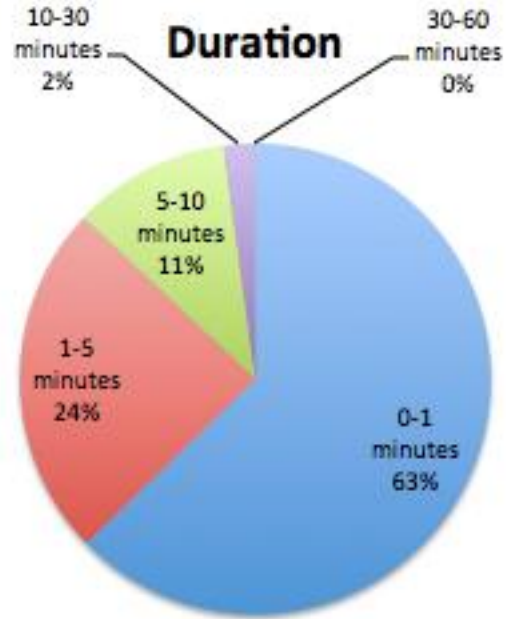
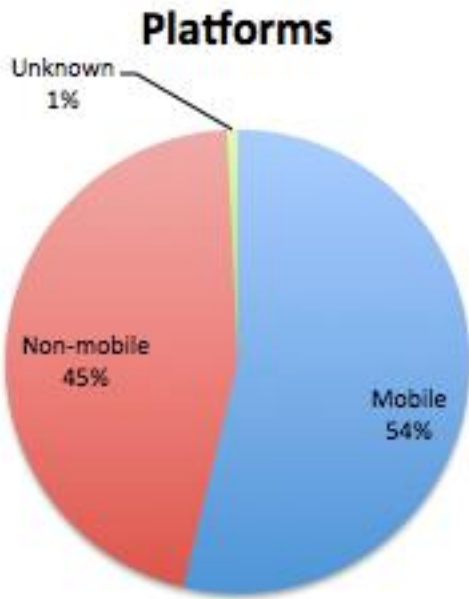
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# Appendix A

## Findings – Site Traffic





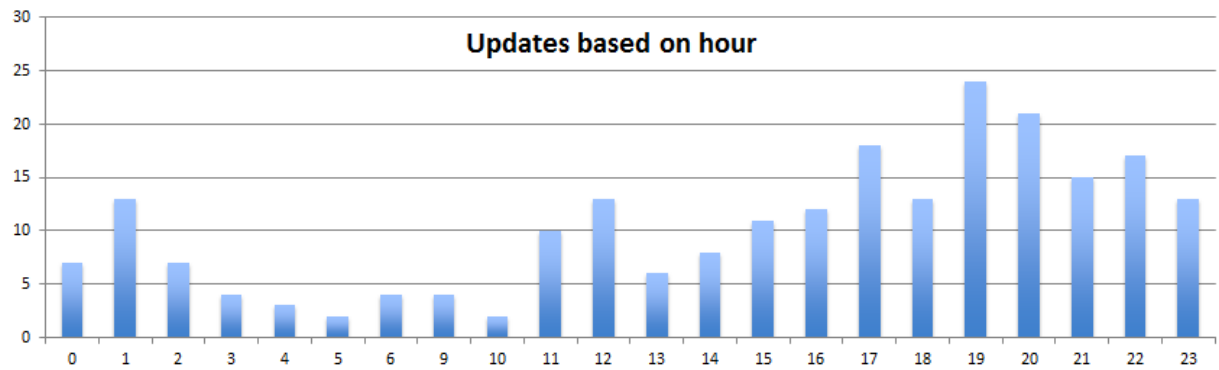


# **Appendix B**

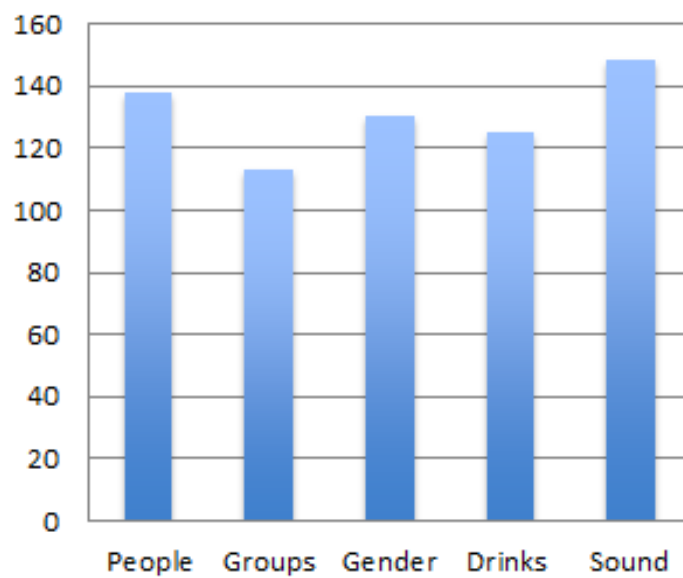
## **Findings – Mood Settings**



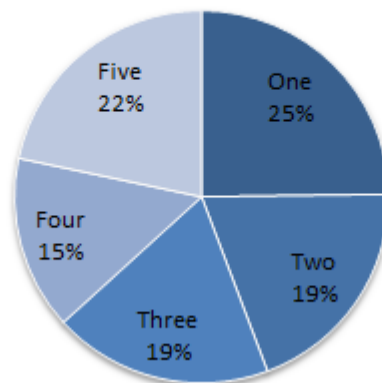




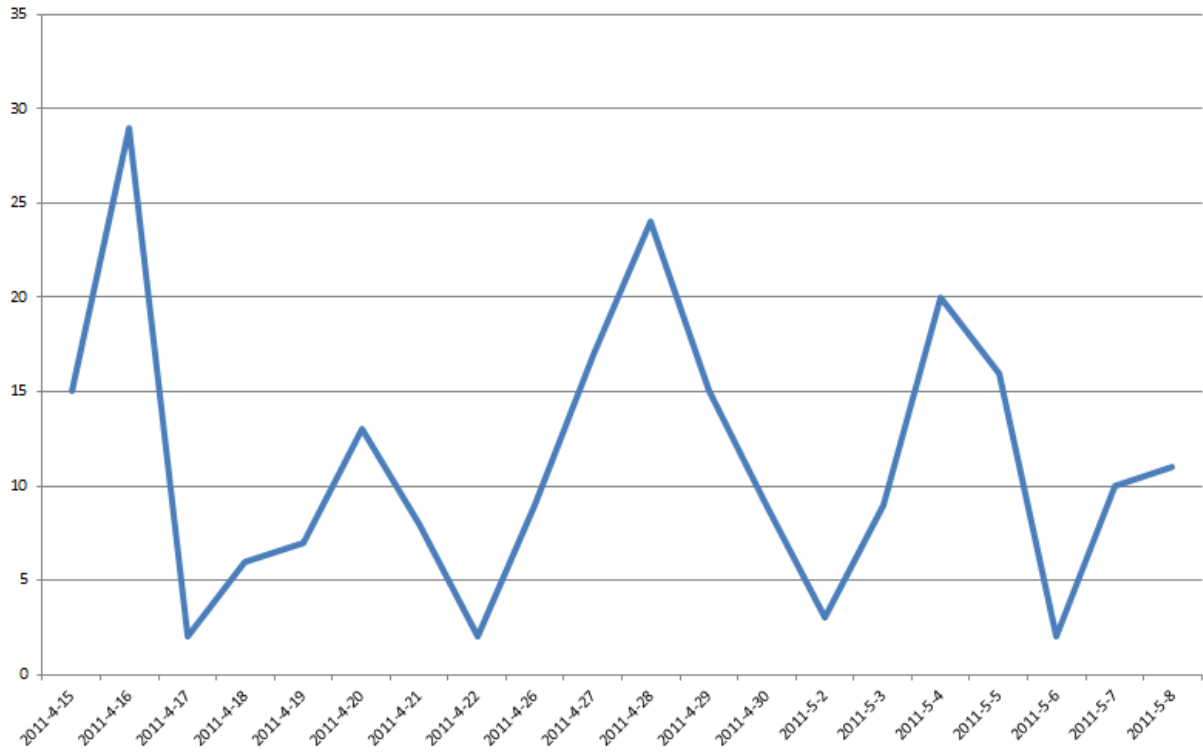
### Number of updates on each parameter



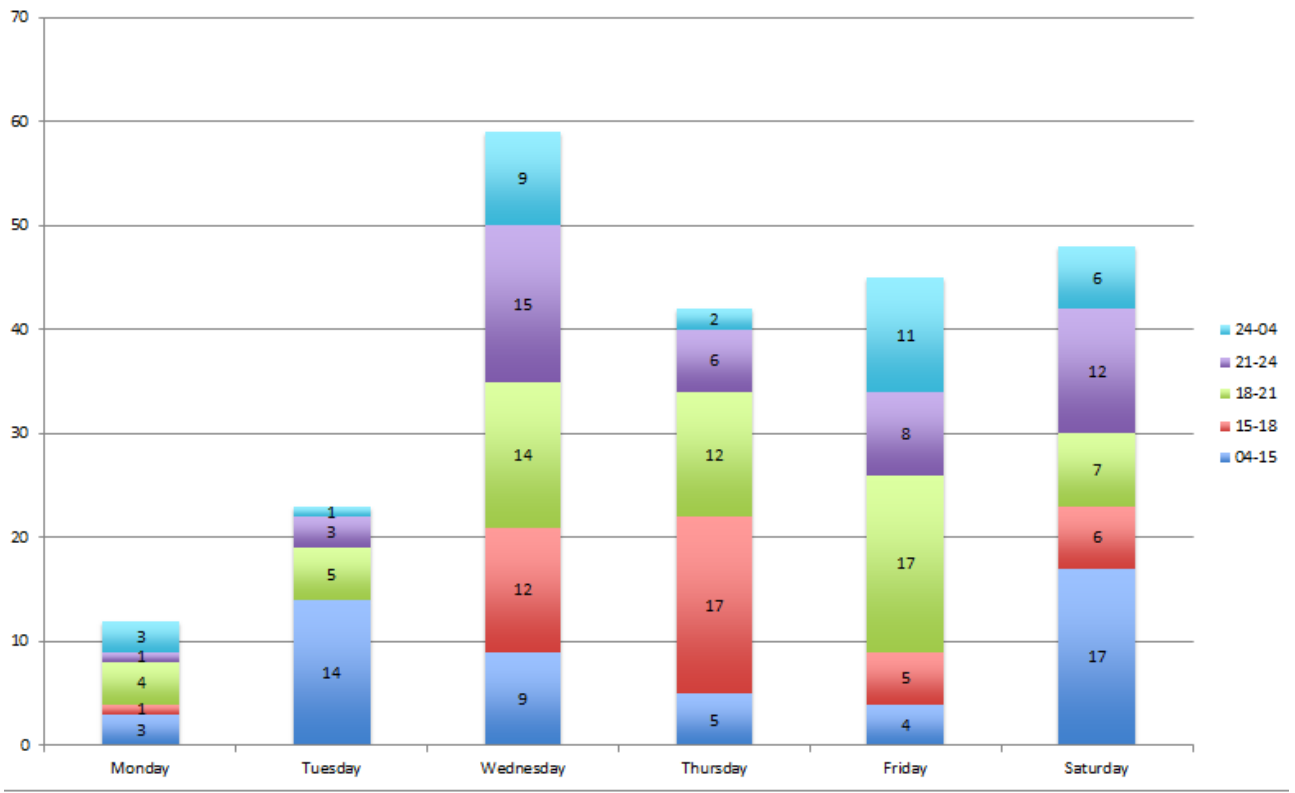
### The number of parameters adjusted when updating



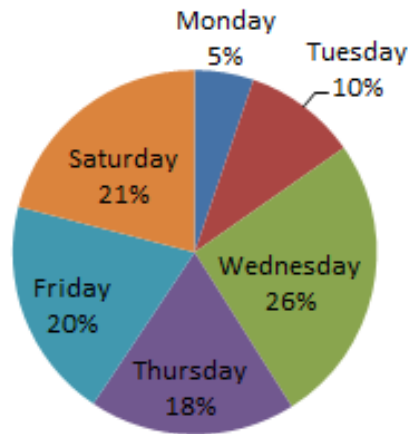
Parameter updates over the entire period



Parameter updates per hour interval



## Updates based on weekday



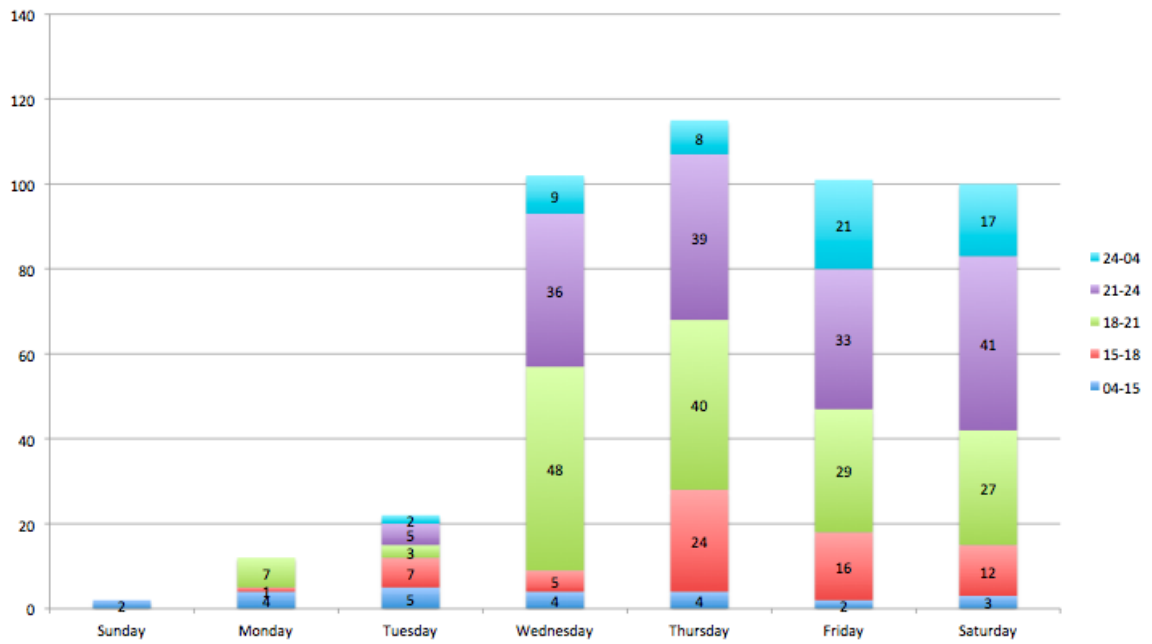


# Appendix C

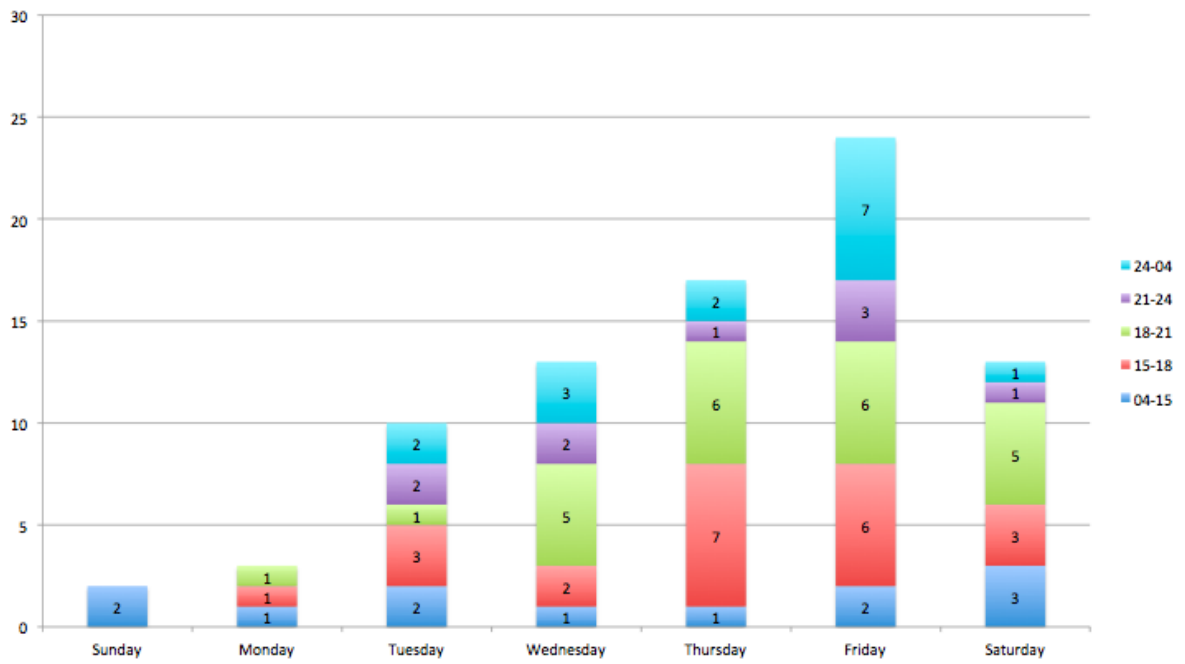
## Findings – Shouts



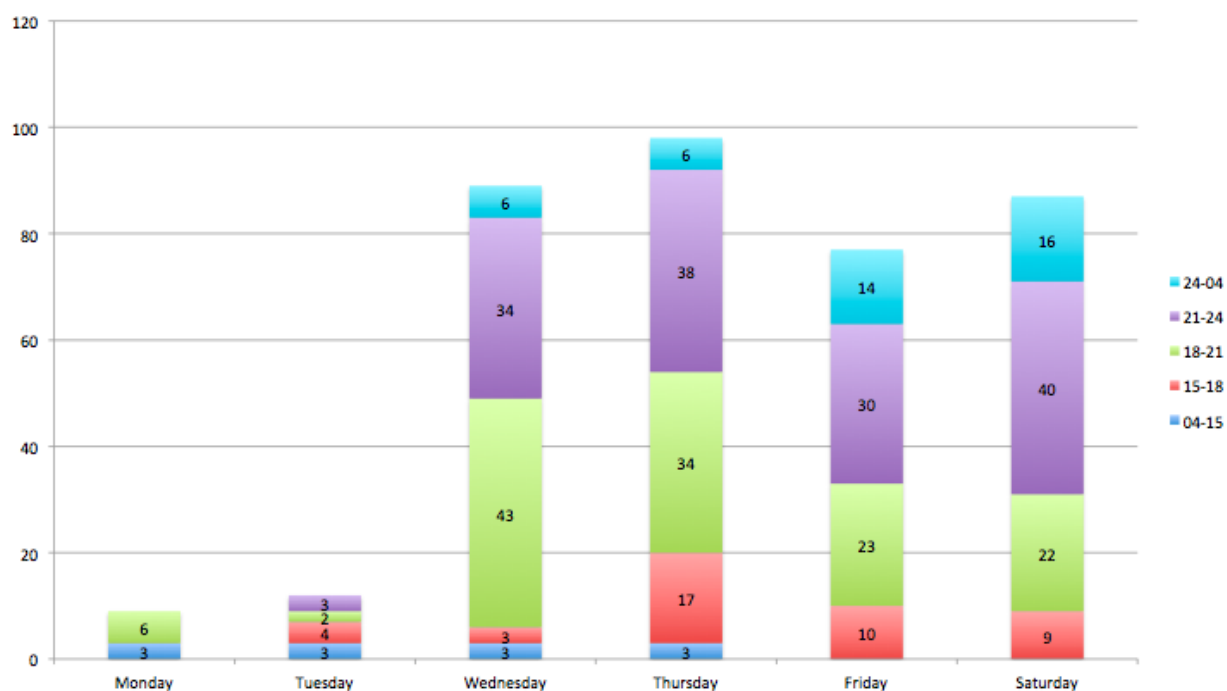
**Shouts per hour interval - All**



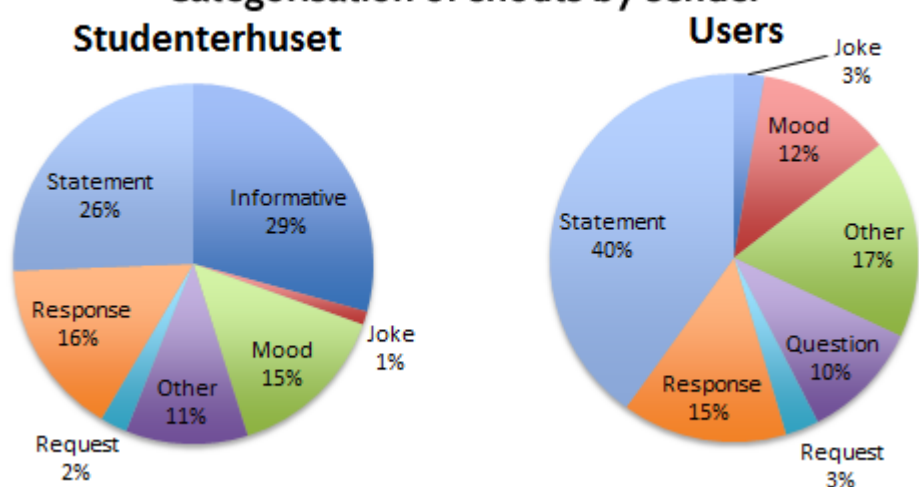
**Shouts per hour interval - Studenterhuset**



### Shouts per hour interval - Others

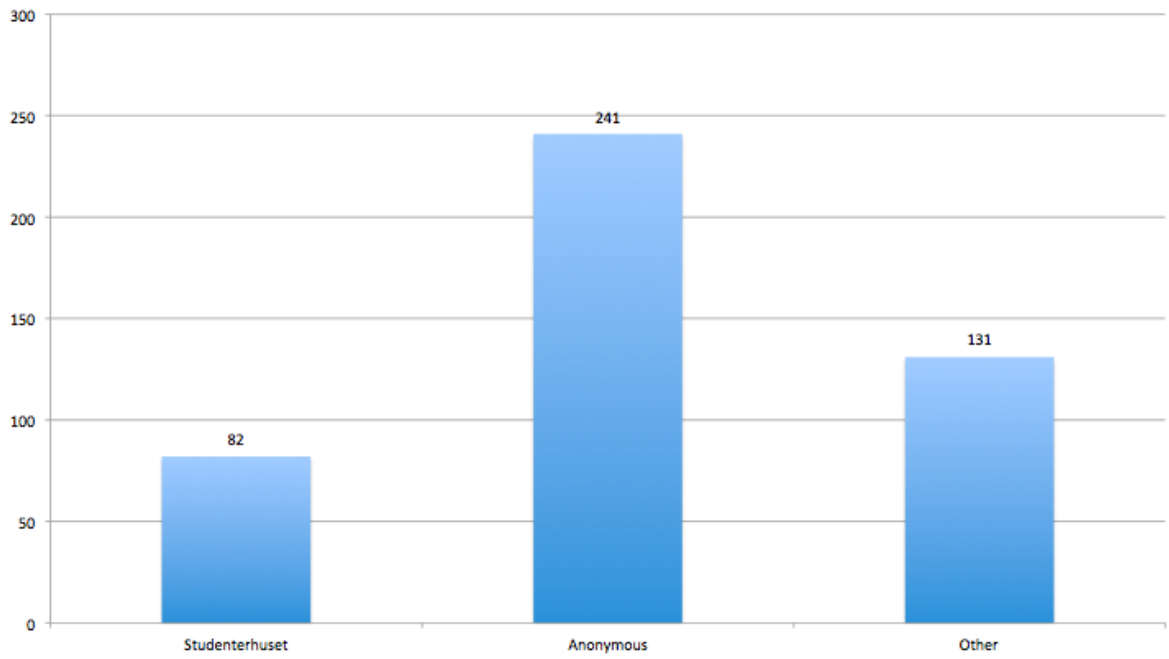


### Categorisation of shouts by sender

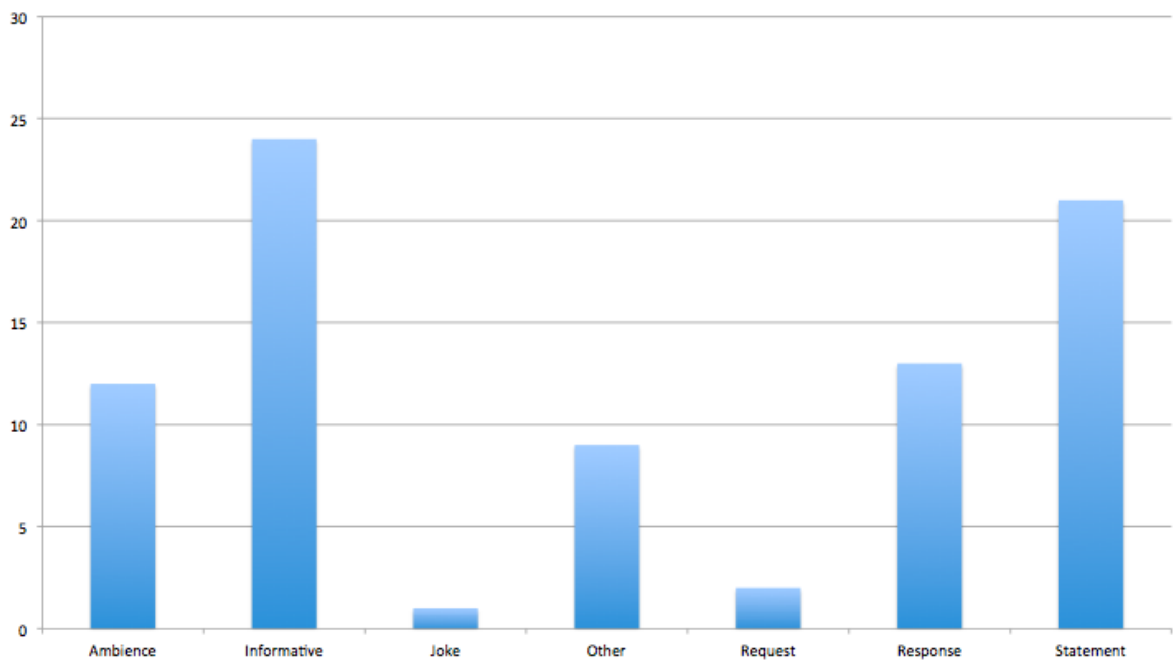




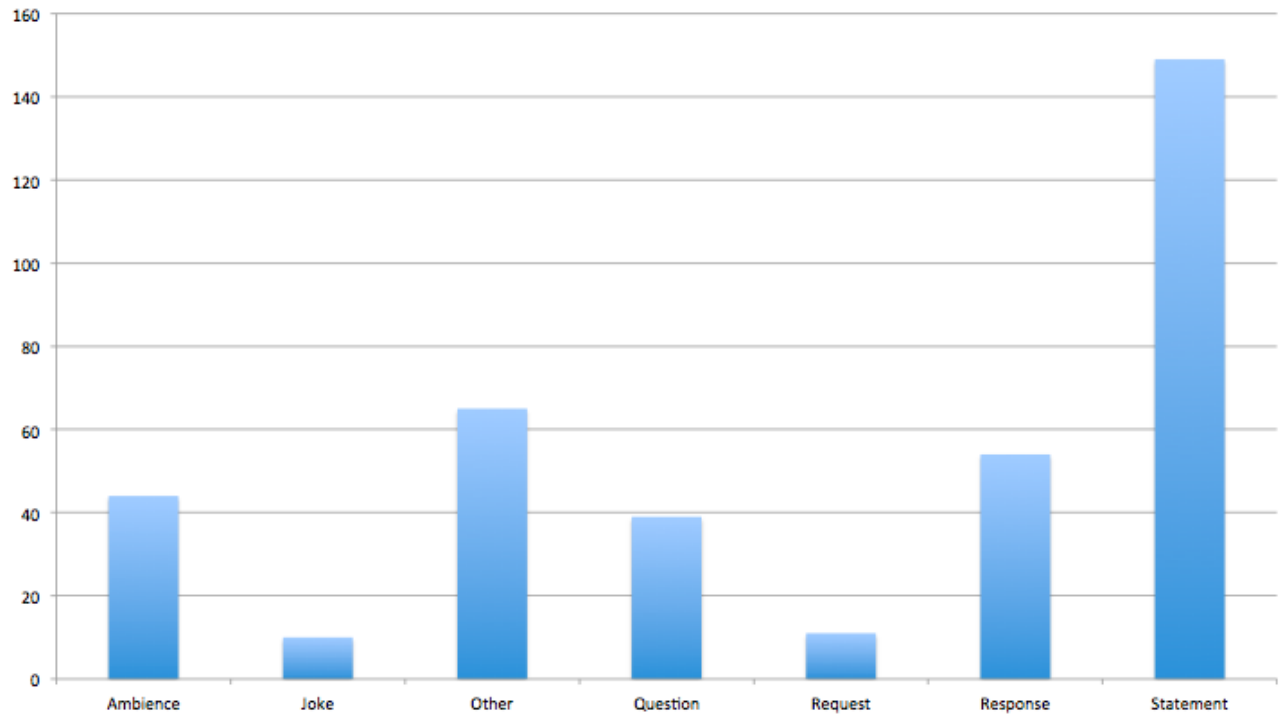
**Shouts by name**



**Categories: Shouts from Studenterhuset**



### Categories: Shouts from Others



# **Appendix D**

## **The Interview Guide**



- How would you overall rate the concept?
- Was the system on the iPad logical to use? Easy to go ahead and use?
- Was the design of the system on the iPad nice looking? Did the look have any importance in the use?
- What has triggered that you updated 'the mood' on the iPad?
- What has been the cause when you have not been updating 'the mood'?
- Is there any difference in how much you use the system? Day? Time of day?
- Were you honest when you adjust 'the mood'? If not, why?
- Have you adjusted 'the mood' differently from the actual mood to attract more people?
- Was it sufficient with the five parameters to represent 'the mood'?
- Which of the five parameters were most relevant?
- Do you have any suggestions to other relevant parameters?
- How have you used the shout feature?
- For 'advertising'?
- For one-to-one communications? E.g. answers to questions
- "Spam"? ;)
- Have you experienced that guests have asked about the system? iPad? Generally?
- Have you had the impression that many people have used the system while they were at Studenterhuset?
- Have you noticed how they have been using the system?
- Do you have the impression that the display has had influence on people's use of the system?
- Do you have the impression that guest have come to Studenterhuset after checking out 'the mood' somewhere else?
- What influence do you think the represented 'mood' has on people?
- Other comments or suggestions?



# Appendix E

## The User Survey





# Survey for themood.at/studenterhuset

This survey is intended for people who have used [themood.at/studenterhuset](https://themood.at/studenterhuset)

Read more about the project at [themood.at](https://themood.at)

**\*Required**

## Introduction

**What is your age? \***

Please enter your age in years

**What is your gender? \***

- Male  
 Female

**How often do you generally go to Studenterhuset? \***

- Never  
 Seldom  
 Sometimes  
 Often  
 Very often

**How did you first hear about themood.at/studenterhuset? \***

- Flyer  
 Poster  
 Social networking sites (Facebook, Twitter, etc.)  
 Email  
 Friends (word of mouth)  
 Other:

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# Survey for themood.at/studenterhuset

\*Required

## Questions about usage

Over how a long a period have you been using themood.at/studenterhsuet? \*

- Less than a week
- Approximately one week
- Approximately two weeks
- More than two weeks

During this period, how many times did you approximately use themood.at/studenterhuset? \*

- Fewer than 5 times
- 5-10 times
- 11-20 times
- More than 20 times

During this period, how many times did you approximately go to Studenterhuset? \*

- Never
- Fewer than 5 times
- 5-10 times
- More than 10 times

I used themood.at/studenterhuset primarily: \*

- Out on the town
- At Studenterhuset
- At home
- Other:

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# Survey for themood.at/studenterhuset

\*Required

## Questions about usage

Please indicate how often you did the following \*

	Never	Seldom	Occasionally	Frequently	Very frequently
I checked out the mood before going to Studenterhuset	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I checked the mood multiple times per day	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I shouted out messages while not at Studenterhuset	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I shouted out messages while at Studenterhuset	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I used the system with a group people	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please indicate how you used the shout feature \*

	Never	Seldom	Occasionally	Frequently	Very frequently
Shouted a statement	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Asked a question to Studenterhuset	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Asked a question to other users	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Responded to shouts from Studenterhuset	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Responded to shouts from other users	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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# Survey for themood.at/studenterhuset

\*Required

## Your experience with themood.at/studenterhuset

Please indicate to which degree you agree with the following statements \*

	Strongly disagree	Disagree	Undecided	Agree	Strongly agree
The system helped me deciding on going to Studenterhuset	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The system made me decide not to go to Studenterhuset	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The system represented the mood at Studenterhuset well	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The mood was easy to interpret from the system	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The representation of the mood at Studenterhuset added extra value to my visit there	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The mood represented in the system matched the actual mood at Studenterhuset	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The shout feature added value to the system	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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# Survey for themood.at/studenterhuset

\*Required

## Your experience with themood.at/studenterhuset

Please indicate to which degree you agree with the following statements \*

	Strongly disagree	Disagree	Undecided	Agree	Strongly agree
The monitor at Studenterhuset encouraged my use of the system	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The monitor at Studenterhuset added extra value to the system	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A system like this would be more useful if used at more places	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The system had a high degree of usefulness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I could see myself use a system like this in the future	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The system was fun to use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The graphic design of the system added value to the experience	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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# Survey for themood.at/studenterhuset

\*Required

## Your experience with themood.at/studenterhuset

Please indicate to which degree you agree with the following statement \*

	Strongly disagree	Disagree	Undecided	Agree	Strongly agree
The five parameters are sufficient to represent the mood	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please indicate the importance of the five parameters used for representing the mood \*

	Not important	Of little importance	Moderately important	Important	Very important
Amount of people	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Size of groups	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Gender	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Drink types	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Soundlevel	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Do you have any suggestions to other parameters that would be relevant when representing the mood?

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# Survey for themood.at/studenterhuset

\*Required

## Final thoughts

\*

Very poor    Poor    Average    Good    Very good

How would you overall rate the concept behind themood.at/studenterhuset?

Please provide any positive feedback

Please provide any negative feedback

If you have any further comments, feel free to add them below

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# Appendix F

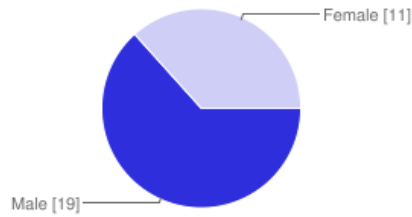
## User Survey Results



**What is your age?**

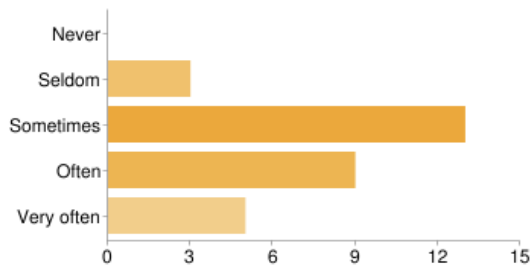
25 21 19 34 29 29 26 36 23 38 22 24 23 28 32 24 22 24 19 26 17 24 30 31 25 21 26 31 21 20

**What is your gender?**



Male	<b>19</b>	63%
Female	<b>11</b>	37%

**How often do you generally go to Studenterhuset?**



Never	<b>0</b>	0%
Seldom	<b>3</b>	10%
Sometimes	<b>13</b>	43%
Often	<b>9</b>	30%
Very often	<b>5</b>	17%

**How did you first hear about themood.at/studenterhuset?**

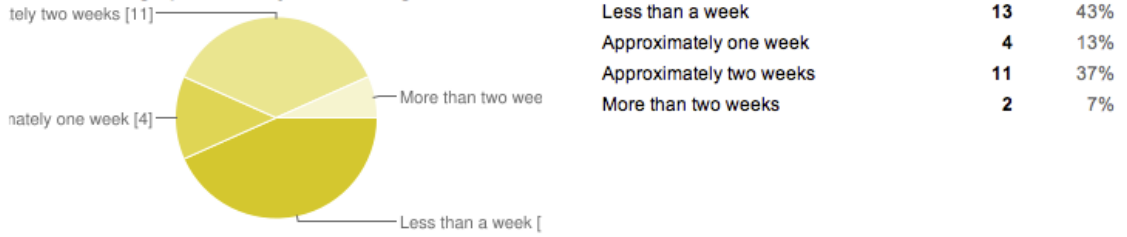


Flyer	<b>2</b>	7%
Poster	<b>0</b>	0%
Social networking sites (Facebook, Twitter, etc.)	<b>14</b>	47%
Email	<b>2</b>	7%
Friends (word of mouth)	<b>7</b>	23%
Other	<b>11</b>	37%

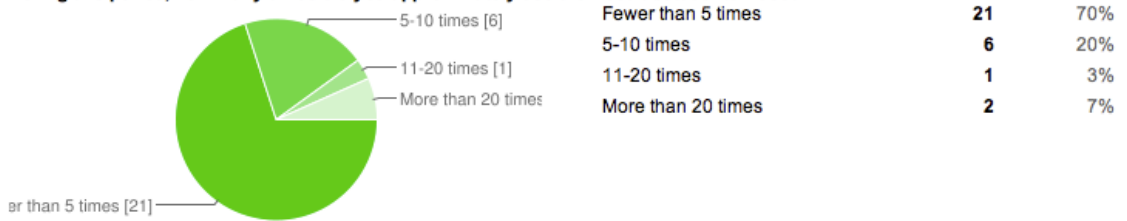
People may select more than one checkbox, so percentages may add up to more than 100%.

## Questions about usage

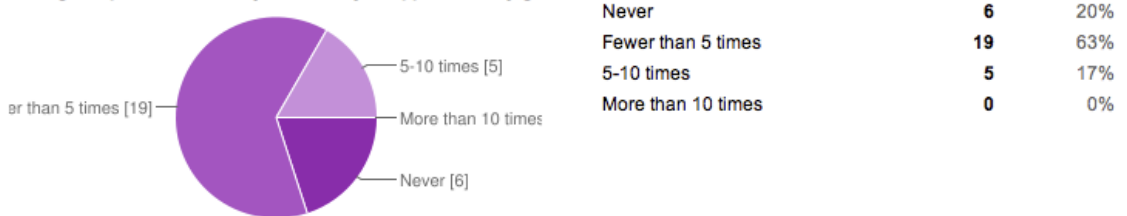
### Over how a long a period have you been using themood.at/studenterhuset?



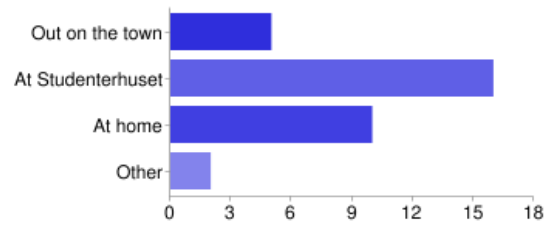
### During this period, how many times did you approximately use themood.at/studenterhuset?



### During this period, how many times did you approximately go to Studenterhuset?



**I used themood.at/studenterhuset primarily:**

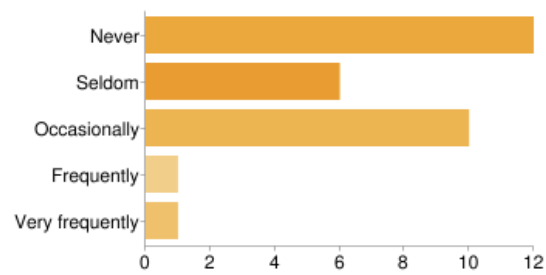


Location	Count	Percentage
Out on the town	5	17%
At Studenterhuset	16	53%
At home	10	33%
Other	2	7%

People may select more than one checkbox, so percentages may add up to more than 100%.

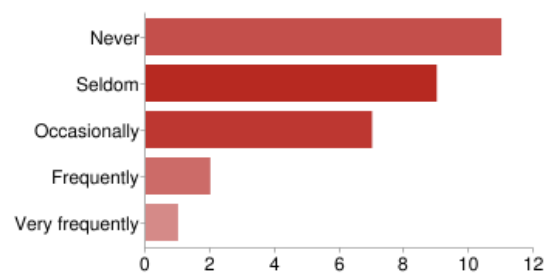
**Questions about usage**

**Please indicate how often you did the following - I checked out the mood before going to Studenterhuset**



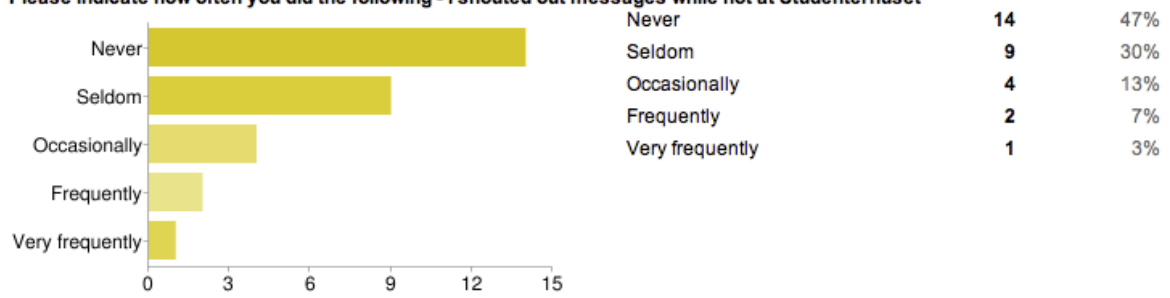
Frequency	Count	Percentage
Never	12	40%
Seldom	6	20%
Occasionally	10	33%
Frequently	1	3%
Very frequently	1	3%

**Please indicate how often you did the following - I checked the mood multiple times per day**

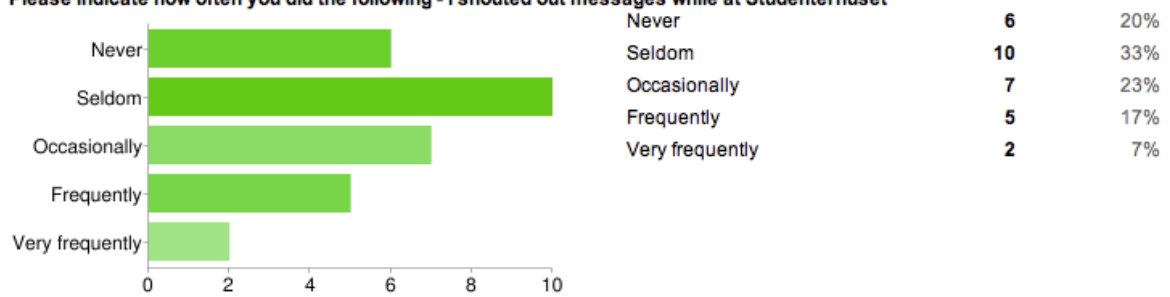


Frequency	Count	Percentage
Never	11	37%
Seldom	9	30%
Occasionally	7	23%
Frequently	2	7%
Very frequently	1	3%

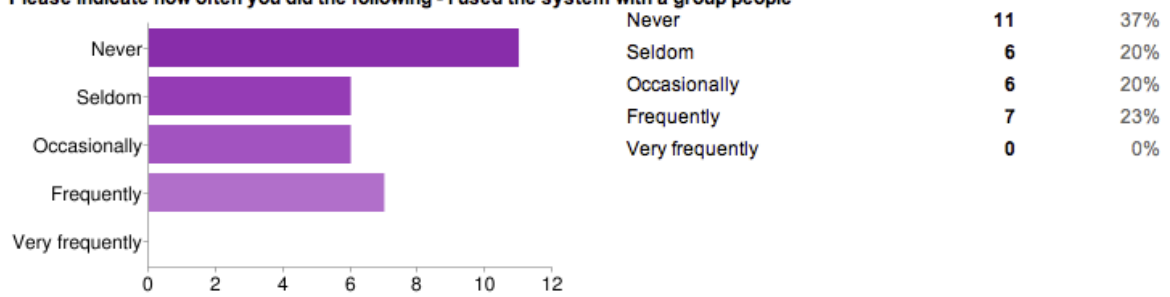
**Please indicate how often you did the following - I shouted out messages while not at Studenterhuset**



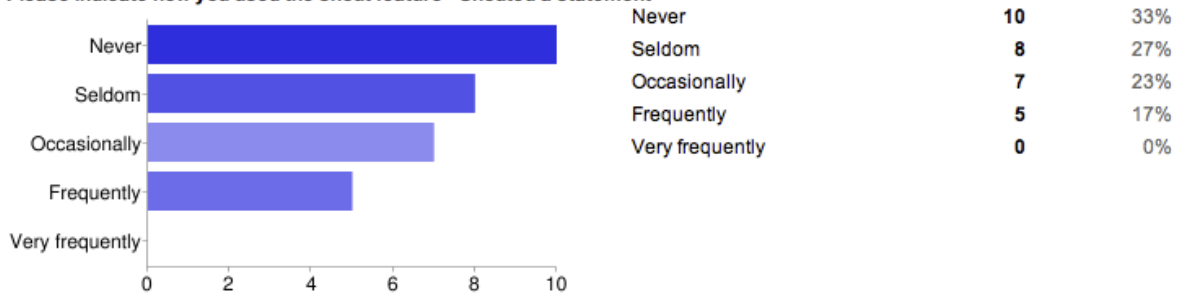
**Please indicate how often you did the following - I shouted out messages while at Studenterhuset**



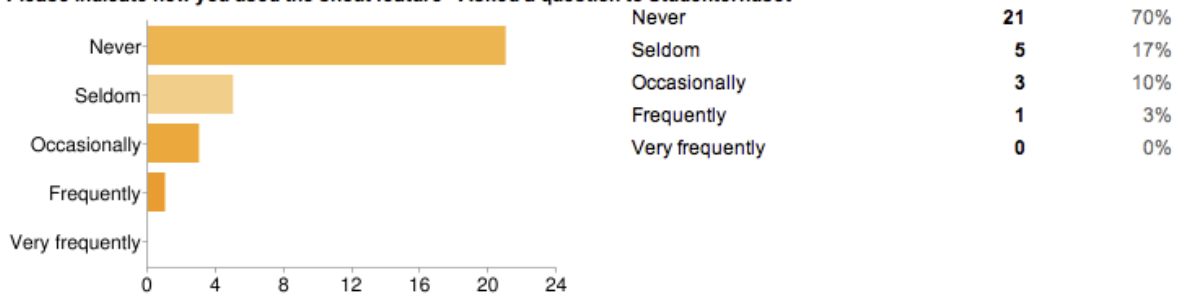
**Please indicate how often you did the following - I used the system with a group people**



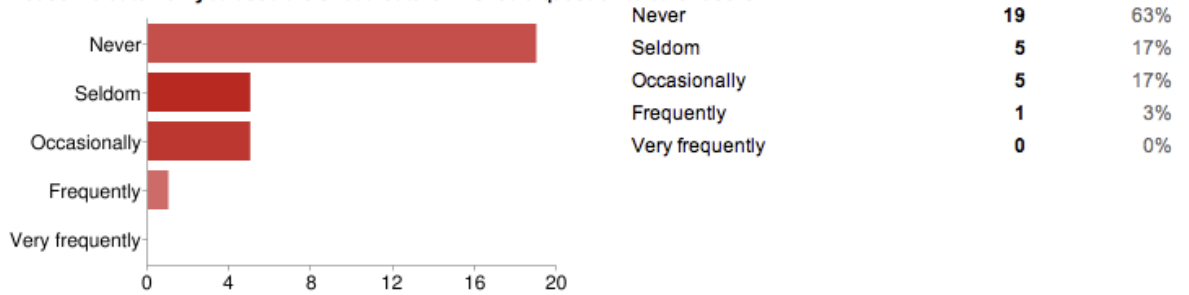
**Please indicate how you used the shout feature - Shouted a statement**



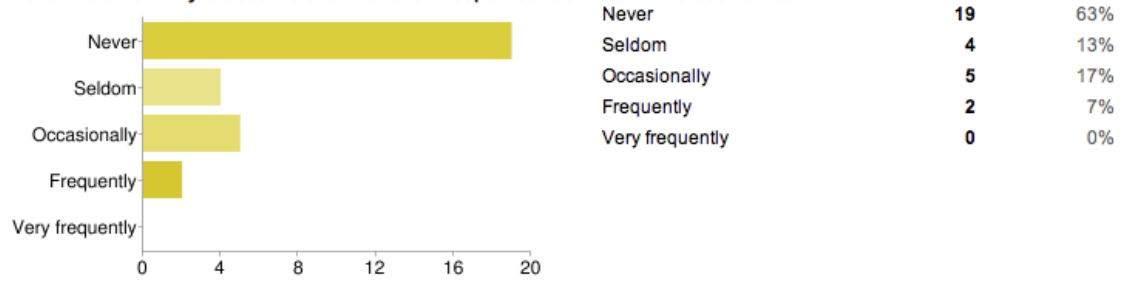
**Please indicate how you used the shout feature - Asked a question to Studentarhuset**



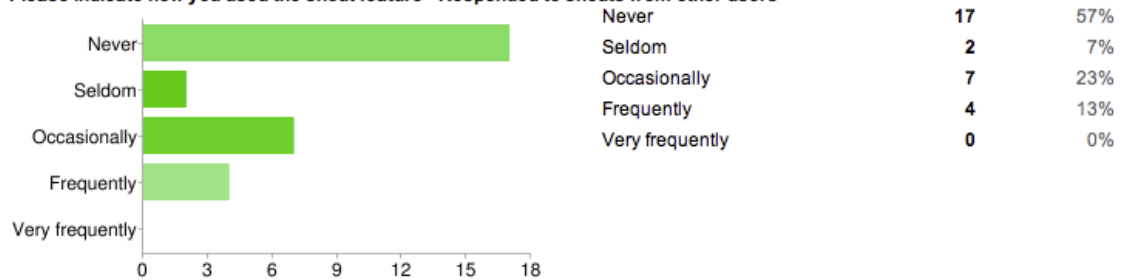
**Please indicate how you used the shout feature - Asked a question to other users**



**Please indicate how you used the shout feature - Responded to shouts from Studenterhuset**



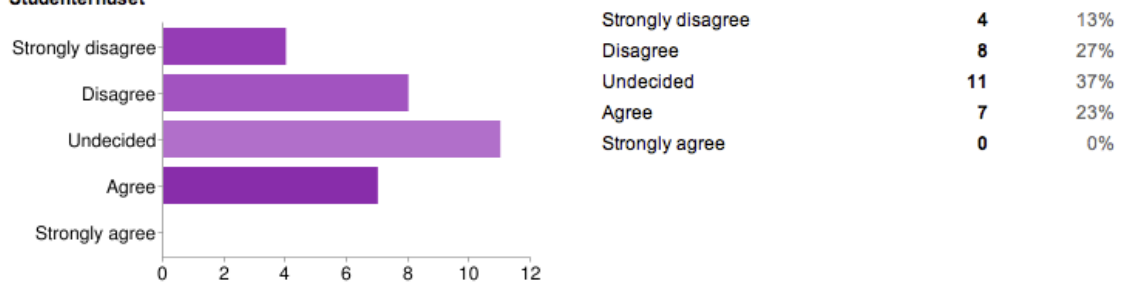
**Please indicate how you used the shout feature - Responded to shouts from other users**




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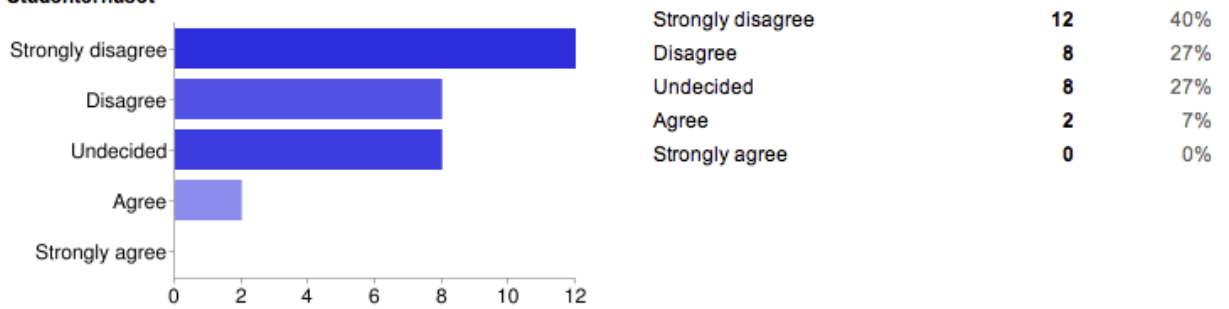
**Your experience with themood.at/studenterhuset**

**Please indicate to which degree you agree with the following statements - The system helped me deciding on going to Studenterhuset**

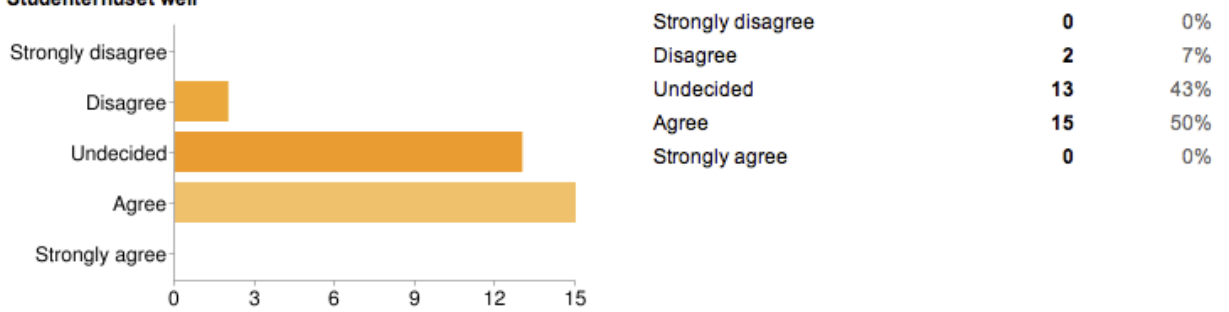




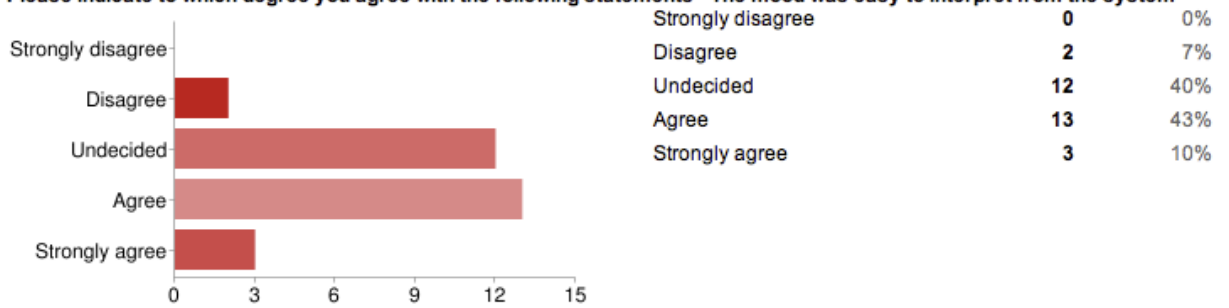
**Please indicate to which degree you agree with the following statements - The system made me decide not to go to Studentarhuset**



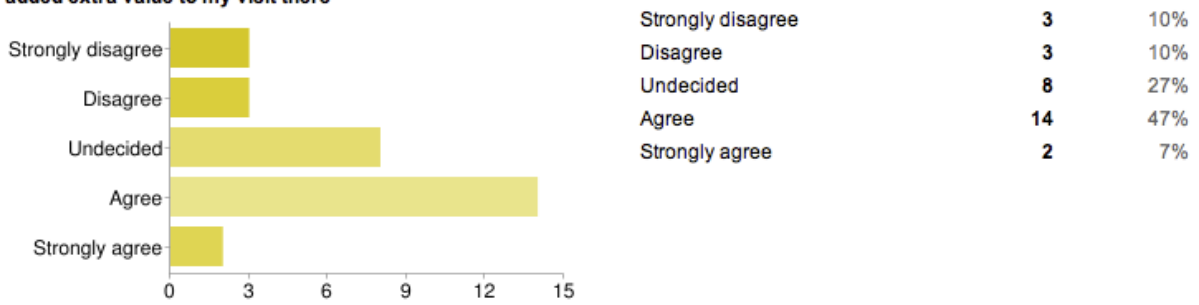
**Please indicate to which degree you agree with the following statements - The system represented the mood at Studentarhuset well**



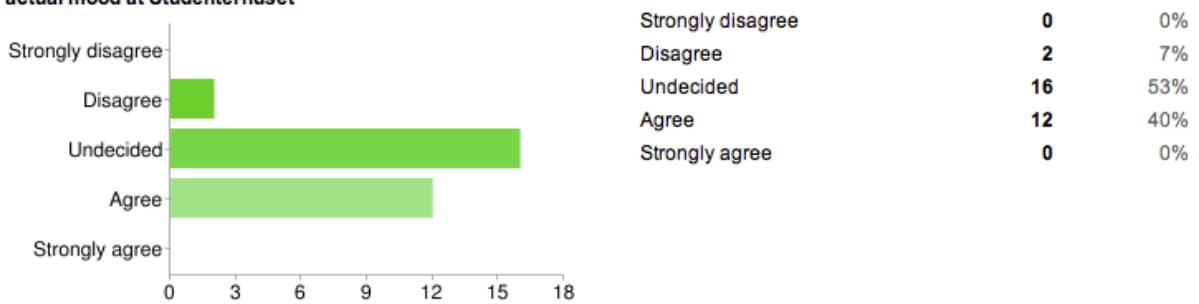
**Please indicate to which degree you agree with the following statements - The mood was easy to interpret from the system**



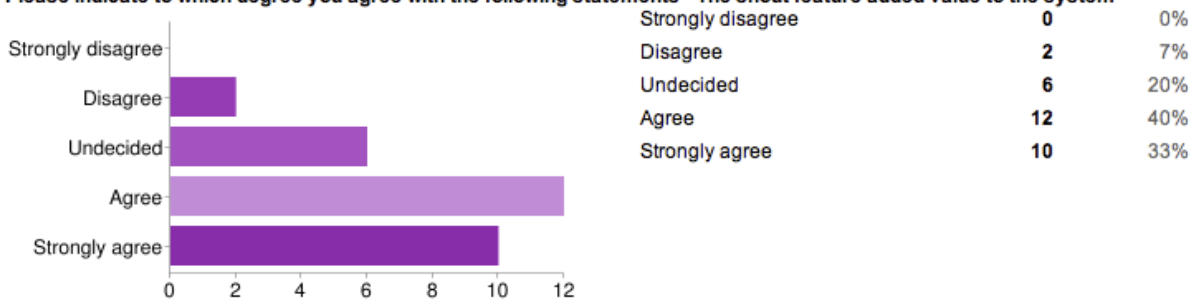
Please indicate to which degree you agree with the following statements - The representation of the mood at Studenterhuset added extra value to my visit there



Please indicate to which degree you agree with the following statements - The mood represented in the system matched the actual mood at Studenterhuset

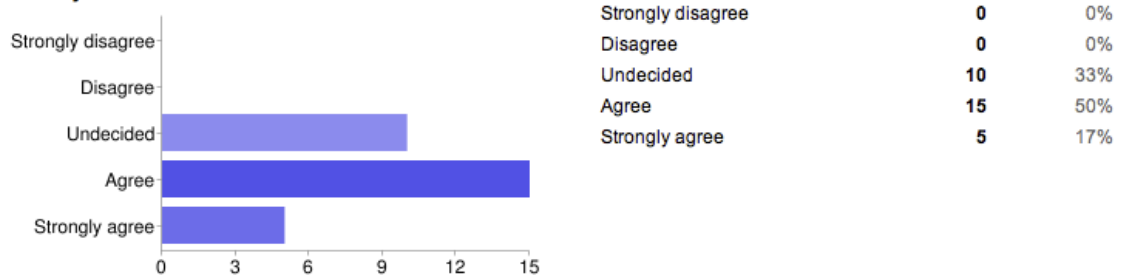


Please indicate to which degree you agree with the following statements - The shout feature added value to the system

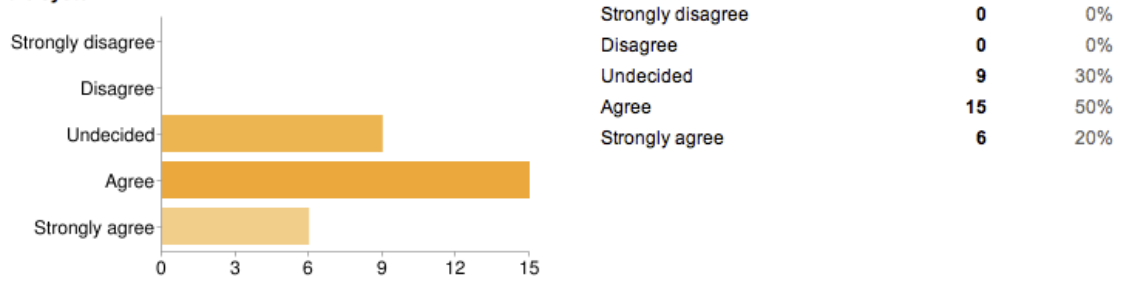


## Your experience with themood.at/studentarhuset

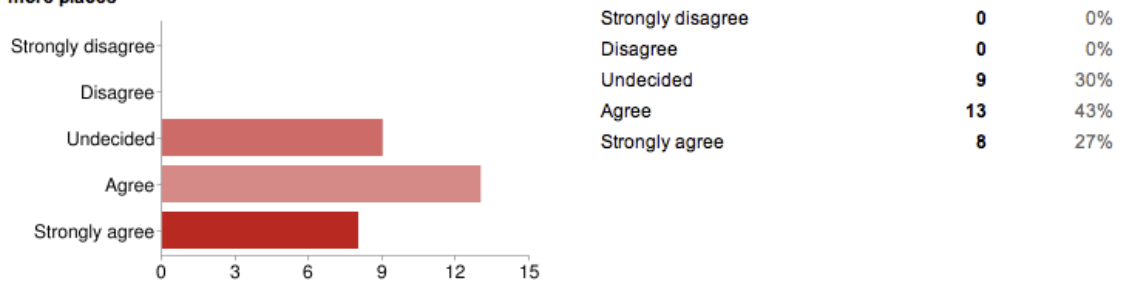
Please indicate to which degree you agree with the following statements - The monitor at Studentarhuset encouraged my use of the system



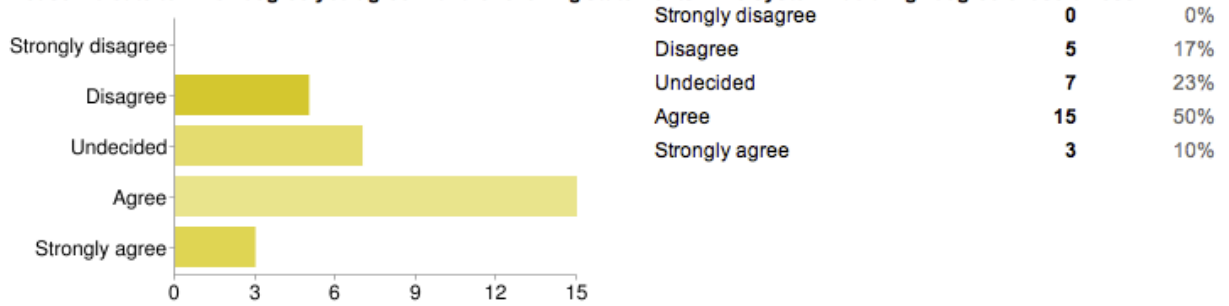
Please indicate to which degree you agree with the following statements - The monitor at Studentarhuset added extra value to the system



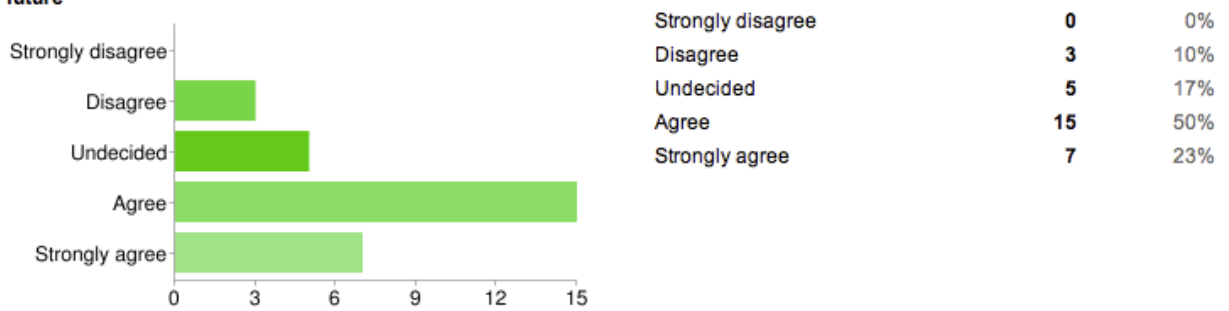
Please indicate to which degree you agree with the following statements - A system like this would be more useful if used at more places



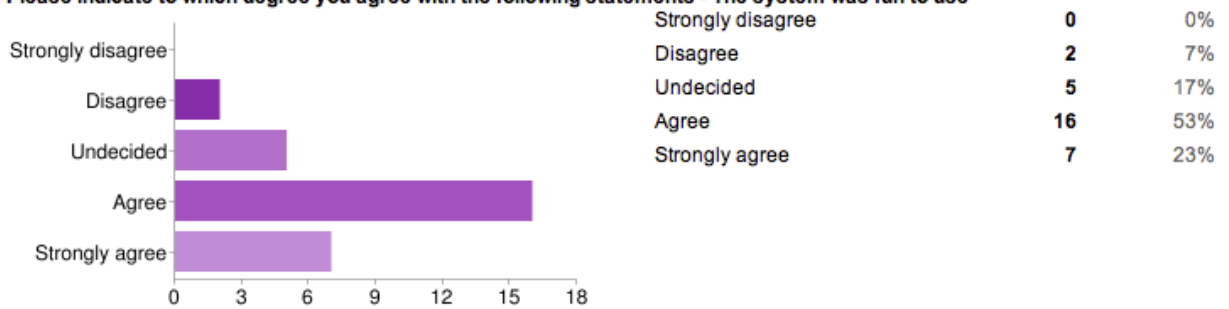
**Please indicate to which degree you agree with the following statements - The system had a high degree of usefulness**



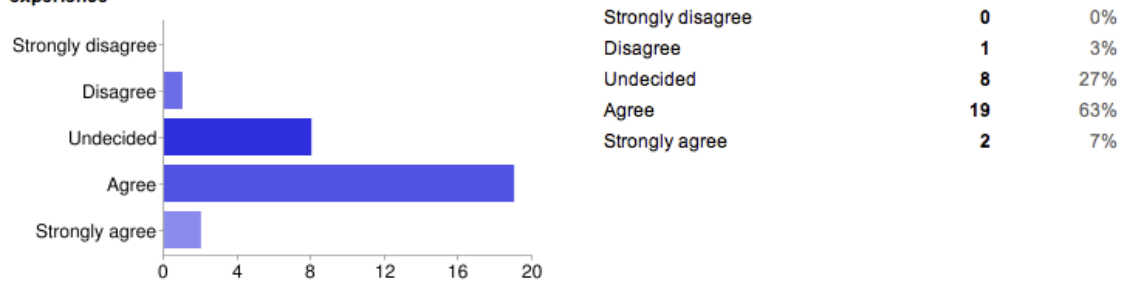
**Please indicate to which degree you agree with the following statements - I could see myself use a system like this in the future**



**Please indicate to which degree you agree with the following statements - The system was fun to use**

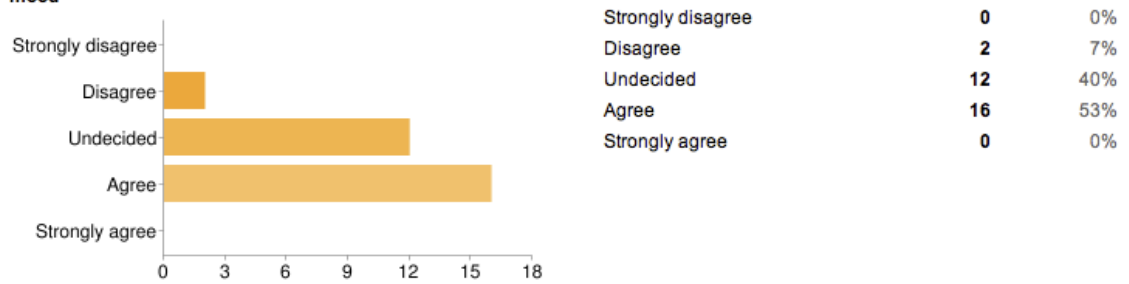


**Please indicate to which degree you agree with the following statements - The graphic design of the system added value to the experience**

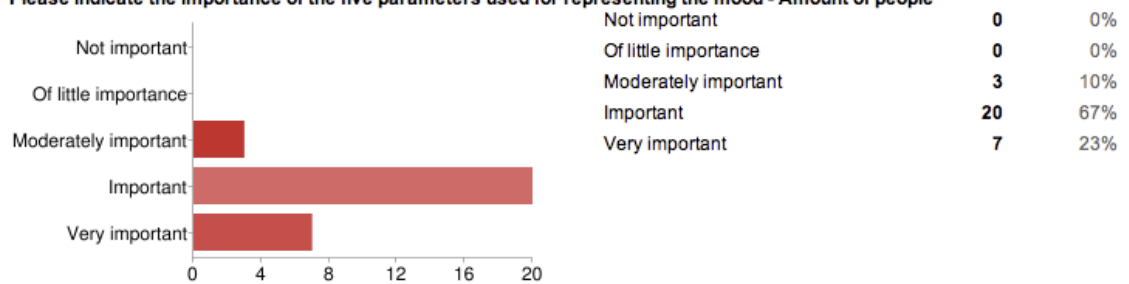


**Your experience with themood.at/studenterhuset**

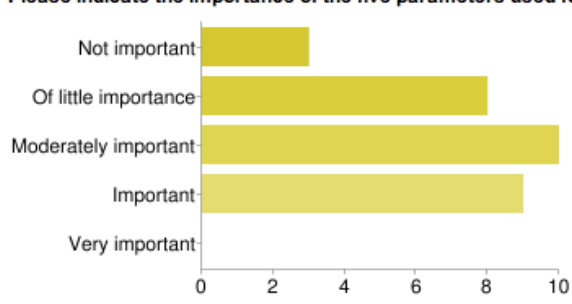
**Please indicate to which degree you agree with the following statement - The five parameters are sufficient to represent the mood**



**Please indicate the importance of the five parameters used for representing the mood - Amount of people**

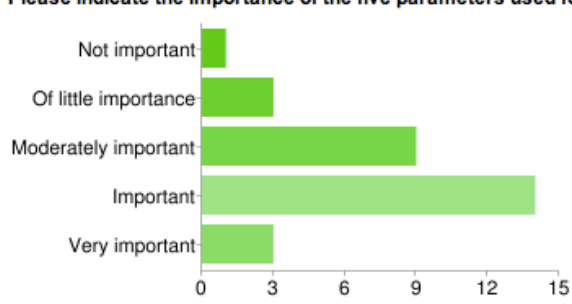


**Please indicate the importance of the five parameters used for representing the mood - Size of groups**



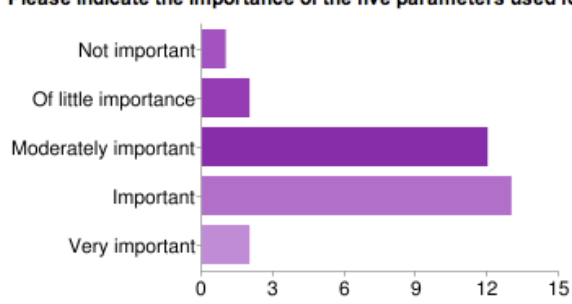
Not important	<b>3</b>	10%
Of little importance	<b>8</b>	27%
Moderately important	<b>10</b>	33%
Important	<b>9</b>	30%
Very important	<b>0</b>	0%

**Please indicate the importance of the five parameters used for representing the mood - Gender**



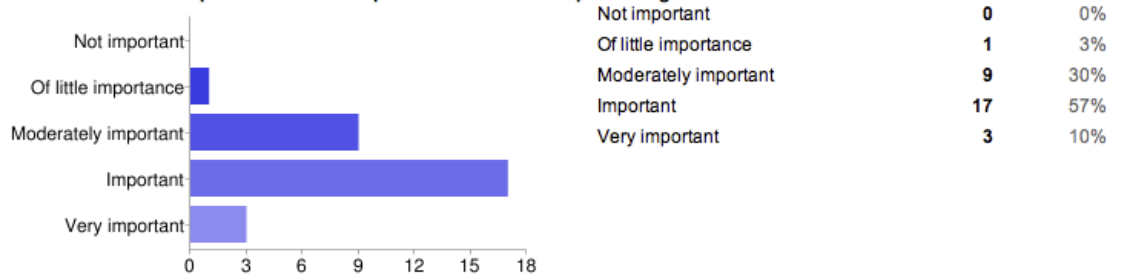
Not important	<b>1</b>	3%
Of little importance	<b>3</b>	10%
Moderately important	<b>9</b>	30%
Important	<b>14</b>	47%
Very important	<b>3</b>	10%

**Please indicate the importance of the five parameters used for representing the mood - Drink types**



Not important	<b>1</b>	3%
Of little importance	<b>2</b>	7%
Moderately important	<b>12</b>	40%
Important	<b>13</b>	43%
Very important	<b>2</b>	7%

**Please indicate the importance of the five parameters used for representing the mood - Soundlevel**

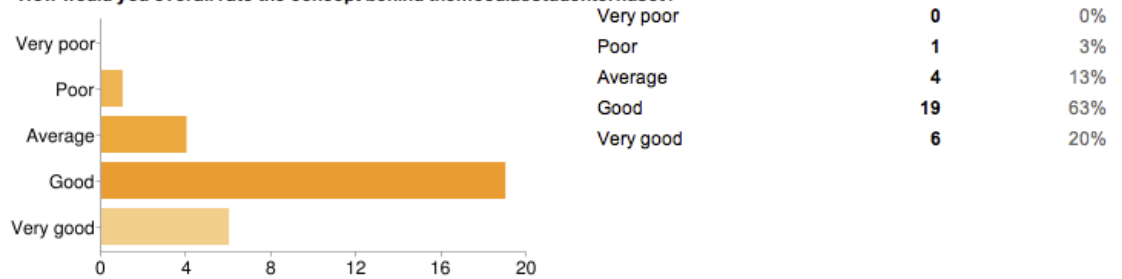


**Do you have any suggestions to other parameters that would be relevant when representing the mood?**

Musik i cafeen vs. musik i salen; folk der deltager i arrangementer (fx spilturneringer, brunch mv) vs folk der hænger ud More stjæles graphics, and realtime monitoring of the parameters. Fx the sound level could easily be monitored with a microfone. Music tempo, smoke level, lighting, level of interaction between guests, many or no people dancing, many or no people kissing, many or no people playing bar games The values varies. Who decides whether it is crowded or not? What do the drink types tell me? what is loud?! Smiling or happy people, Are people studying, playing games or talking Age

**Final thoughts**

**- How would you overall rate the concept behind themood.at/studenterhuset?**



**Please provide any positive feedback**

Fun to use. Overraskende, at det ikke er lavet før, og ikke er alle steder i Gaden... og KBH ;-)  
Great idea. Fun idea Often it's difficult to decide where to go when going out, so a service like this one could be helpful.  
I use the system primarily at home, its very cool to interact with people being at the studenthouse.  
NIL . . . . . jeg synes det er fedt at man kan sidde og skrive til hinanden på den. Idea is nice. fun . . . . .

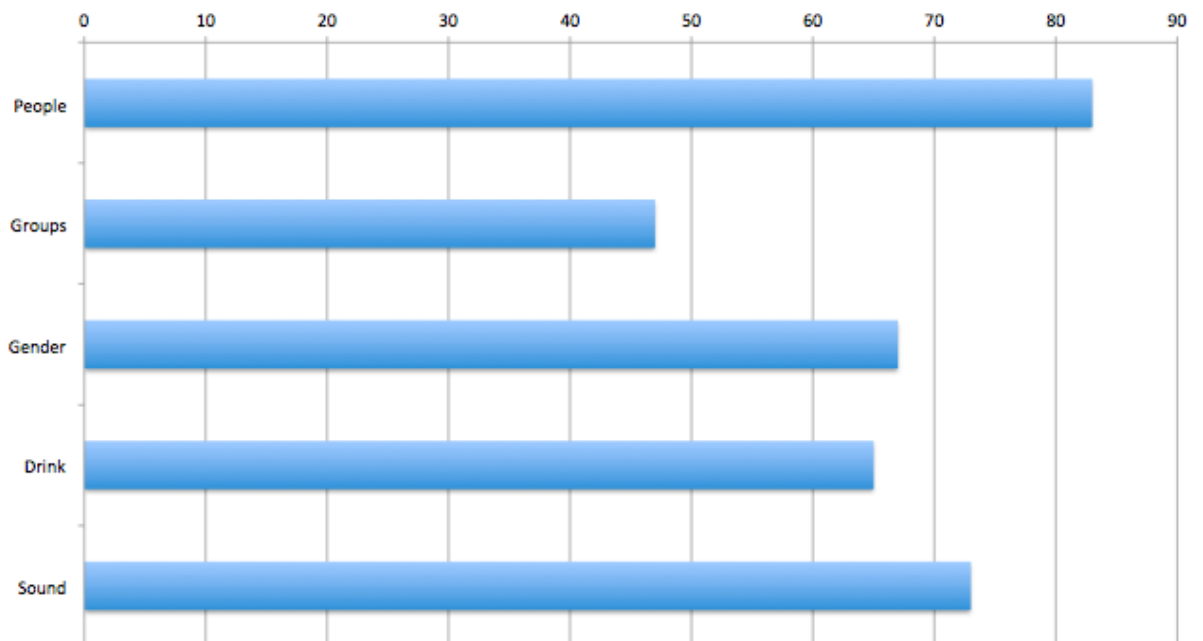
**Please provide any negative feedback**

It should be making itself more aware to people. Som jeg husker det, syntes jeg det var underligt at mit shout kom øverst/nederst i listen (kan huske at jeg synes det var counterintuitivt, men kan ikke huske om det var fordi mit shout kom øverst eller nederst.)  
This shouldn't be a requirement. Pretty uselesu  
The shout buttons look a bit too standard. The service could potentially fuel a negative spiral in terms of the number of visitors to a venue, because instead of attending to get a firsthand look people just check the mood from a distant location.  
Don't really have any - except that the sho ...

**If you have any further comments, feel free to add them below**

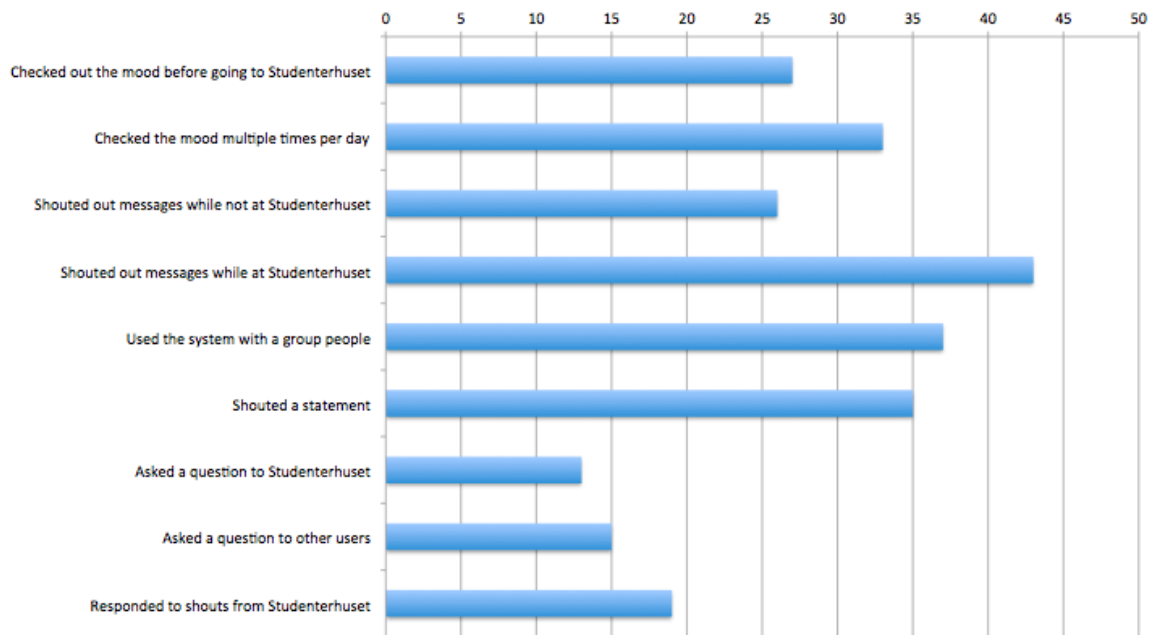
Det kunne være rart at vide, hvem der stod for vurderingerne og hvordan der blev vurderet . . . The success of a service like this i highly dependent on the amount, quality and reliability of mood information if it were to be deployed on a larger scale. NIL . . . . .

**Importance factors of the parameters**

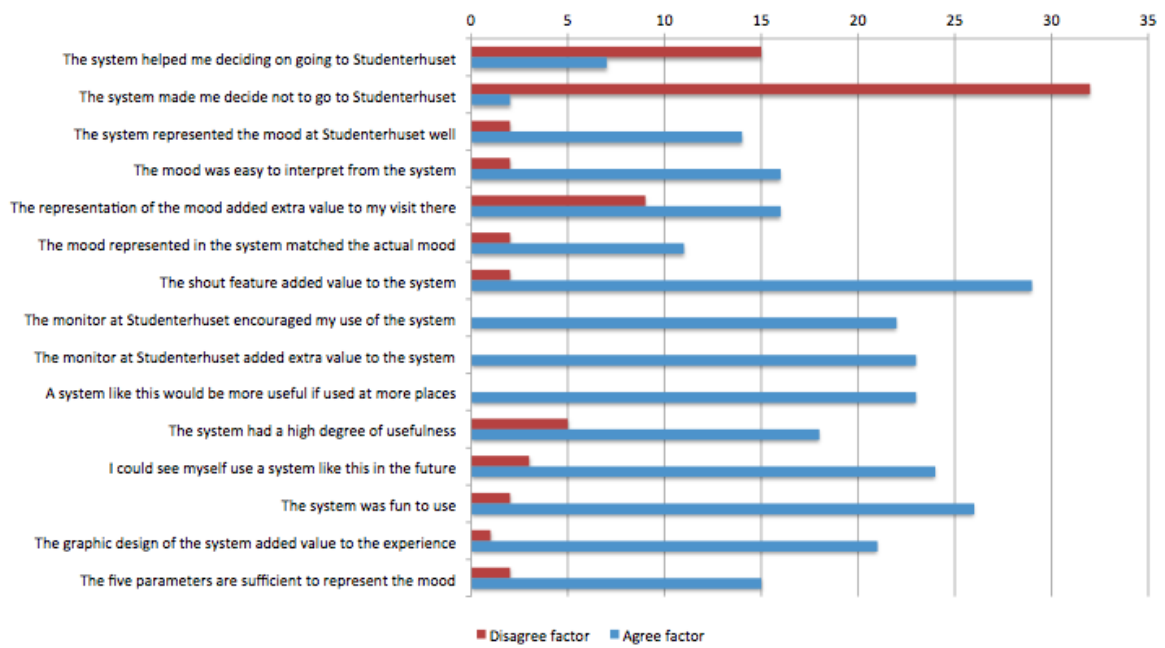




### Usage factors



### Experience



### Number of people answering undecided

