The Evaluation of Affective Quality in Social Software: Preliminary Thoughts

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ABSTRACT
Enormous changes in the computing field are taking place, altering the way we relate ourselves with computers. If computers had at first limited functions and limited presence in our lives, they are now being used everywhere, all the time, for a multitude of purposes and presenting a multitude of means for interactivity. Computer applications are now important not only for their ability to complete their specific tasks properly, but also for presenting characteristics that support our well being and that are in tune with human values. This shift calls for new ways of evaluating systems, giving attention not only to usability and accessibility issues but also to the emotional and affective ones. We present here a brief review on definitions and methodologies for affective evaluation of computer systems, as an invitation for a discussion on the suitability of existing methodologies for this new context and more specifically for social applications.

Keywords
Affective quality, social software, affective quality evaluation, emotional design

INTRODUCTION

Along the countless new challenges that we have been facing with novel computer technologies and ways of interacting with them, many authors agree with the importance of keeping human values as the core of Human-Computer Interaction - HCI (Sellen et al., 2009). This means taking into account elements that did not use to be considered when systems were mainly task-oriented. The value-sensitive (Friedman, Kahn and Borning, 2006) or value-centered design (Goguen, 2004) is concerned with what human beings – in their interaction with computers, or in their interaction with other human beings through the use of computers – desires and needs. Among these new elements that need to be included in the HCI theory and practice are culture, emotion and experience (Bødker, 2006) (Harrison, Tatar and Senger., 2007). As per ITEA (2009), emotions are going to be part of context or input.

The affective system makes judgments and quickly helps determining whether the elements in our environment are dangerous or safe, good or ill (Norman, 2004). The affective functioning model proposed by Ortony, Norman and Ravelle (2004) helps to understand how the human cognition is influenced by the affective states and how this influence can be applied to HCI.

The positive judgment in the interaction with a computer system can be referred to as the affective quality of the interface (Chorianopoulos and Spinellis, 2006), a concept that started to be seen in studies in the HCI area in recent years. According to Zhang and Li (2005), those artifacts that awaken a positive affective state work better, are easier to learn, can be more regularly used and are capable of influencing purchase choices.

We can find much ongoing research related to this subject which intend to address main issues, but when we instantiate it to Social Software (SS), even more questions rise: How can the affective quality of a SS be determined? Can it be predefined or is it socially constructed and different in each instance? Are the approaches found in literature for games or other contexts suitable for SS? Is it appropriate or even feasible to measure and categorize subjective qualities like emotional and affective states of people using a SS? In which ways can affective and emotional aspects contribute to the success or failure of SS?

In this context, the objective of this paper is to bring forth a discussion on how to assess the affective quality of SS, considering the human being with its complex and dynamic relationships with others through the SS or with the SS itself. For that, we review the state of the art in the topic of addressing affective and emotional aspects of interaction.

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This paper is organized as follows: in the next section we present the theory on emotions, affective quality and affective quality evaluation; then we show some of the methods found in the literature for measuring emotional responses from users; next we use this theoretical base to start a discussion on the applicability of these methods in the evaluation of social software. Finally, we conclude the paper indicating future work.

AFFECTIVE QUALITY

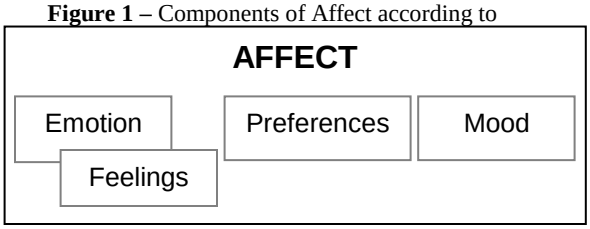
Affect and emotion definitions

The definition of emotion has been discussed for over a century by psychologists and philosophers without consensus (Goleman, 1995). Similarly, its relation with affect and feeling are not established even by researchers within the fields of neuroscience and cognitive science.

Damasio (1996), neuroscientist, argues that emotion is the record of the body according to external stimuli and feeling is the process of living an emotion, contextualized in individual experience. Damasio categorizes emotions as primary - which are innate - and secondary - which are learned associated with responses of the past and evaluated as good or bad. While the primary emotions involve the limbic brain, the secondary emotions also involve the cerebral cortex, a brain area associated to decision making. According to Damasio (1996), this difference in activation of neural structures can be evidenced, for example, distinguishing a real smile from a volunteered one.

Donald Norman (2004) has a different understanding: according to him, affect is the broad and generic term that applies to a system of judgments, which may be conscious or unconscious. Emotion, mood, preferences and feelings are sub-categories of affect. Feelings are readouts of the brain about conditions and changes in body state, such as muscle tension or attention level. Emotions are interpreted feelings, or conscious experiences of affect. Thus, feelings are necessary but not enough for emotion, and emotions, in turn, are subsets of the affective system (Norman, 2004; Ortony, Norman and Revelle, 2004). Figure 1 illustrates this relation.

Figure 1 – Components of Affect according to



Ortony, Norman and Revelle (2004)

Ortony, Norman and Ravelle (2004) argue that their distinction from Damasio's definition – who considers emotion itself as the register of bodily changes – can be explained by the fact that emotions have a cognitive component and feelings do not, because they are components of emotion.

Although the authors have different opinion on defining the terminology, they agree about the existence of conscious and unconscious components and bodily changed records.

How affect is related to cognition (and to interaction)

Damasio (1996), who established the relationship between affect and cognition, criticized the Descartes' dualism, which considered that the soul (reason) is independent from the body (and emotions). Damasio states that what happens in the brain are mental operations that influence the body and vice-versa, proving that a lack of the affective system caused by a brain injury could prevent a person from making decisions or to think about his/her future.

Throughout human evolution, repeated preponderance of the emotion in crucial situations, such as danger, built an emotional repertoire that was associated to innate and automatic reactions of the nervous system (Goleman, 1995).

Currently, the control and awareness of one's emotions are also considered as part of intelligence – the concept of Emotional Intelligence widespread by Goleman (1995) – and the ability to recognize emotions in others is considered an important point in establishing a social contact. In the same way, social contacts are important for the constitution of the emotions - of the individual and of his entire group. For many authors (Boehner et al., 2007; Benyon, Höök and Nigay, 2010; Bødker, Christensen and Jørgensen, 2003), emotions are experienced through interactions, that is, they are an intrinsic part of our social lives.

For Ortony, Norman and Revelle (2004), four domains are related in the functioning of an organism:

- Motivation: actions tendencies that indicate what the body needs and wants;
- Behavior: the physical action;
- Cognition: concerned with meaning and interpretation of the world, i.e. what a person knows, thinks and believes;
- Affect: what the organism feels. It is related to value, i.e. reactions to situations evaluated as positive or negative.

Both affect and cognition are information processing systems, but with different functions. Cognition interprets and understands the world, while affect allows rapid decision making, sometimes before the cognitive system interpretation. Therefore, when there is no rational and logical way to make a decision, it may happen because it "gave a good feeling".

There are evidences that affect influences various processes such as establishing long-term memories, providing learning opportunities and influencing the focus of attention (Ortony, Norman and Revelle, 2004).

Negative emotions concentrate the focus of attention in details and lose the overall view, since in dangerous or stressful situations it is important to be vigilant. This behavior can be useful to escape danger, but not to think about new approaches in solving a problem.

When interacting with a technology, if an attempt fails, to repeat the action is not effective; it is necessary to try new strategies, which can be enhanced in a situation of positive affect, because being happy broadens the thought processes and facilitates creative thinking (Norman, 2004). An experiment showed that people who received a candy or watched comedy movies before being exposed to a complex problem had better performance (Norman, 2004; Ortony, Norman and Revelle, 2004).

Damasio (1996) also illustrates the interference of affect on cognition based on the conclusion of an experiment that required logical thinking: it is more likely that a patient accepts a health care being informed that 90% of patients survived than if informed that 10% died. The feelings linked to the idea of death (negative affect) lead to what he calls an unreasonable inference.

Functional model of information process considering the affective system

Ortony, Norman and Ravelle (2004) propose a multi-functional model for the functioning of an organism with three distinct levels of information processing: reactive level [called also visceral by Norman (2004)], behavioral [called routine by Norman (2004)], and reflective. Each level corresponds to different parts of the anatomy of the neural system and reflects the biological origins of the brain. Simpler animals, like reptiles, are restricted to the reactive level, dogs and other mammals possess the behavioral level and the third level, reflective, which involves conscious cognition, is an exclusive attribute of human being. Figure 2 illustrates the relationship between the three different levels and between the processing system and the world.

Each level of functioning is described below, according to Ortony, Norman and Ravelle (2004) and Norman, Ortony and Russell (2003).

Reactive level

The reactive level is determined biologically and rapidly assigns positive or negative values to external stimuli. It receives sensory signals, sends signals to the muscles (motor output) and alert the higher levels. Its action can be potentialized or inhibited by signals from the behavioral and reflective levels, being essential to mobilize appropriate responses to environmental requirements.

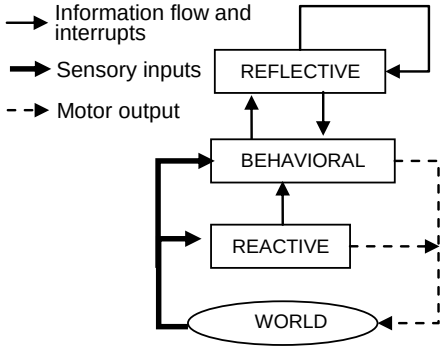


Figure 2 - Relationship between the three levels, the processing system and the world (Ortony, Norman and Revelle, 2004; Norman, 2004)

At the reactive level there is no affect, but a proto-affect, which is restricted to the present moment without references to the future or to the past.

The behavior at this level is composed of two classes − approach and avoidance − and the motivation operates with simple drives, such as appetite and survival.

The reactive responses to stimuli vary with each individual, and sometimes according to the situation as a function of parameters that govern the operation of this level, such as intensity, speed, accuracy and sensitivity to a variety of functions.

Behavioral level

The behavioral level is primarily dedicated to the execution of automatic cognitive processes (or routine) that were learned, such as driving a car, for example. Unlike the reactive level, skills are acquired.

As depicted in Figure 2, these processes can be triggered by the reflective level (deciding to take or not to take an action), by other activities of that level, and by the sensory system that monitors internal and external signals. The reflective level also acts as a control system, halting processes when something understood as an anomaly is found.

There is no consciousness at the behavioral level yet, only awareness. Cognitive processes include aspects of perception, categorization, and basic processes of language comprehension, among others.

At this level, the affect has some characteristics similar to that of emotion, but still not interpreted or cognitively prepared. These "primitive emotions" are created crossing temporal representations of the behavioral level with valence (positive or negative) of the reactive level.

For example, fear is a negative feeling about a potential bad thing, but it is still a feeling waiting to be processed on the reflective level. Table 1 describes this characterization (Ortony, Norman and Revelle, 2004).

Reflective level

The reflective level is where the emotions are cognitively

elaborated. As shown in Figure 1, it neither receives sensory information directly, nor sends signals to the motor control, being capable of influencing the lower levels, activating or inhibiting activities.

Table 1- Characterization of primitive emotions on the behavioral level

Primitive emotion	Level of valence (reactive level)	Temporal relation
happiness	a positive feeling about a **good thing**	present
distress	a negative feeling about a **bad thing**	present
expectation	a positive feeling about a **potential good thing**	future
fear	a negative feeling about a **potential bad thing**	future

The proto-affect of the reactive level and the primitive emotions and feelings of the behavioral level are interpreted by relating cognitive representations with internal and external events that induced the affect in the first instance. Thus, emotions are generated and can be labeled.

This level has a rich repertoire of representational and processing resources that includes the objectives, standards, tastes, plans, mental models, etc. Temporal representation is complete; there are references to past, present, future, and also to hypothetical situations.

The reflective level needs the lower levels to create a complete emotion. Considering the consequences of reflecting upon fulfilled or violated expectations and fear from Table 1, for example, cognitively elaborated emotions are created.

As at behavioral level, there are individual differences in operational parameters of the reflective level regarding focus of attention, working memory, knowledge, culture, self-analysis and even the individual ability to influence the lower levels.

Processes can be bottom-up (from the reactive to reflective) when driven by perception, and top-down (from the reflective to reactive) when they are driven by thought.

At the reactive level occurs the proto-affect process (not an emotion yet), and it is restricted to the association of a value to a stimulus, which can be interpreted in different ways by higher levels resulting in a vague feeling that something is right or wrong at the behavioral level, or generating a full emotion at the reflective level.

At the behavioral level there are some basic feelings, or primitive emotions, with minimal cognitive content. So, emotions – the highest level of affective state - are interpretations of feelings from lower level and occur only at the reflective level, influenced by a combination of contributions from behavioral, motivational and cognitive domains.

Therefore, affect is something general, built according to psychological conditions related to individual value.

Table 2 summarizes the main functions of the organism in the three levels (Ortony, Norman and Revelle, 2004).

Table 2 - The main functions of the organism in the three levels

	Reactive	Behavioral	Reflective
Perceptual input	yes	yes	No
Motor system output	yes	yes	no
Learning	habituation, some classical conditioning	operant and some classical conditioning, case-based reasoning	Conceptuali-zation, analogical, metaphors, etc.
Temporal representation	the present and primitive representation of the past	The past, present, and primitive representation of the future	the past, present, future and hypothetical situations

Why to Evaluate Affective quality

Affective quality is a property of a stimulus, such as objects, places, and events, capable of changing an individual's affect (Russell, 2003; Zhang and Li, 2005). The perception of the affective quality is based on how pleasant, unpleasant, exciting, boring, upsetting, or soothing each stimulus is and this evaluation influences a subsequent reaction towards these stimuli (Russell, 2003).

Perceived affective or hedonic quality of an interface has a positive impact on how users' perceived usability of the system (Zhang, 2005; Norman, 2004; Chorianopoulous and Spinellis, 2006). Tractinsky, Katz and Ilkar. (2000) also evidenced that beautiful user interfaces influenced the user's affective state and worked better.

Norman (2004) argues that it is possible to design interactive artifacts in such way they influence the affective state of an individual, approach called Emotional Design. It highlights the importance of affect and emotion to design pleasurable interfaces, so that they can be more regularly used, easier to learn, influence purchase choices, and produce a more harmonious result (Zhang and Li, 2005).

In the next section some possibilities to evaluate the affective quality of user's interface are presented.

PERSPECTIVES ON THE EVALUATION OF AFFECTIVE QUALITY

Different approaches have been proposed as an attempt to model or to evaluate the affective quality of a system, identifying users' responses or the impressions that they have about that system. In this section we present a brief review on methods reported in literature for evaluation of affective quality for different types of systems and in different contexts, directing the analysis towards the challenges of their use in social software.

In the context of users' interactions with games, Mandrik, Atkins and Inkpen (2006) developed an approach to model emotional states in a quantitative and objective way. Based on users' physiologic responses during the interaction with the game, the techniques presented informed, in a graphical representation, the emotions detected − fun, excitement, frustration, challenge and boredom.

Physiological measures

In order to objectively measure users' emotional states, the authors (Mandrik, Atkins and Inkpen, 2006) based their proposal in physiological metrics that were collected from participants while they played a game. That included the galvanic skin response (the measurement of the conductivity of the skin, which detects the work of sweat glands; reflecting emotional − arousal − and cognitive responses); electromyography (detects tension when applied on the jaw or over the brows − frowning); and electrocardiograms (reflecting the emotional activities as of stress or relaxation). The data collected from these physiological exams served as input for the model proposed by the authors and they resulted in a graphic representation showing the modeled emotions.

The use of physiological metrics seems to be of good potential to cope with the challenge of evaluating user responses in interactive systems, especially in situations in which the reactive level (proto-affect) prevails. The theory behind the techniques presented for the measurement of physiological responses indicates that the results are precise and unquestionable. However, while the physiological metrics are very precise, emotion and affect are not. One may question to what extent the objective data from the physiological exams can be used to correctly model something as subjective as emotions. Some authors (Boehner et al, 2007; Höök, 2004; Bødker, Christensen and Jørgesen, 2003) see affect as a rather social and cultural product. That is, the interpretation of emotions and affect is directly influenced by the environment. In this way, the techniques proposed by Mandrik, Atkins and Inkpen (2006) to model emotions might be adequate for their specific context, but in order to use them for the emotional and affective evaluation of other software (e.g. an online social network), some other considerations should enter the scene.

Other authors have also successfully used physiological information in their studies and specific contexts. Khan, Ward and Ingleby (2009) correlated the facial skin temperature (along with the facial muscles) with pretended and naturally evoked facial expressions for positive and negative affective states. Joho et al. (2009) have also investigated facial expressions.

Inquiring users

According to Scherer (2005), "*while both non-verbal behavior (e.g. facial and vocal expression) and physiological indicators can be used to infer the emotional state of a person, there are no objective methods of measuring the subjective experience of a person during an emotional episode*". Scherer (2005) advocates that, since we are dealing with a highly subjective theme that reflects unique experiences (emotional episodes), the only way to assess this information is by asking the individual to tell us about the nature of his experience. The author lists some methods that are usually applied in order to interview participants. In many cases, participants choose from a list of emotion labels the ones that are closer to what they had experienced. Other researchers prefer to let participants respond with their own words. In the first case, the problem lies in the fact that pre-labeled emotions may interfere in participants' responses, for example, by suggesting emotions that the person would not have thought of. In the second alternative, the problem is that a free-response format may lead to infinity of different words and states, making it hard for the researcher to quantify or make statistical analysis. Scherer (2005) goes further, describing some forced-choice self-report questionnaires commonly used by psychologists. Among the methods that he calls Discrete Emotions Approach are the Likert scale questionnaires (3 to 5-point scales to indicate the intensity − e.g. little, somewhat, strongly − to which one emotional state was experienced), interval scales (e.g. rating the experience from 0 to 100) and nominal scales (choosing among names for the states). The second method mentioned by Scherer (2005) was the dimensional approach, in which a particular affective state can be placed in a three or two dimensional space. The dimensions can be: valence (positive - negative), arousal (calm - excited) and tension (tense - relaxed). Some authors prefer to consider only the valence and arousal dimensions.

The Self Assessment Manikin

Considering three dimensions, Lang, Bradley and Cuthbert (2005) have proposed the Self Assessment Manikin (SAM). It consists of 3 sets of images that pictographically represent − in a 9-point scale − the states in three dimensions: valence, arousal and tension - or dominance, as the authors named. This format allows

the questionnaire to be applied also with those who have difficulties to access written information (e.g. younger children, the illiterate, elderly). SAM has been successfully used in different contexts. Romani and Baranauskas (2009) applied it in an inclusive context for the evaluation of a GWIDO[1] game. Also in an inclusive context, Hayashi et al. (2008) described its use for the affective evaluation of user interaction in e-Gov systems. Leung and Underwood (2007) used only the first two of SAM's three scales (valence and arousal) to collect users' responses for the evaluation of promotional websites.

SAM has also been employed as a component of the framework proposed by Chorianopoulos and Spinellis (2006) for the user interface evaluation of interactive TV (iTV). The authors connect usability, universal access and affective quality theories in order to explore the quality of iTV user interfaces. The framework is based on the three-level model from Norman (2004) described in section 2. It indicates measuring instruments to evaluate users' emotional responses for each of the three levels: reactive, behavioral and reflective. In this framework, SAM appears as a suggested instrument only for the reactive level. Hayashi et al. (2009) adapted the framework and applied SAM for the measurement of users responses for both the reactive and reflective levels. To fit the reflective level, the authors asked participants to fill in the artifact only after a group debate took place. This discussion gave the participants the opportunity of bringing the visceral responses into reflection.

Another evaluation method indicated by Chorianopoulos and Spinellis (2006) that is related to the reactive level is the Activation Deactivation Adjective Check-List (AD ACL) from Thayer, 1986 (apud Chorianopolous and Spinellis 2006). It uses a 4-point scale (definitely feel, feel slightly, cannot decide and definitely do not feel) to rate adjectives that are grouped in the subscales of Energy, Tiredness, Tension, and Calmness (Thayer, 1989). For the behavioral level, the framework from (Chorianopoulos and Spinellis, 2006) points out one evaluation method for the area of advertisement: Personal Involvement Inventory (PII) from Zaichkowsky (1985, apud Chorianopolous and Spinellis, 2006).

Measuring users involvement and engagement

In the literature one can find other initiatives to measure users involvement and engagement − which are aspects related to the behavioral level. O'Brien and Toms (2010) proposed a survey to measure user engagement in a website for online shopping. 31 sentences would be given to participants to rank using a five-point scale ranging from "strongly disagree" to "strongly agree". This survey was built after the authors identified what they considered to be the six main attributes of engagement: Perceived Usability (users' perceived ability to use the website and perform their tasks), Aesthetics (the website's attractiveness and sensory appeal), Focused Attention (concentration on one stimulus only), Felt Involvement (feeling of being drawn into the task), Novelty (curiosity or interest in the task), and Endurability (users' willingness to return to the website and to recommend it to others).

As an instrument related to the reflective level, Chorianopoulos and Spinelli (2006) indicates the hedonic quality evaluation method proposed by Hassenzahl, Beu and Burmester (2001). Their measuring tool consists of a seven-point verbal scale that evidences semantical differences in each end of the scale (outstanding–second rate, standard–exclusive, impressive–nondescript, ordinary–unique, innovative–conservative, dull–exciting, interesting–boring).

Isbister et al. (2006), inspired by the flour sack from Disney (a half-filled flour sack that is animated in a way that it is capable of conveying emotions without using facial expressions nor words), proposed the Sensual Evaluation Instrument to help users to provide feedback (reflective level) about their experiences. The authors crafted physical objects of the size of a grip and asked participants to select from these objects those that best reflect what they felt after facing different stimulus (i.e. pictures and games).

Mixed methods

Ravaja et al. (2006) mixed self-report questionnaires with physiological data collection in their study on the relation between presence and emotions. Similar to the approach proposed by Mandrik, Atkins and Inkpen (2006), they recorded the Electrocardiogram (ECG) from participants. Together with the results from the self-report questionnaires, the ECG was compared in order to understand if the presence of a friend during a video game match evoked different emotional responses as when played against the computer or against a stranger. Also exploring the element of presence, Shahid et al. (2009) have shown that the emotions evoked by a system can differ when the user is in the presence of a friend and when he/she is alone.

Many other studies related to emotional and affective responses can be found. There are, among others, those that explore the identification of emotions (e.g. from a given written text, as in Liu, Lieberman and Selker, 2003 and in Gill et al., 2008); that study the impact or the relationship between affect and learning (D'Melo, Picard and Graesser, 2007; Furtado, Furtado and Vasconcelos, 2007). This review is not meant to be exhaustive. The intention is to have an overview about ongoing researches on emotional and affective evaluation - with their different approaches - in order to allow a discussion on their adequacy to social software.

[1] Games With Interaction Design Objective

EVALUATING AFFECTIVE QUALITY IN SOCIAL SOFTWARE

Pereira, Baranauskas and Silva (2010) define Social Software as "systems that allow people, in their particularities and diversity, to communicate (interact, collaborate, exchange ideas and information) mediating and facilitating any kind of social relationship and favoring the emergence of a collective wisdom and a bottom-up organization". Considering this definition of Social Software and the definition of affective quality from previous sections one may see evaluation of social software as the analysis of the set of properties that a SS has, including its ability to evoke emotions from users.

All SS evoke some kind of emotion from users, be it positive or negative, strong or weak. Even when "indifference" is the emotional response from the user, "indifference" is already a response, and there can be contexts in which it is a positive response.

The evaluation then is not about IF the set of properties of the SS evokes an emotional response or not, but whether this response is appropriate or not for the group of people that compose and co-create this SS. That is, evaluating the affective quality of social software should mean to make an analysis of the emotions involved and how they can or cannot indicate the success of that SS.

As the design of social software takes into account human factors, group dynamics, social and psychological aspects (Pereira, Baranauskas and Silva, 2010), emotions can emerge from the interaction with the software, from the group relation or even from the mediated contact with another person. This way, we see three different dimensions where the emotional or affective evaluation may be applied to contribute with the success of social software:

a) On the Human-Computer Interaction (HCI) dimension: aspects such as aesthetics, usability, accessibility and how the users identify themselves with the social system may be the first step to adopt or not a social software. How the SS user interface elements evoke/afford emotional states in the user is the issue.

b) On the Human-Computer-Group Interaction (HCGI) dimension: The main aspect (the emotions that are expected to be evoked) to be considered in the evaluation are related to the social connectedness, which is defined as the sense of belonging, based on the personal appraisal of having enough social contacts (Santos and Pitt, 2010). This aspect may be the reason for keeping using or to abandon specific social software. This evaluation depends on the nature of the social software, on the context and environment where it is used, and on the emotional balance of the group (Santos and Pitt, 2010). For example, a mixture of anxiety and fear might be expected in some contexts of games, but not in the SS proposed by Moncur (2007) for monitoring babies through maternity and sharing motherhood experiences.

c) On the Human-Computer-Human Interaction (HCHI) dimension: when a relationship between two people is mediated by a social software, it is possible to measure a connectedness feature that supports intimate social relationship (Janssen, IJsselsteijn and Westerink, 2010). When social software is not effective to facilitate a relation, it may be abandoned.

Based on the Honeycomb Framework (Smith, 2007 *apud* Pereira, Baranauskas and Silva, 2010), which defines seven elements that give a functional definition for social software, Pereira, Baranauskas and Silva (2010) analyzed factors that may influence the success of social software. According to these authors, the basic elements of the Honeycomb are **identity**: a unique identifier of each user within the system, representing his/her "me"; **presence**: allows knowing whether certain identity is also online, sharing the same space at the same time; **relationship**: a way to determine how users are related to others; **reputation**: a way of knowing the status of a user in a system, forming an opinion about people; **groups**: the possibility to form communities to share common interests; **conversation**: resources for communication (synchronous and/or asynchronous); **sharing**: refers to the possibility of users sharing objects that are significant, important to them. Pereira, Baranauskas and Silva (2010) argue that some other factors that are not part of the framework are also important, such as usability, accessibility, collaboration, among others. They also state the importance of considering user's affective, emotions and cultural aspects.

Aiming at having a panorama of available methods to evaluate affective quality applied to social software context, Table 3 relates the three types of evaluation with the elements of social software. These three dimensions are not exhaustive and are far from completely characterizing all the possibilities of interactions in social software. They represent a first step in our endeavor in the research on affective and emotional aspects of interaction. Some questions concerning the application of each method are presented to signal the need of further work.

CONCLUSION AND FUTURE WORK

Social Software and the investigation of what motivates participants to use them is a topic of interest to many researchers.

Table 3 – Possible methods and remaining issues to measure affective quality according to each SS elements

	Possible Method **Remaining issues**		
	Human-Computer Interaction (HCI)	**Human-Computer-Group Interaction (HCGI)**	**Human-Computer-Human Interaction (HCHI)**
Identity	**SAM[1]** What are the elements that make the users to identify themselves with the SS?	What are the elements that make the group identify itself as a group and how do they feel about it?	
Presence	Does the way the users' presence is represented express their emotion about being part of the SS? (i.e. people who prefer to be invisible, busy or away most of the time)		**Physiologic responses[7] and self-response metrics[8]** Users want to know who is online, available or nearby. Presence makes a person feeling more comfortable. How to measure it? How the presence representation in the SS could promote (positive/negative?) responses in the user?
Relationship		The use of visualization tools is common in SS to have a perception of who is attracting others, establishing a relationship with others. What kind of emotion do they afford?	Different contexts and kind of relationships may imply different measures. i.e.: Santos and Pitt (2010) measured emotions to solve workplace incivility.
Sharing	Does the user feel safe and secure sharing personal data on SS? What kind of emotion is related to trust in a tool?	How does received feedback when sharing contents evoke emotions? How is it related to the sense of group?	**Survey on user engagement[2]** **Hedonic Quality evaluation [3]** **Sensual Evaluation Instrument[4]** Engagement concerns focused attention, novelty, endurability, involvement, aesthetics and hedonic quality, important criteria to invite the user to continue using it to share experiences. How to separate what is inherent of the tool and what is due to content in an evaluation? Is there an ontology dependence between Sharing and Collaboration?
Reputation	The way one's reputation is expressed to others is compatible with their view about him/herself?		
Groups		**Survey to measure-user engagement[2]** Is the engagement a possible measure to be associated with the sense of belonging? How to associate these concepts?	
Conversation		**Hedonic Quality evaluation[3]** **Sensual Evaluation Instrument[4]** How can group conversations evoke emotions?	**Facial expressions [5]** **Discrete Emotions Approach and Dimensional Approach[6]** **Physiologic responses[7]** How to measure the subjective experience of a person during a conversational episode mediated by SS? (Scherer, 2005). Once again, the methods need to distinguish the answers (emotions) evoked by the talking per se, and those related to the SS features that support emotion on conversation.

1 (Lang, Bradley and Cuthbert, 2005); 2 (O'Brien and Toms, 2010); 5 (Khan and Ingleby, 2009); 6 (Scherer, 2005);
3 (Hassenzahl and Burmester, 2001); 4 (Isbister et al., 2006); 7 (Mandrik, Atikins and Inkpen, 2006); 8 (Ravaja et al, 2005);

We aimed at exploring its relation to emotional and affective issues to foresee its relation to value-centered or value-sensitive design.

By gathering and distributing the methods into different situations and elements of SS, we concluded that, although the existing methods are appropriate and valid for the specific purpose and contexts that they were proposed, much more is still needed to evaluate the affective quality of SS. The methods available can successfully measure the emotions on each user individually during his interaction with the software. Affective and emotional processes are very complex, composed of and stimulated by a myriad of factors and researchers have not yet completely explored this field. When we relate it to SS's components and the values that could be cultivated from the interactions that take place in and with SS, we find even more venues for investigation. Our comments (presented on Table 3) compose an initial step towards future work in emotional and affective evaluations of SS and are indications of the need to deeper investigate the relationship between interface elements and the way they evoke emotional and affective states in the users.

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