POSITIVE EXPRESSIVE TECHNOLOGIES FOR SOCIAL WELLNESS

A thesis submitted for the degree of Doctor of Philosophy

by

Marije Kanis

School of Information Systems and Computing,

Brunel University

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Abstract

Drawing on research from the fields of HCI, social and positive psychology, this thesis investigates the design of technologies that encourage the expression of positive emotions. In parallel, it details the deployment of effective design steps to guide, frame and eventually support understandings of positive mental and social usage effects of technology. Different artefacts termed *PosiPost* have been iteratively developed as exemplars for the discussion and exploration of the ways in which technologies can support positive communication and social sharing. Studies with these technologies have been conducted to explore how these can encourage positive communication and understand how they contribute to social wellness. Specifically, the studies undertaken validate the hypothesis that *the sharing of positive emotions as mediated by technology has beneficial social and mental effects.*

The first stage of the research examined whether and how social technology can be designed for positive affect. A theoretical framework, named THE Medium model was developed to support the design process. Furthermore, design considerations were produced for technologies that encourage the sharing of positive emotions. This latter involved two studies, paper-based and online, which showed the potential for a prefix-based elicitation of positive emotions and drove the design and development of a mobile tool called PosiPost Me (Mobile edition). The second stage of the design process focused on how positive emotions can be mediated by technology in a mobile context and how such tools were used and understood. The iterative design study process continued, resulting in PosiPost Be, a Bluetooth edition, which allows sharing of positive messages with people in close proximity to explore the social and potential positive effects of contextualizing posiposting by adding location as a factor.

Results suggest that by using a prefix-strategy, messages of a positive and mundane nature can be shared and mediated by mobile technology. Analysis of the shared messages provides insights into people's pleasant moments in daily life. A questionnaire instrument named SPOT was developed and used for the measurement of the effects of sharing pleasant moments with the developed mobile expressive technologies in further detail. The results suggest that lightweight positive expressive technologies can have beneficial social wellness effects. In particular, the study showed significant beneficial effects in reducing *depressed* feelings and increasing *social interest in others*. Participants also believed that the mobile PosiPost applications supported *social connectedness, socio-pleasure, social and positive awareness*, and *positive thinking*.

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Acknowledgements

Declaration

The following publications have been produced, directly and indirectly, from the research undertaken in this investigation.

1. Kanis, M. & Brinkman, W.-P. HCI for positive change (2009) *Proceedings of CHI-NL '09,* Leiden, The Netherlands.

2. Kanis, M. & Brinkman, W.-P. (In review) Making mundane pleasures visible: Mediating daily likings with lightweight technology. *Journal of Personal and Ubiquitous Computing, Special Issue on Social Interaction and Mundane Technologies*.

3. Kanis, M., Brinkman, W.-P. & Perry, M. (2009) Designing for positive disclosure: What do you like today? *International Journal of Industrial Ergonomics*, 39(3) 564-572.

4. Kanis, M., Salovaara, A. & Brinkman, W.-P. (2008) Mundane pleasures in everyday life. *Proceedings of SIMTech'08*. Cambridge, United Kingdom.

5. Kanis, M., Perry, M. & Brinkman, W.-P. (2008) Technologies for mental well-being. *Proceedings of workshop on Technology in Mental Health, CHI '08*. Florence, Italy. 68-71.

6. Kanis, M., Perry, M. & Brinkman, W.-P. (2008) Minimal Connectedness: Exploring the effects of positive messaging using mobile technology. *CHI '08 extended abstracts on Human factors in computing systems*. Florence, Italy. ACM press. 2513-2522.

7. Kanis, M. & Brinkman, W.-P. (2008) Designing technologies that encourage the sharing of positive emotions. *Emotion in HCI: Joint proceedings of the 2005-2007 International Workshops*. Stuttgart, Fraunhofer IRB Verlag.

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1 Introduction

1.1 Chapter overview

This introductory chapter motivates a shift in the focus of HCI research to an increasing understanding of positive expressive technologies for supporting social wellbeing. In the beginning of this chapter, the research described in this thesis is motivated by situating the work along trends in Human Computer Interaction (HCI) and its related fields. It further critiques emotion-oriented approaches in HCI while exposing gaps in the literature. This chapter concludes with a general overview of the entire thesis.

1.2 Introduction of the research problem

HCI often focuses on the negative aspects of the interaction experience, for example, removing problems or user frustration (see also Ceaparu et al., 2004, Klein et al., 2002, Bessière et al., 2006) rather than on improving the experience itself and making its outcomes more beneficial or pleasurable for the user. In the literature, explorations of the positive (Rauterberg, 2004b, Rauterberg, 2004a), including studies of pleasant interactions, are underrepresented. Norman (2004) details how users will put up with minor usability problems if the overall outcome of the experience is pleasurable. However, generating a user experience that gives rise to positive affect is difficult to design for (Nielsen, 1993, Myers, 1993, Hancock et al., 2005) and requires more than a mere focus on usability issues. To accelerate evolutionary development of useful technology, Shneiderman (2002) suggests that technology developers should start from an understanding of human needs.

Mumford (1934) characterized the goal of technology quiet simply as: "to serve human needs." One of these is humans' basic need for contact with others (Lewis et al., 2000, Baumeister and Leary, 1995). People's interactions and relationships with others form a network that supports them, enables them to flourish and ultimately enables them to survive (House et al., 1988). However, some have even suggested that people increasingly lack social interactions with each other in everyday life (Putnam, 2000). Current developments, such as the rapid urbanization of the world's population (UN, 2007), may play a notable role in this. For instance, social psychologists like Milgram (1970) have long noted the phenomenon that living in crowded areas can produce a kind of sensory and cognitive overload, causing people to withdraw and drop interest in others. Indeed, although technological developments have brought forward a plethora of means to facilitate social interaction, some controversial studies suggest that the use of

computers, particularly the Internet may contribute to social isolation and reduced happiness, and an increase in depression and loneliness (Kraut et al., 2002, Sleak, 1998). This is also exemplified by other studies such as those in the field of tele-working which have found similar negative results (Mann and Holdsworth, 2003).

Some research has emphasized the shortcomings of electronic media when compared to face-to-face interaction (e.g. Culnan and Markus, 1987). Communication technologies such as teleconferencing and electronic mail often filter or leave out certain personal, social, and behavioural cues used by people to maintain interpersonal relationships and regulate interaction in face-to-face communication (Short et al., 1976, Sproull and Kiesler, 1986). Furthermore, people's engagements with on-line media are sometimes at the cost of their face-to-face interactions in real-life (Nie and Erbring, 2002, Nie and Hillygus, 2002). As a result, technology-mediated communication is sometimes believed to be impersonal and lacking in sociability. However, current and emerging technologies offer the potential to catalyze pleasurable social interactions and could also help in supporting face-to-face interactions in everyday life. The expanding context in which computational power such as mobile and ubiquitous computing can be put to use, allows new opportunities to supporting people in meeting their social and emotional needs. This is an important challenge as the fulfilment of these needs is basic and necessary to a human's wellbeing. Contributing to a person's happiness and positive affect is intimately tied to being aware of one's emotional needs, and being able to meet them (Klein et al., 1997).

Although important, the encouragement of positive affect by means of technology has been underexplored. This thesis proposes to explore new approaches that bring about positive affect by beginning to investigate people's emotional and social needs. Based on studies in the psychology literature (Waugh and Fredrickson, 2006, Fredrickson and Joiner, 2002), the premise of this thesis is that *technology can be developed for activating positive affect for improving a person's social wellbeing*. Naturally, this raises a number of questions: How can technology instigate positive affect within the user? What effective strategy can be used to encourage positive emotions? In what way can technology facilitate pleasant social interaction that contributes to wellbeing? How can or will technologies for the promotion of positive affect improve or change the manner of social mediated interaction? What are the potential beneficial effects of positive expressive communication technologies?

This thesis will explore answers to these questions and in doing so develop new strategies, applications and understandings for activating positive affect.

The following sections outline the motivation of this research. They begin by looking at trends in computing and HCI over time to situate the interactive social experience and its background in relation to two different lines of critique of present-day human-computer interaction. The first line of critique (section 1.3) concerns the traditional and strict focus on functionality and usability, and what other values and aspects of use — such as human's emotional and social needs— are to be acknowledged when designing interactive experiences. The second critique (section 1.4) reviews positive emotional approaches in HCI —or the lack thereof— and addresses the necessity for a shift in focus to increase understanding of technology-mediated positive affect for improving social wellbeing in everyday life.

1.3   Trends in HCI: Designing for human needs

This section describes the shift in HCI research towards a more human-central focus, as shown in Table 1; from what machines and computers are able to do, to what users are able to do, and —most of all— need.

Table 1: Social trends in computing and HCI by keywords.

Previous trend in computing and HCI	Recent supported trend in computing and HCI (Relatively neglected points)
User's abilities	User's needs
Individual/ cognitive	Social/ societal
Work	Daily life

As shown in Figure 1, the history of computing is said to divide into three waves (Weiser, 1996). The first wave of computing, from 1940 to about 1980, centred on terminals and mainframes, each served by many people serving one computer. In these early days of computing, computers were expensive and rare. Research and development was focused on improving technology and computing capabilities such as its processing power. In human interaction with computers, the central attention was on the capacities of the machine. These efforts led to computers becoming faster and more powerful.

Focus on machine	Focus on human-machine	Focus on human-human
Mainframe computing	**PC computing**	**Ubiquitous computing**
One computer used by many people	One computer used by one user	Many (invisible) computers used by one person and networked together

First wave	Second wave	Third wave

Figure 1: The three waves of computing, based on Weiser (1996).

Over time, computers advanced and become more accessible for personal use. The advancements, which is mostly rooted and started with research in universities and research labs, eventually resulted in the technologies, interface styles and applications that are known and widespread today (Myers, 1998). The invention of the direct manipulation of graphical objects (Sutherland, 1963), the introduction of the mouse (English et al., 1967), cheaper desktop computers and the fast growing World Wide Web are some examples of this progression. These developments led to the current state of computing, called the second wave. Personal desktop computers, browsers, and a graphical user interface characterized this wave of computing, from about 1980 until the early 2000s. This conventional state of computing has one person and one desktop computer in a rather uneasy symbiosis, staring at each other across the desktop without really inhabiting each other's worlds (Weiser, 1996). However, in the past few years, computing has started to break away from the conventional desktop screens and has become increasingly incorporated into devices other than desktop computers, such as cars, wearables and particularly mobile phones. Ubiquitous computing (Weiser, 1991), is the third wave, a vision that represents many computers serving each person, anytime and everywhere. It is a vision that is just beginning to develop, in which technologies are woven into the fabric of people's everyday life until these become indistinguishable from it and recede into the background of people's lives.

Currently, this means that technology is spreading from the workplace to people's homes and everyday lives. Technologies have become more and more accessible, and computing devices, such as mobile phones in particular, have become increasingly integrated in people's lives. With that, interest in the user and human aspects has increased considerably. New elements of human life, such as culture, social networking, emotion and experience are progressively more included in HCI (Norman, 2004, McCarthy and Wright, 2004, Kanis et al., 2005). On the whole, the developments of computing and HCI which started from a focus on the machine have progressed towards an increasing central role for the human.

Over time, a gradual shift was seen from the interest in what computers are able to do, to an increasing focus on what users are able to do. This is termed the 'new computing' by Shneiderman (2002). This shift was also reflected in the establishment of Human Computer Interaction as a research field, focusing on human capacities and abilities, while often borrowing from other research disciplines, such as cognitive psychology in particular. Over time, new disciplines and research areas related to HCI have emerged, such as interaction design as a response to new design challenges and Computer-Supported Cooperative Work (CSCW) to respond to the collaborative aspects of the changed nature of computing. CSCW however, mainly focuses on the collaborative and organizational human aspects in the context of work. However, information and communication technology nowadays is not solely used for work purposes; it has become a pervasive part of people's personal and private lives (Redström, 2001). Technology is breaking away from the screen barrier, moving out of the office and into the living room (Holmquist, 2000). Thus, as personal devices are increasingly integrated in all aspects of human daily and social life (Redström, 2001), this focus does not suffice in giving a complete understanding of all everyday social situations of computing.

Laurel (1991) argued that technologies will offer new opportunities for creative interactive experiences, but that these new opportunities will come to pass only if control is taken from the technologist and given to those who understand human beings, human interaction, communication, pleasure and pain. It is a comment that still holds value today; new research and developmental directions in the field should be about providing pleasurable experiences by supporting human's social emotional needs. Experiences should encompass not just what technologies can do but how users and designers can creatively adapt and create interactive experiences to fit the individual users' needs. Based on the discussed research, one starting point for this thesis is that traditional theories and practices of computing and HCI no longer suffice as a sole basis for addressing the social and emotional aspects of human-centric technologies. Therefore, new approaches are needed. However, before going on to discuss emotion-driven perspectives in HCI (see Section 1.4.2), the psychological view of emotion will now be discussed.

1.4   Emotion-oriented approaches

Some researchers have attempted to go beyond the traditional cognitive HCI framework by taking a more emotion-oriented approach (Kankainen, 2002). The following sections will discuss these approaches. As emotions and related affective processes are central to

the discussion of these approaches, the following section will start by defining and understanding (positive) affective states. Although understandably such discussion may come a little early for some readers, it is believed that an initial understanding of the conceptual space of the phenomena to be studied right from the start, will help in a clearer positioning and understanding of the thesis' research object and forth going study.

1.4.1   Understanding positive affective states

In starting the discussion of understanding affective states or processes, which include happiness and the experience of positive emotions, it is important to note that in emotion research there has been considerable debate concerning the defining issues, and particularly how emotions should be classified.

One vision by Fordyce (2000) is that people generally seek feelings of love, contentment, success, satisfaction, elation, and enjoyment —positive feelings, which comprise happiness. On the other hand, people generally avoid negative feelings (Greenberg, 2008) such as despair, loneliness, grief, anger, resentment, fear, guilt, failure, and anxiety —that comprise unhappiness. Indeed, according to Fordyce (2000), all human behaviour, from the more animalistic to the more lofty needs of self-actualisation, could be seen as being motivated by this simple, two-pronged, survival strategy: the seeking of positive emotion and the avoidance of negative emotion.

Dating back to Wundt (1897), some researchers have defined emotions according to one or more dimensions. A popular version of the dimensional theory of emotion, is Russell's (1979) two-dimensional circumplex model, which places emotions along bi-polar dimensions of valence and arousal. This perspective —in contrast to the basic emotions perspective (Ekman, 1992) which sees emotions as distinctive discrete states— treats emotions as fundamentally the same, differing only in terms of pleasantness or intensity. In the context of Russell's emotion theory, valence is generally defined in terms of pleasure and its opposites. An emotion is said to be positive because it is associated with pleasure. An affect or emotion is said to be negative because it is associated with some opposite of pleasure, conceivably unpleasantness, displeasure, or pain (Charland, 2005).

Another means of distinguishing affective states concerns their occurrence in time. Some emotions occur over a period of seconds (e.g. surprise) where others can last years (e.g. love). When looking at happy moods and emotions, the longevity of a mood is slightly longer than an emotion (Picard, 1997), however, these can be considered as rather similar entities. Although difficult to define (Scherer, 2005), emotions can be seen as mental and physiological states associated with feelings, thoughts, and

behaviours (Reisenzein, 2007). According to Ekman (1989), they are a universal phenomena. However, there is not one universal definition of emotion (Cabanac, 2002). Oatley's (1992) understanding of emotion recognizes its complexity and social function and is in line with the conceptual space of this thesis. Although a more developed understanding of the emotional and social constructs studied in this thesis will be better determined as the study unfolds (see Chapter 6 for more specifics on the verified constructs studied), the research undertaken in this thesis is underpinned by Oatley's understanding of emotion as "communications to oneself and others", and accepts his reworking of Scherer's definition of emotion as an "evaluation of an external or internal event as relevant to a major concern" (Oatley, 2007).

For the approach of this thesis, emotion is primarily of matter as it is a prime determinant of the sense of subjective wellbeing or happiness. A variety of philosophical, religious, psychological and biological approaches have been taken to define happiness and identify its sources (e.g. Haring, 2007, Lyubomirsky et al., 2005c). People generally regard themselves as happy when they are in a notably heightened state of positive being. Happiness could be seen as just a positive emotion, since physiologically, positive emotions are quite similar and there are no known physiological measurements that distinguish happiness from other emotions (Fordyce, 2000). Unlike basic negative emotions, positive emotions such as contentment, satisfaction and pleasure do not have a distinctive signal (Ekman and Friesen, 1982, Ekman, 1992). Happiness however, is often considered as something more encompassing than just a fleeting positive emotion. Philosophers and theoreticians have often defined happiness in terms of living a good life, or flourishing, rather than simply as an emotion (e.g. Haring, 2007, Brülde, 2007). Happiness seen in this way is more of a long-term condition, an overall sense of personal wellbeing and contentment with life. From this perspective, the term happiness denotes the experience of *frequent* positive affect. This definition is particularly supported by Lyubomirsky and her colleagues (2005a, 2005b) who state that frequent positive affect as being the hallmark of happiness has strong empirical support. In particular, Diener and his colleagues (1991a, 1991b) found that the relative proportion of time that people felt positive emotions relative to negative ones was a good predictor of self-reports of happiness, whereas the intensity of emotions was a weaker predictor.

While happiness has sometimes been reserved for prolonged, stable, or completed wellbeing or success in life, pleasure is thought of as present in any moment in which people feel happy —and just to the extent that people feel happy then (Katz, 2006). Another associated affective state, *wellness*, or wellbeing —as opposed to illness— is regarded very similar to happiness and simply considered as the subjective experience

of positive affect or frequent pleasure. When looking at psychological research into subjective wellbeing, the literature draws a distinction between brief emotional episodes, periods of pleasure or acute happiness, and an underlying longer-lasting state of happiness. This underlying state is conceptualized as a sense of satisfaction with one's life, both in general and in specific areas of one's life such as relationships, health and work. It is this underlying state of happiness, a quantification of subjective wellbeing that is the focus of much current research (Blanchflower and Oswald, 2004). However, the primarily focus of this thesis is on the briefer emotional positive episodes and pleasures, as it is believed that these will eventually contribute to longer states of happiness (Fredrickson and Joiner, 2002).

1.4.2   Emotion driven perspectives in HCI

Emotion plays an important role in our interactions with people and computers in everyday life. An increasing number of researchers address the subject of emotions and their role in HCI. To further understanding of the focus of this thesis, this section critiques the diverse approaches to emotion-oriented HCI research.

Table 2: Emotional trends in computing and HCI by keywords.

Previous trend in computing and HCI	Recent supported trend in computing and HCI (Relatively neglected points)
Functionalities, Tasks	Emotions, Pleasure
Usability	UX design, Funology, Happiology
Negative stressors (e.g. error rate)	Positive stressors
Cognitive psychology, Human Factors, Ergonomics	Social & Positive psychology

Realizing that products and technologies that have passed usability tests do not always become intimately linked with people's lives on an emotional level, several practitioners have begun to recognize the importance of emotions in product use (e.g. Norman, 2004, Jordan, 2002). Wiberg (2005) points to the various different approaches that are based on emotions. Based on her delineation, current emotion-driven perspectives on positive affect (such as enjoyment and fun) in HCI research can be identified as follows:

1. Usability reductionism, where enjoyment or satisfaction is simply seen as a result of ease of use (e.g. Nielsen, 1993, ISO, 1998);

2. Design reductionism, where enjoyment and fun are features to be added on by graphical, industrial or game designers;

3. Affective computing, where the main focus is on giving computer systems, such as robots, interface agents and assistants, the ability to imitate and sense human emotions (Picard, 1997);

4. Affective enrichment, where the focus is on enriching the conscious expression of people's emotions, both positive and negative, by adding new types of interaction elements (e.g. Sundström et al., 2005b) or communication features (e.g. smileys) to the system itself, and finally

5. Market reductionism, where the concept of creating positive affect is mainly seen as a commercial tool, for example, to evoke brand affinity or seduce costumers (e.g. Allen et al., 1988, Dormann, 2001).

However, these perspectives provide little support in the work of designing technologies that actively encourage positive emotions for improving human wellbeing in everyday life. This thesis will address the challenge of doing so. The approach taken in this thesis is different as the research directly builds on research from the field of positive psychology to design technological, psychological interventions (as distinct from systems) to actively support and encourage the expression of positive emotions as people go about their everyday lives.

1.4.3   From usability to pleasure seeking

For a long time, the understanding of, and focus on, notions of positive affect, such as concepts of pleasure, enjoyment and happiness have not been given the attention these deserve within HCI. Pleasure for example, which is closely tied to entertainment and enjoyment (Blythe et al., 2003, Bryant and Miron, 2002), has long been identified as one of the main reasons for people using media (Sherry, 2004). But even though this is one of the oldest and most persistent research findings across studies done regarding the uses and gratifications of media, the adoption of fun, pleasure and enjoyment as a research topic in the HCI community has been very slow. Although Malone (1984) published the first heuristics for designing enjoyable, intrinsically motivating user interfaces in 1984, and Caroll and Thomas (1988), called for the scientific study of fun in 1988, according to Monk et al. (2002), neither of these papers generated substantial further research effort in comparison to the extensive research in more traditional HCI.

In recent years, largely due to the rising success of computer and video games in the entertainment industry, fun and enjoyment have finally become an increasingly important software candidate. Researchers (e.g. Jordan, 2001, Hancock et al., 2005) have come to realize that technology has the potential to bring a wide range of emotional benefits —to bring pleasure. The field of HCI has begun to take a broader view of users' affective experiences when interacting with computer systems.

Tractinsky and Zmiri's work (2006), for example, focuses on explaining the relationships between aesthetics, user satisfaction and a pleasant interaction experience. Besides focusing on how useful a technology might be, in recent years, practitioners and researchers have also started to be more concerned with how enjoyable a new technology might be. Funology, the so-called science of enjoyable technology (Blythe et al., 2003), and User Experience (UX) design are movements that have increasingly inspired research efforts that go beyond HCI's traditional task-oriented perspective in the search of fun, pleasant and engaging experiences (Hassenzahl and Tractinsky, 2006). Although HCI, human factors and ergonomics have traditionally been focused on, and identified with usability issues, a new phase of 'human factors for pleasure seeking' (Jordan, 2002) is beginning to emerge. On top of safety, efficiency, and productivity, the field has finally made a start to include the need for human beings to experience enjoyment in the use of technological media. But although the general interest in the field of HCI, human factors and ergonomics in pleasure and fun as a goal of software design is growing, the research community is far away from having a coherent understanding of positive affect, what constitutes a person's happy mood or wellbeing, and how technology can be used to support wellbeing in everyday life. It has become clear that the field's current understanding of user concerns derived from the world of work and cognitive psychology, is simply not adequate to this new design challenge.

One reason for the lack of understanding on the topic of wellbeing and the generation of positive affect in HCI could be the subjectivity and the somewhat vagueness of it. As HCI researchers have a tradition of focusing on the measurement of usability issues, methods to adequately measure and value aspects of wellbeing and happiness as mediated by technology have not yet matured. According to Monk et al. (2002) and Nielsen (1993) a possible explanation is that researchers are in general suspicious about the introspective, personal judgements of users, which make the process of seriously grounding design decisions more difficult. Moreover, there is no pronounced tradition in either cognitive psychology or emotion psychology that stresses the human psyche's capacity for positive emotions and enjoyment (Monk et al., 2002, Seligman and Csikszentmihalyi, 2000). Usability issues, cognitive shortcomings and negative emotions such as grief and frustration (e.g. Bessière et al., 2006) have been well studied in HCI research. UX design is an exception as this subfield goes beyond the purely cognitive and task-oriented while often stressing the positive aspects of the user experience. But although UX is well discussed at conferences, symposia and in the industry, it lacks empirical research (Hassenzahl and Tractinsky, 2006), which impedes theoretical advancement and restricts understanding of evaluating positive aspects of technology. However, it is believed that empirical understanding of the mechanisms

underlying media enjoyment, and particularly insights in human daily pleasures, will facilitate better design of (social) media (Sherry, 2004) and technology that can positively affect human wellbeing in everyday life.

1.4.4   Designing for positive affect

One might question whether designing for encouraging positive emotions, such as fun, pleasure and enjoyment is a desirable goal, and whether the processes and topics involved differ in any considerable way from designing for usability. However, the absence of usability problems is not the same as the presence of positive feelings. HCI and its community need to refocus its research interests from negative stressors to positive motivators (Blythe et al., 2003). Ensuring that positive emotional benefits are delivered requires attention to more than just usability. A usability approach to design that sees technology use as a way of increasing productivity and efficiency leaves out aspects of use that are in many respects incompatible with human needs in everyday life. New research directions should aim to look beyond usability to understand what makes people experience pleasure in everyday life. Rather than efficient use, this thesis' direction is aimed at designing technology for people's experience of positive affect in their everyday practices.

In addressing this challenge, HCI can benefit from positive and social psychology theories to inform the profession on the design of communication technologies for sharing and understanding daily pleasures.

1.4.5   Understanding everyday pleasures

Designing technologies and applications that not only bring functional benefits, but also positive emotional benefits is a rather new challenge for the HCI community and requires empirical understanding of people's positive emotions and daily likings. Research efforts in the field of psychology may be helpful with some of these understandings. The psychologists Hurlburt and Heavey (2006) argue that inner experiences, such as thoughts, feelings, and sensations, are a central feature of the human condition, essential to understanding ourselves, to communicating about ourselves to others, and in understanding others. Therefore, paying accurate attention to inner experience is important both for psychology and for non-psychologists. However, psychological science has largely avoided the study of positive inner experience. Some studies (Hurlburt, 1997, Csikszentmihalyi and Hunter, 2003) have shown that randomly sampling thoughts can be a reliable and valid technique for exploring human pleasant experiences.

Still, there is surprisingly little that is known about the pleasant emotional experiences and happy moments that occur in people's ordinary life, with or without any technology. Research efforts in the rather new field of positive psychology, also called 'happiology' —the science of human happiness— have started to grapple with understanding happiness, positive emotions and the experience of pleasure (Fredrickson, 2003). However, so far, a refocusing towards the understanding of pleasurable events in human lives does not appear to have filtered deeply into the theory and practice of technology design. This is perhaps surprising, as there is clearly an opportunity to employ technology for uncovering the nature of daily pleasures.

This research proposes to explore human pleasures in everyday life by using technology as a method to record people's positive thoughts, feelings and sensations. It aims to contribute to the understanding of the emotional and social benefits that technology could support, by using lightweight technology[1] to study the pleasures evoked through daily life events, rather than on positive affect provoked by products, as employed by Norman (2004) and Jordan (2000). These explorations, in which lightweight technology is used as a research tool for providing views of encountered human daily pleasures, may help to expand current understandings in HCI, as well as contribute towards new insights in the field of psychology.

1.4.6   Toward HCI for social wellness

The previous sections critiqued trends and development in computing and HCI and suggested new focal points for the direction of this research. Table 3 below puts these trends together for a general overview.

Table 3: Summary of trends in computing and HCI over time by keywords.

Previous trend in computing and HCI	Recent supported trend in computing and HCI (Relatively neglected points)
User's abilities	User's needs
Individual/ cognitive	Social/ societal
Work	Everyday life
Functionalities, Tasks	Emotions, Pleasure
Usability	UX Design, Happiology
Negative stressors (e.g. error rate)	Positive stressors
Cognitive psychology, Ergonomics	Social & Positive psychology

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[1]Lightweight technology can be considered as relatively simple technology in terms of functionality and not demanding a lot of commitment and personal effort from the user.

Ensuring that emotional and social benefits are delivered to users requires attention to more than just improvements to usability. Rather than focusing on how to effectively support individuals in accomplishing, primarily work-related tasks, this research depicted a shift in HCI-thinking for supporting social wellness. This work focuses on what it sees as the relatively neglected points of HCI (as outlined in the right column of Table 3) in addressing human social and emotional needs for increasing users' positive affect. Research in computational support for social wellbeing represents an expansion of the scope of HCI research. As the majority of underpinning theories will still need to be developed for this goal, this research believes that HCI can considerably benefit from studies of daily pleasures and particularly use the sciences positive psychology and social psychology for this process, as they already have a longer tradition with these topics.

1.5 Research outline

The previous sections critiqued traditional HCI and current emotion-oriented approaches. This last part of the chapter will outline the approach taken in this research. The design of technologies should aim to serve human needs. Though technologies have potential to serve these, it is not always clear what strategies to deploy to facilitate these. Research in the field of HCI is helpful in informing these usage strategies. However, as previously discussed, traditional HCI and ergonomics often focus on the negative side of the user experience. As noted earlier, the lack of problems or user's negative feelings towards a system is not the same as the presence of positive feelings. Even though emotion and social computing in the field of human-computer interaction is gaining popularity (e.g. Picard, 1997, Dourish, 2001), examples and strategies on how designers and developers could provide technologies and interactive experiences that actively encourage and communicate predominantly positive emotions are still scarce. This research is an exploration of how to switch this focus. The position taken in this thesis is that HCI and computing can benefit from psychology to simultaneously improve the facilitation of human emotional and social needs, and foster the adoption of technologies that encourage positive thinking and sociability. Drawing on previous approaches in HCI and psychology, it investigates the design of technologies that encourage the expression of positive emotions to increase insights in how the sharing of daily pleasures can affect people's social wellness.

Instead of thinking about what computers can do, the developments in computing urge us to revisit the basic question of what people want to do, in respect to people's needs and how technologies could support user's positive affect. From the rather negative perspective on looking at what machines can do, this thesis calls for a move towards a

more positive perspective that evolves around the human and their social need. In the latter, social technologies should aim to meet human's emotional needs for encouraging positive affect. However, this raises the question of *how could technology encourage positive affect*?

1.5.1   Research questions and hypothesis

Technology has the potential to support humans in meeting their social and emotional needs, but the question is how. This thesis presents an approach for supporting social wellbeing by using positive expressive technology. It bases its investigations on psychology studies that support the idea that positive disclosure can augment social wellbeing and face-to-face interactions in everyday life (Smyth, 1998, Frisina et al., 2004, Seligman et al., 2005, King, 2001, Burton and King, 2004, Lyubomirsky et al., 2005c, Emmons and McCullough, 2003). Using the literature and different positive expressive prototypes, called PosiPost, as a context for reflection and future undertakings, this thesis attempts to assemble a framework of questions and strategies for designers and researchers to consider when working to achieve beneficial social and mental effects with positive expressive technology. What design considerations can be implemented, if any? Can potential beneficial effects be measured and articulated so they might inform future efforts? Ideas and avenues on how to address this challenge will be developed and enumerated in the following chapters. This approach involves a number of research questions.

- Can technology encourage positive disclosure?
- How can (lightweight) technology be designed to promote beneficial effects?
- What are the social and mental effects of using positive expressive technology?
- And, in which way are the design and the medium itself influential in this process?

This brings forward the hypothesis: *The sharing of positive emotions as mediated by technology, can promote beneficial social wellness effects for its users*.

This hypothesis entails two main research questions:

1. How can (or might) technology encourage the sharing of predominantly positive emotions?
2. What are the potential social and mental benefits of (mobile) technologies that support (shared) positive disclosure?

An overview of the study design developed to answer the questions and test the hypothesis is provided in Chapter 3.

1.5.2   Goal for prototype development: lightweight interaction

The main goal of this research was to study whether technologies can catalyze social wellness by encouraging the sharing and expression of positive emotions. Actual working systems —positive expressive applications— were build to increase insights of such technology, and particularly, to assess its potential beneficial effects. In doing this, other research questions were also explored. One particular sub-question was whether lightweight technology could be built in a way that ideally did not add to the complex (social) demands of daily life, while still offering social and mental benefits to the user. A design goal was therefore to develop lightweight applications on top of general available (mundane) platforms and technologies.

The motivation was that technological developments have enabled the provision of substantially more functionality to the user, a phenomenon which has led some people to describe today's heavily featured software as "bloated" and as increasingly complex to use (McGrenere and Moore, 2000). This is a point of concern, as when people do not understand how to operate a product, as a result, they often cannot fully profit from the functionality that a product offers (Gültekin, 2004). Moreover, technology does not always fit comfortably in people's busy daily social lives. For example, the growing phenomena of social network fatigue (Goth, 2008, Pasick, 2004) and micro-blogging (Lavallee, 2007) illustrate that technology can sometimes impose considerable and unwanted load, input and social demand on users. Thus ideally, the goal was to design technology in a way that does not add to the complexity of a person's daily life and practices.

As technologies, particularly mobile phones, have become 'mundane' (Graham and Rouncefield, 2007), meaning that they are increasingly pervasive and integrated in people's daily life practices, they offer unique characteristics for offering lightweight interaction to cultivate positive affect. This work aims to address the challenge of lightweight interaction by using simple applications for providing a view of human pleasures evoked in everyday life. Simple applications, running on mundane mobile technology, are presented as a non-invasive vehicle to record and share positive thoughts and pleasant experiences.

To conclude, this research's purpose was to explore whether sharing a notification about pleasant moments in daily life with simple technology could be beneficial for a person. In doing so, it aims to contribute to the understanding of beneficial emotional and social effects that particularly lightweight (mobile) technology could support.

1.5.3   Interest for the community

The development of positive expressive technologies for supporting social wellness requires new HCI theories, design illustrations and practices, and this thesis aims to contribute to the understanding of this. It bases its investigations on the progression of a theoretical framework and the lessons learned from the design, development and evaluation of a collection of prototypes called PosiPost that aims to encourage the sharing of positive emotions. It uses the prototypes as informative probes, compares these with each other, and relates these to other attempts and theories in order to elicit key elements for promoting social wellness. Setting out a framework of guidelines, good practice and lessons learned from the development and study of the potential social and mental benefits of these applications, the aim is to inform and help other designers and researchers in the design of and reasoning about technologies for positive affect and so to advance the state of HCI for social wellness. Furthermore, it is hoped that such positive expressive technologies can positively contribute to a person's mental health.

1.5.4   Structure of the thesis

The remainder chapters describe the theoretical and technical background of this research, detail the studies conducted and present the findings of each of these. The chapter overview for the rest of the thesis is as follows:

Chapter 2: Theoretical framework - sets the theoretical foundations of this thesis in order to support the hypothesis for this research in the context of how technology could support social wellbeing. It starts by detailing social and emotional needs and presents a theoretical framework, as developed as part of this thesis, called THE Medium model as a tool to structure the relevant literature to address the need for pleasurable social interaction. An extensive body of research and projects in fields such as Computer Supported Collaborative Work, online communities, ubiquitous computing and social technologies is discussed to gain an understanding of previous approaches related to the problem space of the design of social and positive emotional supportive systems. Theories and studies from social and positive psychology are discussed to support the position that technology can be developed for positive disclosure to promote beneficial effects.

Chapter 3: Research methodology – This chapter details the reseach questions and describes the methodology used to investigate the research problem. An overview of the

different studies and mixed method approach taken to address these questions and test the hypothesis is provided in this chapter.

Chapter 4: Encouraging positive thoughts - The purpose of the studies detailed in this chapter is to support the first part of the hypothesis; the development of a strategy to encourage the sharing of positive emotions, and investigate whether positive expression can be encouraged by technology (the second part of the hypothesis is primarily supported in Chapter 7). This chapter describes two design studies that were conducted to investigate how positive thoughts can be mediated and shared, using paper-based questioning techniques and social-online tools. Furthermore, it presents a preliminary analysis of participants' contributions on what thoughts people like to share. Moreover, the analysis of the study resulted in a set of design considerations for the design and development of positive expressive technologies. The findings of the study offer a prefix-based strategy for effective positive disclosure and insights in how this might be enhanced technologically.

Chapter 5: Mediating positive thoughts in a mobile landscape - This chapter focuses on the design process, detailing whether and how positive emotions can be mediated by technology in a mobile context and how such tools can be used and understood. This chapter investigates the mediation and sharing of positive expression through two mobile concept demonstrators. Using the design considerations, developed in Chapter 4, it describes the system design and iterative design process of two mobile technologies: PosiPost Me (Mobile Internet version) and PosiPost Be (Bluetooth edition) that both enable users to create and share positive thoughts at any time and place. In this chapter, the third study is discussed, in which PosiPost Me is used as a probe to investigate real-world use. The study is presented to increase understanding of possible effects of positive expressive communication technologies. The design of the system and the methodology used to conduct the study are described. It particularly focuses on the understanding of the mental health and social effects, which includes the introduced concept of minimal connectedness. It further investigates questions in the context of mediating and sharing positive thoughts. Particularly, whether usage of positive technologies resulted in the sharing of predominantly positive expressions. The study validates some iteration with regard to the research questions, while the iterative design study process continued. This resulted in PosiPost Be, a Bluetooth edition that allows sharing of positive messages with people in close proximity to explore the social and potential positive effects of contextualizing posipostings by adding the factor location. The gained understandings and developed prototypes of this chapter are used for the fourth main study, described in Chapter 7.

Chapter 6: Measuring social wellbeing - To enable investigation of potential beneficial effects of the positive expressive technologies developed, a measurement instrument is needed. This chapter discusses the development of a psychometrical instrument to measure social wellbeing and related constructs. It discusses a validity study and existing measuring techniques, which informed the resulting questionnaire that is used for the study described in Chapter 7.

Chapter 7: The effects of positive messaging - The second part of the hypothesis is studied in this chapter; which particularly focuses on the effects of the mobile positive expressive applications PosiPost Me & Be. This chapter details the main study, the analysis of the generated messages on what people like, and discusses users' perceived benefits with regard to the tested applications. It discusses the findings of the main study conducted with the two mobile PosiPost prototypes and describes the social and mental benefits of sharing pleasant experiences with mobile technology.

Chapter 8: Conclusion and future directions - concludes the thesis, lists its main contributions and achievements of the studies. It discusses the validation of the hypothesis, lists the limitations of the study and discusses future directions for research arising from the studies.

2 Theoretical framework

2.1 Introduction

The first chapter situated and motivated the research, and introduced the research questions in the context of how technology could contribute to social wellbeing. Having critiqued the traditional views in computing and HCI in the prior chapter, this second chapter will detail a more human-centred viewpoint, while focusing on the positive emotional aspects of HCI and computing. The purpose of this second chapter is to define the research area addressed by this work, and to detail the hypothesis through a critical analysis of the relevant literature.

Wellbeing is intimately tied to meeting human's needs. The fulfilment of emotional needs is basic and necessary to human wellbeing. If needs go unmet, the consequences can be serious (see e.g. Baumeister and Leary, 1995, Deci and Ryan, 2000). The position taken in this thesis is that technology has the potential to augment the ability of humans to meet social and emotional needs. But naturally, the question of *how* requires investigation. This chapter's rationale makes a case for supporting social wellbeing by using positive expressive technology. Theoretical foundations and ways to address this challenge will be developed and enumerated in this chapter.

2.2 Overview

Because social wellbeing is closely linked to meeting one's needs, the first section of this chapter is devoted to examining and understanding human's social and emotional needs. This chapter starts by identifying human needs and pleasures. Seeing that social interaction is one of the most vital determinants for subjective wellbeing, this chapter continues with concentrating on this particular need. The argument is made that although technology has the potential to support social interaction, it does not always support this need well. For example, some studies show that computers and Internet use can lead to social isolation, and a prominent stream of research tells us that, when compared to face-to-face interaction, current computer-mediated communication is generally believed to be impersonal and lacking in sociability. Thus, better tools and understandings are needed to direct the design of technologies to be better tuned for facilitating desired and pleasurable forms of social interaction.

To investigate how technologies can be designed to adequately facilitate the need for pleasurable social interaction, THE Medium model is presented. This is a theoretical framework that describes the factors that could effect and influence social interaction. It

is presented as a tool to help analysis and design of technologies that aim to support pleasurable forms of social interaction. Through THE Medium model, the challenges and design issues in designing for social interaction are unfolded, suggesting that the proposed categories —Time, Human, Environment and Medium— and their factors are useful and influential when designing and analyzing systems that aim to address social wellbeing. Furthermore, a body of research and projects in fields such as Computer Supported Collaborative Work, online communities, mobile and ubiquitous computing are discussed via this model, to increase understanding of previous approaches related to the problem space of the design of social and emotional supportive systems. The theoretical framework shows that developers have a wide spectrum of factors to consider, when designing systems for pleasurable social interaction. According to the literature discussed via the model, these factors —such as a *medium's characteristic*s and *proximity*— can play an influential role in supporting social interaction and these are factors that designers could leverage.

Having particularly focused on social interaction in the first part, the second part of this chapter looks at the link between social interaction and positive affect in more depth. As previous HCI and computing approaches do not suffice as a sole base for the design of social supportive systems for wellbeing, this work also builds on the social and positive psychology literature, in order to further investigate the relatively neglected, but important relation between social interaction and positive affect, and to develop a new perspective on how technology could support social wellness via activating positive disclosure.

Essential to this perspective is that the structured literature review via THE Medium model brings forward a central point in the argumentation of this chapter by linking sociability with positive affect. One central factor that the psychology literature accounts for, is that sociability is influenced by positive emotions (Waugh and Fredrickson, 2006, Fordyce, 2000). In addition, instances of positive affect play a vital role in human flourishing (Fredrickson and Losada, 2005). To understand the role and potential of positive emotions, this works further builds on positive psychology literature (such as Lyubomirsky et al., 2005c), to demonstrate the value of positive affect and the verified benefits of expressing positive inner experiences. As the understanding of the design and theoretical space develops, the chapter moves from the more general to the more specific, to support a more detailed comprehension of the hypothesis. The position is taken that computational media offers vast potential for positive disclosure. It proposes to use technology as a method to record and share people's positive thoughts, feelings and sensations, so as to provide insights of encountered human pleasures. In this way, people's positive inner experiences can be uncovered, collected and activated, and the mediation of positive affect by technology

can then expand understandings of its potential beneficial effects. The discussion eventually leads to the theoretical refinement of the main hypothesis, i.e. that the expression and sharing of positive emotions as mediated by technology can contribute to social wellness.

2.3   Human needs

Although over the last few years, research into HCI has begun to explore ways that are better tuned to users and their *abilities*, current technologies have not fully incorporated an understanding of human's social and emotional *needs*. An inquiry into how technologies should be designed to improve the wellbeing of users who are emotional and social by nature should begin with an inquiry into the emotional and social needs humans have (Klein et al., 1997, Wilson, 1967). The beginning of this chapter begins this work by discussing the need for positive affect and social interaction and describes approaches addressing these needs.

2.3.1   Happiness: The need for positive affect

Centuries ago, Aristotle (350 B.C.) concluded that above all, human beings seek happiness. While happiness is sought for its own sakes, every other goal —health, beauty, money or power— is valued only because people expect it will make them happy (Csikszentmihalyi, 1990). In present day Western society, happiness has been embraced as one of its most important goals, both at an individual level and for society at large. Individually, people try to shape their lives in such ways that they can enjoy them, and it is widely believed that people can increase their happiness (Veenhoven, 1994). But although over the last decennia Western society as a whole has become wealthier, healthier and science has progressed in many ways, the general population on the whole, has not convincingly become happier (Blanchflower and Oswald, 2004). Considering the amount of time that the happiness pursuit was started, not a lot of academic progress has been made in the understanding of subjective wellbeing and frequent positive affect. In 1930, Dodge already wrote that theories of happiness had not advanced beyond those formulated by the Greek philosophers (cited in Wilson, 1967). More than 30 years later, Wilson echoed this sentiment, noting that only a few tentative theories had been proposed to explain individual differences in subjective wellbeing. However, the slow progress in understanding happiness is understandable, as a concern to understand positive affect and the forces that affect people's wellbeing are difficult questions, yet important. While more empirical study is still much needed —particularly in terms of the role technology could play in happiness interventions— new approaches

and empirical understandings of the age-old challenge for the pursuit of happiness have begun to develop, particularly in the nowadays field of psychology.

Leading a happy, fulfilling life is intimately tied to experiencing frequent positive affect and meeting ones emotional needs (Klein et al., 1997, Wilson, 1967). The fulfilment of emotional needs is basic and necessary to human wellbeing (Deci and Ryan, 2000). Connecting with this level of human need and desire can be considered as the Holy Grail of user experience and technology design (Knemeyer, 2006).

An essential concern in addressing this challenge is knowing what makes people happy. Beyond personality and socio-demographic variables, including extraversion (Gannon and Ranzijn, 2005), age, income, gender and education (Diener et al., 1999) as possible predictors of subjective wellbeing, the psychology literature has recently identified that there are many things —such as good quality of living area, good health (Borooah, 2006) and success (Lyubomirsky et al., 2005b), that are sources of happiness. By far, however, the key condition for happy moods appears to be a social one (Fordyce, 2000, Lin et al., 1999, Berscheid, 1985). Studies on the pursuit of happiness show that the fulfilment of one's social need is one of the strongest correlates of positive emotions (Lyubomirsky et al., 2005b, Okun et al., 1984, Kawachi and Berkman, 2001). Social interactions are correlated with happiness, but also suggested to be necessary for happiness (Diener and Seligman, 2002, Diener and Oishi, 2005, Baumeister and Leary, 1995). Having identified that social interaction is one of the most vital determinants for subjective wellbeing, this is further investigated below, before moving on to discuss the technology to support it.

2.3.2   The human need for social interaction

Interactive experiences should be designed to fit human's needs. One of the earliest psychologists to focus attention on human needs, happy individuals and their psychological trajectory was Abraham Maslow, who is most well known for his hierarchy of needs (Maslow, 1970). As shown in Figure 2, the vital need for humans for contact with others is reflected in Maslow's hierarchy.
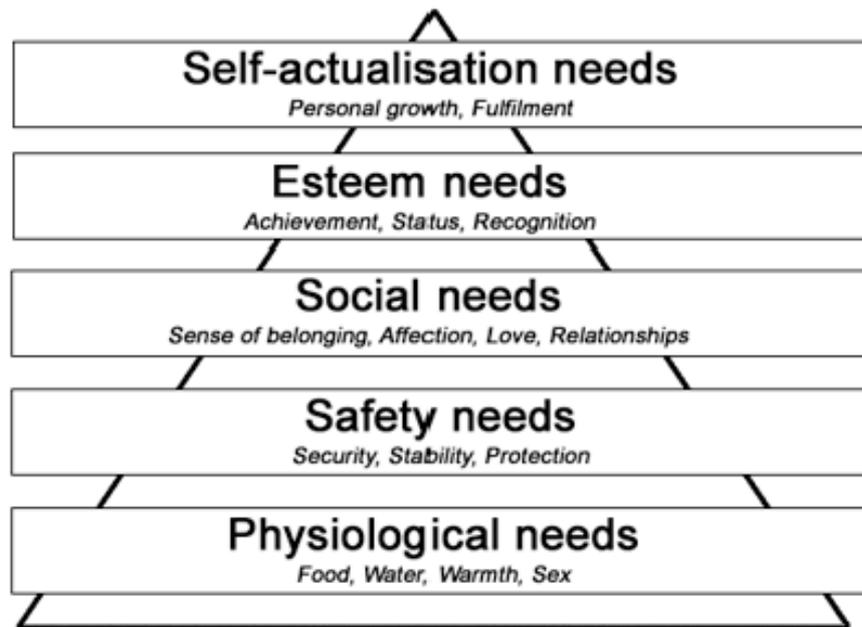
Figure 2: Hierarchy of human needs, based on Maslow (1970).

Maslow, a leading exponent of humanistic psychology, developed the Hierarchy of Needs theory that describes the process by which an individual progresses from basic needs (such as food) to the highest needs of what he called self-actualization. According to his model, if both the physiological and the safety needs are relatively well gratified, the social, belongingness need will emerge to the foreground. This need is concerned with all emotional relationships: love, affection and belongingness and means that when social needs become dominant a person will strive for positive relationships with others. Maslow's theory remains influential today for understanding human motivation and personal development. It has inspired many researchers such as Duval (2006), who addressed the importance of harmonizing wearable technology development with human needs.

In the footsteps of Maslow, followers in positive, as well as social psychology, have nowadays used more empirical methods to highlight the importance of the social need in experiencing happiness (Waugh and Fredrickson, 2006, Diener and Oishi, 2005). Many psychologists have now empirically evaluated the finding that humans have a need to belong. A meta-analysis by Baumeister and Leary (1995) addressing the social need, shows that studies consistently demonstrated that people have a need to affiliate. Heinrich and Gullone's literature review (2006) also contended that satisfying social relationships are vital for good mental and physical health. While satisfying social relationships have been associated with more positive outlooks on life, more secure attachments and interactions with others, and more efficient restorative behaviours (Cacioppo et al., 2000) —smaller social networks, fewer close relationships, and lower

social support and interactions on the other hand, have been linked to depressive symptoms, higher morbidity and mortality (Durkheim, 1897, Cacioppo et al., 2000, Lewis et al., 2000). However, although the fulfilment of one's social need is generally considered as a key concern for emotional wellbeing, it is not always optimally supported. The next section discusses this issue further.

2.3.3   Meeting the need for lightweight social interaction

Maslow suggested that the social desire for love and belonging was the lowest level of unmet need for most Americans (Griffin, 2003). Putnam (2000) even suggested that his assessment still holds true years on. Today's Western society can sometimes be a lonely one. The American Psychological Association (DeAngelis, 1995) reported on research that indicates that the mobile, urban and impersonal lifestyle is creating a culture of loneliness. In a culture where money can be pulled from a machine without ever interacting with a human bank teller, anything can be bought from the internet without meeting eyes with a shop assistant, people can see the same people year in and out, but never exchange one word while commuting to work, it is acceptable to suggest that the current Western society has increasing signs of isolation.

According to Dill and Anderson (1999), modern society bears numerous characteristics which contribute to loss in social interest, loneliness, and depression. Milgram (1970) pointed earlier to urbanization as a cause for social withdrawal. Increased social mobility could be suggested as another reason for increased social separation in modern culture, as because people move in different directions, people have less chance to maintain and establish connections (Csikszentmihalyi, 1990, Dill and Anderson, 1999). This is worrisome, as a range of studies show that being isolated and feeling lonely contributes powerfully to problems in psychological and physical wellbeing (Baumeister and Leary, 1995, Cacioppo et al., 2000). However, technology also offers a lot of potential to support this need for social interaction. Paradoxically, it could help to restore some of the traditional daily human contact and to regain a more positive sense of social interaction in modern world society. For example, system development could focus on promoting and exploring positive outlooks, increasing social interest and social awareness in physical space.

Particularly in the last few years, much progress has been made in the development of social software. As such, technology offers a wide range of possibilities to facilitate social interaction, communication and expression, through blogs, email, instant messaging and social networking sites. However, these technologies do not always have a positive impact on social wellbeing. For example, communication tools like email messages and instant messaging have enabled the rise of cyber bullying behaviour

(Kowalski et al., 2008), which for instance, can manifest itself in the circulation of hurtful instant messages. Bluetooth jacking, the practice of sending unsolicited messages to discoverable phones in range, or bluesnarfing, the theft of data from a discoverable phone, is another illustration of communication mechanisms that are often perceived as intrusive, malicious or unwanted (Thom-Santelli et al., 2007). Multi-player games allow for interaction between different people, but in games such as Shoot'em ups this often involves shooting or encouraging other potentially aggressive behaviour towards the other person (Anderson and Bushman, 2001). Thus, social interaction as mediated by technology is not always constructive or positive.

In addition, technology does not always fit in comfortably with people's busy daily (social) lives. Reported trends suggest that technology can sometimes place considerable and unwanted load on users. Technological annoyance is no longer limited to mobile phones ringing at the matinee. Communication technology, such as e-mail or Instant Messaging systems are not only disruptive (Czerwinski et al., 2000), but these social applications can also cause mental overload and stress, which, besides reducing people's productivity, can negatively impact human wellbeing (Zeldes et al., 2007). Some mental-health professionals report that the intrusion of mobile email gadgets, such as Blackberries and wireless technology into social life is such disruptive for families that it is therefore a growing topic of discussion in therapy (Rosman, 2006). Other studies (Nie and Erbring, 2002, Nie and Hillygus, 2002) indicate that people who spend a lot of time online at home, do so at the expense of face-to-face relationships, particularly with friends and family. Instead of hindering offline social interactions by demanding one's constant attention online, technology could aim to support interpersonal interactions in physical space. Moreover, people's offline social interactions are often far more nuanced than online tools currently allow them to be. For example, befriending people on social networking sites such as Facebook works in ways that would be considered as strange behaviour offline. Online social networking sites can also add to people's feeling of overload. The conception of social network fatigue (Goth, 2008, Pasick, 2004) is a sign that some people are starting to feel the weight of not being able to keep up with their online social networks. Salovaara (2008) also notes that mobile messaging can become a burden for users due to the effort required and the social expectations to reciprocate.

To cope with overloaded discourse, disengagement is a strategy users will often adopt. Jones et al. (2004) found evidence for the suggestion that users are more likely to generate and respond to simpler messages in overloaded mass interaction, and more likely to end active participation as the overloading of mass interaction increases. This suggests that there might be a role for more *lightweight* forms of interaction and simpler

messaging applications that ideally do not add to the daily load and on-line demands of a person's life and practices, but engages people in everyday life.

This chapter so far discussed that humans have a need for social interaction, and technology has advanced to the point where tools can be developed to help people meet their social needs. Technology should not replace interpersonal offline interactions, but its role here is seen as a tool to support, empower and positively augment social wellbeing in physical space. Although the social nature of computing is currently becoming evident to a new generation of technologists and researchers, technologies do not always support the need for social interaction very well. New directions should reconsider how social tools and applications can support interactions that are pleasant, constructive and can be better integrated in people's busy social lives. The discussed trends suggest that there might be a need for simpler, lightweight social technologies that can still delight and engage people. New strategies that are better tuned to the user's need for pleasure and social contact should hence be developed. The next sections will make a start with a further detailing of approaches to understand (a) the nature of pleasure and (b) how technology can be designed for pleasant social interaction.

2.3.4   Identifying socio-pleasure

Well-designed interactive experiences connect with people, meet their practical and emotional needs and can make a positive difference in people's lives. At its best it can bring positive outcomes such as social connectedness, self-expression, pleasure and happiness. Jordan (2002) shares this perspective and argues that in order to create meaningful designs one needs to start by understanding people. Moreover, designing social technologies that bring positive emotional benefits requires understanding of the kind of pleasures people experience. Rather than just focusing on the pleasures evoked by products, as employed by Jordan (2000), the interest of this research is identifying the pleasures people experience in daily life.

Some pleasurable experiences can be described with Csikszentmihalyi's flow model (1990). His Flow Theory describes the optimal psychological state (thus *flow* or *zone*) when people reach total enjoyment and engagement in an activity. Inspired by Csikszentmihalyi and the goal to create engaging experiences, flow could be considered as perhaps the only key concept from positive psychology that has truly filtered into HCI theories and practices. However, the flow state does not manifest in all moments when people experience pleasure. It cannot cover many simple pleasures of life, for example moments when a person rewards herself with having a cup of coffee with a

friend after having finished a laborious task. Compared with other pleasure frameworks (see Wen-chih and Tyan Yu, 2007), the typology by Tiger (1992) illustrates a broader range of classifications for pleasure. His emphasis is not only on physical and cognitive pleasure (such as derived from a flow state), but also on the important value of social interaction. He identifies four types of pleasure:

- Physio-Pleasure: These are pleasures that have to do with the body; pleasures derived from the senses (i.e. haptic, visual or audio). This pleasure covers tactile and olfactory properties and includes the physical sensation obtained from eating or drinking.

- Psycho-Pleasure: This type of pleasure derives from a certain progress, accomplishment or *flow*. Psycho-pleasure refers to the satisfaction enjoyed as a result of individually motivated tasks or acts.

- Ideo-Pleasure: This concerns people's personal values and attitudes. It comprises pleasure derived from entities such as books, art and music that are in agreement with certain attitudes and values people have, such as aesthetic, political or ecological values.

- Socio-Pleasure: This is the enjoyment derived from relationships with others. This covers pleasant social interactions with friends, family, loved ones, colleagues, and can also be a person's good relationship with society as a whole.

Increased understanding of human pleasures will help to understand how interactive experiences can be designed for positive affect and play a positive role in social situations. This classification will therefore be used in the study described in Chapter 7, which examines the use of mobile technology to uncover the pleasures people enjoy in everyday life.

The inclusion of socio-pleasure in this framework is particularly important. As previously outlined in this chapter, social relationships and interactions are a necessary cause for happiness, but these interactions need to be pleasant to serve this function (Diener and Oishi, 2005). However, theories and practices of how technology can support positive social interactions are under explored. The next sessions will therefore aim to address this by investigating how interactive systems can facilitate socio-pleasure. In the next part of this chapter, a theoretical framework, termed THE Medium model[2] is presented that describes the factors that could affect socio-pleasure and is used as a tool to classify and discuss the design of social technologies.

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[2]Parts of this work have been published in Kanis, M., Brinkman, W. P. & Macredie, R. (2006) Facilitating socio-pleasure as mediated by ubiquitous technology. *Proceedings of the 13th European Conference on Cognitive Ergonomics*. Zürich. 117-118.

2.4 THE Medium model

At the beginning of this chapter, it was posited that technology has the potential to augment the ability of humans to meet social and emotional needs. However, enhanced tools and understandings are needed to achieve the design of technologies that are better tuned to support desired and pleasant forms of social interaction. A *theoretical* framework called THE Medium model is proposed as a starting point for addressing these issues. The framework is used to support understanding of how technologies could influence social interaction. It describes the factors that could affect social interaction and is presented as a tool to help the analysis and design of technologies that aim to support socio-pleasure. By using THE Medium model and its categories —Time, Human, Environment and Medium— for taking a structured approach to discussing the literature, the challenges and design issues of designing for social interaction unfold, suggesting that the framework and its factors from the literature are useful when analyzing and designing systems that aim to address social wellbeing.

2.4.1 THE Medium model for Socio-Pleasure

Studies from HCI, CSCW, positive psychology, and in particular theories of online communities and social psychology have identified factors that impact on social wellbeing and bonding. After a review of such literature (e.g. Barfield et al., 1994, Preece, 2000, Hogg and Vaugham, 2005, Agamanolis, 2005, Halloran et al., 2006, Hornecker, 2005, Dourish, 2006) four key categories emerged: Time; Human; Environment, and Medium. These formed the basis of THE Medium model, encompassing factors that could affect socio-pleasurable interaction. The model is elaborated in Table 4.

The framework was used to organize the literature that is relevant to describe the factors that affect socio-pleasure. It is thus important to note that THE Medium model is simply intended as a way for structuring thought as regards to theory. The model is a way to connect theories and further develop the hypothesis. It is not intended in itself to provide a theory. The benefit that the use of the framework provides comes from breaking the issue of mediating socio-pleasure into four categories. The reason for doing so is to make it easier for those in the analytical design process to consider the full spectrum of the sorts of influential factors that affect positive social interactions with technology. The medium model is not then a theory of the mediation of socio-pleasure, but by identifying some of the potential influential factors in the first place, it is simply a tool for taking a structured approach to the issue of encouraging socio-pleasurable interactions.

Table 4: THE Medium model and factors likely to affect socio-pleasure

Category	Factors that affect socio-pleasure
TIME	Zeitgeist
	Beginning, duration and ending of interaction(s)
	Positive moment in time (e.g. birthday)
	History of interactions (memory)
	Synchronous/ Asynchronous (e.g. Instant Messaging/e-mail)
HUMAN	Personal characteristics (physical, personality, gender, cognition and age)
	Similarity (e.g. shared beliefs, interests)
	Shared activity (e.g. play)
	Physical exertion
	Face-to-Face interaction (visibility)
	Physical contact & expression
	Trust (e.g. security, self- disclosure)
	Reciprocity
	A person's mental state (e.g. a person's mood)
	Emotions (positive & negative)
	Familiarity
	Availability
	Expectation of interaction
ENVIRONMENT	Proximity/ distance
	Pleasant/ unpleasant environmental conditions (temperature, weather)
	Culture
	Place & space
MEDIUM	Medium's characteristics (e.g. content, structure, behaviour, appearance)
	Embeds a socially transforming interface
	Shareability

2.4.2   THE Medium model as design and analytical tool

Although not always in control of every factor (e.g., personal characteristics and environmental conditions), THE Medium model shows that developers have a wide spectrum of factors to consider when designing for socio-pleasure. Naturally, these factors differ in importance at various social stages in relationships and in differing contexts (e.g., increasing social awareness, breaking the ice, community building, maintaining and remembering relationships). Also, this model does not intend or claim to be all encompassing or necessarily show that certain media such as mobile or ubiquitous technologies can facilitate better socio-pleasurable interactions than other technologies. It suggests however, that these technologies have characteristics such as

flexibility in time, human visibility and environment that could be capitalized on. The structured approach facilitated by the framework is to help to ensure that potential interesting factors are not overlooked.

The function of the framework is to assist both in analysis and design, by sensitizing and orienting the relevant factors for socio-pleasure. To help to encourage socio-pleasurable interactions and build an understanding of the framework and its theoretical underpinnings, studies and illustrations of mediating social interactions are discussed next.

2.4.3   Time

The model sees time as a powerful and universal notion. By using time as a basic constituent in technology design, many facets can be explored. Many changes the information age brings are time-based: faster response time, increased immediacy, more potential for change. Technology causes and accelerates change (Barfield et al., 1994). On the other hand, such rapid developments also bring about research agendas that call for slower movements and reflection. Calm technology (Weiser and Brown, 1996) and Slow technology (Hallnäs and Redström, 2001) are examples of design agendas for technology aimed at reflection and moments of mental rest rather than efficiency and speed in performance.

The availability of networked information and its accessibility at any time changes the availability of past and future. Its immediacy places the choice in the moment and consequently exposes the importance of time. Although underexplored, the notion of time can be seen as a central constituent that is part of the playground of designers of interactive (social) experiences (e.g. Halloran et al., 2006). Products and applications function (or not) in a changing world. A technology designed today will exist and operate in another world tomorrow. Designers can take THE Medium model's factor *zeitgeist* into account for aiming to design interactive multimedia in such a way that makes it still meaningful in the following years.

In the model, time and its factors, *including the beginning, duration and ending of interaction(s)* are seen as influential in the design of socio-pleasurable interactions. While an architect designs a space, it is believed that 'a time' can be designed by interaction designers and developers (Barfield et al., 1994). Every design of a certain interactive social experience fills a time. One could say that by designing an experience a time is designed. In that sense, interaction designers are designers of time. Whether

one has 'a good time' or 'a bad time' depends on the quality of the design and on the quality of the designer or developer. On a social level, people also construct *positive moments in time*. For example, birthdays or new years' celebrations give people a reason to design and reflect on a good time together. In workshop forms, researchers have started to explore how such moments of celebration can be augmented with technology (Karau et al., 2008). This, for example, means creating novel inputs and outputs for blowing out birthday candles over distance.

An interactive experience is usually 'in the moment': it can be over before one knows it. In terms of social activity, the process of building social relationships usually lasts longer. But like interactive experiences, when social interactions take place, this usually involves the determination of *beginnings, durations* and *endings*. In terms of designing for social interaction, this can mean a starter of a conversation or relationship (such as a social icebreaker), the maintenance of a lasting relationship or even ending or remembering a social bond with a digital memorial (e.g. Foong and Kera, 2008).

In actuality, there can be no true new beginning of an interaction as something has always gone before. The sequences of events that a user goes through when interacting with a medium can be seen as a *history of interactions*; as an image in people's minds and as a created piece of memory. Such history can be stored in many places: in the system, in the body, in thought, in feelings, or in rituals. In a sense, one could say that interaction designers can control and manage the factor *history of interactions*, because the trails that are outlined by designers and followed by users prepare the user for their next steps. The information provided by designers through the system enables users towards a future. Thus, such history is central to the design of technologies: the history of the designer determines the quality of the designs; the history of the user determines the perception of the interaction. On a social level, *history of interactions* is also central to social success or failure. The history of previous interactions and build social relationships determine the kinds and quality of the current ones.

When interacting with each other, one's timing resonates with the other person's timing as every person has his or her own temporal experience. A collaborative experience can therefore be seen as one person's time and the other person's time inextricably fused together. Direct interactions are only possible with people or communication systems one can synchronize with. With the invention of technologies for instant, *synchronous* communication such as mobile phones, people can be connected with each other 24-7. However, with synchronous social interaction —such as a phone call— a good start for one individual may be too soon, too fast, too late or too slow for one another. An

asynchronous communication tool such as email has established itself as a fast method to send messages. In asynchronous interaction however, someone else's beginning may not be one's own. Nonetheless, technologies such as these have made it easier for people to keep in touch with one another in different points in time. The Palimpsest (Agamanolis, 2003) is an example of a technology that aims to bridge interpersonal distances in time. This is an interactive experience that overcomes time as an obstacle of social presence by superimposing layers of recorded social interaction and presenting them as a single image. In this way, it facilitates chance encounters between different moments in time.

2.4.4   Human

In the model, human beings are considered essential in technology-mediated social interaction. As naturally, one cannot interact with another person on its own. People have different *personal characteristics*, such as personality, and some researchers (e.g. Brinkman and Fine, 2005) have started to take these into account for finding ways in which technology can be customised for a more personalised interaction. On the other hand, *similarity in interests and beliefs* have been identified as an important factor when establishing human relationships (Brown et al., 1991, Byrne, 1961). For example, the Lovegety (1998) was designed to match people with similar interests. On the Internet, websites that are devoted to people with common interests bring people together. *Shared activity* —in the form of a soccer game over distance— is used by Breakout for Two, demonstrating *physical exertion* as an influential factor in social bonding (Mueller et al., 2002). There has been an increasing body of work focusing on the mediation of *physical contact & expression* resulting in several studies and prototypes for supporting remote or mediated touch (e.g. Chang et al., 2002, Oakley and O'Modhrain, 2002, Haans and IJsselsteijn, 2006). iBand (Kanis et al., 2005), a technology enhanced bracelet, is a ubiquitous tool for social networking in real space using *physical contact & expression* and *face-to-face interaction* in the form of a handshake as a way to break the ice and build initial trust. Interestingly, successful social relationships are often built on *trust* (Preece, 2000). Most interactions among people or organizations, such as personal disclosure online or purchasing a product from an e-commerce company involve some level of trust. For example, eBay aims to support the building of *trust* by giving the user the ability to provide and access information about vendor reputations. A related concept to mutual *trust* is reciprocity. In social psychology, *reciprocity* is seen as a key factor in interpersonal attraction (Hogg and Vaugham, 2005). The concept is helpful in explaining social interaction, as reciprocity implicates the rule of treating others like one would like to be treated; it refers to responding to a positive action with

another positive action, and responding to a negative action with another negative one. The 'reciprocity principle' also entails people's tendency to become more attracted to those whom they believe are attracted to them; experimental evidence suggests that people tend to like those who like them and dislike those who dislike them (Vaughan & Hogg, 2005). The relationship between interpersonal attraction and positive and negative affect is also highlighted by Clore and Byrne (1974). Their Affect-Attraction model postulates that one tends to like others who are around when experiencing a positive feeling, even if this other person or event is not directly involved in making a person feel good.

THE Medium model has identified *positive emotions* as an influential factor in social bonding. When people are in a positive mood they are more likely to engage with other people and form social relationships (Waugh and Fredrickson, 2006). So far however, this factor has been relatively neglected in technology design and research.

2.4.5   Environment

This category is bridged by the *proximity* factor that permits Human's *familiarity, availability* and *expectation of continued interaction* to come into play in determining social attraction. Proximity generally leads to repeated exposure and greater familiarity, and therefore more liking (Hogg and Vaugham, 2005). People who live in close proximity of each other are easily accessible, so that social interaction requires little effort and is more likely to happen. Physical *proximity* or *distance* can be a crucial determining factor in forming and maintaining relationships. Proximity of living situations increases the likelihood of people forming friendships. A study by Festinger, Schachter and Black (1950) showed how the formation of ties was predicted by the living distance between people. According to their study, the location where a person lived and even subtle architectural features, such as a staircase, affected with whom people formed friendships. Related to this point, *pleasant* or *unpleasant environmental conditions*, such as temperature also influences social attraction. Griffit and Veitch (1971) exposed humans to pleasant, overcrowded and hot conditions in a room, and found that as density and temperature increased, a corresponding increase occurred in the negative feelings towards others.

Communication technologies can enable friends, family or colleagues help to build and maintain relationships despite a physical distance (Octavia et al., 2007). Technology developed in this category, such as video-conferencing applications aim to bridge distances and enable encounters between people in different places. Research has also begun to focus on how technology can enable awareness of remote activity and promote

a sense of presence among distant partners (e.g. Agamanolis, 2003, Patel, 2003, Romero et al., 2007).

Place and space and its distinction have emerged as a growing consideration for HCI and CSCW researchers and designers (Dourish, 2006). As the rise of wireless and mobile technologies have given new sites at which to examine space, place, and mobility, many research efforts have now been devoted to the social issues surrounding locative media and urban computing (e.g. Hornecker, 2005, Paulos and Goodman, 2004, Consolvo et al., 2005, Thom-Santelli et al., 2007). Furthermore, the Environment category also has the *culture factor* to its disposal. For example, Talkman for the Portable Sony Playstation incorporates this factor as it is designed to be a fun, social ice-breaking translator. It is also a mobile medium, which links the discussion to the final category.

2.4.6 Medium

The Medium (for example desktop or mobile technology) can be seen as basically everything that conveys information and this is the form in which all the factors are framed and come together. Developers can control usability, but they cannot control sociability (Preece, 2000). However, in the way they design the medium (as in technical application), and its interface they can frame the interactions and influence the socio-pleasurable experience.

Barfield and his colleagues (1994) suggest that every interactive medium has the following components:

• Content: the functionality and information that is accessible for users.

• Structure: the apparent organisation of information and functionality.

• Behaviour: all potential system behaviours (manifest behaviour), and all potential user actions (evoked behaviour), together defining the potential for interaction.

• Appearance: all parts of the system that the user can perceive: Input/ Output devices, controls, feedback, images, sounds, movies, etc.

Together these components define the interactive medium that the user interacts with. All these elements can be manipulated for designing socio-pleasurable interactions.

The WANDerful Alcove, a collaborative play space in which participants wield magic wands and perform wizardry together, aims to *embed a socially transforming interface* (Kanis et al., 2003). The notion of a socially transforming interface, is an interface that, when wielded, transforms its user into a more social character in a digital interactive experience than one would be normally, and in which the user is more likely to interact

and collaborate in an ad-hoc and constructive way with other people as part of the experience. Similar to this notion, is the concept of *Shareability* (Hornecker et al., 2007), a design principle that refers to how a medium or interface engages a group of co-located, co-present users in shared interactions. Central are the notions of access points and entry points. Access points denote characteristics that enable the user to actually interact and join a group's activity. Entry points invite and entice people to interact with a medium.

In conclusion, THE Medium model provides a set of factors to facilitate thinking and analysis of the design of technologies for socio-pleasure. The model enables orientation and exploration in terms of different possibilities for supporting socio-pleasure. Through THE Medium model, many factors that influence social interaction have been identified. As such, it brought the possible interesting potential of positive emotions for technology-mediated social interaction to attention. The prototypes, which are discussed in the next chapters, will use THE Medium model as a design tool. More specifically, a factor of each category of the model is taken up for the design of the prototypes. Namely, it will investigate *synchronous/ asynchronous* interaction from the Time category, *positive emotions* in the Human Category, *proximity/distance from the Environment category* and the role of the Medium is also given attention as the design of different systems unfold. As the factor *positive emotions,* in support of social technology-mediated interaction, has been relatively under investigated, this factor will particularly be further explored in this thesis.

2.5   A focus on positive emotions

So far, the question of how technology can influence social interaction was investigated through THE Medium model. Different approaches and influencing factors of pleasant social interaction were also discussed. Particularly interesting is that THE Medium model put forward that the factor positive emotions influences sociability (Fredrickson, 2003). The beginning of this chapter discussed that this also works the other way; i.e. social interaction gives rise to positive affect and is important for human wellbeing (Diener and Seligman, 2002, Diener and Oishi, 2005, Baumeister and Leary, 1995). In addition, positive affect plays a vital role in human happiness (Fredrickson and Losada, 2005).

Seeing the important role of positive emotions, the second part of this chapter looks at the value of positive affect in further depth. It will particularly draw on the positive psychology literature to develop a new perspective on how technology could support social wellness via encouraging the expression of positive emotions.

2.5.1   From mental illness to mental wellness

As critiqued in chapter one, traditionally, the field of HCI, cognitive ergonomics and psychology often focus on negative emotional aspects, such as dealing with frustration. However, the lack of user's negative feelings is not the same as generating the presence of happy, or emotionally positive feelings. In the field of HCI, the nearest commonly used measure to this is the notion of user satisfaction (Rushinek and Rushinek, 1986, Pearson and Bailey, 1980) Yet, satisfaction is generally considered to be related to "freedom from discomfort" (ISO, 1998) or the enjoyment or usability of a system, matching this to a user's goals. Certainly, a satisfied user may indirectly become happier, but this affect is only elicited and measured by reference to the way that their tasks are carried out. However, technology offers the potential for more than this task-oriented perspective on a user's positivity. Psychological research offers an insight into what could be possible to achieve through harnessing technology to improve human wellbeing.

Positive psychology, the study of human happiness (Seligman and Csikszentmihalyi, 2000), arose from the need to add a positive side to the predominantly negative discipline of psychology —negative, in terms of its focus on mental *illness*, rather than *wellness*. Research in the field of positive psychology has added to an increasing understanding of the value of positive emotions, why and how they matter. Longitudinal studies (Fredrickson, 2003) show that the presence of positive emotions can play a role in the development of long-term resources such as psychological resilience and flourishing. Fredrickson's broaden-and-build theory (2001) proposes that positive emotions broaden an individual's momentary mindset, and by doing so help to build enduring personal resources. As such, experiencing a positive emotion leads to states of mind and to modes of behaviour that indirectly prepare an individual for later hard times, and the expectation exists that these resources will have a role in improving the person's long-term quality of life in terms of mental wellbeing.

Whilst psychology has grappled with these issues, so far, this refocusing towards the role and value of positive affect does not appear to have filtered deeply into the theory and practice of technology design. This is perhaps surprising, given that HCI and cognitive ergonomics have a tradition of drawing from other disciplines, such as cognitive psychology for a better understanding of users' perception and problem solving abilities.

2.5.2 The value of positive emotions

The field of positive psychology attempts to respond to the systematic bias inherent in psychology's historical emphasis on mental wellness rather than on mental illness (Seligman, 1990) and has made a clear contribution towards an understanding of the value of positive emotions. While some pioneering humanistic psychologists developed theories along these lines at an earlier stage (Maslow, 1962), research in positive psychology has recently made a push to provide empirically supported foundations for the study of human happiness and the value of positive emotions (Seligman and Csikszentmihalyi, 2000, Duckworth et al., 2004).

Many studies on the benefits of frequent positive affect clearly suggest that happiness precedes important outcomes and indicators of thriving, including fulfilling and productive work, satisfying relationships, high levels of mental and physical health, and longevity (e.g. Danner et al., 2001, Lyubomirsky et al., 2005a). Positive emotions –such as joy, contentment, interest, liking and loving– and many of their speculated benefits, include novel, expansive, or exploratory behaviours that over time can lead to meaningful, long-term resources, which can be physical, intellectual, psychological and social in nature. According to Fredrickson and Joiner (2002), there is an upward spiral (or snowball effect) in which positive emotions contribute to building such human resources. This means that when people engage in positive emotions habitually, over time, they can become life enhancing. For example, when people experience positive affect, they are usually more open to, and aware of, their social environment (Fordyce, 2000). In this way, cultivating positive thoughts can eventually lead to social bonding and lasting relationships (Waugh and Fredrickson, 2006). These building resources, such as psychological resilience or social relationships, also help in building a strong and improved system of coping with stressful life events and to finding positive meaning in negative events and circumstances (Fredrickson and Joiner, 2002). The implication of this is that people, who habitually experience positive emotions, become more resilient over time and develop a greater sense of emotional wellbeing. Considered together, the discussed literature helps in understanding the value of positive emotions and their various potential long-term benefits.

2.5.3 The value of expressing positive emotions

There is a substantial amount of research suggesting that expressing emotions can improve a person's wellbeing. An extensive meta-analysis of emotional expressive studies by Smyth (1998), shows that the act of expressing one's thoughts is in itself thought to be healing. Also, a more recent meta-analysis (Frisina et al., 2004) of similar studies clearly suggest that expressing emotions can be beneficial for a person's health

and wellbeing. Because of its promising potential, the use of expressive writing techniques has been increasingly tested for its psychotherapeutic benefits (Pennebaker, 1997), offering an alternative to traditional therapies (with the advantage of lower cost and greater accessibility).

Although the topic of writing may differ, the simple act of writing to express emotions can have many valuable effects (Pennebaker, 1990). For instance, a study involving freshman students writing about emotional topics related to coming to college showed improvements in grades, and even enhancements in months following the exercise (Pennebaker et al., 1990). As with the majority of the past psychology literature, initial research efforts have mainly focused on the beneficial disclosure of negative emotional, traumatic experiences. However, more recent efforts have shown that various benefits can also be gained by concentrating on the expression of positive emotions. King (2001), for instance, showed that writing increases positive affect, as opposed to negative affect, and that it is beneficial not only for one's health, but also for one's social wellbeing. Likewise, Burton and King (2004) elicited better health and mood from participants instructed to write about intensely positive experiences.

Studies focusing on the disclosure of positive emotions (Lyubomirsky et al., 2005c) suggest that by using happiness-increasing interventions, it is possible to harness and increase positive emotions such as joy and gratitude. Similarly, Emmons and McCullough (2003) found that practicing grateful thinking on a regular basis can enhance wellbeing; it appears that gratitude promotes the savouring of positive life experiences and situations, so that the maximum satisfaction and enjoyment can be distilled from one's circumstances. Another study along similar lines (Seligman et al., 2005) also suggests that people can improve their wellbeing by doing simple exercises that relate to harnessing positive thoughts. In a rigorous Internet study with 471 participants, Seligman and his colleagues compared positive psychology interventions with a placebo-controlled exercise. For an activity termed the 'Three Good Things' exercise, participants were asked to write everyday for one week about three good things that happened to them. Participants expressed that the exercise made them increasingly focus on the good things that happen during the day and researchers reported increased happiness and reduced depressive symptoms for the six months that researchers tracked the participants.

In conclusion, there is a substantial and empirically based body of research which suggests that expressing and cultivating positive thoughts can be a simple yet powerful way of improving a person's wellbeing and offers a set of techniques that could be employed to achieve this through technological intervention.

2.5.4   Technology for experiencing positive affect in daily life

Building on the previous work in positive psychology, there is an opportunity for the HCI community to design applications that encourage and support the expression and sharing of positive emotions. A small number of researchers in the field of human factors, HCI and information and communication technology development have already drawn inspiration from positive psychology for a more explicit positive approach to human-centred design and evaluation (Sklar and Gilmore, 2004), for user experience (UX) research with a focus on designing (engaging) systems for fun or pleasure (Hassenzahl and Tractinsky, 2006), or for preliminary design theories that are based on supporting human needs and flourishing (Zhang, 2007). So far however, most inspiration and research efforts have come from the 'flow theory', one of the key concepts of positive psychology that was originally coined by Csikszentmihalyi (1990). His motivational theory has been applied to technology design and a number of HCI and media theories, such as by Sherry (2004) for understanding enjoyment in media, and by UX researchers in their goal towards creating engaging or optimal experiences (e.g. Bederson, 2004).

Although a widely accepted, shared understanding of UX research is still lacking (Hassenzahl and Tractinsky, 2006), this field has particularly embraced the perspective that technology use in itself can be a source of pleasure. Recent research efforts, that go beyond HCI's traditional negative task-oriented perspective, such as UX research, have increasingly concentrated their efforts on creating engaging interactive experiences that provoke user's positive reactions toward interactive media and its contents (Hassenzahl and Tractinsky, 2006). HCI's growing subfields such as affective computing (Picard, 1997), social computing and UX design have shown that technology can emotionally connect and delight people (e.g. Jordan, 2000, Sundström et al., 2005a). However, supporting people's experience of positive affect or wellbeing does not simply imply the design of a fun technology or pleasant-to-use, aesthetic product. A refocus is needed for understanding how technology can be designed for people to experience positive affect in their everyday lives, beyond the mere encounter with technology. This research is thus taking a different approach in its (psychotherapeutic) aim to use technology for improving the experience of positive affect in everyday life. In doing this, it builds on positive psychology's empirically based body of research suggesting that exercises concerning expressing and cultivating positive thoughts can be a simple yet powerful way of improving a person's wellbeing. However, *the role technology could play in such positive psychology interventions* remains largely unexplored. This research addresses this challenge, by focusing on the design of technology for the psychotherapeutic activity of expressing and sharing daily pleasures.

The assumption of this thesis is that technology offers great potential for supporting the expression of positive emotions, particularly for improving mental health in everyday life. Computational media has become increasingly portable, smaller, cheaper, and part of people's everyday lives. These advancements have given birth to mundane technologies, such as mobile phones, which offer promising characteristics for providing accessible pervasive mental health care 'on-the-go.' Technology thus offers advantages that might lower the barriers that prevent people from engaging in traditional psychotherapy (Lange et al., 2003).

Another advantage of utilizing technology is that it enables researchers to study people's natural interactions in a relatively simple, inexpensive, and straightforward manner. Slatcher and Pennebaker (2006) also point to the benefits gained in using online technologies for psychological research. Particularly, unlike previous expressive-writing studies, it appears that the connective and recording qualities of technology are particularly promising in demonstrating some of the social processes that may underlie the effects of expressive disclosure.

2.5.5   Encouraging positive expression via technology

Technologies for cultivating positive emotions to catalyze beneficial social and mental effects have so far been under explored, particularly in the context of mental health. Although not intended as a psychotherapeutical exercise, some research efforts have focused on augmenting the expression of emotion with communication technology. One example of this is eMoto, a mobile service enabling users to emotionally enhance their SMS messages with a range of affective gestures. This alters the background of the text message to include a range of affective expressions that make use of colours, shapes and animations (Sundström et al., 2005b). Other communicative technology, in this case a blog, and postcards have been used to encourage the expression of emotion and inner thoughts on the Post a secret website (Warren, 2005). This site mainly addresses the uncovering of negative emotions, such as fear or shame. Others (e.g. Angeli et al., 2006) addressed the rather dark topic of the misuse and abuse of interactive technologies by examining how computers sometimes bring about the expression of negative emotions and uninhibited behaviour.

Java et al's study (2007) is one of the few which investigates and highlights mundane expression by lightweight modern technology. Their study looks at the micro-blogging tool Twitter (Lavallee, 2007) and how typical it is as a everyday activity, suggesting that most posts on Twitter concerned rather ordinary expressions about daily routine or what people are currently doing. However, such communication systems are not

necessarily intended for expressing positive emotions or sharing pleasant experiences, let alone, designed for the study of daily pleasures to understand or promote social wellbeing.

Although under explored, technology also offers much potential for encouraging positive disclosure as a psychotherapeutic intervention. Blunt (2006) conducted a study suggesting that the mode of writing –using computers or longhand– had no effect on disclosure and self-censoring of personal content. This is encouraging as it suggests that beneficial effects of expressive writing could also be gained using input technology.

Whilst this thesis is inspired by research in positive psychology, it aims to build on and extend related research and studies on positive emotions to optimize and increase HCI understanding of technology-mediated sharing of human pleasures and its potential benefits. The literature discussed in this chapter makes a case for supporting social wellbeing by using technology for the sharing of daily pleasures and cultivation of positive affect.

2.6   Discussion

In this chapter, human's social and emotional needs were discussed with respect to how technologies could support the cultivation of positive affect for social wellness in everyday life. As reflected in Maslow's hierarchy of needs, and as further demonstrated and evaluated in empirical studies, humans have a basic need of contact with others. People's social interactions are beneficial for their health and wellbeing. However, current technologies do not always optimally support social interaction.

To enhance understandings for the design of technologies that are better tuned to support desired and pleasant forms of social interaction, THE Medium model was presented as a theoretical framework, describing the factors that could affect social interaction, as a tool to help the analysis and design of technologies that aim to support socio-pleasure. Through THE Medium model, it was highlighted that positive emotions play an important role in social wellbeing. A further review of the positive psychology literature added support to the beneficial value of positive emotions, its expression and the important role these play in supporting social wellbeing.

This chapter's rationale supports the argument that technology has the promising potential to mediate positive emotions and that this might have a positive impact on a person's social wellbeing. In doing this, there might be a role to play for social technologies that facilitate more lightweight forms of interaction to better integrate with

people's current busy daily social lives. The body of research discussed in this chapter substantiates the main hypothesis of the thesis that *the sharing of positive emotions as mediated by technology, can promote beneficial social and mental effects*. However, to verify and assess potential benefits of lightweight technologies for the sharing of positive emotions, there is first a need for such positive expressive technology. Therefore, a design strategy is needed for the development of such technology. Furthermore, the assertion that technology can mediate positive emotions needs to be tested. Chapter 4 will therefore concentrate on the first part of the hypothesis: *encouraging positive disclosure*. Chapter 7 will concentrate on the second part of the hypothesis: the potential social and mental benefits of using positive expressive technology. The next chapter presents an overview of the studies and details the methodology used to support the hypothesis.

3   Methodology

This third chapter describes the methodology used to address the research questions, and details the approach taken to investigate the research problem. An overview of the study design developed to answer the questions and test the hypothesis is provided in this chapter. The objective of this chapter is to provide a general introduction of the research approach taken, as a detailed description of each individual study is left for the associated, subsequent Chapters (4, 5, 6 and 7).

3.1.1   Methodological aim

The aim of the methodology was to test the hypothesis of this research, that *the sharing of positive emotions as mediated by technology, can promote beneficial social wellness effects for its users*. This entails two main research questions:

- How can (or might) technology encourage the sharing of predominantly positive emotions?
- What are the potential social and mental benefits of (mobile) technologies that support (shared) positive disclosure?

Evidence was gathered and analyzed to answer the first question, as this was a prerequisite for answering the second question. The first part of this work thus focused on the potential of technology to facilitate the expression and sharing of positive thoughts and feelings, and the second part's focus was on assessing the social and mental benefits of using such technologies.

3.1.2   Mixed methodology

The research conducted in this thesis involved five studies for which a combination of several research methodologies was applied. A mixed methodology, which involves a qualitative and quantitative approach and triangulation, was employed across the different phases of this research process, as it was believed that this approach would more likely assure the validity and reliability of the results and provide a more comprehensive understanding of the analyzed phenomena (Tashakkori and Teddlie, 1998). The goal of mixed methods research is not to replace either of the quantitative or qualitative approaches, but rather to draw from the strengths and minimize the weaknesses of both in single research studies and across studies (Johnson and Onwuegbuzie, 2004).

To a certain extent, the research used a qualitative/ quantitative form of sequencing.

This meant that at the beginning the studies had a more qualitative focus and that in the final part a more quantitative approach was taken. The investigation started by exploring the design and development of technologies for sharing positive emotions, in which the resultant technology was used in an explorative pilot study. Qualitative data on participants' perspectives of using the technologies was generated from interviews with users. The results of this study were then used for the design of a subsequent, mostly quantitative phase of the study; as a closed-ended questionnaire instrument was developed to measure the benefits of the designed technologies.

3.1.3   Design research

Designing communication technology for positive affect involves much more than enabling people to accomplish certain tasks more effectively, and therefore, traditional methods and approaches to human-computer interaction that focus on usability do not suffice for this research. To support critical discussion of, and reflection upon, the design of positive expressive technologies, both new design philosophies and a richer collection of design examples were needed. As this thesis concerns the potential of communication systems in facilitating shared positive disclosure, one important method for this thesis involved iteratively developing prototypes, in the form of artefacts, to aid the evolution and understanding of such systems. For this reason, the results of this thesis are partly based on design research. The aim of design research is to construct artefacts and evaluate them (Järvinen, 2007). The constructed artefacts can be products, prototypes or innovative designs. The results of design research can be:

1. The created and evaluated systems;
2. Thinking models that describe the systems, actions and situations related to them, and
3. Tools that are useful for creating and evaluating the systems (Kankainen, 2002).

This work involved undertaking design-based research for all these three results.

Most often, the contribution of design-science research is the artefact itself (Hevner et al., 2004). Indeed, the iterative design approach taken, resulted in the development of a collection of different artefacts called *PosiPost*. However, the output of this research goes further than the mere building of a system, as the development of the artefacts was also aimed to inform the theory of the thesis and evaluate its benefits. Along with these artefacts, THE Medium model was used as a theoretical framework and constructed to identify the factors that possibly affect pleasant social interactions. This framework was used as a design and analytical tool to explain the thinking and understanding of mediating positive emotions with social technology. In particular, the studies from the

field of Positive Psychology highlighted the potential of sharing positive emotions with technology. Two design studies (described in chapter 4) were conducted using a paper prototype and social-online tools to investigate (the feasibility of) the mediation of positive affect using a prefix-based approach. These studies fed into the design of a technological intervention for increasing positive affect, resulting in a mobile PosiPost application using the prefix "Today I like" to encourage positive disclosure. Following on from this, the developed technology, *PosiPost Me* served in a pilot study (described in Chapter 5) as a technology probe (Hutchinson et al., 2003) that enabled further discussion on how such positive expressive tool was used and understood. The study informed the further development of the postive expressive prototypes for the remote sharing (PosiPost Me) and proximity sharing (PosiPost Be) of positive messages. The fourth study (described in Chapter 6) was to develop a questionnaire instrument (SPOT) to investigate the social and mental effects of positive messaging. The instrument was used to evaluate the developed technology and investigate its social and positive psychological effects. The developed artefacts thus offered examples enabling continuous discussion and study of the ways in which positive expressive technologies can support the sharing of daily pleasures and catalyzed understanding of its potential benefits.

3.1.4   Research aims and procedures

The following text provides an overview of the studies conducted. It describes the research aims and the procedures followed to investigate these.

First phase studies –encouraging positive disclosure (Chapter 4)**:** To firstly explore the potential of the expression and communication of positive thoughts, two studies were conducted. These studies used paper-based questioning techniques and social-online tools to capture what positive experiences people like to share. These studies aimed to:

- detail the kind of positive and social interactions people (can) engage in and how these can be influenced by technology;
- provide insights into the ways positive emotions can be expressed and shared;
- investigate the tactics (a prefix-based strategy) that could be used to encourage the sharing of positive emotions;
- develop a set of design considerations for the development of positive expressive technology;

- provide insights in the various pleasures people express and make out from ordinary happenings in life when given the opportunity to (anonymously) record and share positive feelings and experiences (with others);
- specify the nature of expressions people like to share, and
- determine if predominantly positive disclosure could be elicited.

The collected data from the first-phase studies was used to demonstrate the potential of positive expressive systems using a prefix-based strategy. Analysis of participants' contributions suggested that various, often situated thoughts and emotions of a predominantly positive nature can be harnessed using the prefix *Today I like*. Furthermore, the analysis resulted in a set of design considerations for the design and development of positive expressive technologies. With this knowledge, mobile technologies could be developed to investigate the second research question of the possible benefits of positive expressive technologies for its users.

Design study - pilot study with mobile expressive technology (chapter 5)**:** The design considerations were used to guide the design of a mobile expressive technology, called PosiPost Me, for the sharing of positive messages over mobile Internet. A pilot study with the PosiPost Me prototype as a technology probe (Hutchinson et al., 2003) was undertaken which involved the observation, recording and questioning of people using the artefact in real-world context. It was conducted to:

- increase understanding in how such a positive expressive tool was used and understood in situ,
- determine whether positive experiences would be shared by mobile technology, and
- explore possible mental and social benefits.

This study also further directed the design process that resulted in the development of PosiPost Be, enabling the sharing of positive messages via Bluetooth with people in closer proximity.

Final empirical studies – evaluation PosiPost Be and PosiPost Me (Chapter 6 & 7)**:** The data collection and analysis of the primary investigations were used to design the subsequent and final phase of the study. The results from the previous phase were used to inform the construction of a more structured and quantifiable instrument; a questionnaire instrument, called SPOT, was developed to enable the measurement of the effects of using positive expressive media. This included a study with 13 experts to test the content validity of the questionnaire's prposed constructs and its items, using Lawshe's method (1975).

Using this developed questionnaire, an empirical study with the created mobile expressive technologies PosiPost Me and PosiPost Be was conducted to evaluate the effects of sharing pleasant moments. The study and data gathered were used to:

- gain insights into the contextual use of the mobile technologies;
- understand the potential influential role of the mobile medium; compare between the different applications and explore differences in (de)contextualised messaging, and
- determine the social and mental beneficial effects as a result of using the mobile expressive technology.

During this study, the participants were asked to rate their appreciation of the systems and give their opinion on a number of other questionnaire items that together formed social and emotional constructs. The effects studied concerned the constructs: *sociability, wellbeing, social disclosure (openness), appreciation of messaging system, message perception, perceived positive affect, positive thinking, socio-pleasure (the enjoyment derived from interacting with others), social curiosity, awareness, positive awareness* and *connectedness*. The participants were questioned with the developed instrument after using each version of PosiPost so that a comparison between the different media could be made. All participants were also interviewed after using both versions of PosiPost. Furthermore, the postings shared were recorded to analyse the types of pleasures the participants shared.

A content analysis was undertaken to provide insights in the various pleasures people make out from ordinary happenings in life, and explore the mundane nature of sharing pleasures. Furthermore, on the results of the final study, statistical analysis was conducted. In this way, user's preferences, perceptions, mental and social effects of both the positive expressive applications were investigated. The study and data gathered were used to gain insights into the contextual use of the mobile technologies, and determine the social and mental beneficial effects of positive expressive media.

In total, five studies were conducted to address these research aims. The specific details for each individual study can be found in the upcoming chapters. Figure 3 presents a general overview of all the studies conducted and the research approaches taken to address the research aims.

First phase studies (Chapter 4): Encouraging positive disclosure
Exploring the potential of the expression and communication of positive thoughts

> **Study 1:** paper-based questioning techniques
> Location: Scotland (Highlands and Islands region)
> Participants: 20 Scottish children (6-15 years old)
> **Study 2:** social-online tools (to reach a wider audience)
> Location: on-line/ worldwide
> Participants: ± 27 on-line individuals (from e.g. Canada, Germany, Romania and Israel)
> **Research approach:** Two studies involving ± 50 participants, using paper-based questioning techniques and social-online tools were conducted that captured 151 contributions on what thoughts people like to share. The contributions were analysed and motivated the design of mobile positive expressive prototypes.

Study outcomes: Design considerations (e.g. *Today I like* prefix, *mobile tool)*

Design study (Chapter 5): Mediating positive thoughts in a mobile landscape
Exploring the design and use of mobile positive expressive systems (PosiPost)

Design research: Development PosiPost Me & PosiPost Be

> **Study 3**: Pilot study with PosiPost Me
> Location: England
> Participants: seven early technology adopters (4 male/3 female) with diverse nationalities
> **Research approach:** A study using qualitative data techniques (design research, interviews) was undertaken. This involved the observation, recording and questioning of people using the PosiPost Me prototype in real-world context as a technology probe (Hutchinson et al., 2003). The study informed the iterative development of PosiPost Me and PosiPost Be.

Study outcomes: PosiPost Be and Me, understanding of potential effects from use

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Final empirical studies (Chapter 6 and 7)**:** The effects of positive messaging
Investigation of the social and mental effects of positive expressive technology

> **Study 4:** Content validity study for development SPOT for measuring **S**ocial & **P**ositive psychological effects **O**f **T**echnology
> Participants: 13 raters (experts) that were specialists in the field of (social) psychology, Emotion and HCI.
> **Research Apprach:** A study was conducted to validate a new questionnaire instrument, SPOT, for measuring the Social and Positive Pyschological effects Of Technology. Lawshe's method (1975) was used to assess the content validity of the questionnaire's proposed constructs and its items. This meant that a draft version of the questionnaire for content validity testing was sent to a panel of experts, who were asked to indicate for each item whether it was 'Essential', 'Useful, but not essential', or 'Not necessary' to measure the underlying construct. Furthermore, Cronbach's alphas were calculated to measure the internal consistency of the SPOT instrument.

Study outcome: SPOT questionnaire instrument

> **Study 5**: Empirical study with PosiPost Me and PosiPost Be
> Location: England (London) and The Netherlands (Delft University)
> Participants: 15 (8 male/ 7 female) users with diverse nationalities (20-40 years old)
> This included 10 colleagues working in the same university building in Delft and a group of 5 friends in England living near each other.
> **Research approach:** An empirical study with the developed mobile expressive technologies PosiPost Me and PosiPost Be was conducted to evaluate the social and mental effects from using the positive expressive applications. The participants were questioned with the SPOT instrument and also interviewed after using each version of PosiPost (Be or Me) for a week. The 379 messages shared were recorded. On the results of this study, statistical and qualitative analysis was carried out.

Figure 3: Overview of the studies conducted and research approach taken.

3.1.5   Conclusion

This chapter described the general methodological overview and approach taken to conduct the research. It described the need for undertaking design research, which was necessary to develop the needed artefacts that informed and fed the subsequent studies. The use of a mixed-method approach has been chosen, as both quantitative and qualitative research methodologies are seen as useful for the interpretation and possible generalisation of the results (Johnson and Onwuegbuzie, 2004). The methods used to conduct the research will be further detailed in the following chapters of this thesis when the studies are described each individually.

4 Encouraging positive disclosure

4.1 Introduction

This chapter's[3] premise is that technology has the potential to support the elicitation, expression and communication of positive thoughts. However, its success depends on understanding and incorporating appropriate strategies for interactive system design and development.

The previous chapter discussed the literature supporting the argument that expressing positive emotions can have a positive impact on a person's social wellbeing and that this might be enhanced technologically. Based on indications in the psychological literature, the sharing of positive emotions with technology appears to have promising potential. However, design considerations and illustrations are needed showing whether and how it is feasible to design applications that encourage and facilitate positive disclosure. Following on from this, two design studies are presented investigating how positive thoughts can be mediated and shared. These studies involved approximately[4] 50 participants, using paper-based questioning techniques and social-online tools that captured 151 contributions on what thoughts people like to share. The findings demonstrate the potential for designing systems based on a prefix-based elicitation of positive emotions. An analysis of participants' contributions is discussed to investigate whether various messages of a predominantly positive nature can be harnessed, thereby emphasising the importance of immediacy and situatedness in expression. Furthermore, this chapter discusses a set of design considerations for the design and development of positive expressive technologies. In this way, this research sets out a possible design route for positive communicative systems.

4.2 Study objectives

The aim of the research reported in this chapter is to increase understanding of the design of technologies that support the elicitation and sharing of positive emotions. The two studies described next investigate a prefix-based design approach to trigger positive

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[3]Parts of this chapter have been published in Kanis, M., Brinkman, W.-P. & Perry, M. (2009) Designing for positive disclosure: What do you like today? *International Journal of Industrial Ergonomics*, 39(3) 564-572.

[4]This is an estimate based on online alias and IP-addresses as the on-line participants were anonymous.

disclosure; the first study involved young participants in Scotland using a low fidelity paper prototype, while the second study used on-line tools to reach a wider audience. These studies conducted offer a way to develop understandings of possible tactics for effective positive disclosure and how this might be enhanced technologically.

The two studies conducted were undertaken to inform the socio-technical design steps and rationale for a positive expressive application. The main objectives of the studies were to:

- provide insights into the ways positive emotions can be expressed and shared;
- investigate the tactics that could be used to encourage the sharing of positive emotions;
- detail the kind of positive and social interactions people (could) engage in;
- specify the nature of expressions people like to share, and
- determine if predominantly positive expression could be provoked.

The idea of using prefixes for encouraging positive disclosure was chosen as such approaches have been proven useful in positive psychology interventions (e.g. Seligman et al., 2005). For example, Emmons and McCullough's (2003) expressive writing exercise encourages positive emotions by asking people to write what they are grateful for. Following a similar format, the aim of this study was thus to explore how such interventions could translate to a technological application. A number of prefixes were chosen to explore which one would appeal to a relatively wide public and engender positive emotions. These prefixes (e.g. *I am grateful* for and *I love*) were loosely based on positive emotions, such as hope, gratitude, loving and liking.

4.2.1   First study with a paper instrument

The first study was conducted in Scotland, in 2006, over two days with children and young people ranging in age from 6 to 15 years old. The study was primarily set in three classrooms in the Highlands and Islands region, during an educational event. The research was done on site and the participants, from different Scottish schools, were fairly evenly distributed in terms of gender. Appropriate consent had been obtained for the study from all involved.

This study was intended to test the effectiveness of different 'prefixes' for expressing positive affect, and to understand how the technique could be used to elicit positive thoughts. A paper instrument, shown in Figure 4, was developed to elicit insights such as how and in which form people could be stimulated to express positive thoughts and

what kind of content participants would create with a positive expressive medium. A prefix approach was taken to allow a simple and quick way of expression that could work across different media. With the paper instrument, participants were asked to finish sentences starting with the given prefixes: *Today I like, I like, Today I love, I love* and *I dream about* to try and capture mainly positive thoughts. Although the focus of this study was on the elicitation of positive emotions, the prefix *I am sorry for* was also included to test if the postings of this nature would provoke emotions of a more negative kind.

Figure 4: A participant posting a message with PosiPost's paper prototype.

Each prefix was put on a different slip of paper. The rationale behind the design of the individual slips with prefixes was to avoid giving participants the impression of having to complete all of the prefixes on an A4 form in a fixed order. The participants were instructed only to complete the prefixes that they wished to do so for. The participant's responses in the form of the paper slips were posted in the paper mailbox.

4.2.2   Second study with online tools

The second study concentrated on how positive expressions can be triggered, shared and mediated by desktop and Internet technology in particular. This stage of the research was used to gain more positive postings for analysis and to gain insights into the elicitation and sharing of positive thoughts. As most of the participants in the initial study were relatively young and from the same country (Scotland), the use of Internet technology had the advantage of reaching a wider range of participants worldwide. Participants came from countries including the United States, Canada, Romania, Germany, Israel and the United Kingdom. This second study built upon the outcomes of the first study and allowed further refinement of the prefixes. As some participants in the first study had given the same answers when using different prefixes, the second study used less prefixes of similar kind (e.g. *Today I love, I love*) and added the different prefix *This is nice about you* to include a prefix that was more focused on eliciting positive feelings toward others.

This second, longer-term study ran for nearly six months and made use of these social-online tools:

- a blog (http://posipost.blogspot.com)
- an email address (posipost@gmail.com)
- Justcurio.us, an already existing anonymous on-line question and answer system

Existing social-online tools were included in the study as these brought advantages including large existing communities of users and platforms where the expression of positive as well as negative thoughts occurred. The prefixes (*Today I like, I love, I am grateful for* and *This is nice about you*) were used and applied in combination with the online tools. For example, people used the mail address to send posipostings with a prefix such as *I am grateful for* in the subject header, and in the case of the PosiPost blog, the prefixes were posted as individual entries that users could respond to. Justcurio.us (2005-2007) is an anonymous question and answer system, open to anyone, with one simple rule: to ask a question, one must first answer someone else's question. In the case of Justcurio.us, the prefixes were posted as questions (e.g. What do you like today?) that any random stranger could then answer. The prefixes were posted at analogous points in time, and displayed in no fixed order.

In the first paper-based study, the researcher observed the participants in-situ and this could have had an influence on their postings. In order to address this potential bias, in the second study, users were not directly or explicitly told that their postings were to be used for the purpose of a study. This was to ensure that the postings received were the same as those that would occur in naturalistic settings. The online posters only completed the prefixes that they wanted. In addition, people posted based on their own

initiative and were not presented with any incentives, other than those gained from the pleasure of posting.

4.3   Data analysis

The total of the first and second study resulted in the collection of 151 postings from approximately 50 participants; 23 face-to-face and ±27 online individuals. The first study involved 23 participants and resulted in 78 postings that were mostly completed in one or two minutes, indicating that the method used for positive disclosure was easy and quick enough.

The 27 participants for the second study are an estimate because of the anonymous nature of the posting. Table 5 shows the number of postings across both studies. In the first study, the mean of posipostings per person was four, and in the second study this was in the region of almost two and a half postings.

Table 5: Distribution of posipostings in relation to participants during both studies.

	N	**Total** Posipostings	**M**	**SD**
First study	23	78	4.0	2.2
Second study	27[1]	73	2.4[1]	2.3[1]
Both studies			**3.0**[1]	
Total	**50**	**151**		

N = Participant sample size, M = Mean of Posipostings per participant, SD = Standard Deviation of the number of postings per participant
[1]This is an estimate based on online alias and IP-addresses as the individual posting was anonymous

4.3.1   Categorization and analysis of PosiPost content

The posipostings from both the first and second study (e.g. "Today I like surprising people with flowers" or "I am grateful for having a good book to read") were analysed and coded into different categories. The characteristics of the content that emerged were categorized by two coders to ensure reliability.

The coders categorized the content independently using the following categories:
- *Time*; a reference to time, e.g. "I am grateful for the day".
- *Human (socio-pleasure);* posting contains a social element or reference to a person, e.g. "Today, I like receiving a surprise phone call from a friend".
- *Environment (location);* a reference to a physical location or posting contains an environmental factor, such as a reference to the weather, e.g. "Today, I like sunshine".

- *Object;* a reference to a physical object, e.g. "I love my new shoes".
- *Activity;* a reference to an action, e.g. "Today, I like going to the gym".
- *Right here – Right now (situatedness);* a reference to what is happening at that particular moment in time and place, e.g., "Today I love the workshop" when attending a workshop at the time of expression.
- *Emotion (explicit);* an explicit reference to an emotional state of a person, e.g. "Today I like smiling".
- *Everyday event;* a reference to ordinary things and mundane events, e.g. "Today I like eating".
- *Positive;* the content is of a mainly positive nature, e.g. "Today, I like waking up to another beautiful day".
- *Offensive;* the content could easily be regarded as racially, sexually or politically offensive.

The categories were not designed to be mutually exclusive. For example, a posting such as "Today, I like working" could be placed in *Activity* and further be placed in other categories such as *Positive*. Thus, each posting could have multiple codings. The consistency of the allocation of the codings was analysed by calculating a series of Cohen's Kappa —Index of Inter-rater Reliability (see Table 6). Table 6 shows a general high level of agreement between the coders, given that values above 0.70 are normally considered satisfactory (Robson, 1993). In the few cases where the two coders disagreed, they discussed the comments and agreed on a classification afterwards.

Table 6: Agreement between the coders expressed by Cohen's Kappa.

Category of content evaluation	Cohen's Kappa		
	Study 1	**Study 2**	**Mean** Studies 1&2
Time	1.00	1.00	1.00
Human (social)	0.86	0.93	0.90
Environment (location)	1.00	1.00	1.00
Object	1.00	0.97	0.99
Activity	0.88	0.97	0.93
Right here - Right now (situatedness)	0.87	N.A.	N.A.
Emotion (explicit)	1.00	0.94	0.97
Everyday event (mundane)	1.00	0.70	0.85
Positive	1.00	1.00	1.00
Offensive	1.00	1.00	1.00

Table 7 shows the number of the postings that were classified in a specific category, displaying both the absolute frequency and the percentage of a specific study. As there is no absolute guarantee that users will (always) only post positive messages, the most remarkable finding, as shown in Table 7 is that the posted content was of a predominantly positive and non-offensive nature. As anticipated, the prefix *I am sorry for* encouraged the only expressions of non-positive emotions, like sadness or regret (e.g. "I am sorry for Busted splitting up", "I am sorry for my lack of ability"). The prefix *This is nice about you* was not found to be the most suitable for encouraging positive communication, as from all the tested prefixes, it provoked the only two comments that people may find offensive. Table 8 shows that this prefix generated a relatively low amount of postings as well.

Table 7: Numbers and percentages of postings according to category and study.

Category	Posted content that falls in category	
	First study	Second study
	Frequency	Frequency
Time	0	7
Human (social)	8	21
Environment (location)	3	14
Object	13	21
Activity	27	24
Right here, Right now (situatedness)	40	N.A.
Emotion (explicit)	6	11
Everyday event	7	13
Positive	76	73 [1]
Offensive[1]	0	2

[1] Although two postings were considered offensive, these were still regarded as positive by the coders

The following analysis was to study the effect of these prefixes in more detail. The prefixes used and posipostings that they generated are shown in Table 8. A Chi-square test on the distributions of the postings in the first study shows that there is a significant ($\chi^2(5, N = 78) = 13.25$, p. $= 0.021$) variation of the distribution of messages depending on the prefix, and likewise for the second study ($\chi^2(4, N = 73) = 68.16$, p. < 0.001). This indicates that some prefixes were more popular (i.e. *Today I like*), or more effective in the elicitation of messages than others. As Table 8 shows, from the eight prefixes used, the most popular prefix was *Today I like* as this elicited the widest range of positive responses in both studies.

Table 8: Used prefix versus generated posipostings.

Study 1: Used prefix	Total		Study 2: Used prefix	Total
Today I like	21		Today I like	40
I like	20		I like	6
Today, I love	10		Today, I love	3
I love	10		This is nice about you	4
I am sorry for	9		I am grateful for	20
I dream about	8			
Total	**78**		**Total**	**73**

4.3.2 Expressing emotions: Right here, right now

From the analysis of the first study conducted on location, the category Right here/right now (situatedness) scored relatively high (see also Table 7) which suggests that expressing situated experiences is popular. The following step of the analysis was therefore to examine the relationship between the usage of a prefix and a reference to what is currently happening at that location or particular time. Table 9 shows a cross tabulation between prefix and situatedness.

Table 9: The number of postings according to prefix and relation to 'Right here, right now' (situatedness).

Used prefix	Right here, right now		Total
	Relates to what's happening at the moment (situatedness)		Frequency
	No Frequency	**Yes** Frequency	
Today I like	6	15	21
I like	7	13	20
Today I love	3	7	10
I love	7	3	10
I am sorry for	8	1	9
I dream about	7	1	8
Total	38	40	78

The distribution of the messages reveals a significant variation ($p. = 0.002$, Fisher's exact test). Thus, especially when using the prefix *Today I like* the majority of the expressions were related to a particular moment in time or location. For example, "Today I like making music" was expressed right after a workshop on making music with a computer program. The online study was not taken into consideration for this category, as it was not possible to know or observe what people were experiencing online at the time of their postings.

The analysis of the content of the posipostings also showed that people sometimes include a location in their positive thought. People, for example, posted that they liked "collecting shells on the beach", "working at home", "Dublin" or "sitting with their laptop in a bar". As many of the expressions were suggested to be time and location dependent, and the category situatedness scored highly, the belief was strengthened that a positive expressive technology should preferably allow for immediacy of disclosure so that positive emotions can be expressed *at any time* and *from any place*. As such, this motivated the need for mobile positive expressive technology to allow users to create and share positive emotions at any time and from any place. The implementation of such consideration for mobile expressive tools will be further discussed in the next chapter.

4.3.3   Review and further discussion of social-online tools

Following the previously described analysis, a review of existing online tools was undertaken to gain further insights into shared positive disclosure with Internet technology. This involved the analysis of hundreds of existing positive thoughts found in online discussion groups. Two websites were studied: the photo management and sharing site, Flickr, and a social networking site called 43things. This latter site was particularly interesting as it is a virtual space where users create and share lists of goals and desires. Examples include wanting to list 100 things that make one happy, learning to drive, getting a tattoo or wanting to make pesto. The rationale of studying these two sites was to gain wider insights of the kinds of positive emotions people share and engage in on an everyday basis.

While some people use Flickr to archive their image collections, most users see Flickr as a social site, a place for sharing images (House, 2007). People who tag and share pictures of things they like and love were observed to be popular. The Flickr I love discussion group and numerous tags starting with "I love" are an example of this. On 43things.com, it was found that a high number of people had stated existing wishes of a positive nature. For example, out of 1,038,570 people wanting to do 974,515 things in total, 13,297 people stated that they wanted "to be happy" (number 5 of 43 things most

popular goals), 417 people expressed the desire to "be more optimistic", 424 people wanted to "be positive", more than 50 people wanted to express positive thoughts and even two people had expressed the desire "to anonymously post positive messages wherever I go".

An indication of the constancy of the studies can be found in the similarities between the expressed content of the collected postings, combined with the additional postings found online (e.g. on Flickr) and more detailed research (Fordyce, 2000, Diener et al., 1999) on what generates happy emotions. Some broadly defined categories that emerged from the positive psychology literature (such as Fordyce, 2000, Csikszentmihalyi, 1990) (with concordant examples from the collected posipostings to show overlappings) of factors that contribute to people's subjective wellbeing include:

- Overcoming negative emotions or experiences, such as resentment (e.g. "I am grateful for leaving the army: It was the happiest decision I made this year" or "I love being able to overcome my unrealistic negative thoughts".);
- Wealth and materialistic possession (e.g. "I like my new car");
- Flow, progress and accomplishment (e.g. "I like getting a good mark" or "Today, I like getting my work done");
- Social contact (e.g. "Today, I like talking to a friendly stranger" or "Today, I like dancing with a friend"), and
- Savouring mundane, ordinary activities in daily life (e.g. "Today, I like listening to music at home").

Most notably, the last two factors have similarities with categories defined in the first and second study. The category *Human (socio-pleasure)* can be linked to Social contact in which, on average, 20% of the postings were categorized in. The last point shows similarities with the category *Everyday event* (13%) and *Activity* (43%). The categorization and accounts of what people like and enjoy offer interesting starting points for a more in depth investigation of people's daily likings. People's pleasures and its potential mundane nature will be further studied and analysed in Chapter 7.

4.4   Design oucomes

The outcomes of this study and a review of the literature (e.g. Pennebaker et al., 2001, Seligman et al., 2005). motivated a rationale for the design of systems that aim to encourage the sharing of positive emotions. The following steps taken in the design process were socio-technical in nature, i.e. they emerged from the context of the first two studies, an analysis of the postings and people's usage and sharing practices with

the on-line tools. As such, the steps taken in the design process could be seen as considerations that aim to highlight critical underlying aspects of design, where the sharing of positive emotions is a key concern. The rationale behind these considerations was to feed into the design of a positive psychological intervention in the form of a technological application called PosiPost. These considerations might also be of use to other practitioners in designing interactive experiences that actively encourage positive emotions, as these are still scarce. The design steps that guided and motivated the design process were as follows:

1. *Design for shared positive reflection*: The design for positive affect has been the leading design goal from the start. Positive thought processes can be stimulated by psychological intervention and technological applications giving users the opportunity to share and positively reflect on their situation. Enabling user's reflection on past and current positive experiences and sharing these with others can enable the user to re-experience these and stimulate positive thought processes in future (Pennebaker et al., 2001). Furthermore, sharing and incorporating examples of others' positive or desired behaviour (such as observed on 43Things.com) can encourage the creation of a positive mental framework for the user's own positive use.

2. *Design for technology and its functionalities*: Although positive psychological interventions untill now have not been particularly designed as technological applications, computing systems have notable useful functionalities for the sharing of positive emotions. Particularly, it allows recording, registration and communication of positive thoughts. For example, the fact that expressions can be recorded means that they can be used to 'seed' positive messages for new users even before they have posted, thus giving them an idea and positive example of what is expected. Each technology has their own useful functionalities which —depending on user's preferences— can be exploited and combined in different ways. Mobile technology, for example, gives the user the opportunity for positive disclosure at any place and time.

3. *Use of an effective format —such as a prefix approach— for eliciting positive thoughts from users*: An elicitation format needed to be chosen to suit a positive expressive technological intervention and the context to be designed for. In this case, by testing and using a prefix approach for the positive expressive application, users are believed to be provided with a direct, simple mechanism by which to share their feelings. It was felt that it could be easily integrated into any number of technologies, from simple pen-and-paper to the latest mobile devices. Furthermore, it frames each participant's input and sharing as no one is required to provide more

or completely different information than another: there is an equitable distribution between participants.

4. *Trial a number of prefixes. The decision on the kind of prefix to use was considered to be critical*: The prefixes were linked to the desired, positive type(s) of emotions (e.g. liking, loving) in an attempt to elicit those. The nature of the particular audience and the context in which emotions are shared (with friends, work colleagues, etc.) was kept in mind. In this chapter's studies, the prefix *Today I like* appeared to be the most effective, because it invoked the widest positive response.

5. *Induce intended (positive) emotions via information and communication technology surface features:* It was believed that positive emotions during interaction can be encouraged by designing certain technology interaction features, such as an appropriate graphical interface. Although in this case the focus was on positive emotions, negative emotions may be desirable in other cases, and thus may be the intended emotions designers want to induce via system interaction. For example, anxiety is a negative emotion, but anxiety can be motivational in achieving certain positive goals (Zhang, 2007). It was considered important to have the intended emotion in mind from the beginning, so that appropriate mechanisms and features, could be designed accordingly, so to be more likely to result in the desired (emotional) outcome.

6. *Be cautious with features to disclose users' origin*: Even though (mobile) technological developments make it possible to easily reveal users' origins, as in name and location, cautiousness was taken in deciding whether allowing the application to detail a user name and location automatically at all time. Consolvo and her colleagues (2005) showed in their studies that users are often hesitant to disclose location automatically and that their willingness to disclose is often context dependent. Furthermore, although anonymity is often believed to encourage malicious use and antisocial behaviour, anonymity can also have many positive effects, such as that it can encourage more open, honest and sometimes unexpected forms of communication between people at different levels (Ehrlich, 1999, Joinson, 2001). In the study, the postings with the prefix *Today I like* all happened anonymously and were all categorized as positive.

7. *Design the application to allow for immediacy in expression, and disclosure at any time and place:* An important outcome of the conducted studies was that expressed emotions are often *situated.* And so it was believed that ideally, an interactive system should allow the user to share their emotions at any time and place the user wants to do so.

These design steps were applied to the design rationale and prototyping of two mobile positive expressive tools, termed PosiPost Me and PosiPost Be, to explore and further investigate how implementation can affect positive usage. The mobile versions of PosiPost will be detailed in Chapter 5, but for now the following section illustrates how the design considerations were implemented and used for the development of these positive expressive systems.

Design rationale for mobile PosiPost

The outcomes of the study guided the development of two mobile editions of PosiPost and its underpinning design rationale. The mobile versions for positive disclosure, called PosiPost Me and PosiPost Be are applications that enable the distribution of positive messages at any time and from any place, using a mobile phone (see Chapter 5 for more details). The design steps taken were implicit in what the research and design process was trying to achieve. For instance, the importance of immediacy and situatedness in emotional disclosure, as highlighted by this chapter's study, particularly motivated the design of a mobile tool, as the aspect of mobility was evidenced as being core to (positive) emotion elicitation. This meant that the specific features of a mobile device needed to be taken into account for positive expression, and thus there was a need to consider how its features such as a small screen size and restricted input mechanisms could be best leveraged.

Guided by previous positive psychology interventions (e.g. Emmons and McCullough, 2003, Seligman et al., 2005) and the promising outcome of this study, PosiPost uses a prefix approach. The applications developed let users create a posiposting by asking them to finish a sentence starting with the prefix *Today I like* (as shown in Figure 5) to encourage the expression of (daily) thoughts of positive nature. Furthermore, the prefix format makes a speedy posting possible, as the input constraints for mobile phones need to be taken into consideration. The positive expressive systems also incorporate the fact that sharing process of pleasurable emotions reactivates the positive aspects of the emotional experience (Pennebaker et al., 2001). Thus in this way, the use of PosiPost creates a possible opportunity to re-experience pleasurable moments through social sharing as in the expression of emotions.
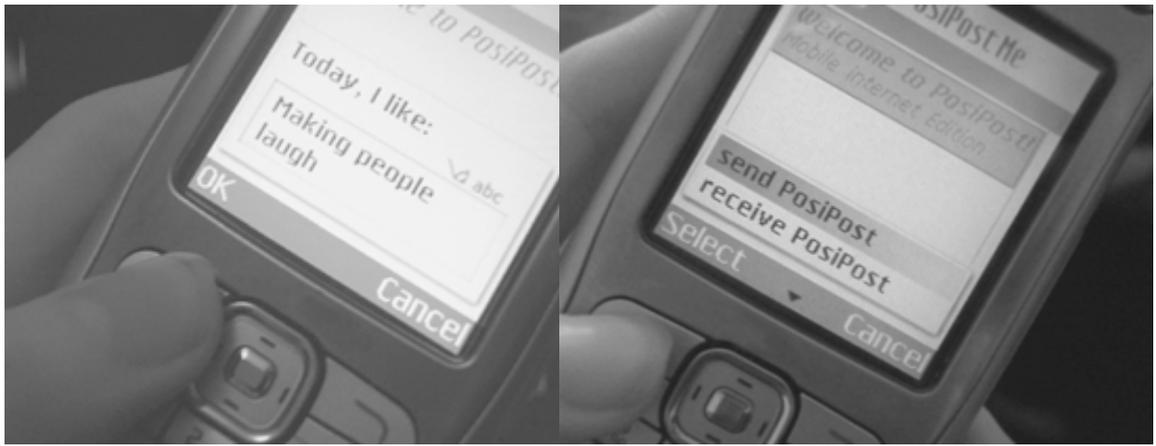
Figure 5: Using the prefix *Today I like* for sending a message with PosiPost Me.

The PosiPost Me system also provides a website (http://www.posipost.org) in which all the posipostings from every (mobile) PosiPost user are collected and randomly displayed. To ensure a wide variety of postings directly from the outset, the website for PosiPost Me was initially populated with all the posipostings that had been collected during the first and second studies. When people do not have a phone with the PosiPost Me application on it, they can still view other users' posipostings through the website. The website additionally offers a free download of the PosiPost Me application for a S60 (smart) phone. The Internet site functions as a shared public display, while the version on the mobile phone is more private. The public website and its collected positive examples provide people with examples they can use to stimulate their own positive use. Led by the first considered design step, all the users' created messages are stored on the phone and accessible any time for personal (positive) reflection. Making use of mobile technology on top of desktop technology and the Internet has the advantage that the strengths of each can be exploited. Mobile technology has the advantage that the user can post and receive posipostings from anywhere and at any time, while desktop technology and the Internet bring the advantage of general inclusion and accessibility while harnessing individual mobile experiences into a collective whole.

4.5   Discussion and further directions

For some users, and in some cases, a positive expressive application may be more beneficial, and some users might be more motivated to use such a technology. Research (Wright, 2002, Smyth, 1998) suggests that people who naturally do not express their emotional state to a great extent (such as men, alexithymics, and those high in hostility) could be more likely to benefit from a computer-mediated expressive application. However, the success of expressive interventions in general, and with individuals from

different backgrounds and ages (Wing et al., 2006), suggests that results from positive interventions might be generalizable to various settings and be beneficial for a wide variety of people. Up to now, research and practices have been too limited to draw clear conclusions on most effective ways for positive disclosure using technology. The studies conducted and technology envisioned are therefore initially aimed at giving a wide range of users the opportunity to express and share their different positive emotions in daily life and to allow investigation of a wide range of settings. In this way, users will encounter and share the broadest variety of thoughts. While some researchers (Pennebaker et al., 2001) suggest that people usually prefer to share their emotions with their closest intimates, the contributions generated by the participants and study of people using the social online tools indicate that people are also willing to share positive emotions with random strangers at a distance. However, the willingness and motivation to share positive thoughts with mobile technology needs to be further verified in the next studies.

In terms of its implications for design, the study not only offers design considerations and directions for future studies and communication technologies, but also highlighted the potential role that positive expressive technologies might play in interventions and theories to aid mental wellness (see Chapter 8). Because in the case of the envisioned mobile PosiPost applications the user is both the receiver and sender of messages, one could benefit in two different ways.

Interestingly, all the postings created with the prefix *Today I like* in the first and second studies have been observed and coded to be of a positive and non-offensive nature. The next focus of this research involves detailing the mobile PosiPost applications and a real-world study of PosiPost Me in use. This will further explore whether positive emotions are communicated by users (as intended) and enable the further investigation of the way in which beneficial social and mental effects can be promoted by positive expressive applications (or not).

Although emotion in the field of HCI is becoming recognised as an important factor in the user experience (e.g. Picard, 1997), examples and strategies of how designers and developers could provide interactive experiences that actively encourage positive emotions are still scarce. The presented research explored how to progressively engage with this focus and make a contribution to detailing the design considerations in developing systems that aim to bring out the expression and sharing of emotions of a more positive nature. The chapter described the investigation of a prefix-based design approach to trigger positive disclosure, and discussed the design implications for interactive systems for eliciting and sharing positive thoughts.

The studies motivated the deployment of a design strategy when developing (mobile) systems for shared positive disclosure. Furthermore, the work reported makes three specific contributions:

1. Analysis of the conducted studies resulted in a set of seven design considerations for the design and development of interactive experiences that aim to actively encourage the sharing of positive emotions;

2. The study offers the proposed mobile PosiPost versions as exemplars of this rationale, which uses the set of design considerations to underpin their development;

3. The paper-based and online studies showed the potential for a prefix-based elicitation of positive emotions. The data analysis of the conducted studies suggests that the deployment of the prefix *Today I like* is an effective way to encourage messages of a predominantly positive and non-offensive nature. This prefix also appears to particularly trigger situated expressions that are related to what is happening at that particular moment in time.

The discussion, design and study of PosiPost is continued in the next chapter. Using the set of design considerations developed in this chapter, the next chapter will detail the development of PosiPost's mobile editions. In the next chapter, the focus is on an investigation of the real-world use of PosiPost Me to understand the potential benefits of mobile positive expressive applications. This follows a discussion of the development of PosiPost Be, a Bluetooth edition that allows sharing positive thoughts with people in close proximity. This will enable further verification and enhancement of the incorporated design rationale and considerations, particularly in mobile contexts.

So far, research and practices of positive expressive disclosure in combination with technology have been very limited in scope and breadth. In spite of this, the work presented showed the feasibility of the proposed approach for positive disclosure and opens new avenues for the design, development and investigation of technologies for positive communication and concurrent wellbeing.

5   Mediating positive thoughts in a mobile landscape

5.1   Introduction

To understand and anticipate the potential impacts of sharing positive emotions with mobile technology, systems to support such practices are needed. This chapter reports on investigations based on the development of two mobile concept demonstrators to explore the mediation and sharing of positive expressions with lightweight mobile technology. Using the design considerations developed in the previous chapter, two design examples, illustrating how positive thoughts can be mediated by mobile technology have been developed. The chapter describes the iterative design process and system designs of the positive expressive technologies PosiPost Me (Mobile internet version) and PosiPost Be (Bluetooth edition). These both enable users to create and share positive thoughts wherever and whenever users wish to do so.

In Chapter 2, the point was raised that there might be a need for more lightweight forms of (social) interaction, which ideally would not add to people's demands and complexities in everyday life. This research looks to address this situation by presenting PosiPost Me as a lightweight technology to explore this issue. Describing the design process detailing how positive emotions can be mediated by mundane technology, this chapter focuses on lightweight interaction in a mobile context. In particular, how such tools can be used and understood is detailed. A pilot study is therefore discussed in which PosiPost Me is used as a probe to explore real-world use[5]. A qualitative and explorative approach was used in which participants were interviewed and observed using PosiPost in their context to increase understanding of potential effects of positive expressive communication technologies in natural settings.

From participants' discussion in the third study, the concept of PosiPost Me as a facilitator of *minimal connectedness* emerged. The notion of minimal connectedness means that people are *decidedly connected* (i.e. participants are connected by choice) to another person's thought or experience. The minimality refers to the simplicity of the

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[5]Parts of the description of the study in this chapter have been published in Kanis, M., Perry, M. & Brinkman, W.-P. (2008) Minimal Connectedness: Exploring the effects of positive messaging using mobile technology. *CHI '08 extended abstracts on Human factors in computing systems*. Florence, Italy. ACM press, 2513-2522.

system and the absence of known pre-existing connections, as well as to the amount of social demand placed on users. Further characteristics of this notion are also discussed in this chapter.

Importantly, the study validates whether the usage of the positive technology PosiPost Me resulted in the sharing of predominantly positive expressions. Further questions in the context of mediating and sharing positive thoughts are also explored. This exploration and the iterative design process resulted in PosiPost Be, a Bluetooth edition that allows sharing of positive messages with people in close proximity. This Bluetooth application was built to further understand the role of the medium (see Chapter 2) and the influence of local-contextual awareness in sharing positive messages. The specific results from a study of its use are a number of design understandings, examples and insights, including support for social proximity-based and remote sharing of positive messages and improved understandings of positive disclosure by means of mobile technology.

5.2 PosiPost Me

At the end of Chapter 4, PosiPost Me was briefly presented as a design illustration for positive expressive technology. The design considerations developed in the previous chapter, were implemented resulting in a lightweight mobile application designed to investigate the potential of positive messaging. PosiPost Me is used as a facilitator of minimal connectedness, examining how this form of connectivity supports and gives rise to user's positive affect. A study is presented of the ways in which the application was used and understood. As well as encouraging positive thoughts, analysis shows how the form of minimal social connectedness afforded by the application is marked by its minimal social obligation, curiosity and ambiguity.

5.2.1 System design

The design decisions during the development of mobile PosiPost were informed by the prior paper-based and online studies, and the design considerations described in the previous chapter, which showed the potential for a prefix-based elicitation of positive emotions. As the prefix *Today I like* proved most popular, this was incorporated in the mobile tool. Importantly, these initial studies also drove the design for an explicitly mobile tool as these suggested a need for immediate expression at any place and any time.

Mobile devices connect people to other people, and particularly enable to connect with people on the move. Wei and Lo's study (2006) which investigated the social uses of

mobile phones with Taiwanese students, suggested that mobile phones can be seen as a pleasure device. Mobile technology offers communication, connectivity, content consumption and content creativity. The Smartphone is a capable, almost always on, two-way device for creating and consuming information, which according to Beale (2005) makes it an ideal device for pervasive and supportive social computing. PosiPost Me (Mobile internet edition) runs on a Smartphone and is an application that aims to exemplify its ability to support pleasant social interaction.

PosiPost Me (Figure 6) utilises a simple client-server based model that enables the sharing of messages via mobile Internet, using a 3G network. The mobile application was built with Python for the S60 (Smartphone) platform that uses PHP and JavaScript on the server side. The distribution of the messages in PosiPost Me is completely randomized and anonymous, so that contextual attributes —location, time and messenger of the postings— are not known to the receiver. Retrieval is based on message pull: any time the user likes, one can ask the client to retrieve a posting. Users can receive posipostings one at a time and view all messages that they have created for personal reflection. In this way, the user has direct control over the receiving and sending of the messages. For initial use, the system was populated with postings from the previous studies, so that posiposters could immediately use these as an inspiration for their own positive usage. Further details concerning the system can be found in the system's manual (see Appendix F).

Figure 6: Sending a message with PosiPost Me (Mobile internet edition).

5.2.2   Facilitating minimal connectedness

Although little is understood about the area of mobile technologies used to actively support positive affect, the research discussed in Chapter 2 points to a clear need for

social interaction in supporting positive emotions, and current trends in the design and growing use of communication technology have made this an increasingly important area of investigation. However, even though technology offers a wide range of possibilities to facilitate social interaction and expression, such as email, instant messaging and social networking sites, in Chapter 2 it was noted that these digital technologies do not always have a positive impact on social wellbeing; social technologies can be sometimes felt as demanding and obligating, requiring substantial personal effort, input and commitment. This suggests that there may be a role to play for a less demanding and more minimal form of social interaction than the engaging and rich forms of communication media that are available to users. This research looks to address this situation by presenting PosiPost Me as a probe for investigating positive expressive communication systems that facilitate minimal connectedness.

5.2.3   Related work

A few mobile applications correspond with PosiPost Me's notion of facilitating more lightweight forms of interaction. For example, Twitter's very fast growing popularity shows a role for minimalistic messaging and micro-blogging. However, PosiPost's interactive mechanisms differ, in that Twitter does not facilitate an anonymous, single and personal distribution of messages that places the stress on distribution randomness or encourage positive messaging. Twitter is not intended as a minimal connectedness tool as it even tends to make some users feel "too connected" (Lavallee, 2007). PosiPost Me is designed as a mobile application (although it can be used on a mobile browser), and so is interactively different, and offers different personal communicative affordances and immediacy. Kaye's work (2006) is interesting in demonstrating that simple, minimal devices can still be evaluated and interpreted as being rich. His work is different in that it facilitates intense one-to-one single bit communication between intimates as opposed to random strangers. It is therefore also not minimal in the social expectations and demands that this type of communication can bring. From this viewpoint, this work shares Hindus and her colleagues' (2001) belief that social interaction should not be imposed on users as people can already feel increasingly obliged to keep in touch, and can see added communication as extra responsibilities. Following on from the design considerations from Chapter 4, this work also draws upon design lessons on the creation of ambiguity and intersubjectivity in personal communication (e.g. Aoki and Woodruff, 2005, Boehner and Hancock, 2006). Ambiguity leverages space for multiple interpretations and can so create personal social space. Like ambiguity, also anonymity can be a valuable resource for design and user's (social) actions. Although anonymity is often believed to encourage malicious use and

antisocial behaviour, anonymity can have many positive effects, such as that it can encourage more open, honest and sometimes unexpected forms of communication between people at different levels (Ehrlich, 1999).

5.3   Pilot study with PosiPost Me

In this section, the focus is on a study investigating the real-world use of PosiPost Me. The objectives were to explore if actual use would correspond to the anticipated positive usage, determine if the design decisions for user interaction had been just, iterate the design of PosiPost and gauge initial understanding of potential positive emotional and social benefits.

For the pilot study, in 2007, seven people in England, were given a phone with the PosiPost Me prototype, interviewed and observed while using the application in their natural settings. These participants, in their late twenties and thirties, had various nationalities (including English, Irish and French), four of them were female, and all of them considered themselves to be relatively expert technology users and early adopters. The reason for this was that at this stage of the studies, advanced users were sought, because they could overcome potential difficulties with using a phone in general (for example, typing in a message) so as to focus on application use. Initially, participants were instructed to create and receive at least one posiposting, whilst observed and initially questioned on their immediate experience of the system. Participants were then left with the devices and asked to make use of the system in their own time for ± 5 five days (depending on the availability of the phones and participants); the determination of when and where to posipost was left to the participant in order to permit data-collection of real-world user behaviour. Participants were then interviewed in their everyday settings. Because of the mobile nature of the study, in which usage usually takes place in different places and moments of the day, it was believed that such an approach was more appropriate than a confined lab environment. The application served several aspects: as an artefact for users and researchers to think about new lightweight and expressive communication technologies; as a way of exploring the field-testing of the technology; and as a technology probe (Hutchinson et al., 2003) to understand the needs and desires of users in a real-world setting.

At this stage of the research, an in-situ exploration in which PosiPost was discussed and used as part of people's everyday practice and experience was considered as most suited and informative for gaining insights on the design, use and potential benefits of the mobile expressive technology. The technology probe method was used which meant that in this situation, PosiPost was regarded as a provocative artefact in which parts of the design were intentionally left minimal, open-ended and ambiguous for the users to

fill with their interpretation. The addition of more planned features such as the functionality to share pictures was held back to allow the study of the deeper motivational and social issues of interest, and avoid any additional complications caused by major usability problems introduced by this added complexity.

5.4 Study outcomes

The study with PosiPost Me uncovered several potential impacts and discussion points relating to the system's usage and broader social context. The qualitative data gathered offers important insights into the contextual use of the technology and its role in motivating positive feelings. The findings are outlined and discussed below.

5.4.1 Encouraging positive thoughts

Participants' usage with PosiPost Me resulted in over 30 posipostings created and many more received. All the participants created and received at least two messages. It is important to note that due to the intentions of this study, users were given the opportunity, but were not pressured to post (frequently), as the intention here was not to collect as many postings, but to catalyze discussion on how such positive expressive technologies could have an emotional impact on their users. Participants stated that they did not feel too pressured to posipost by fellow posters, which indicates that social demands were low.

As previously, all of the postings were categorised by two independent coders to test for a potential positive or non-offensive nature. A small series of Cohen's Kappa-Index of Inter-rater Reliability was calculated and showed the highest levels (1.0) of agreement, and thus considered as satisfactory. Interestingly, all the postings created with PosiPost Me were observed and coded to be of a positive and non-offensive nature. This strengthens the findings from the previous studies that (mobile) technology can encourage positive expression. However, as the participants used the application for the purpose of a study, this could have influenced the positive nature of the postings, because they were aware that these were being collected. Nevertheless, this is a promising indication that the design rationale for PosiPost Me appears to have been effective in encouraging the expression of positive emotions, although still requires further evaluation.

Examples of posipostings created include messages as diverse as "Today I like: Cod! In the Metro" or "Today I like finding my purse". Some were long and thoughtful reflections on life, others, brief and humorous. When observing participants receiving

posipostings, positive expressions and reactions such as smiles or laughter were frequently observed. When receiving posipostings, some participants reported reading them out loud or showing them to other people that they knew in their immediate surroundings. An especially enthusiastic reaction occurred when a posiposting was received which coincidentally matched the action and context of a participant at the time. While a participant was having a drink in a cafe, he received the posiposting "Today I like the smell of coffee. It is so good, and I love walking through town and being able to smell all the cafes." This might indicate that when posipostings synchronize with the current experience of the receiver, the message may be imbued with more meaning and be received more positively.

This relationship to context was also the case in message creation. References to location and what posiposters were doing at that particular moment in time seemed to be more prevalent in the content of mobile posipostings (e.g. "Today I like picking blueberries from the road") when compared to the positive thoughts expressed during the first-stage study using desktop web-based technology (e.g. "Today I like payday", or "…hugs and kisses"). The postings created in England, such as "Today I like the view over the River Thames" showed that the postings were dependent on the location of the study. Clearly, the mobile nature of PosiPost Me offers the potential for users to create messages that are situated within their contexts of use, and nearer the time that they feel the need for such expression.

The study points to a potential issue of reciprocal imbalance, in that one person's positive expression may not always provoke a positive emotion with the recipient; indeed the opposite may be true. For example, one participant noted that the posting "Today I like receiving sweet messages from friends" provoked mixed feelings, recognising that such a message might be pleasant to reflect on, but also that he felt a small sense of jealousy when considering why he had not received such messages from his own friends. This notion of reciprocal imbalance is an interesting point to recognise, and one that may have implications for the use of the application by particular user groups. Nevertheless, such reciprocal imbalance also has the potential to allow users to appreciate the world from a different perspective and this itself may bring a positive value to its users. Moreover, even though some posipostings were valued more and seen as more interesting, funny, or pleasant than others, all participants indicated that the messages they received were perceived as positive.

The application tries to explore and positively affect the wellbeing of the senders and the receivers. As users can both send and receive, they could potentially benefit in both ways (see e.g., Pennebaker et al., 2001). Although at this stage of the research process it is difficult to confirm whether posiposting had beneficial mental effects, for example on positive thinking, all participants indicated that they liked posiposting and enjoyed

the experience on the whole. Participants also expressed that because of PosiPost, they had to instigate themselves to think more about the positive things happening in their lives. For example, one participant expressed: "PosiPost made me focus and reflect on the positives in my situation when I was posting. The things I posted about were all small things, but made me realize that these things made me happy."

5.5   Minimal social connectedness

From participant's discussions, the concept of PosiPost Me as a facilitator of *minimal connectedness* emerged. The notion of minimal connectedness means that people are *decidedly connected* (i.e. participants are connected by choice) to another person's thought or experience. The minimality refers to the simplicity of the system and the common ground between people, and the absence of known pre-existing connections, as well as to the amount of social demand placed on users. Further characteristics are discussed below.

5.5.1   Social connectivity

PosiPost Me generates interactions between random, unknown people, and thus users are unlikely to have feelings of social obligation or expectations and to reciprocate within their relationships. As a participant explained: "I feel often guilty when I don't return a call or reply to friends' emails. PosiPost, in a way, feels less demanding than other social media." The fact that users do not actively have to engage in social relationships in order to receive positive emotional input is interesting in that it suggests that this minimal form of social connectedness has a positive emotional value to users without the costs of social engagement and the reciprocal effort and obligations that go along with maintaining social relationships. Minimal social connectedness does not mean that people do not feel connected to each other, but that *they are willingly connected with minimal required knowledge of each other*. One participant expressed: "I am often interested in knowing who the other poster is, but I am not necessarily interested in really getting to know them." One participant even stated: "I do not really care about the other person posting, I care more whether their messages are interesting or not!"

5.5.2   Simply sharing

The low effort costs associated with receiving a PosiPost message appeared to be the main reason that receiving messages occurred far more frequently than the creation of postings, and most participants said that they preferred to receive posipostings because

of this. However, the creation of postings on the whole, was also perceived as "fun". Also, whilst the generation of messages required very little effort, sending messages was also relatively simple, not just in terms of physically generating content and inputting a new message through the Smartphone interface, but also in that it did not require its users to take any consideration for the needs of other people in their social network, as might be seen in determining when and how a phone call or email message might be appropriate for its recipient. The designed-in anonymity of the messaging negated any requirement for considering the emotional needs of people that they knew and consequently also reducing the effort required to contextualise their expressions of positivity. The generation of messages was also considered an important part of the use of the system in another respect, with its users both recognising and gaining vicarious pleasure from the thought that other people might enjoy reading their own postings, as well as the fact that they could express to the world-at-large their own positive feelings at that moment. As one participant expressed: "I just want to share my happy feelings with the whole world!"

The point that more postings were received than sent may not be simply to do with the low effort costs of message retrieval: most participants reported that they often chose to receive multiple posipostings one after one another, indicating users' curiosity and broader interests in other (though unknown) people's thoughts and ongoing activities. As a participant expressed: "It gets very addictive to receive a message. Once I received a message, I kept on pressing the button to see the next positive thought as I was curious to see the next and the next one each time." Another participant also stated: "One is not enough. I want to see more of them". This links to what some of the participants likened to an engagement and connectedness with the world at large, and perhaps that these were psychological insights that they might not normally be party to. This might be because of the message's utterly mundane character (such as "Today I like: When my hair smells nice") or allowing users to feel that they were as normal (or some other socially binding characteristic) as the original message poster (for example, "Today I like singing loudly like an idiot"). This access to people's inner mental and experiential worlds, even though those other people were unknown to the participants, provided both a sense of entertainment and self affirmation that, in both cases, carried a positive message to PosiPost's recipients.

5.5.3 Curiosity and ambiguity

This issue of curiosity into the inner lives of others links to the embedded ambiguity of the design in the presentation of content to message recipients. PosiPost Me's random and anonymous distribution of posipostings results in messages that can be completely

decontextualised. Details such as person, origin and time are completely unknown to the other user. As a participant noted: "These messages are rather cryptic". Another participant, responding to the message "Today I like: ballet flats" recorded that he had no idea what 'ballet flats' were. Instead of regarding this ambiguity as a problem, this can be seen as an opportunity. According to Gaver et al. (2003) ambiguity can be frustrating, but can also be intriguing, mysterious, and delightful, and this is reflected in the reported attitudes of the study's participants. The cryptic nature of the posipostings impelled the participants to interpret the messages' contexts for themselves, and seemed to encourage them to start grappling conceptually with the messages, the people and their contexts. For example, participants frequently reported wondering after receiving posipostings "Who sent this?" and tried to find their own interpretations behind the postings. For instance, one participant said: "I like to fill in the blanks and make a story around the poster and the posting, even though it might not be the actual story behind the message." She also expressed: "I enjoyed trying to write ambiguous messages." Another participant said: "PosiPost should definitely remain anonymous." —an opinion shared by many posters, often because they liked to keep the mystery around the posting. As another participant explained: "Part of the fun is getting the messages and guessing from whom these might be from."

5.5.4   Random togetherness

The nature of social connectivity provided by PosiPost Me as a form of random togetherness provides an interesting view into user's understandings of the 'global community' that we all form a part of. This is illustrated by participants who said to enjoy hearing about worlds of experience that were different from their own lives. For example, one English participant expressed that she particularly liked postings such as "Today I like trains and scenery in India" (even though this posting may not necessarily have been created in India) and another participant said: "I prefer postings coming from other places as I already know about my own." The sharing of one's 'daily likings' could provide for a possible abstract or vibrant connection between random individuals, with the positive, affirming existential benefits that this can bring with this.

Glimpses of other people's thoughts can be used as an insight or eye-opener into the nature of the likings of a remote individual, or could provoke an increased awareness for what is generally happening around the user's common world of experience. However, the introduction of an expressive system facilitating 'minimal social connectedness' raises questions of how it influences social interaction. As interactions are decontextualised and not directed to any known person, do they still hold value for

users? The collected data would suggest that it does, but it is hard to assess its extent, or how it would motivate users to continue to use the application. In an attempt to answer these questions, participants were asked if contextualising social connections and posipostings to location would add greater value. While some participants expressed the desire to use PosiPost in their own environment or amongst their group of friends, another participant expressed: "I don't mind the personal randomness at all. It is funny that it could be from anyone and anywhere in the world." This tension between decontextualised and contextualised interactions needs further attention.

5.5.5   Technical challenges

One clear usage barrier for PosiPost Me was that the application only works on Symbian Smartphones. Participants were given mobile phones with PosiPost Me and a free data connection (or offered the option to cover the cost of using their own SIM-card), but this issue of ownership might have impacted on the use and incorporation of the device into their everyday practices and needs. In some cases, participants mainly posted from their home or work, as they did not want to carry an extra phone around all the time or were afraid to lose or damage the phone. Also, the unreliable nature of fast mobile Internet coverage meant that not all of the messages created could be posted or requested messages received, which sometimes caused user's frustration. As a participant explained: "I was often frustrated when I could not receive PosiPost Me posts due to bad connection, but very happy when I did get them." Some users made interesting creative use of this issue, by challenging other users in a competition to receive the most postings by then picking out places (such as hanging out of the window) and times to obtain the best Internet coverage in order to share more postings than others.

At the end of the study, the majority of participants stated that they would like to continue to use the application on their own phone, but did not have a compatible model. Interestingly, the only participant that came into possession of a compatible phone and data connection continued to use PosiPost Me after the study.

5.6   Contextualising messages to location

The design and evaluation of PosiPost was iterative. The study with PosiPost Me aimed to evolve the design as a result of the input received from participants. And so the study provided feedback on how to continue the design work.

One of the important discussion points that came out of this study was the extent to which contextualizing expressions to a location would be beneficial for users. The

iterative design process therefore continued to result in a new mobile version of PosiPost, a social proximity device called PosiPost Be, to permit investigation of this issue. This Bluetooth edition enables the sharing of positive thoughts with people in close proximity to explore the social and potential positive effects of contextualizing posipostings where proximity interaction is a key factor.

5.6.1   PosiPost Be

With PosiPost Be users are able to exchange messages with other posiposters who come in close proximity, via Bluetooth. The application, built with Python for series 60 Nokia phones, enables the automatic sharing of positive messages with other posiposters within the Bluetooth range of ± 10 metres. In this design, users have the option to reveal clues about their origin (such as an alias or postal code). Due to the proximity, it is easier for the recipient to know the context. Dey (2001) defines context as "any information that can be used to characterize the situation of an entity", such as a person, place, or object that is considered relevant to the interaction between a user and an application, including the user and applications themselves. And thus in PosiPost Be's case, contextual attributes (time, place and the possible sender) of the posting are easier to determine. With mobile phones equipped with PosiPost Be software, users are able to broadcast positive thoughts to and freely fetch these posipostings from nearby users directly without connection to a network or server. The sharing of the messages is thus based on a decentralized peer-to-peer system, which uses a push method for receiving the messages. Users can moderate the postings, by having the option whether to pass on the received messages they like. The application can filter for specific Bluetooth names of the mobile devices so that posipost messages are only send to people who want to posipost. The reason for two mobile applications (i.e. Me & Be) is to understand the role contextual attributes and the medium plays on the nature of the messages shared and enable comparison of the potential benefits (see Chapter 7).

In terms of the system development and Bluetooth's automated sending functionality of PosiPost Be, the application was far more complicated to build than PosiPost's Mobile internet edition. However, the functionality of the systems for the user is quite similar; although the (known) contextual attributes (location, time, possible sender of the posting) are different, both media are built to receive and send positive messages using the prefix *Today I like*. PosiPost Be's instruction manual, which can be found in Appendix G, contains further details with regard to the system.

Figure 7: Waiting for, reading and sending a message with PosiPost Be.

5.6.2　Social proximity devices

Interactions through communication technologies such as Internet and mobile phones no longer require physical, temporal and local co-presence. As such, they have broadened the range of possible social interactions and changed perspectives on the role of location, time and physical barriers of communication in the design of social media. Inspired by THE Medium model, which has identified users' Environment and being in *proximity* or *distant* from one another as a factor that can be influential in social interaction, PosiPost Be is a *proximity*-based application for the *synchronous* sharing of positive messages. As such, it offers a contrast to PosiPost Me's *remote* and *asynchronous* way of sharing messages.

Research in proximity-based mobile applications has primarily focused on location-based services (see e.g. Li, 2004). Such mobile services focus on providing or

disclosing location related information to people on the move. One example of a social location disclosure application is Dodgeball (2008). This is a mobile social networking application that enables users to share their location with friends via text messages. PosiPost Be can be differentiated from such work by the fact that it is focused on supporting users in *sharing positive emotions* with others in close proximity (i.e. within Bluetooth range of up to 10m), perhaps between friends or strangers.

A downside of proximity-based messaging applications has been exemplified by the practices known as 'Bluejacking' (Thom-Santelli et al., 2007) and 'Bluecasting' (Duckham et al., 2007) which is the sending of unsolicited messages via Bluetooth. Complex security mechanisms on Bluetooth phones to avoid such intrusion is a possible reason why proximity-based Bluetooth applications are not so numerous. Bluetooth security is also an issue for PosiPost if it is to scale beyond a research project (see future work in Chapter 8).

5.6.3 Moderating positive thoughts and mobile technology

Although it is possible for users to post negative content with PosiPost Me and PosiPost Be, the applications are not designed to encourage this form of use. Based on the design considerations presented in Chapter 4, PosiPost aims for positive interaction by its use of colours, wordings and the provision of the positive prefix *Today I like.* PosiPost Be enables the user to pass on the received messages they like. In this way, the user can instantly moderate messages with a perceived negative content. Although mechanisms to moderate the content of posipostings to discourage any potential future 'negiposts' are in place and could be used if desired, until now however, this has not been needed. The content analysis in Chapter 4 showed that none of the posipostings starting with *Today I like* were perceived as negative, a finding that was further replicated via the study with PosiPost Me in this chapter. In Chapter 7, this finding will be investigated and further verified with both the PosiPost mobile applications.

Although the initial findings show that positive usage can be encouraged by means of the technology, developing for positive messaging with PosiPost Be proved more challenging. The reason of this were the difficulties encountered in bypassing the mobile phone's Bluetooth security, which although normally intended to prevent unwanted or negative messages, also makes the automatically sending of messages with more positive intentions more difficult.

5.7   Discussion

This chapter implemented the design considerations developed in Chapter 4, which particularly pointed to mobile technology for the sharing of positive messages. As the prefix *Today I like* was particularly effective in triggering positive and situated emotions, this prefix was incorporated into two mobile versions of PosiPost to encourage the expression and sharing of positive disclosure, affording users immediate expression of and access to positive thoughts wherever and whenever users so wish.

Through an iterative process, two positive expressive applications were built to run on mobile technology to facilitate the expression and sharing of daily likings, with remotely located people via PosiPost Me, and with people in close proximity via PosiPost Be. Both mobile PosiPost prototypes aim to encourage positive sharing, but each have their distinctive flavour, offering a differentiable experience and opportunity for comparative study (such as done in Chapter 7).

The design of both media was purposely kept lightweight. Discussion with this study's participants affirmed a need for positive expressive technology that facilitates more lightweight forms of interaction, requiring minimal input, effort and social demands. The anonymous disclosure, the 'minimal connecting' and simple micro-blogging functionality afforded by the presented mobile applications, could be seen in similar line with the superficiality, the anonymity, and the transitory character of urban-social relations, as pointed out by Wirth (1938).

The mobile PosiPost versions are relatively simple in their implementation, essentially providing a text stream between random mobile users. However, this description belies the complexity of use for the production and consumption of posipostings, as evidenced by their interpretation, role and use as described by study participants. As a technology probe, the study with PosiPost Me provides an insight into how positive technologies can have an emotional impact on their users, and the findings offer a view into how people create, interpret and make use of content intended to elicit a positive emotional response. The study also explores the notion of minimal connectivity through its highly constrained model of social (dis)connectedness. What the findings perhaps unexpectedly demonstrate is that these restricted conditions for communication do not negate the usefulness of the application, rather they afford unique and valued characteristics that users employed for their own purposes, and which appeared to have an impact on enhancing positive affect in its users.

As with the other studies (and subsequent use), even though users are mostly anonymous, no malicious use has been found or reported. This is not to say that the system will not be appropriated for malicious purposes, but that there have been no instances recorded, which in itself is an interesting outcome. Further work now involves

the further assessment of the potential social effects and benefits of positive expressive technology, exploring whether positive emotional responses are actually engendered. How the concept of minimal connectedness can be employed for future technology design remains an open research challenge for the HCI community.

The study validates some iteration with regard to the research questions and raises issues that need to be further investigated in subsequent study, such as exploring the effects of contextualising positive messages and the role of the medium. The iterative design approach resulted in the social proximity based application PosiPost Be as a design exemplar for the mobile mediation and moderation of positive thoughts. Particularly, PosiPost Be was created to focus on the immediate distribution of messages with people in close proximity (location and time send are made known, revelation of user's origin is optional), to allow exploration and comparison of the social and potential positive effects when contextualizing posipostings by adding the factor of localized social proximity. The gained understandings and developed prototypes of this chapter are used for the further in-depth study of the social and emotional effects of using mobile PosiPost, as described in Chapter 7.

6   Measuring social wellness

6.1 Introduction

The previous chapter provided insights into the potential beneficial social and mental effects as a result of using positive expressive technology. This chapter discusses the development of a questionnaire instrument called **SPOT** to enable the measurement of *Social and Positive psychological effects Of Technology* in more quantifiable detail. **SPOT** was designed to assess whether the mobile PosiPost systems serve social and emotional communication needs, and to measure its social and mental impacts. Thus, with this questionnaire, the focus is specifically on the social and affective benefits that positive expressive systems may foster. Furthermore, the validity and reliability of the developed instrument and its constructs will be discussed.

The measurement of something as intangible as social wellness and other related constructs is not without difficulties. The following sections reflect on previous approaches and measuring instruments to address this challenge.

6.1.1   Measuring social concepts

Although recent developments have seen the emergence and proliferation of social and communication technologies, valid and reliable instruments that measure the social effects of such systems have not kept pace with technological developments. However, some researchers have started to underline the importance of developing measurement methods that are sensitive to the social experience with these systems (e.g. Tu and Yen, 2007, IJsselsteijn et al., 2003).

The lack of valid and reliable measures for mediated social affects could be partly due to difficulties in grasping and capturing social concepts. Some researchers have started to define the conceptual space of social abstracts, particularly connectedness and awareness (Bel et al., 2008, Baren et al., 2004), to guide measuring instruments. Agreement on such conceptualisation is important in order to reach an acceptable level of content validity and so to guide more valid and reliable measures. In psychometrics, content validity (also known as logical validity) refers to the extent to which a measure represents all facets of a given social concept. A method of measuring content validity was developed by Lawshe (1975). It is essentially a method for gauging agreement among experts or judges regarding how essential a particular item is. Lawshe's method is proposed for the development and evaluation of the SPOT instrument. This enables an agreement on the representation of its concepts and so to help remedy limitations in past attempts for measures.

6.1.2   Methods for measuring wellbeing

Oatley's understanding of emotions as evaluations (2007) and communications to oneself and others (1992) underpinned the conceptual space of thesis. However, emotions and related affective states are complex, while its definitions often do not refer to a single, well-defined or easily observable phenomenon, thus reflecting the complexity of the area (Hudlicka, 1995). Happiness and emotion research is also hampered by differences and variances in terms of the conceptualisation of its subject as well as the limitations inherent in current measurement techniques (Larsen and Fredrickson, 1999). It is therefore worth taking a moment at this point to explore the psychological research into subjective wellbeing —a less colloquially term for happiness— in the context of measuring. Research has identified two broad aspects of subjective wellbeing: an affective component, which is usually further divided into pleasant affect and unpleasant affect (Diener, 1984, Watson et al., 1988, Larson, 1987, Diener et al., 1991b), and a cognitive component, which is further referred to as life satisfaction (Pavot and Diener, 1993). A distinction in measuring attempts can also be drawn between brief emotional episodes of positive affect, periods of joy, pleasure or acute happiness, and a longer, underlying state of happiness, that can be conceptualised as a sense of satisfaction with one's life, both in general and in specific areas of one's life such as relationships, health and work (White, 2007). This longer, underlying state of happiness, a measure of subjective wellbeing has been the focus of most current research. The focus in that case is thus subjective wellbeing and attempts to understand people's own evaluations and attitudes towards their lives. An example of this is the Satisfaction With Life Scale (Pavot et al., 1991, Diener et al., 1985, Pavot and Diener, 1993), a currently popular instrument for judging and assessing overall satisfaction with life. It seems likely that the interest in such measures of happiness has to a large extent been promoted by a call for measures of subjective wellbeing to form the basis of government policy and the political assessment of a nation's success (Diener, 2000).

Research has also focused on brief measures of affective wellbeing, resulting in several instruments that measure affect. More particularly, mood and affective wellbeing have been frequently assessed with the Affectometer (Kammann and Flett, 1983) and the Positive and Negative Affect Schedule (PANAS) (Watson et al., 1988). Although the PA-NA (Positive Affect-Negative Affect) typology has proven to be quite popular in investigating, several limitations exist. First, more research has been focused on negative affect, in many cases to the exclusion of positive affect, such as in scales to measure depression (e.g. Beck and Steer, 1984). Second, the issue of the independence of PA and NA continues to be debated in the literature (Russell and Carroll, 1999a, Russell and Carroll, 1999b, Watson and Tellegen, 1999). Also, researchers (e.g. Larsen

and Diener, 1992) have noted problems with the PANAS scales as measures of PA and NA in general. The particular items of the PANAS scale stand out as unlike those chosen by other researchers. For example, the items *happy* and *depressed* are missing while high arousal items are predominate (for PA: Active, Alert, Attentive, Excited/ for NA: Distressed, Jittery, Upset). This focus on high activation might explain why in studies (Kennedy-Moore et al., 1992, Egloff et al., 1995) PANAS' PA scored higher on weekdays than on weekends, whereas with other measures positive affect increased in accordance with the higher number of positive events and less work over the weekend. Egloff, et al. (1995) also argue that this is a result of the fact that Positive Affect as measured by the PANAS is best described as "engagement." As this research is more interested in measuring positive affect as in "pleasantness" and social effects, PANAS was therefore not found appropriate for this study.

Positive affect is related to social activity (Clark and Watson, 1988), but an instrument that assesses both social and positive affects, as a result from using technology, in detail, is hard to find. However, unlike the PANAS, the Affectometer scale and its revised second edition (Kammann and Flett, 1983, Tennant et al., 2007) attempt to incorporate social concepts in its instrument, as "interested in other people" and "lonely" are some of its items. Affectometer 2 had previously been suggested as a promising scale and psychometrically sound tool for monitoring positive mental health (Kammann and Flett, 1983, Tennant et al., 2007) and has been included in the Health Education Population Survey (HEPS) in Scotland. It does not include items specifically on life satisfaction, but affective wellbeing is well represented. This suggests the potential for assessing changes in the level of (social) wellbeing. This scale comprises 20 statements and 20 adjectives relating to mental health in which positive and negative items are balanced, and interestingly, the development of a version with a reduction in the number of items was supported. As the Affectometer 2 had a few social items and a good range of positive items, its adjectives (16 out of the 20) were used as a starting point for the development of a new scale to fit within the measurement goals of the study and represent the social and positive psychological aspects of the affective experience with technology.

The rest of this chapter reports on the development and testing of a new measure —the scale for *Social and Positive psychological affects Of Technology* (**SPOT**). This scale builds on previous scales, such as the Affectometer, and aims to capture a wide conception of social wellbeing, including affective-emotional and social aspects, in a form that is appropriate enough to be employed in user studies with technology.

6.2   Development of SPOT

To enable the measurement of potential beneficial effects of positive messaging on people's social wellbeing, and gauge users' opinions of mobile PosiPost's usage, a questionnaire instrument, called SPOT was developed. This section describes the development, content validation and reliability testing process of the SPOT instrument, designed to evaluate whether the developed positive expressive technologies support user's positive mental and social needs. A literature review revealed that at present, there appears to be no suitable measurement tool to address the affective and social affects of communication means. This prompted the development of a new questionnaire instrument which specific focus was on the social and affective benefits that positive expressive systems may foster.

6.2.1   Method

SPOT's development draws on the results from the qualitative study with PosiPost Me, current academic literature, existing scales, an expert panel testing the content validity, and psychometric testing for alpha reliability. After reviewing the key literature (e.g. Romero et al., 2007, Kammann and Flett, 1983, Baren et al., 2004) a list of questionnaire items was established. This resulted in a questionnaire consisting of two parts. Part A consisted of a set of adjectives (e.g. happy, depressed or sociable) for which participants needed to rate to what degree this fitted which how often they felt that way over the last week on a five point scale (0=not at all–4=All of the time). Part B of the questionnaire had 67 questionnaire items, representing various constructs, such as Connectedness and Positive awareness. For this part, participants are required to rate on a seven-point Likert scale, the extent to which, they agreed or disagreed with the statements concerning PosiPost.

6.2.2   Content validity and reliability testing

Firstly, in order to validate the SPOT instrument and to determine how representative the questionnaire items were for the particular constructs, a content validity approach was adopted. Secondly, Cronbach's alphas were calculated to measure the internal consistency of the SPOT instrument.

For the first part, Lawshe's method (1975) was used to assess the content validity of the questionnaire's proposed constructs and its items. Although relatively few researchers have taken this approach (e.g. Dwivedi et al., 2006), Straub et al. (2004) suggests that this is an important and highly recommended practice, particularly in the case of developing a new instrument. This meant that a draft version of the questionnaire for

content validity testing was sent to a panel of experts, who were asked to indicate for each item whether it was 'Essential', 'Useful, but not essential', or 'Not necessary' to measure the underlying construct. For example, for the 'Happy' item, all experts rated it as essential for measuring the construct wellbeing, and the statement "PosiPost increased my positive thoughts" was rated as an essential item for measuring the construct positive thinking. The content reviewers were experts in areas such as affective research, sociology, psychometric testing, HCI, CSCW, clinical and social psychology. The reviewers were selected on the basis of publications and involvement in leading conferences, workshops or their engagement with the research area. The content validity questionnaire, which can be found in Appendix A, was sent to 15 experts using e-mail which included a description of the purpose of the study and instructions on how to complete the questionnaire. Replies from 13 respondents were then collated by counting the number indicating "essential" for each item. According to Lawshe, if more than half the experts indicate that an item is essential, that item has at least some content validity. A greater level of content validity exists as larger numbers of experts or panellists agree that a particular item is essential. Using these assumptions, Lawshe developed a formula termed the content validity ratio: CVR = (ne - N/2)/(N/2). In which CVR= content validity ratio, ne= number of panellists indicating "essential", N= total number of panellists. Using this formula, the questionnaire items that did not meet the minimum desired CVR values were omitted, so that a questionnaire with satisfactory valid constructs remained. The CVR values of the final items (rounded to one decimal place) all met the minimum strict CVR value of 0.5 at the 0.05 level of statistical significance for a panel size of 13 experts (see Lawshe, 1975, Brinkman, 2009 for the tables of minimal CVR values to ensure that agreement is unlikely to be due chance). Apart from assessing content validity, the experts also provided some qualitative feedback on the questionnaire in general, for example when they believed items needed clarification or rewording. These suggestions were incorporated before the revised instrument was used in a study with PosiPost Be and Me, described in the next chapter.

Straub et al. (2004) recommend that a new survey instrument should undergo statistical procedures to determine whether constructs demonstrate an acceptable level of reliability. The internal consistency of the underlying constructs was therefore measured with Cronbach's alpha. To test the reliability of the SPOT instrument, it was given to a post-graduate population sample in a study with PosiPost Be and Me (further described in the next chapter). For the final resulting SPOT instrument, some items were removed so that the Cronbach's α-values would improve. The α-values of the resulted constructs ranged between 0.6-0.9, which can be interpreted as indicating acceptable reliability.

The findings are presented in Table 10 and Table 11. In these Tables, apart from Lawshe's 'strict' CVR, the light CVR (explained as 'relaxed' by Brinkman, 2009) is also given, which is a less stricter version of Lawshe's CVR as it also takes the 'useful, but not essential' items into consideration. These tables illustrate that even for the strict CVR all the constructs had a value above 0.5. This means that the instrument also possesses an appropriate level of content validity.

Table 10: Part A's final questionnaire items: reliability expressed in Cronbach's α (alpha) and Content Validity Ratio (CVR).

Part A	CVR		Cronbach's α			
Adjectives	CVR light	CVR strict	preBe	postBe	preMe	postMe
Wellbeing[1]	0.97	0.57	0.28	0.29	0.18	0.18
Happy	1.00	1.00				
Tense	1.00	0.50				
Depressed	1.00	0.83				
Construct: Social	1.00	0.72	0.83	0.82	0.36	0.70
Sociable	1.00	0.83				
Interested in other people	1.00	0.83				
Socially aware	1.00	0.50				

[1] Wellbeing was tested as being multi-dimensional (Crohnbach's α<0.7)

Table 11: Part B's constructs (and its items) —construct reliability expressed in Crohnbach's α (alpha) and Content Validity Ratio (CVR).

PART B	Cronbach's α			CVR	
Construct and items	*Be*	*Me*	*Mean Be& Me*	*Light*	*Strict*
Social disclosure	**0.70**	**0.79**	**0.74**	**0.9**	**0.3**
I wanted to maintain a sense of distance between other posiposters				0.8	0.5
I wanted to make posiposting more intimate				1.0	0.4
I got to know more about other people				1.0	0.1
I did not learn anything about others				0.8	0.2
Appreciation of messaging system	**0.74**	**0.67**	**0.71**	**0.9**	**0.5**
I felt in control of the interaction				1.0	0.4
It was easy to posipost				1.0	0.4
I would not recommend this application to others				1.0	0.7
I like receiving positive thoughts from strangers				0.7	0.5
I like sending posipostings					
I liked receiving posipostings					
Message perception	**0.59**	**0.77**	**0.68**	**0.9**	**0.8**
The messages I received were positive				1.0	1.0
The application provoked negative messaging				0.8	0.7
I liked the messages I send					
I believe that the postings I send were stupid					
Perceived positive affect	**0.65**	**0.75**	**0.70**	**1.0**	**0.7**
I smiled when receiving posipostings				1.0	0.5
Other's positive thoughts did not make me happy				1.0	0.7
I believe my posipostings made other posiposters happy				1.0	0.5
Posiposting made me happy				1.0	1.0
The application did not make me feel more positive				1.0	0.7
Positive thinking	**0.79**	**0.74**	**0.77**	**0.9**	**0.8**
Sharing positive thoughts with others did not inspire my own positive thinking				1.0	0.7
PosiPost increased my positive thoughts				1.0	1.0
People's posipostings positively inspired me				1.0	0.8
Other's positive thoughts influenced me in a negative way				0.7	0.7
Socio-pleasure: the enjoyment derived from interacting with others	**0.8**	**0.82**	**0.81**	**0.9**	**0.8**
Sharing posipostings with others was fun				1.0	1.0
Interacting with others through PosiPost was not pleasurable				0.8	0.5
I like sending posipostings				1.0	1.0
I liked receiving posipostings				1.0	1.0
I like reading old posiposts				1.0	0.5
I did not like sharing positive messages with others				0.7	0.5
Social curiosity	**0.79**	**0.72**	**0.75**	**0.8**	**0.6**
Some posipostings made me curious				1.0	0.8
I tried to discover who the other posiposters were				0.8	0.5
PosiPost did not make me (more) interested in others				0.7	0.5
Awareness	**0.57**	**0.84**	**0.70**	**0.9**	**0.5**
PosiPost did not make me feel more aware of my social environment				0.8	0.7
PosiPost made me more aware of others				0.8	0.7
Because of posiposting, I paid more attention to what's going on around me				0.8	0.4
When posiposting, I was not aware of my real environment around me				1.0	0.4
Positive awareness	**0.65**	**0.86**	**0.76**	**0.8**	**0.6**
PosiPost made me feel more positive towards others				1.0	0.8
Because of PosiPost, I gained a negative attitude towards other people				0.5	0.5
Through PosiPost, I looked more positively on my surroundings				1.0	0.7
When posiposting, I saw my environment through a negative lens				0.8	0.4
Connectedness	**0.69**	**0.70**	**0.69**	**0.8**	**0.6**
I would like to become acquainted with other posiposters				1.0	0.5
PosiPost made me feel more connected with others				1.0	0.8
Other posiposters felt as strangers to me				0.7	0.5
I felt distant from others				0.5	0.4

6.2.3   The SPOT instrument

The employment and testing of the SPOT instrument in the study with the PosiPost Me and Be prototypes did not result in major issues expressed by the participants, which leads to a tentative suggestion that SPOT is an adequate instrument. The revised SPOT questionnaire consisted of two parts: Part A was used to measure participants' social and mental state at the particular moment. For example, the participants involved in the study described in Chapter 7 completed Part A before and after the days they used the PosiPost application. Part B was to gain participants' more detailed perceptions on the effects of PosiPost, which participants only completed after they used the PosiPost application. The questionnaire seemed to be rather easy to administer, also in combination with the positive expressive technology. The only main issue expressed was that the questionnaire was considered as quite long, considering that for the study this needed to be filled in multiple times. However, the content validity study and the α-reliability testing further reduced the items.

For Part A, 24 items were originally tested (see Appendix A), from which 16 adjectives had been taken from the Affectometer 2 (*Lonely, Good natured, Clear headed, Helpless, Impatient, Useful, Depressed, Relaxed about things, Optimistic, Withdrawn, Interested in other people, Discontented, Confused, Tense, Understood, Insignificant*) and eight added (*Happy, Sociable, Reserved, Detached, Friendly, Socially aware, Connected, Unconscious*). Interestingly, most of the 16 adjectives that had originally been taken from the Affectometer 2 had relatively low values in terms of content validity and reliability, so that only three of its original adjectives (*Interested in other people, Tense* and *Depressed*) remained in the final SPOT instrument. Conclusively, as shown in Table 10 and Appendix D, from the 24 adjectives tested for Part A, six adjectives (*Sociable, Interested in other people, Socially aware, Happy, Tense,* and *Depressed*) finally remained in the resulting SPOT instrument.

The final constructs are shown in bold in Table 11. The final resulting SPOT questionnaire, which has been appropriated for further testing and usage by other researchers —including the scales and instructions for participants— can be found in Appendix D.

6.3   Discussion and limitations

This chapter described research focused at developing and testing a questionnaire instrument that is sensitive to the affective and social benefits that positive expressive media may have for its users. The results from this study imply that the developed

SPOT instrument is a promising measure as the testing during the development phase has shown indications for it to be a reliable and valid measure. It has to be noted though that the instrument has some limitations and needs further iteration and validation (such as testing for its construct validity). Wellbeing could not be taken as one construct as it was found to be multidimensional. Furthermore, the instrument was designed within the context of the PosiPost technology. By removing all references to PosiPost from the items (such as done in Appendix D), the instrument would allow the measurement of social and positive mental effects of expressive technology without explicitly linking it to the use of PosiPost. Therefore, it is believed that the SPOT instrument could become a useful addition to the currently limited spectrum of relevant measurement tools in the field of technology-mediated social and positive communication, particularly aimed at measuring the dimensions of social wellbeing and the social and affective effects of expressive media. SPOT is very likely to prove a useful step forward, but it should not be regarded as the last word on the subject as further validation and iteration should be promoted. As the focus on the positive end of the spectrum of mental health increases, understanding of the concept will grow and develop, and new iterations and measures may be revised and required.

To discover more about the nature of potential benefits of positive expressive technologies, these need to be identified and studied through scientific measurement. The developed instrument has therefore been put to use in the study with the mobile PosiPost prototypes, which is the focus of the next chapter.

7 The effects of positive messaging

7.1 Introduction

To understand potential impacts of positive expressive technologies and to develop design responses that will encourage positive outcomes, the impacts must be assessed. The following part of the study will detail the impacts of the developed mobile positive expressive technologies.

This study investigates the pleasures people enjoy in everyday life, and explores the effects that occur when people are given the opportunity to share those pleasures with two mobile applications, PosiPost Be and PosiPost Me. An empirical study was conducted, involving 15 participants in England and The Netherlands using the applications for a week each. Drawing on the SPOT questionnaire instrument, interviews and a corpus of 379 messages shared, the study presents a content analysis of the kind of pleasures people express and an investigation of the effects of sharing such pleasures. The study points to the importance of the mundaneness of reported pleasures and discusses the role simple mobile technology plays in making mundane pleasures visible. The results from the study testify to the social and emotional benefits of sharing mundane pleasures with lightweight technology. Particularly, empirical findings showed significant increased *social interest in others* and a decrease of feeling *depressed* as a result of using PosiPost.

For the empirical study, the two mobile messaging technologies PosiPost Be and Me, as discussed in Chapter 5, were used to investigate the potential of positive messaging. The empirical study discussed in this chapter had three main purposes: 1) to find out what kind of daily pleasures people express when given the opportunity to anonymously record and share positive feelings with others; 2) to study the potential beneficial social and emotional effects as a result of using PosiPost Me and PosiPost Be; and 3) to understand the potential influential role of the (lightweight) mobile medium and the context of messaging.

7.2 Method

The study involved 15 participants, 8 male and 7 female post-graduates, between 20 and 40 years of age (M=28, SD=3). The participants had a wide variety of different nationalities (including Dutch, English, American, Indonesian, Chinese, Kuwaiti and Romanian), but were all based in England or The Netherlands. The users in England belonged to a group of friends living near each other in London. In The Netherlands, the

users were colleagues who worked in the same university building in Delft. These sites were chosen to ensure that messages would be regularly exchanged with people in close proximity, when using PosiPost's Bluetooth edition. When the participants were asked about their mobile phone experience, 20% said they used mobile Internet, 80% used their phone just to SMS and call and all of them indicated to have a mobile phone.

The participants used both PosiPost applications for one week each. They were instructed to use the application, post at least one time a day, and were given manuals for PosiPost Be and Me for further reference (see Appendix E, F and G). A neutral stop week was held between these two periods to diminish the possible effects from using the first application. Ethical approval from the University department, and written consent from the participants had been obtained before the start of the study (see Appendix B for the form of consent). The majority of the participants indicated that they preferred to be given a SIM-card, rather than using their own (and being reimbursed for potential costs). In The Netherlands, the participants were randomly split, subject to availability, into two groups of five; one group started with the PosiPost Me application and the other with the PosiPost Be application first (see Table 12). Reasons for this set-up were a limited availability of suitable mobile phones and to counterbalance the potential influence of the order of using each application.

Table 12: Usage of the PosiPost applications by the two groups, according to week.

Group 1	PosiPost Be	Week of rest	PosiPost Me	
Given SPOT Part A	A&B	A	AB	

Group 2		PosiPost Me	Week of rest	PosiPost Be
Given SPOT part	A	A&B	A	AB

Week nr.	**1**	**2**	**3**	**4**

To enable the measurement of potential beneficial effects of positive messaging on people's social wellbeing, and gauge users' opinions of mobile PosiPost's usage, the early version of the developed questionnaire instrument SPOT, discussed in Chapter 6, was used (see Appendix C)[6]. The SPOT questionnaire consisted of two parts: Part A was to measure participants' social and mental state at the particular moment. Participants completed Part A before and after the days they used each PosiPost application. Part B was to gain participants' more detailed perceptions on the effects of PosiPost, which participants only completed after they used the PosiPost application. The pre- and post effects of positive messaging were only studied using data from Part

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[6]Although the participants received the pre-SPOT version which contained more items, the analysis of the final study only used the final (valid) items of the SPOT instrument.

A of the questionnaire from the 10 Dutch participants. This was because participants in England started too enthusiastically and did not complete Part A before using PosiPost. Moreover, the five participants used both applications at the same time. Thus, accurate pre-measurement for the English group could no longer be obtained for this part. Part B of the questionnaire was given to both groups after they used each version of PosiPost so that a comparison between the different media could be made. The postings shared were recorded for later analysis. Furthermore, all participants were interviewed after using both versions of PosiPost.

7.3   Content analysis

The study resulted in 379 (179+200) messages created with PosiPost's two editions (Mobile internet and Bluetooth, respectively). Based on the postings shared with the two different versions of PosiPost, the study provides a content analysis of the pleasant moments that users expressed and shared with others and particularly explored the potential mundane nature of such experiences.

Apart from work that led to the theory of flow (Csikszentmihalyi, 1990), only a few studies have been published that have gathered and analyzed pleasant everyday experiences. In most of these studies the focus has been on rather dramatic emotional experiences such as bereavement (Pennebaker et al., 2001), births, overcoming an illness (Scherer and Tannenbaum, 1986) or a grand moment of winning the lottery (Brickman et al., 1978). An exception are the studies by Clark and Watson (1988), and Csikszentmihalyi and Hunter (2003) who gathered information about positive and negative experiences through written diaries and experience sampling, to learn about daily emotional events. The top reported pleasures had a more mundane character, such as watching TV, talking with friends, and eating a meal. Also the studies described in Chapter 4 and 5 pointed out that there are various moments that people express and undergo in everyday life which are not necessarily dramatic or peak experiences. As mobile phones have become 'mundane', meaning that they have increasingly become pervasive and integrated into people's daily life practices, the mobile PosiPost applications offer a good opportunity for the sharing and recording of people's day-in, day-out pleasurable moments, in a lightweight, non-invasive way. By using the mobile PosiPost applications for the recording and sharing positive expressions, the contents could be analysed to uncover various pleasures in everyday life that people engage in. The messages generated in the study (e.g. "Today I like ice skating! On natural ice" or "Today I like getting an email from my father") were analyzed and coded into different categories. The categories used were based on the findings from the previous content analysis described in Chapter 4 and Tiger's pleasure framework (1992). Tiger's

typology illustrates a broader range of classifications for pleasure, when compared with other pleasure frameworks (Wen-chih and Tyan Yu, 2007, Csikszentmihalyi, 1990), as the emphasis is not only on physical and cognitive pleasure (such as derived from a flow state), but also on the value of social interaction. To address the question of what the participants' shared expressions of happy moments were about and the possible mundaneness of those, the focus of this content analysis was on the pleasure and mundane categories. The categories are explained in Table 14 along with examples from the collected posipostings. The characteristics of the posted content were coded into these categories. Like the content analysis described in Chapter 4, this classification was done independently by two coders to ensure reliability. Afterwards, the consistency of the allocation of the codings by the two raters was examined by calculating a series of Cohen's Kappa, the measure for inter-rater reliability. As shown in Table 13, for all categories, there was a high level of agreement between the coders, given that all Cohen's Kappa values were above 0.80, which is normally considered as satisfactory (Robson, 1993). In the few cases where the two coders initially disagreed, they discussed and agreed on one classification afterwards.

Table 13: Agreement of coders expressed in Cohen's Kappa.

Category of content evaluation	Cohen's Kappa
Negative	1.00
Offensive	1.00
Psycho-pleasure (progress, accomplishment)	0.98
Leisure time (break, rest)	0.90
Ideo-pleasure (personal values, attitudes)	0.96
Socio-pleasure (human, social)	0.94
Physio-pleasure (physical sensation)	0.98
Mundane (everyday event)	0.89
Situatedness (right here/ right now)	0.82
Emotion (explicit)	0.94
Overcoming negative emotions or experiences	1.00
Materialistic possession (novelty)	0.99
Activity	0.87
Time	0.88
Object, medium	0.98
Environment (location)	0.96

Table 14: Numbers and percentages of postings to topic category.

Content category	Posted content that falls in category (of 379 postings in total)			
	Me	Be	Total PosiPost Me&Be	
	%	*%*	*Freq.*	*%*
NEGATIVE: Posting is not about something positive.	0	0	0	0
OFFENSIVE: Posting could be regarded as racially, sexually or politically offensive.	0	0	0	0
PSYCHO-PLEASURE (progress, accomplishment): Enjoyment derived from a certain progress, accomplishment or flow. Can refer to the satisfaction enjoyed as a result of individually motivated tasks or acts. *"Today I like completing a jigsaw puzzle"*	25	17	78	21
LEISURE TIME (break, rest): Posting contains task-free or relaxation moment. *"Today I like the weekend!"*	33	16	91	24
IDEO-PLEASURE (personal values, attitudes): Pleasure derived from books, art and music, etcetera, that are in agreement with attitudes and personal aesthetic, political, ecological values. Can refer to ideas, images, and emotions that are privately experienced. *"Today I like what I do for a living"*	30	23	101	27
SOCIO-PLEASURE (human, social): Pleasure derived from social contact and relationships with others. *"Today I like getting to know my colleagues better"*	41	33	140	37
PHYSIO-PLEASURE (physical sensation): Pleasure derived from haptic, visual, audio senses. Can e.g. refer to the physical sensation obtained from eating or drinking. *"Today I like the taste of chocolate melting in my mouth"*	47	46	176	47
MUNDANE (everyday event): Pleasure derived from a mundane, ordinary, simple thing happening in life. *"Today I like working at home"* *"Today I like a bit of fresh air"*	60	65	238	63
SITUATEDNESS (right here, right now): A posting concerning what is happening at particular moment in time and place. *"Today I like meeting new neighbours who grew up in Connecticut too"*	78	75	289	76
Emotion (explicit): An explicit reference to an emotional state of a person. *"Today I like happy people"*	3	6	17	4
Overcoming negative emotions or experiences *"Today I like going to return the washing machine"*	6	4	18	5
Materialistic possession (novelty) *"Today I like my new outfit"*	16	6	37	10
Activity: A reference to an action. *"Today I like playing football"*	24	13	68	18
Time: A reference to time. *"Today I like that it's almost xmas"*	22	16	72	19
Object (medium): A reference to a physical object. *"Today I like the phone"*	24	17	78	21
Environment (location): A reference to a physical location, or posting contains an environmental factor, such as a reference to the weather. *"Today I like the cold weather"*	30	23	100	26

In Table 14, the numbers and percentages of the postings according to topic category are displayed. For example, 25% of the messages posted with PosiPost Me fell in the category *Psycho-pleasure*. The categories in capitals are the ones that were found to be key to addressing this chapter's interest in mundane mediated pleasures (see Chapter 4 for further details on the other categories). The vast majority of the postings (99%) fell in at least one of these key categories (e.g. *Mundane*, or *Pleasure* category). As all the postings could be coded by at least one of the 16 categories, this suggests that this set of categories is describing practically all postings in some way. Again, the categories were designed *not* to be mutually exclusive. For example, a posting such as "Today, I like having cake with my colleagues" could be classified as a *Socio-pleasure* and further be placed in other categories such as *Mundane* and *Physio-pleasure*. Thus as before, each posting could have multiple codings.

Pearson's chi-square tests were carried out to compare the codings for each category of the messages generated with PosiPost Me versus PosiPost Be. No significant differences ($p. > 0.05$) were found for the pleasure and mundane categories, indicating that the mobile medium used had no clear influence on the kinds of pleasures and mundaneness reported. However, significant differences were found for the categories *activity* ($\chi 2 = 7.14$, $df = 1$, $p. = 0.008$), *leisure time* ($\chi 2 = 15.10$, $df = 1$, $p. < 0.001$) and *materialistic possession* ($\chi 2 = 8.83$, $df = 1$, $p. = 0.003$). Thus, the medium might have had some influence on the posted content related to these categories. For all of these three categories, significant more of this kind of posted content was generated with PosiPost Me than with PosiPost Be.

Three immediate conclusions can be drawn from the content analysis. First, all postings were considered as positive and non-offensive, which strengthens the findings of the previous studies, discussed in Chapter 4 and 5, that positive emotions can be mediated by (mobile) technology. Second, from the four pleasure categories, *Psycho-pleasure* scored lowest (21%). Even postings referring to *Leisure time* with its 24% scored slightly higher. This can be seen as an indication that pleasure derived from active flow states should not be the only concept of pleasure for the HCI community to focus on. Third, a very high proportion of codings fell in the *Mundane* category (63%). This calls for a further discussion that could guide design efforts in HCI.

7.4   Effects of sharing pleasant experiences

The results of the content analysis showed that positive messages of a predominantly mundane nature were shared and mediated with the PosiPost mobile technology. With

this knowledge, the effects of sharing mundane pleasures and also other positive messages could be investigated. During the study, the participants were asked to rate how they had been feeling that week according to a number of adjectives (SPOT part A), rate their appreciation of the system and give their opinion on a number of other questionnaire items that together formed social and emotional constructs (SPOT Part B). These adjectives and constructs were as follows:

Part A
- social –*sociable, interested in other people, socially aware*
- wellbein*g –happy, tense, depressed*

Part B
- *social disclosure (openness)*
- *appreciation of messaging system*
- *message perception*
- *perceived positive affect*
- *positive thinking*
- *socio-pleasure (the enjoyment derived from interacting with others)*
- *social curiosity*
- *awareness*
- *positive awareness*
- *connectedness*

Using these adjectives and constructs, user's preferences, perceptions, mental and social effects of both the applications were explored.

On the data of the pre- and post study (part A), univariate analyses were conducted (Table 15) to test the influence of using PosiPost Be and Me for each construct. Even though the sample group was small (n=10), the results still show that the usage of PosiPost had a significant effect on participants being *interested in others* ($F(1,9) = 7.58$, *p.* $= 0.022$) (*M* pre: 3.3, *M* post: 3.5) and on feeling *depressed* ($F(1,9) = 5.65$, *p.* $= 0.041$) (reversed value; not depressed *M* pre: 4.4, *M* post: 4.8). These are important findings as the results of the pre- and post study indicate that the usage of *PosiPost* had beneficial effects, as the findings thus show that mobile PosiPost *had a positive effect on increasing social interest in others* and *reducing depressed feelings*. To illustrate this, one participant in England noted in the interview: "I didn't send messages only when I was happy. On the contrary, like last week I felt sad and depressed because I didn't have a normal Internet connection, so I definitely also used it when I wasn't so happy to cheer me up."

Table 15: Results of the univariate analyses of variance on the social wellbeing constructs for the independent variables usage and medium.

Construct/Factor	Usage			Medium			Usage x Medium		
	df's	*F*	*p*	*df's*	*F*	*p*	*df's*	*F*	*p*
Social[1]									
Sociable	1,9	1.00	0.343	1,9	0.89	0.370	1,9	0.00	>0.99
Interested in other people	1,9	7.58	0.022	1,9	0.14	0.716	1,9	1.71	0.223
Socially aware	1,9	1.61	0.309	1,9	0.00	>0.99	1,9	1.71	0.223
Wellbeing[1]									
Happy	1,9	1.00	0.343	1,9	0.10	0.758	1,9	1.00	0.343
Tense[2]	1,9	1.71	0.223	1,9	0.00	>0.99	1,9	0.38	0.555
Depressed[2]	1,9	5.65	0.041	1,9	0.07	0.798	1,9	3.46	0.096

[1]Wellbeing was tested as being multi-dimensional (Crohnbach's α<0.7) and therefore *Wellbeing* and *Social* were not analysed as single constructs
[2]Negative formulated items were reversed so that these all scored in the same direction

Because Part A only focused on the participants' present state of social wellbeing (and its questions did not point to the used technology), questionnaire part B was designed to gain more specific and detailed results on the effects and perceptions of using PosiPost.

For Part B, all the construct's average scorings positively scored above 4 for each PosiPost version; which can be considered as the neutral position on the 7-point Likert scale. Using the Part B data, one-sample *t*-tests were conducted to test whether the average questionnaire items score differed significantly from 4; the neutral position. The results show that, with the exclusion of *social curiosity (p.*>0.05), for all the other constructs this was indeed the case (all *p*'s <0.01). This means that the participants believed that *PosiPost had a significant positive effect* on increasing *positive affect* (*M* Me=5.1, *M* Be=5.1), social *connectedness* (*M* Me=4.8, *M* Be=4.5), *positive awareness* (*M* Me=5.4, *M* Be=5.1), *socio-pleasure* (the enjoyment derived from interacting with others) (*M* Me=5.7, *M* Be=5.4) and *positive thinking* (*M* Me=5.2, *M* Be=5.2). Participants also seemed to like both of the applications as the construct *Appreciation of messaging system* also scored on the positive side of the scale for both the applications (*M* Me=5.4, *M* Be=5.1).

7.5   The medium and the positive message

The analysis of the study investigating the role of the presented technology, showed that PosiPost Be and PosiPost Me can both function as a medium for positive expression; independent of whether posting is proximity based or decontextualized. The results

from the questionnaires showed that the different mobile media both catalyzed positive mental and social effects after usage. Statistical analysis, as shown in Table 16, investigating the role of the media (PosiPost Be or PosiPost Me) indicated that the difference in version only significantly influenced users' perception of the shared messages ($F(1,12) = 5.89$, *p.*=0.032). This suggests that participants perceived the messages created and shared with PosiPost Me as more positive, and liked the messages they sent more with PosiPost Me. Some participants noted that they liked messages from countries that were different than their own as they said to already know about their own context. Yet, they also said that they particularly liked messages that they could somehow relate to their own context and so become positively inspired by. For example, when a participant initially felt annoyed because of being cold, she was cheered up by receiving the posting "Today, I like have a hot chocolate" as she felt that this was a good suggestion. On PosiPost Be, a participant noted that when other posiposters were around, more pressure was felt to make an interesting posting.

Table 16: Results of univariate analysis of variance of medium (PosiPost Be & Me) and Part B's constructs.

Construct	Me	Be	Medium		
	Mean		*df's*	F	*p*
social disclosure	4.6	4.5	1,12	0.97	0.345
appreciation of messaging system	5.4	5.2	1,12	0.64	0.441
message perception	5.6	5.7	1,12	5.89	0.032
positive affect	5.1	5.1	1,12	0.39	0.546
positive thinking	5.2	5.2	1,12	0.29	0.600
socio-pleasure	5.7	5.4	1,12	0.29	0.599
social curiosity	4.2	4.1	1,12	0.05	0.822
awareness	4.6	4.5	1,12	0.07	0.797
positive awareness	5.4	5.3	1,12	0.48	0.502
connectedness	4.8	4.5	1,12	1.08	0.318

Also the length of the messages, in amount of words per posting, for PosiPost Me (*M*=3.5) and PosiPost Be (*M*=3.1) was not significantly dependent on the used version of PosiPost ($t(378)$=-1.53, *p*=0.126).

The only other found statistical significant difference between PosiPost Me and Be ($t(378)$=-5.60, *p*<0.001) was that messages with PosiPost Me had more content codings associated with each posting. Thus, posted content created with PosiPost Me on average fell into more different categories than when created with PosiPost Be. This could be

linked to the result that the categories *activity*, *leisure time*, and *materialistic object* had significantly more postings created with PosiPost Me. As the context of the messages with PosiPost Me is completely unknown, another reason could be that therefore users were more diverse in their postings to describe their current context. However, this is only speculative.

7.6   Discussion

The data gathered offers important insights into the contextual use of the presented technology, its social and mental beneficial effects such as its role in encouraging *positive affect*. The study and content analysis provides insights into the various pleasures people make out from ordinary happenings in life, and made the particular mundane nature and the effects of sharing pleasures visible. Important themes and findings are outlined and discussed below, supported with accounts from the interviews.

7.6.1   Encouraging positive affect

This research calls for a further discussion that could guide the design of technology for positive affect. The point raised is that technology can enable and empower the user to share and become aware of positive moments, and that this process could contribute to social and mental wellness. While supporting and mediating positive affect has been one of the leading design goals of PosiPost from the very start, the questionnaire results now actually indicate that users believe that the technology can support *positive thinking*, *positive awareness* and *positive affect*. The presented findings are therefore promising, as these indicate that simple technologies, such as PosiPost can actually aid people in becoming more aware of positive aspects of everyday life. This is illustrated by a Dutch participant noting "Even though when I wasn't in a positive mood I liked sending posipostings. Especially then, I enjoyed thinking about what I liked today in order to put myself in a better mood."

7.6.2   Shared positive affect

PosiPost, as a lightweight technology for shared positive disclosure, helped to uncover not only the benefits of *expressing* emotions, as typically studied by others (Pennebaker et al., 2001), it brought the interesting potential and benefits of *receiving* others' *positive* thoughts to the attention. On the receiving end, retrieving a positive posting often seemed to inspire the receiver to reflect on his or her feelings in a more interesting, positive context. Interestingly, in the interviews, participants indicated that

more messages were retrieved than created. The reasons given by the users was that although they liked creating posipostings ("I can let the world hear my voice!"), they also very much liked receiving posipostings. They said to be curious about knowing others' positive glances, and that receiving these mundane glances involved less effort than expressing them. This could be interpreted as a positive answer to the question whether simply sharing a notification about often-mundane pleasant moments with lightweight technology could help to make others feel happier as well. This was supported by a participant noting "receiving postings made me happy", and compared this buzz with receiving an exciting email.

7.6.3   Social context

PosiPost Be as a social proximity application opens up interesting possibilities for social interaction in real space. How such an application can support encounters and social interaction between co-located people could not be fully explored due to a relative small number of participants using PosiPost Be, and thus the lack of spatially proximate people at any time. However, the study still provides insights in how the exchange of daily likings in digital realm could support and augment existing social behaviour and interactions taking place in physical space. For example, one participant noted: "I think PosiPost can add something to the usual conversations I have with colleagues here, as these are normally quite superficial. When I receive an interesting message I can strike up a conversation about this with a colleague." Observations about such a thing happening were, for example, when one male posiposter in Delft discovered another female participant and asked his colleague: "Ah, were you the one liking pink dresses?" Also participants in the group of friends in England described how the anonymity of the messages stirred up conversations: "We would talk about the posipostings or even call people trying to figure out the possible sender of a posting."

In an encounter between spatially proximate people, such as can be facilitated with PosiPost Be, social interactions can be more focused and contextualized as opposed to PosiPost Me. An example of this happening was one participant posting: "Today, I like looking forward to xmas dinner tomorrow" and then another co-located person send the posting "Today I like knowing you'll come to xmas dinner too." A participant who witnessed this happening said they particularly liked this kind of social interactions and the feeling of really doing something with others in a building. However, the study results pointed out that the measured social effects, statistically speaking, such as increased *social interest,* were the same measured for both media in this study setting. A posting generated with PosiPost Be, such as "Today, I like getting to know my colleagues better" could be seen as support for PosiPost Be having more potential as a

social icebreaker. However, interactions between total strangers with PosiPost Be have not been explored. Furthermore, participants seem to be more interested in the posipost than the posiposter, and seemed to like to keep some social distance. As a participant noted: "The main important thing for me is still the posipost message."

7.6.4 Making the invisible visible

Weiser (1994) and his vision of 'invisible computing' began with an interest in the role of computers in everyday life, and a desire to build computers that did not interfere with our everyday activities. According to Weiser, a good tool is an invisible tool. By invisible, he meant that the tool does not intrude on people's consciousness; in which the focus is on the task, not the tool.

While the reason for using mobile technology in this research was to provide an *invisible* vehicle for the user, this was done for the opposite outcome of making pleasures and its particular mundane nature *visible*, and thus to seamlessly support the person's capability to notice pleasant situations in everyday life. It should be noted though that 5.4% of the postings were related to the medium used or the PosiPost process, such as "Today I like using posipost with my n95 phone". Thus, although these were positive accounts, this is an indication that users were sometimes consciously aware of the medium, and this could therefore be interpreted as the PosiPost technology not entirely being invisible.

Interestingly, the participants pointed out an issue with what can happen if a technology becomes 'too invisible'. In the interviews, some participants said that although they wanted to PosiPost, they sometimes just forgot about it, since especially PosiPost Me as a pull medium was very much designed to work in the background. However, some participants said that seeing the actual phone reminded them of wanting to post. As further expressed by one participant: "Every time I saw the phone, I remembered, and then created and shared a couple of posipostings." Thus, what could be learned is that even though making technology invisible is a good goal to strive for, the potential consequence of technology being too much in the background, too invisible, might be that people forget that it can be used to support them.

7.7 Conclusions

The results from the study testify to the social and emotional benefits of sharing mundane pleasures with lightweight technology. Particularly, empirical findings showed significant increased social interest in others and a reduction of feelings of depression as a result of using PosiPost.

The presented lightweight applications, built on top of mundane mobile technology, seem to support the person's capability of becoming aware of pleasant situations in everyday life. The study and content analysis provided insights in the pleasures people make out from ordinary happenings in life, and uncovered their particular mundane character.

The results from the interviews and questionnaires showed that the different presented mobile media both catalyzed positive mental and social effects. Based on questionnaire's Part B analysis, the investigation of the effects of the presented positive expressive media suggest that the mediation of people's daily likings can positively influence social and emotional constructs, such as *positive thinking* and *socio-pleasure*. These findings are encouraging as they demonstrate that technology can mediate the sharing of positive thoughts for contributing to people's social and mental wellness. Particularly interesting are the findings from questionnaire Part A showing a significant positive effect on *social interest* and reduction in feeling *depressed* as a result of using PosiPost. As depression is widespread and rising (Murphy et al., 2000, Klerman and Weissman, 1989), such a finding should therefore not be neglected. A promising direction is therefore to investigate how such positive expressive technologies could work in clinical practice or help people's social and mental health 'on the go.'

In comparing the two mobile expressive media, the study results suggested that, although the contextualizing of the messages influenced how messages were perceived, both the investigated media had significant beneficial emotional and social effects as a result from using the technologies.

Finally, this work documented the role that lightweight applications, running on mobile technology, can play in the sharing and uncovering of daily pleasures to promote beneficial social and mental effects. In doing so, it aimed to make a contribution to simple design thinking by presenting a new direction of how lightweight, mundane technology could possibly contribute to users' happiness. Although further inquiry is needed, it could be concluded that lightweight technologies can be a catalyst for 'grand' effects.

8   Conclusions and future directions

This chapter concludes the thesis and details the challenges that still lie ahead. It summarizes the previous chapters on the design of positive expressive technologies for supporting social wellness. This thesis makes theoretical and practical contributions in the space of HCI for social wellness, but also shows that much progress remains to be made. After synthesizing and concluding the research, the limitations and main contributions are discussed. In terms of design implications, the chapter reflects on how the PosiPost applications and associated studies contribute to the discussion of *lightweight design thinking*. As the design for technology-mediated positive affect is at its inception, directions for future research are outlined. Particularly, the role that positive expressive technologies could play in the provision of mental health care is discussed.

8.1   Synthesis of the research

This thesis began by motivating the need for technologies that support social wellness by encouraging positive expression. It was posited that *technologies can support the sharing of positive emotions to promote beneficial mental and social effects*. This hypothesis was supported by studies from the field of positive psychology, which has devoted considerable research effort towards understanding the value of positive emotions and the development of reliable and valid psychological interventions (e.g. Fredrickson, 2003, Fredrickson and Losada, 2005). A theoretical account of the potential for expressing positive emotions with technology was developed through the lens of THE Medium model. This drew on psychology literature (see Chapter 2) that detailed how the expression of positive emotions can have beneficial effects, such as increasing sociability (Waugh and Fredrickson, 2006) and also pointed to a clear need for social interaction in supporting positive affect (Baumeister and Leary, 1995). Although opportunities exist for exploiting the potential of social technology to aid in the encouragement of positive affect and enhancement of social wellness in everyday life, the design, development and deployment of such technologies have so far been scarce. This work aimed to address this challenge.

Besides giving a theoretical account of the potential of expressing positive emotions with technology, prototype examples —PosiPost Me and PosiPost Be— were presented for shared positive disclosure. The examples were used as illustrative cases of how lightweight technology can encourage positive affect and demonstrate the possibilities and potential beneficial effects of using such positive expressive technologies.

The design and evaluation of PosiPost was highly iterative. Three separate studies were carried out with the aim of evolving the design as a result of the input received from participants. In the first stage of the design process the studies were used to gain insights into the prefix-based elicitation and sharing of positive thoughts. This involved two studies, described in Chapter 4. The first involved using a paper instrument with young people in Scotland. The second used social-online tools, which could reach a wider range of participants worldwide. These initial studies showed the potential for a prefix-based elicitation of positive emotions. Chi-square tests of the distributions of postings shared during these studies showed a significant variation in the distribution of messages, depending on the prefix used. As the prefix *Today I like* was particularly effective in triggering positive and situated emotions, this prefix was incorporated into the mobile versions of PosiPost to encourage the expression and sharing of positive emotions when mobile, affording users immediate expression of and access to positive thoughts wherever and whenever users so wish.

The second stage of the design process used the design considerations, which had been the outcome from the first stage of the study (detailed in Chapter 4), for the creation of the mobile applications PosiPost Be and PosiPost Me. The aim of developing PosiPost was to explore the potential of remote and proximity sharing of positive messages with mobile technology. Using a qualitative and explorative approach, a third study was conducted (described in Chapter 5), in which PosiPost Me was used as a probe to explore the potential effects of using positive expressive communication technologies in real-world settings. From the discussion with the study participants, PosiPost Me emerged as a lightweight technology that facilitates 'minimal connectedness'; a less demanding and more minimal form of social interaction than the engaging and rich forms of communication media that are currently available to users.

Both the mobile applications PosiPost Me and PosiPost Be were developed and used to investigate the further potential of positive messaging and explore the influential role of the medium. The lightweight PosiPost applications, built on top of mundane, mobile technology, were used as non-invasive vehicles to record and share people's positive thoughts for providing a view of human daily pleasures. The analysis of the study investigating the role of the presented media showed that PosiPost Be and PosiPost Me can both function as a medium for positive expression, independent of whether posting is proximity based or remote and decontextualized. These media can both act as a vehicle for projecting into someone else's daily lives and engage with another person's positive glances.

The SPOT instrument was developed to enable the measurement of social and positive effects of technology (see Chapter 6). The final study (see Chapter 7), involving participants based in The Netherlands and England, used this instrument, semi-structured interviews and the insights and developed prototypes from Chapter 5 for an in-depth investigation of the social and emotional benefits of sharing positive moments. In summary, the results testified to the beneficial effects of using the mobile expressive technologies. The study findings suggest that mobile PosiPost can aid people in becoming more aware of others and positive aspects in everyday life, and that this process can positively contribute to social and mental wellness.

8.2   Conclusions

The hypothesis of this thesis was that the sharing of positive emotions as mediated by technology, can promote beneficial social wellness effects for its users. This entailed two main research questions:

1. How can (or might) technology encourage the sharing of predominantly positive emotions?

2. What are the potential social and mental benefits of (mobile) technologies that support (shared) positive disclosure?

In addressing the first question, the work presented showed the feasibility of a prefix-based approach for positive disclosure and opens new avenues for the design, development and investigation of lightweight technologies aimed at supporting positive affect and concurrent social wellbeing. Supporting and mediating positive affect has been one of the leading design goals of PosiPost from inception and the empirical work has demonstrated that it is indeed feasible to exchange positive messages with technology. By designing PosiPost as a lightweight technology for shared positive expression, this research uncovered various pleasures in everyday life that people engage in and uncovered its particular mundane nature. In doing so, it demonstrated an opportunity for the development of lightweight and mobile technological solutions for supporting and encouraging positive disclosure in everyday life.

In addressing the second question, the empirical work conducted showed that mobile PosiPost users believed that the mediation of their daily likings can positively influence social and emotional constructs, namely positive thinking, social/positive awareness and socio-pleasure, independent of whether the sharing of messages is proximity or remote based. The participants also reported significant increased social interest in others, and to be feeling less depressed after using each mobile PosiPost version.

The positive study results for the constructs concerning sociability (e.g. increased social awareness and social interest in others) suggest that the sharing of positive messages

with the mobile PosiPost systems seem to aid in positively engaging with others, not only with other PosiPost users, but particularly with their direct social environment and surroundings at large. This is in line with the literature discussed in Chapter 2 (Waugh and Fredrickson, 2006) which indicated that when people experience positive emotions, this helps social bonding in physical space, while Clore and Byrne's study (1974) suggested that this social acting when experiencing a positive feeling is omni-directional. Therefore, the findings are promising, as these indicate that lightweight technologies, such as PosiPost can actually contribute to augmenting social wellness in everyday life. Naturally, further and larger studies with different and various types of users will need to be undertaken to further strengthen and verify such benefits.

8.3 Contributions

The contributions of this thesis are best placed at the intersection of the HCI and positive psychology research communities. The theoretical relevance of the research lies in the validation of the hypothesis, and new insights and tools that can further be used in the field of HCI, positive psychology and mental health care to encourage positive affect. Relevance can also be defined on a more practical level in relation to the potential of technology to support social wellness and aiding people to become aware of positive moments in daily life. The five main contributions of the thesis are:

- **HCI for social wellness as a theoretical contribution**

The theoretical contribution of this thesis lies in the area of HCI for social wellness. Instead of studying mental illness and eradicating negative emotions, as has been the case in much of past psychological research and HCI, this research focused on social wellness in the belief that technology can be designed to encourage positive affect and so contribute to social wellness. By demonstrating the potential of activating positive affect with technology and delineating its various mental and social benefits, new approaches and understandings were offered in this thesis to address this challenge. Building on the knowledge of HCI, social psychology, and the relatively new field of positive psychology, the work focused on social wellness, and was both trans-disciplinary and exploratory in its approach, and as such, has strengths and weaknesses in its application. As current HCI theory has not really attempted to link these disciplines, the contribution of this research lies in the exposing of the opportunity of combining these fields so to both inform each others' work and theory, specifically in terms of the expression and development of technology to support positive affect.

By combining positive psychology with a HCI and design approach, this thesis contributes to the discussion on supporting the experience of positive affect, which could also proof useful in the scientific study of happiness and HCI. However, this trans-disciplinary involvement is a complex area, and one could say that this has just been opened up with this research. As this is a preliminary start, to advance this work, research communities will need to be willing to adopt such approach so to develop and extend such studies much further.

- **THE Medium model as a theoretical framework for socio-pleasure**

THE Medium model as a theoretical framework is a contribution to understanding how technologies can support socio-pleasure by defining the factors that could be influential in this, as identified by the literature. The structured review of the literature, as supported by the theoretical framework, initially exposed the influential relationship between social interaction and the factor *positive affect*. The framework was further used as a design tool for the development of PosiPost. As the final study findings show that the study participants believed that PosiPost supported *socio-pleasure*, this can be seen as an indication that THE Medium model supported the design of technologies for pleasant social interactions.

With the development of PosiPost Me as a *Medium* for the *asynchronous* sharing of messages over remote *distance*, and PosiPost Be for the *synchronous* and *proximity* based sharing of messages, factors from each category of THE Medium model were explored. The research work thus investigated the categories and its factors Time-*asynchronous/ synchronous,* Human- *positive emotions,* Environment-*distance/proximity* and Medium- *medium characteristics.* However, to develop this framework further, ideally, all potential influencing factors affecting social interaction in general and as proposed in THE Medium model should be further explored and validated.

- **Design considerations and illustrations: PosiPost Me and Be**

Design considerations were developed in Chapter 4, to contribute to the design of technologies for positive affect. Based on these, a collection of artefacts, termed PosiPost was developed, enabling users to share positive messages. These artefacts were employed as design illustrations, but also as research instruments for increasing and cultivating positive affect. As design illustrations, the applications can be further used as devices for reflection and discussion of technologies for positive affect and facilitated minimal connectedness (see Chapter 5). As research instruments, these could be applied in further studies, possibly extending understanding of the potential benefits of positive

disclosure or be employed for the recording and study of the dislikes or likes of various different people on a larger scale.

- **Insights into people's daily pleasures as mediated by technology**

Content analysis was performed on the shared messages (or posiposts), which provides a basis for understanding and using PosiPost as a tool for researchers to uncover what people enjoy in everyday life. The analyses of the messages shared in the study provided insights into people's daily likings and demonstrated the particular mundane nature of shared pleasures. Although *Psycho-pleasure* has relatively been given a lot of attention in the HCI-community, from the four pleasure categories, this pleasure scored lowest. This can be seen as an indication that pleasures, others than those derived from active flow calls, deserve further attention and discussion in HCI. The thesis also documented how such messages can be analysed (see Chapter 4 and 7). This is useful for the further explorations of self-disclosure and emotional expression with technology (e.g. for analyzing the contents of people's expressions or status on social networking sites such as Facebook, or to gain insights in the influence of a specific media when expressing oneself). Insights into people's daily likings, could in turn ideally lead to the design of activities, practices or user experiences that take into account what gives rise to people's positive affect, thus further increasing it.

- **SPOT: Measuring the Social and Positive psychological effects Of Technology**

A new instrument for assessing affective and social benefits of technology was developed. The SPOT instrument for measuring the social and positive effects of technology was intended to complement and not replace other useful existing software development approaches, such as usability evaluation methods. The SPOT instrument is provided in Appendix D, so that further verification and validation of this tool (or its usefulness with other technologies and cases) can be explored by other researchers. When these iterations are complete, the SPOT instrument could fill a current gap, proving useful to those who want to monitor positive mental and social affects and evaluate the impact of interventions with technology.

8.4   Issues raised and future directions

Following on from the contributions of this thesis, each one points to future directions of research. Specifically, two main domains of future research are proposed. The first of these arises from the limitations of the studies undertaken. These include issues such as scalability, technical constraints, the study population and the range of settings examined. The second issue is to determine the ways in which tools can be applied in

support of social wellness, the provision of mental health care and the evaluation of mobile expressive technologies. More generally, research and development is needed that will contribute to the development of lightweight design thinking.

8.4.1   Limitations of the study

A number of limitations of the research have already been described during the discussion of the studies undertaken. Other limitations concern the approach taken in this research. For example, this research tested a prefix strategy that trialled a number of prefixes and used the prefix *Today I like* for studying the pleasures shared with mobile technology. Thus, the results obtained specifically relate to prefix based elicitation. However, other design strategies (and applications) may be more valuable or effective in terms of promoting positive affect and augmenting social wellness.

Another limitation was that PosiPost's usage and message sharing by the participants was done in the context of a study setting. This could have influenced users' behaviour and outcomes of the study, in particular the fact that the generation of shared messages were all positive. This may indicate that users could have been influenced by the context of the studies, in the sense that users may have felt that they needed to show desired behaviour. However, this limitation has to be considered in the context of the SPOT instrument showing that the questionnaire item "The messages I received were positive" had one of its highest scorings overall. In the second study, users were not observed and did not know that their on-line postings were analyzed in the context of a study. The findings from the final study's interviews also suggested that the users believed that the tested technology can enable and empower the user to express, share and become aware of positive moments of everyday life. This triangulation of the data strengthens the finding that technology can encourage positive effect.

Other limitations lie in the current complexities with, and need for, reliable and valid instruments for the evaluation and measuring of social and emotional effects using mobile technology (an issue addressed in Chapter 6 and in section 8.4.2). SPOT was developed to address this, but the operation of such a novel instrument consequently limits the extension of the findings.

There are also limitations and directions for future work that stem from the current technical constraints and availability of the technology. As PosiPost currently only runs on Nokia Series 60 (2nd edition) mobile phones, work on porting the application to other phones is needed for the sharing of messages to scale. Other limitations of the research could lie in the novelty of the application, thus influencing participants' long-term usage patterns. This inability to experiment with the applications for long periods, but also

amongst larger populations of people across mobile platforms, can be seen as constraining. Future work should involve making the system available to more users, investigating the sharing of positive messages among more different types of users (e.g. people with bipolar syndrome, total strangers and friends), thus directly addressing longer-term usage and scalability of the system.

The development of the applications, particularly PosiPost Be, proved to be both time-consuming and technically complex. This was primarily due to difficulties with the Bluetooth security of the mobile phones which, although no malicious use was intended, made the automatic peer-to-peer sending of positive messages via Bluetooth very challenging. The resulted PosiPost Be application now has an interesting feature embedded within it, which enables the user to pass on the received messages to other posiposters and so enables users to moderate the messages shared. Due to the availability of devices, proximity sharing via the passing on of messages has not been explored to its full potential. In a futuristic scenario, in which many people have PosiPost Be on their phones, it would be interesting to investigate which messages are considered most interesting or will be passed on by the most people. This means a study on a large-scale to explore which kind of messages will be passed on the most. Whether a message such as "Today I like bananas" will travel further than "Today I like peace in the whole world" can be explored. Besides exploring this functionality, it would be generally worth exploring use by larger groups or crowds in proximity and in different settings, for example at football matches or concerts to enable a further exploration of the contextualized sharing of messages.

With respect to the scalability of the system, an issue for further investigation is integration of PosiPost with social networking sites that have micro-blogging functionality, such as Facebook or Twitter. In particular, it would be interesting to investigate what people would continue to share and whether these messages will remain positive with a large user bases. Such work could also include a comparison and investigation of the effects of expressing negative emotions with technology.

8.4.2   The design and evaluation of expressive technologies

The PosiPost applications and the SPOT instrument are the practical outcomes of tools that can help to grow current understandings of increasing positive affect with social technology. However, both need further iteration and need to be adopted by others to prove truly useful outside of the confines of this thesis.

Positive messaging across different media

The iterative design process resulted in different editions of PosiPost: I PosiPost (Internet edition, running over a web page), PosiPost Me (Mobile internet edition) and PosiPost Be (Bluetooth edition for mobile phones). A Facebook edition is under development, which would enable the investigation of the influential role of the medium even further. For example, whether each different medium will result in the same beneficial social and mental effects and whether or in what way the medium influences the expressed message. Transmitting the idea of encouraging positive affect across different media also implies that users will have a wider range of options to choose from when wanting to share positive messages with others.

In terms of the design of positive expressive technologies, naturally also other prefixes than *Today I like* or different tactics than a prefix strategy could be fruitful. Also the design of the medium, its characteristics and the addition of design features (e.g. pictures, gestures, sound) deserve further attention.

The evaluation of mobile technologies for social wellness

The evaluation of mobile applications for social wellness, such as Posipost Be and Me, comes with challenges and opportunities. The increasing worldwide adoption and use of mobile technology, and its increasing functionality, connectivity and computational power mean that advanced applications are possible. Consequently, academic interest in particular from the HCI community in mobile media has increased considerably. However, evaluation methods mainly continue to mimic those of desktop computers. As the conditions of use at the desk are rather different from when in a mobile context, the opportunity is to advance (in-situ) evaluation methods that address the contextual attributes and properties that are unique for mobile applications. Some researchers have begun to tackle the issue of new evaluation methods for mobile technology and its changed context of use (e.g. Holmquist et al., 2002, Kjeldskov et al., 2005) and have explored some social impacts of using mobile technology (e.g. Turner et al., 2008), but challenges still lie ahead. Particularly, measurement techniques for evaluating the social and emotional effects of mobile technology, such as its potential contribution to happiness and support for desired levels of social interaction, still need to be further developed. In addition to this, measuring the social and mental impacts of mobile technology is not trivial. Even though emotions and social processes have been extensively studied in psychology, the debate on how human emotions, happiness and social processes can be presented and described is still ongoing. As such understanding of emotions and their conceptualisation and presentation is still incomplete, it is difficult to define methods that can succeed in capturing the impacts of technology. The SPOT

instrument, however, is a step towards the goal of a reliable and valid method so that further iteration can be followed.

8.4.3   Lightweight design thinking

This study with PosiPost raises discussion of lightweight design thinking. The approach taken to the design of PosiPost —supporting people to construct and become aware of mundane pleasures— helps to go beyond the 'wow' experience rhetoric that treat user experience as a mere encounter with the technology, detached from the context, abundance and demands of everyday life. The design of lightweight interaction links to the notion of minimal connectedness, and gives technology developers a novel perspective on designing technology that is sensitive to people's social expectations and demands in modern busy lives.

It could be suggested that the strength of the designed technology did not lay in the abundance of complex 'wow' functionalities, but in the rich mundane contents and notifications shared and created by its users. A further lesson that could be drawn from the results, is that a medium can be designed in a lightweight way, but still have beneficial social and mental effects, and that adding more (complex) features, or devoting more time in terms of development (in the case of PosiPost Be) does not necessarily mean greater beneficial effects for the user. Further discussion and exploration of the value of lightweight interaction could help HCI practitioners and application designers in determining when less is more.

8.4.4   Positive expressive technology for mental wellness

Within the HCI community, there is a growing awareness that technologies should be designed to appropriately address the complexity of human needs in order to make a positive contribution to a person's wellbeing. However, taking the appropriate design steps to facilitate these is a complex process. It requires a thorough understanding of the mechanisms through which the use of technologies influence psychological mental health. Methodologies from the field of HCI offer a valuable starting point for gaining this understanding, but fall short when it comes to knowledge in the field of mental health care. Clinical psychology and psychiatry have a long tradition of dealing with issues and treatment of mental health. However, they often rely on fixed face-to-face interactions with patients that have serious diagnosable mental health conditions. In contrast, communication technologies such as mobile phones are playing an increasingly important role in people's everyday life and practices. As such, because they are often to hand, technology-mediated mental wellness interventions could be

more easily accessible to everyone. The mobile PosiPost versions could therefore play a positive role in the provision of such mental health care. However, despite the success reported in the studies in terms of validated mental gains, to aid public's mental health, much further research is needed to deepen understandings of the design, timing, and dose of interventions that would work, as well as the characteristics of individuals who would benefit the most from using such a technology.

8.5   Final remarks

Technology has advanced to the point where tools can help people meet their social and emotional needs. Studying interaction mediated by these tools plays an important role in the development of HCI for social wellness. Psychologists' knowledge of social wellbeing, happiness and the role technology could play in this are not yet fully understood; a stronger scientific base is necessary to make unequivocal recommendations to societies, individuals, HCI and mental health practitioners about how to increase happiness. To progress understandings in the field of HCI and positive psychology, both disciplines can benefit from a closer partnership, and it is hoped that this thesis is a beginning in building some of these bridges.

This thesis argued that computational media offers a great promise for contributing to social wellness through mediating positive affect. A number of avenues have been explored. The resultant domain theory and tools of this research can be used as a resource for the design of technologies for social wellness while being sensitive to people's daily (social) commitments and busy lives. However, this thesis is only a starting point in addressing such challenges, yet the importance of this work merits a much larger effort. Fruits of such endeavours hold the promise of technologies that can contribute to happy social beings. It is hoped that this thesis made it clear that scientific knowledge about encouraging positive affect is possible and desirable and that technology can play a positive role in mediating this.

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Appendices

Questionnaire test PosiPost Be/Me study

Thank you for testing the questionnaire items!

The questionnaire we are currently developing is designed to *measure users' perception of the (social) use of different positive messaging applications called PosiPost and their potential effects on social wellbeing.* To test the face and content validity of this questionnaire, we would like your expert opinion on whether you think the questions (in part A and B) are relevant.

In our study, participants will be requested to use different PosiPost applications, each for one week, with a stop week within the use of these. We intend to hand out part A of the questionnaire (with the adjectives) before and after each week of the study and give part B of the questionnaire (that concerns PosiPost) after use of each PosiPost version. For this study, participants will use two mobile editions of PosiPost. In both versions, people are asked to finish the sentence with the prefix *Today I like* to encourage positive thoughts. One edition, called PosiPost Me, is the Mobile internet edition of PosiPost that enables the user to randomly share anonymous positive thoughts of this nature with people over any distance. The other, more contextualized version used is PosiPost Be, a Bluetooth edition that enables users to share positive thoughts with people in their near proximity. With both these editions, users can send, receive and read posipostings.

This particular questionnaire mostly uses closed questions, as we would like to use more open questions in additional interviews.

Please have a look at the questionnaire test below to rate the following questionnaire items on how they measure their underlying constructs. Your feedback will be very much appreciated!

(Please circle or put a cross near the answer of your choice)

For the questionnaire test, please rate your level of expertise within these fields:

Field of expertise	Novice	Intermediate	Knowledgeable	Expert
Questionnaire design	1	2	3	4
Psychology (e.g. wellbeing studies, mental health)	1	2	3	4
Affective computing (e.g. emotions)	1	2	3	4
Social research and/ or social computing (e.g. CSCW)	1	2	3	4
Human Computer Interaction (e.g. also mobile technology, ubiquitous technology)	1	2	3	4
……………………………………… (Please fill in any potential other field that you think that may also be relevant)	1	2	3	4

ADJECTIVES[7] **(part A)**

Please look at each word and circle the number that best fits with whether you think this questionnaire item is essential, useful or not necessarily for the construct (concept) we would like to test. For example, if you think that the item "Clear headed" is not necessarily to measure the construct of "Wellbeing" select "Not necessarily". (The colours mark the positive/ negative opponent of the adjective.)

The construct we generally would like to test with Part A: Social wellbeing

Words	Essential	Useful, but not essential	Not necessarily
Construct we would like to test here: *Wellbeing*			
Happy	0	1	2
Good natured	0	1	2
Clear headed	0	1	2
Tense	0	1	2
Helpless	0	1	2
Impatient	0	1	2
Useful	0	1	2
Confused	0	1	2
Depressed	0	1	2
Relaxed about things	0	1	2
Discontented	0	1	2
Optimistic	0	1	2
Understood	0	1	2
Insignificant	0	1	2
Construct we would like to test here: Sociability			
Lonely	0	1	2
Withdrawn	0	1	2
Sociable	0	1	2
Interested in other people	0	1	2
Reserved	0	1	2
Detached	0	1	2
Friendly	0	1	2
Socially aware	0	1	2
Connected	0	1	2
Unconscious	0	1	2

Please describe any comment about this particular part of the questionnaire here:
....

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[7]Important parts of questionnaire Part A have been based on the Affectometer2: Kammann R and Flett R (1983) Affectometer 2: *Australian Journal of Psychology* 35 (2) 259-265.

PosiPost (Part B)

These statements concern the PosiPost application. Please rate the following questionnaire items on how it measures their underlying construct.

(If you have specific comments on particular questions, these can be raised below this section of the test.)

Construct and items	Essential	Useful, but not essential	Not Necessary
Social disclosure			
1. I wanted to maintain a sense of distance between other posiposters.	0	1	2
2. I wanted to make posiposting more intimate.	0	1	2
3. I felt socially obliged to posipost	0	1	2
4. People did not expect me to posipost	0	1	2
5. When posiposting, I prefer to be anonymous	0	1	2
6. I like to reveal my identity when posiposting	0	1	2
7. I prefer not to receive anonymous posiposts	0	1	2
8. I prefer to know the identity of the other posiposter	0	1	2
9. I got to know more about other people	0	1	2
10. I did not learn anything about others	0	1	2
11. I kept posiposting to myself	0	1	2
12. I talked about posiposting with others	0	1	2
Appreciation of messaging system			
13. I felt in control of the interaction	0	1	2
14. Sometimes I felt frustrated with the application	0	1	2
15. PosiPosting took a lot of effort	0	1	2
16. It was easy to posipost	0	1	2
17. More people should use this application	0	1	2
18. I would not recommend this application to others	0	1	2
19. I like receiving positive thoughts from strangers	0	1	2
20. I prefer to share posipostings with familiar people than with strangers	0	1	2
Message perception			
21. PosiPost messages were personal	0	1	2
22. Other's positive expressions felt distant and unwelcoming	0	1	2
23. Received postings were clear to me	0	1	2
24. I believe that the messages I got were cryptic	0	1	2
25. The messages I received were positive	0	1	2
26. The application provoked negative messaging	0	1	2
Perceived positive affect			
27. I smiled when receiving posipostings	0	1	2
28. Other's positive thoughts did not make me happy	0	1	2
29. I believe my posipostings made other posiposters happy	0	1	2
30. I feel other people did not like my positive thoughts	0	1	2
31. Posiposting made me happy	0	1	2
32. The application did not make me feel more positive	0	1	2

Construct and items	Essential	Useful, but not essential	Not Necessary
Positive thinking			
33. Sharing positive thoughts with others did not inspire my own positive thinking	0	1	2
34. PosiPost increased my positive thoughts	0	1	2
35. People's posipostings positively inspired me	0	1	2
36. Other's positive thoughts influenced me in a negative way	0	1	2
Social effects:			
Socio-pleasure: the enjoyment derived from interacting with others			
37. Sharing posipostings with others was fun	0	1	2
38. Interacting with others through PosiPost was not pleasurable	0	1	2
39. I like sending posipostings	0	1	2
40. I liked receiving posipostings	0	1	2
41. I like reading old posiposts	0	1	2
42. I did not like sharing positive messages with others	0	1	2
Social curiosity			
43. I did not wonder about what some posipostings meant	0	1	2
44. Some posipostings made me curious	0	1	2
45. I tried to discover who the other posiposters were	0	1	2
46. PosiPost did not make me (more) interested in others	0	1	2
Awareness			
47. PosiPost did not make me feel more aware of my social environment	0	1	2
48. PosiPost made me more aware of others	0	1	2
49. Because of posiposting, I paid more attention to what's going on outside me	0	1	2
50. When posiposting, I was not aware of my real environment around me	0	1	2
Positive awareness			
51. PosiPost made me feel more positive towards others	0	1	2
52. Because of PosiPost, I gained a negative attitude towards other people	0	1	2
53. Through PosiPost, I looked more positively on my surroundings	0	1	2
54. When posiposting, I saw my environment through a negative lens	0	1	2
Connectedness			
55. I would like to become acquainted with other posiposters	0	1	2
56. I was not interested in getting to know other posiposters more	0	1	2
57. PosiPost made me feel more connected with others	0	1	2
58. Other posiposters felt as strangers to me	0	1	2
59. I felt a sense of being with other posiposters	0	1	2
60. I felt distant from others	0	1	2

If you would like to add questionnaire items or think that some questionnaire items are in need of further clarification or improvement, please tell us. When commenting, please use the number of the question for easier identification.

....

....

....

The order of the questionnaire test items will be changed for the actual questionnaire.

Please describe any further points that you would like to make with regard to this questionnaire here:

....

....

....

....

Please note that all your details and comments will be treated confidentially and ethical approval by Brunel's Research Ethics Committee is being sought.

Thank you very much for testing the constructs of this questionnaire!

Consent form for a study: PosiPost Be/Me

We would like to invite you to participate in a study that involves testing two applications on a mobile phone. The study aims to investigate user's perception on the use of these two different positive messaging applications and its potential effects on social wellbeing. To advance this research, we would really like your consent to participate in our study!

For the study, you will be asked to use two different applications that are called *PosiPost Me* and *PosiPost Be*. PosiPost Me is a Mobile Internet edition of PosiPost that enables you to randomly share anonymous positive thoughts with people over any distance. The other version, PosiPost Be allows you to share positive messages with people in near proximity over Bluetooth. With both these editions, participants can send, receive and read postings starting with the prefix *Today I like*.

Participants will be asked to use these two PosiPost applications each for one week, with a stop week between the usage of these. Before and after the use of these two applications you will be requested to fill in a simple questionnaire, which will mostly concern closed questions. We would like to ask participants more open questions in short additional interviews afterwards. If you would like to participate (and please do!) please use this form to detail your consent as of course we won't progress without. Please also note that ethical approval from the Brunel University ethics committee has been obtained. Your participation will be very much appreciated!

Title of study: PosiPost Me/Me: An investigation into the social use of mobile positive messaging systems

Name of Researchers: Marije Kanis, Willem-Paul Brinkman and Mark Perry
Contact details: <removed from appendix>

	Please tick to confirm
I confirm that I have read and understand the information stated above.	
I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.	
I understand that any contact details I will provide will be handled with care and are not intended to be sold or abused by any third parties.	
I agree to take part in the above research study.	
I understand that relevant sections of any of my data collected during the study may be looked at by responsible individuals where it is relevant to my taking part in this research.	
I understand that I will not be referred to by name or email address in any report concerning the study.	
I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, without my legal rights being affected.	

- **My available dates for the 3 week study in Delft University are** (please circle):
26 November – 14 December 2007   3 December – 21 December 2007

A suited Nokia smart phone (unlocked) will be provided during the course of the study. We will provide a Sim card with this phone or you can use your own Sim card.
In either case you will be reimbursed for potential costs involved.
- **I prefer to use my own Sim card (**please circle the answer of your choice):
Yes   I don't mind either way   No

- **Please detail the type of your Sim card (e.g. Telfort, Orange):**

- **Contact details (for interview)**
Email-address:
Phone number:

Name of participant:
Date: **Signature:**

-Thank you-

Questionnaire PosiPost Be/Me study

Thank you for filling in this questionnaire!

Please answer the questions below (Circle the answer that applies):

• Phone ID

• Gender
Male/ female

• Age:
……. (years)

• **Which of the different PosiPost types did you use most recently?**
None   /PosiPost Be (Bluetooth edition)   / PosiPost Me (Mobile internet edition)

• **How would you describe your use of mobile phones?**
Don't have a mobile   /Use mobile Internet   /Only use sms and calls

ADJECTIVES (PART B)

Please look at each word and circle the number that best fits how often you've felt that way in the last week.

Words	Not at all	Occasionally	Some of the time	Often	All of the time
Happy	1	2	3	4	5
Lonely	1	2	3	4	5
Depressed	1	2	3	4	5
Reserved	1	2	3	4	5
Relaxed about things	1	2	3	4	5
Optimistic	1	2	3	4	5
Withdrawn	1	2	3	4	5
Sociable	1	2	3	4	5
Interested in other people	1	2	3	4	5
Discontented	1	2	3	4	5
Detached	1	2	3	4	5
Tense	1	2	3	4	5
Friendly	1	2	3	4	5
Socially aware	1	2	3	4	5
Connected	1	2	3	4	5
Careless	1	2	3	4	5

PosiPost (PART A)

Look at the statements concerning PosiPost and circle the number that best fits your opinion
(1 strongly disagree – 7 strongly agree). Please fill this in for the last PosiPost version you used.

Statements	Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
1. I liked receiving posipostings	1	2	3	4	5	6	7
2. I believe my messages made other posiposters happy	1	2	3	4	5	6	7
3. I believe that the messages I received were sometimes hard to contextualize	1	2	3	4	5	6	7
4. I did not learn anything about others	1	2	3	4	5	6	7
5. I did not like sharing positive messages with others	1	2	3	4	5	6	7
6. I often wondered about what some posipostings meant	1	2	3	4	5	6	7
7. I think that other people did not like my positive thoughts	1	2	3	4	5	6	7
8. I felt a sense of belonging to a posipost group	1	2	3	4	5	6	7
9. When posiposting, I felt distant from others	1	2	3	4	5	6	7
10. I felt in control of the interaction	1	2	3	4	5	6	7
11. I felt socially obliged to posipost	1	2	3	4	5	6	7
12. I got to know more about other people	1	2	3	4	5	6	7
13. I did not discuss posipost with others	1	2	3	4	5	6	7
14. I like (reading) old posiposts	1	2	3	4	5	6	7
15. I like receiving positive thoughts from strangers	1	2	3	4	5	6	7
16. I like sending posipostings	1	2	3	4	5	6	7
17. I like to reveal my identity when posiposting	1	2	3	4	5	6	7
18. Because of PosiPost, I looked more negatively upon other people	1	2	3	4	5	6	7
19. I prefer not to receive anonymous postings	1	2	3	4	5	6	7
20. I prefer to know the identity of the other posiposter	1	2	3	4	5	6	7
21. I prefer to share posipostings with people I know, rather than with strangers	1	2	3	4	5	6	7
22. I smiled when receiving posipostings	1	2	3	4	5	6	7
23. I talked about posiposting with others	1	2	3	4	5	6	7
24. I tried to discover who the other posiposters were	1	2	3	4	5	6	7

	Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
25. I wanted to maintain a sense of distance between other posiposters.	1	2	3	4	5	6	7
26. I wanted to make posiposting more intimate.	1	2	3	4	5	6	7
27. I was not interested in getting to know other posiposters more	1	2	3	4	5	6	7
28. I would like to become (more) acquainted with other posiposters	1	2	3	4	5	6	7
29. I would not recommend this application to others	1	2	3	4	5	6	7
30. Interacting with others through PosiPost was not pleasurable	1	2	3	4	5	6	7
31. It was easy to posipost	1	2	3	4	5	6	7
32. I believe that more people should use this application	1	2	3	4	5	6	7
33. I felt disconnected from other posiposters	1	2	3	4	5	6	7
34. Other's positive expressions felt distant and unwelcoming	1	2	3	4	5	6	7
35. Other's positive thoughts did not make me happy	1	2	3	4	5	6	7
36. Other's positive thoughts influenced me in a negative way	1	2	3	4	5	6	7
37. I felt an expectation from other posiposters that I would send posipostings	1	2	3	4	5	6	7
38. People's posipostings positively inspired me	1	2	3	4	5	6	7
39. PosiPost did not make me (more) interested in others	1	2	3	4	5	6	7
40. PosiPost did not make me feel more aware of my social environment	1	2	3	4	5	6	7
41. PosiPost increased my positive thoughts	1	2	3	4	5	6	7
42. I did not care to know who the senders of my received postings were	1	2	3	4	5	6	7
43. I liked the messages I send	1	2	3	4	5	6	7
44. PosiPost made me feel more connected with others	1	2	3	4	5	6	7
45. PosiPost made me feel more positive towards others	1	2	3	4	5	6	7
46. PosiPost made me more aware of others	1	2	3	4	5	6	7
47. PosiPost made more aware of things happening around me	1	2	3	4	5	6	7
48. PosiPost made more aware of positive things happening around me	1	2	3	4	5	6	7
49. PosiPost messages were personal	1	2	3	4	5	6	7
50. Posiposting made me happy	1	2	3	4	5	6	7
51. PosiPosting took a lot of effort	1	2	3	4	5	6	7
52. Received postings were clear to me	1	2	3	4	5	6	7

	Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
53. I was interested in knowing who had send particular postings	1	2	3	4	5	6	7
54. The application provoked negative messaging	1	2	3	4	5	6	7
55. Posipostings seldom made me curious	1	2	3	4	5	6	7
56. The messages I received were positive	1	2	3	4	5	6	7
57. Sharing posipostings with others was fun	1	2	3	4	5	6	7
58. Sharing positive thoughts with others did not inspire my own positive thinking	1	2	3	4	5	6	7
59. Through PosiPost, I felt more positive towards my surroundings	1	2	3	4	5	6	7
60. When posiposting, I prefer to be anonymous	1	2	3	4	5	6	7
61. When posiposting, I saw my environment from a negative perspective	1	2	3	4	5	6	7
62. When posiposting, I was not aware of the physical environment around me	1	2	3	4	5	6	7
63. I was not curious to know from where certain messages came from	1	2	3	4	5	6	7
64. Sometimes I felt frustrated with the application	1	2	3	4	5	6	7
65. The application did not make me feel more positive	1	2	3	4	5	6	7
66. I believe that the postings I send were stupid	1	2	3	4	5	6	7
67. I cared about knowing the origin of my received posiposts	1	2	3	4	5	6	7

Are there any further points that you would like to make with regard to PosiPost?
……
……

When would it be okay to meet you for a further quick interview on Friday (14/21 Dec.)?
(Please circle the preferred timeslots)
13:00-13:20 13:30-13:50 /14:00-14:20 /14:30-14:50 /15:00-15:20 /15:30-15:50 /16:00-16:20 /
16:30-16:50 /17:00-17:20/ Please contact me to arrange another day/……………………………

Please note that all your details and comments will be treated confidentially and ethical approval from Brunel's ethical committee has been obtained.

Thank you very much for filling in this questionnaire!

SPOT

Questionnaire to measure Social and Positive psychological affects Of Technology

****

Note to researchers who would like to test, reiterate or use the SPOT instrument in their research: Both parts of the questionnaire, or either Part A, for a one-shot assessment, or Part B, to assess pre- and post-test changes over time, can be used. Also Part B's different Questionnaire's constructs (taken together with its items) can be used independently, depending on researcher's requirements. When the instrument is given to study participants, the construct's items should be put in a more random order (such as done in the questionnaire in Appendix C). In cases where <x> is shown in the questions, researchers should make this appropriate for the specific technology they will be testing. Please note that this instrument could still be further validated and iterated. If you have any questions or comments with regard to this instrument, please mail the author, Marije Kanis. Email. Marije.kanis@brunel.ac.uk.
NOTE: THIS WAS ADDED FOR THE THESIS AND NOT GIVEN TO PARTICIPANTS
****

Please answer the questions below (Circle the answer that applies):

Gender: **Age:**

Male/ female   …….   (years)

ADJECTIVES (PART A)
Please look at each word and circle the number that best fits how often you've felt that way in the last week.

Words	Not at all	Occasionally	Some of the time	Often	All of the time
Sociable	1	2	3	4	5
Interested in other people	1	2	3	4	5
Socially aware	1	2	3	4	5
Happy	1	2	3	4	5
Tense	1	2	3	4	5
Depressed	1	2	3	4	5

PosiPost (PART B)

Please look at the statements and circle the number that best fits your opinion

(1 strongly disagree – 7 strongly agree).

Constructs and items	Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
Social disclosure							
I wanted to maintain a sense of distance between other users.	1	2	3	4	5	6	7
I wanted to make <interacting with the system> more intimate.	1	2	3	4	5	6	7
I got to know more about other people	1	2	3	4	5	6	7
I did not learn anything about others	1	2	3	4	5	6	7
Appreciation system	1	2	3	4	5	6	7
I felt in control of the interaction	1	2	3	4	5	6	7
It was easy to <interact with the system>	1	2	3	4	5	6	7
I would not recommend this application to others	1	2	3	4	5	6	7
I like receiving <x=e.g. messages> from strangers	1	2	3	4	5	6	7
I like sending <x=e.g. messages>	1	2	3	4	5	6	7
I liked receiving <x=e.g. messages>	1	2	3	4	5	6	7
Message perception	1	2	3	4	5	6	7
The messages I received were positive	1	2	3	4	5	6	7
The application provoked negative messaging	1	2	3	4	5	6	7
I liked the messages I send	1	2	3	4	5	6	7
I believe that the postings I send were stupid	1	2	3	4	5	6	7

Positive affect	1	2	3	4	5	6	7
I smiled when receiving <x=e.g. messages>	1	2	3	4	5	6	7
Other's positive thoughts did not make me happy	1	2	3	4	5	6	7
I believe my messages made other users happy	1	2	3	4	5	6	7
<Messaging/interacting with the system> made me happy	1	2	3	4	5	6	7
The application did not make me feel more positive	1	2	3	4	5	6	7
Positive thinking	1	2	3	4	5	6	7
Sharing positive thoughts with others did not inspire my own positive thinking	1	2	3	4	5	6	7
<Using the system> increased my positive thoughts	1	2	3	4	5	6	7
People's <x=e.g. messaging> positively inspired me	1	2	3	4	5	6	7
Other's positive thoughts influenced me in a negative way	1	2	3	4	5	6	7
Socio-pleasure	1	2	3	4	5	6	7
<Interacting through the system> with others was fun	1	2	3	4	5	6	7
Interacting with others through <the system> was not pleasurable	1	2	3	4	5	6	7
I like sending <messages>	1	2	3	4	5	6	7
I liked receiving <messages>	1	2	3	4	5	6	7
I like (reading) old <messages>	1	2	3	4	5	6	7
I did not like sharing positive messages with others	1	2	3	4	5	6	7
Social curiosity	1	2	3	4	5	6	7
Interacting with <the system> seldom made me curious	1	2	3	4	5	6	7
I tried to discover who the other <users> were	1	2	3	4	5	6	7
<The system> did not make me (more) interested in others	1	2	3	4	5	6	7

Awareness	1	2	3	4	5	6	7
<The system> did not make me feel more aware of my social environment	1	2	3	4	5	6	7
<The system> made me more aware of others	1	2	3	4	5	6	7
<The system> >made more aware of things happening around me	1	2	3	4	5	6	7
When <interacting with the system>, I was not aware of the physical environment around me	1	2	3	4	5	6	7
Positive awareness	1	2	3	4	5	6	7
<The system> made me feel more positive towards others	1	2	3	4	5	6	7
Because of <the system>, I looked more negatively upon other people	1	2	3	4	5	6	7
Through the system>, I felt more positive towards my surroundings	1	2	3	4	5	6	7
When <using the system>, I saw my environment from a negative perspective	1	2	3	4	5	6	7
Connectedness	1	2	3	4	5	6	7
I would like to become (more) acquainted with other users	1	2	3	4	5	6	7
<The system> made me feel more connected with others	1	2	3	4	5	6	7
I felt disconnected from other people	1	2	3	4	5	6	7
When <using the system>, I felt distant from others	1	2	3	4	5	6	7

Are there any further points that you would like to make with regard to *<the system>?*

……
……
……
……
……

-Thank you -

Instructions for participants

We would like to start with thanking our study participants. Here are some instructions to make it easier for you, so please read the parts you're into with a bit of concentration.

Important step

- Start with petting yourself on the back with the very nice decision to participate.

Contact

Please don't be shy and contact us if you have any questions, comments or think this guide is just lacking something. In return we'll try to support your need for a more personal and insightful touch.

Our mail addresses: <removed from appendix>

(Please note that we're not into spam. If you really want to send us anything other than study-related questions: We're after a WII and some warm knitted socks for the winter.)

What to do: The full deal

In this 3-week study (26 Nov.- 14 Dec. or 3 - 21 Dec. 2007), you will be given a phone that runs two different PosiPost mobile applications that we would like you to play with.

Week 1: At the very start (Monday 6 Nov. 6 or 3 Dec.) you'll be given a sheet (called part A) with some very quick questions (±3 min work). After that, you'll be shown how to use one PosiPost application (PosiPost Me OR PosiPost Be) and taught how to create your very first PosiPost message. From then on, you're free to use and explore the application on your own 'till the end of the workweek. PosiPost as much as you want to, with let's say a minimum of one message a day. Friday, you'll be asked to hand in the phone (unharmed) to <x> and fill in a simple questionnaire (called part A&B).

Week 2: To reward you for your efforts, we would like you to just totally relax for a week and do nothing related to PosiPost.

Week 3: The last week of the study will be the same as the first one. So you'll be given the simple questionnaire part A to complete at the beginning of this week and questionnaire A&B to complete at the end of this week. The only difference will be the PosiPost application you'll use. To sum up your experience, you'll be asked to give a short interview. This will take place on the very last Friday (14 or 21 December) of the study when returning the phone. We will mail you with more specifics on time and place. Also, if Friday is not convenient for you, than we would be happy to arrange a day that suits you better. The interview is just to tell us about your experience and to

give you a chance to vent any possible frustration or share any more insightful and pleasant thoughts. That will be really it.

2 for the price of 1: PosiPost Be & Me

This study involves using two mobile applications: PosiPost Me and PosiPost Be.

Both these PosiPost versions allow you to share positive messages starting with the prefix *Today I like*. One edition, called PosiPost Me, is the Mobile internet edition of PosiPost that enables you to randomly share anonymous positive thoughts of this nature with people over any distance. The other version, PosiPost Be, is a Bluetooth edition that enables you to freely share posipostings with people in your near proximity and to pass on any received message you like. With both these editions, you can send, receive and read posipostings. You can find out more specifics by looking at the PosiPost Me or Be manual or by contacting us.

The end: after the study

Give yourself a big hooray for lasting until the end of the study! We would really like to thank you for this very welcome contribution to our research.

Can't get enough of it?

So the study is over, what now?! That's totally up to you. If you feel sad that posiposting is over, don't be, you can go on! If you would like to keep on mobile posiposting, you'll need a Nokia S60 Smartphone (E.g. Nokia N70, Nokia 6630). Just let us know and we'll guide you through the installation process. Installation instructions for the PosiPost Me version can be found from here: http://www.posipost.org. Not a lucky owner of a suitable phone? No worries, on-line posiposting is also possible.

Go to http://www.posipost.org to find I PosiPost, the PosiPost Internet edition. Still not satisfied? A PosiPost Facebook edition is on its way! That's really it…

THANK YOU, participants!

PosiPost Me: How does it work?

PosiPost Me enables you to send, receive, send and post positive messages from anywhere at any time with your phone.

Starting up PosiPost Me
You can find the PosiPost Me application icon in the 'My own' folder or directly in your phone menu. It is a stand-alone application, which means that you can just directly select-click the puzzle icon that says 'posipost…to start the PosiPost Me application.
(If for some reasons this doesn't work, just go to the Python application by select-clicking the puzzle/Python icon (you can find Python directly on your phone desktop or in the 'my own' folder)
• With the left selection key, Choose 'Run script'
• Scroll down and choose the script called "0000PosiPostMe.py"
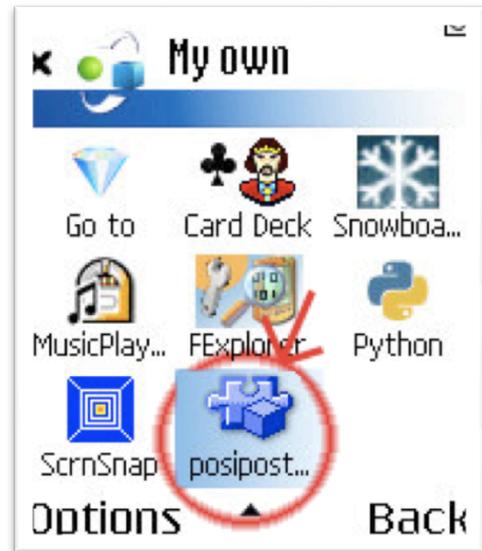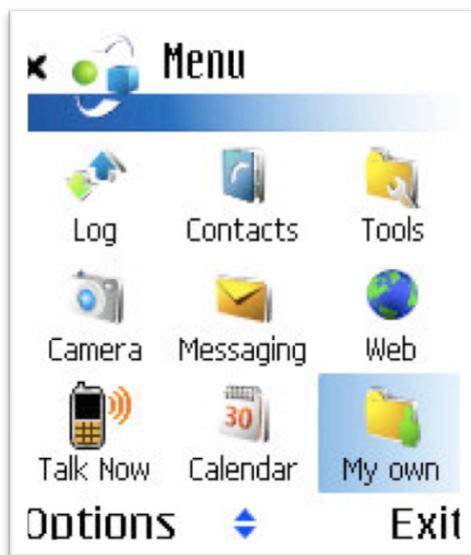
• Wait a couple of seconds
• PosiPost Me will start!

PosiPost Me Options menu
The options are:
• Send PosiPost
• Get PosiPost
• Read my PosiPost

Sending PosiPost

You can create PosiPost by choosing send PosiPost in the option menu and then finishing the sentence *Today I like.*
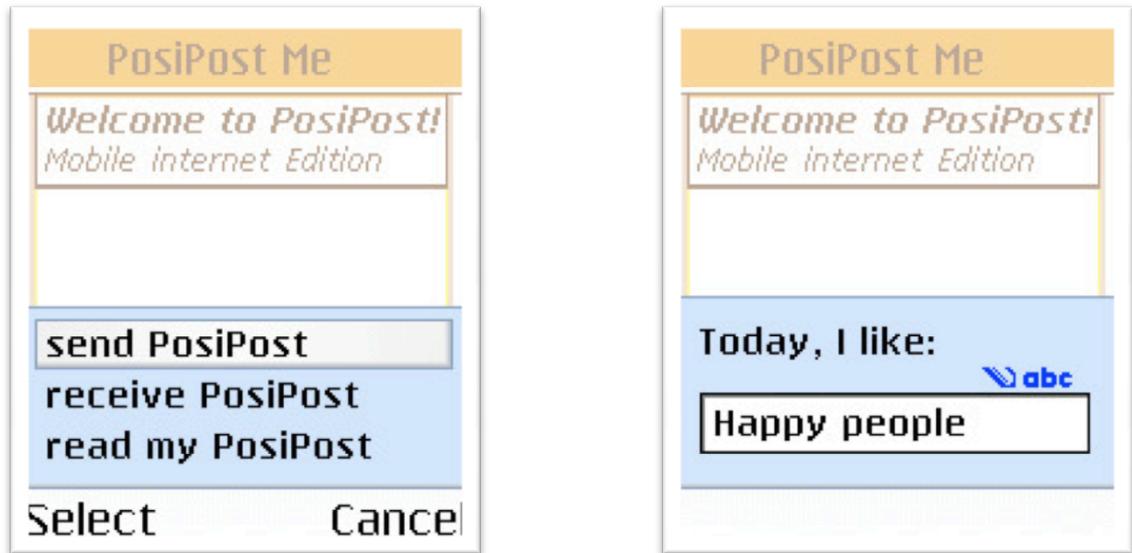
Typing a message with the Nokia phone can be a bit challenging at first. See the figure below for the placement of the keys. After you have typed in a message, click 'ok'.

Using the keys of your phone
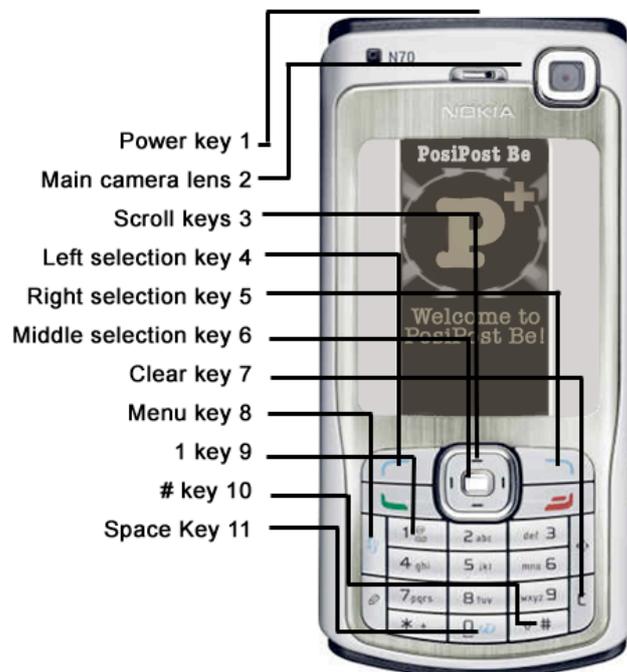
Then, to send it you will have to select your Internet Access point, depending on your provider, e.g. 'T-mobile Internet connection'. Be careful here, as choosing an MMS connection or Image connection won't work. After, it will hopefully tell you that you have successfully send a PosiPost! Others now will be able to randomly get your PosiPost. PosiPosts are also randomly displayed on this website: http://www.posipost.org. You can send as much PosiPost messages as you like.

Getting PosiPost
You can receive PosiPost messages by choosing 'get PosiPost' with the left selection key. Be careful that you select the right access point if a selection menu appears (e.g. T-Mobile Internet connection, but not something with mms)

A PosiPost should appear after few seconds. You can choose to get PosiPost any time and as much you want to!
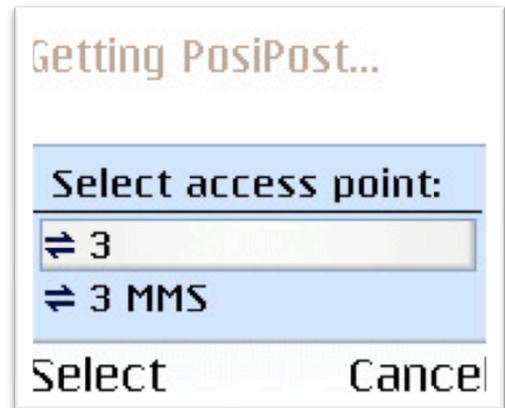
Reading your PosiPost
You can read your own created PosiPost at any time you like by choosing 'Read PosiPost'. There might be some messages left from previous users.

Enjoy!

Quitting PosiPost
To quit the application, you can choose 'Exit' with the right selection key, but we generally advise you not to quit.

Worst case scenario
Bad mobile Internet coverage: PosiPost's Mobile Internet Edition needs a mobile Internet connection. Yes, you read it correctly. Sometimes it can happen that there is no network coverage and then it just won't work. Unfortunately, this one is out of our hands (but in the hands of providers such as Orange and T-Mobile). Just keep on trying multiple times and places and it really should happen and work at least some of the time. You can see whether you have a current Internet connection by checking whether there is a 3G icon displayed on your phone. If you don't see a 3G but an aerial symbol than it means you currently have a slow or non-existent connection. If you can use Internet on your phone, you should be able to PosiPost as well. In any worst case, don't despair as we are there for you.

Please do try this at home
Please do try PosiPost Me at home, at work and anywhere else!

PosiPost Be: How does it work?

The application PosiPost Be allows you to automatically share positive thoughts with other posiposters that come in close proximity. A PosiPost message is created by finishing the sentence with the prefix *Today I like* on your phone. The mobile program automatically keeps an eye out for others with the PosiPost Be service, and then uses Bluetooth to send the created messages when it finds a posiposter within range. For each of the messages you receive, you can decide whether to automatically pass them on. In this way, many positive thoughts could be exchanged and potentially travel via many people. Will a message such as "Today, I like eating bananas" be passed on by more people than "Today, I like peace"? Find out by using PosiPost Be. The more posipostings you send, and the more people with the PosiPost Be application running in your environment, the more posipostings can be shared.

Starting up PosiPost Be:
Starting up the PosiPost Be application should be a pretty straightforward process. However, it is important to go through these steps:

- Before start-up, always make sure Bluetooth and Bluetooth discovery is on. Check this by going to the Bluetooth menu with the right selection key.

- Make sure that your phone's visibility is 'Show to all'.

- In your Bluetooth settings, make sure that the Bluetooth name of your phone contains (POSI) For example: (POSI) Mark, 305 (POSI), my (POSI) phone or WP3 (POSI). This is important, as posipostings will only be send to phones with (POSI) in their Bluetooth group names.

PosiPost Be is not a stand-alone version, we apologize. We made this application in a program language called Python, so there you go.
- Go to the Python application by clicking on the Python snake or puzzle icon (you can find Python directly on your phone menu or in the 'my own' folder)

- With the left selection key, Choose 'Run script'
- Scroll down and choose the script called "0000PosiPostBe.py"

- PosiPost Be will start!

After start-up
After start-up, the application will instantly check whether you have received new PosiPost. Stars on the screen mean the application is processing.

Then, **the application will automatically start scanning** and will be **waiting for** available *PosiPost Be* devices that come in your proximity. This means that you'll be able to receive posipostings from people near you.

You will also be able to **access the PosiPost Be option menu**.

PosiPost Be option menu:
- Send PosiPost
- Read PosiPost
- Settings:
    - *Origin*
    - *Expiry filter*
    - *Group name*

Sending and creating a PosiPost message
- Select 'Options' with the left selection key and then select 'Send PosiPost'.
- Finish the sentence, "Today I like". See 'Using the keys of your phone' to help you typing the message.
- When finished, select 'ok'.
- This PosiPost message will then be stored. The application will be waiting for when another posiposter comes in proximity. When this happens, the created posting will be automatically send. Please note that this process may take a while.
- Thus, it's best just to leave the Bluetooth application running for a long while.

Using the keys of your phone

Power key 1
Main camera lens 2
Scroll keys 3
Left selection key 4
Right selection key 5
Middle selection key 6
Clear key 7
Menu key 8
1 key 9
key 10
Space Key 11
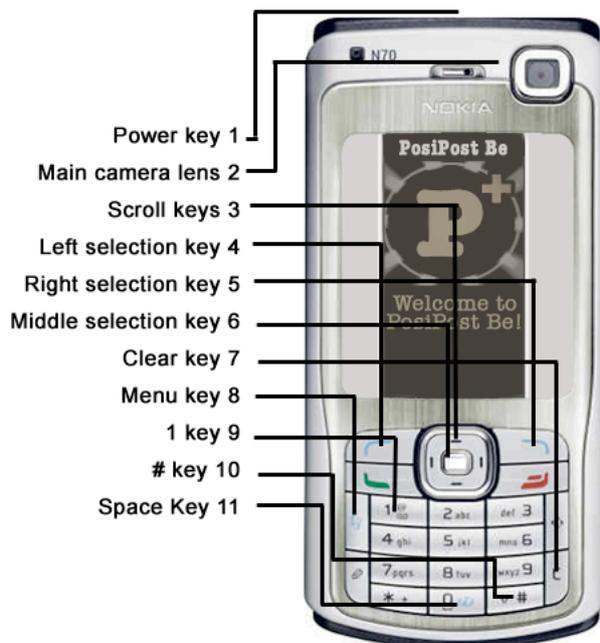
Reading your PosiPost
Select 'Options' with the left selection key and then select 'Read PosiPost'.

The last created or received PosiPost will be displayed with some extra info:
- *Origin***:** A description of the name and/or location send with the message.
- For example, 'Jan Jansen@AH', Brixton wp3 or 'mark in kantine'
- ('Origin' can be set by choosing 'settings' and then 'origin')
- *Passed People:* The amount of posiposters via which this message has been passed on by.
- *Created:* The date the posiposting was originally created

Pressing the left selection key will call the menu that enables you to go to the next and previous messages and to close 'read PosiPost'.

Receiving PosiPost messages
When a fellow posiposter comes in close proximity, you will automatically receive new and approved, passed on PosiPost from the other person near.
- The origin, date created and the amount of people the received message has been passed on by are displayed.
- You will be asked whether you want to pass on the received PosiPost(s)

Passing on PosiPost
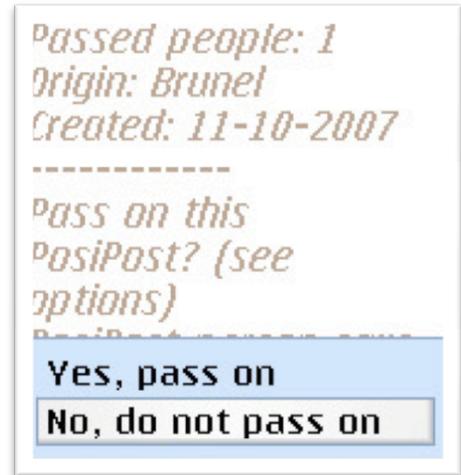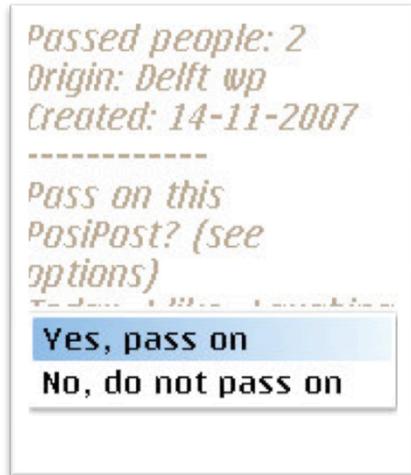
All the posipostings you receive can be transferred and passed on to other posiposters that come in your vicinity. In this way, a PosiPost message could potentially go a long way and pass through a lot of people. Will a message such as "Today, I like being at the beach" be passed on by more people than "Today, I like peace"? That is up to you to decide. For all the posipostings you receive, you can decide whether to pass on the received posipostings to other posiposters that come near.

Information about the number of posiposters that have passed on a particular posiposting is displayed when receiving the posipost message. For example, Passed people: 4, means that this message has already been received and passed on by four different people.

How to pass on posipost to other posiposters
When you receive posipost, for each message you will be automatically asked: Pass on this posipost?
• Use the left selection key en select 'yes' if you want to pass it on, and select 'no' if not.
• In the 'options' menu, select 'next' to see and answer the same question for the next received message(s)
• Continue these steps, until there are no new received messages that are pending for passage.

If you don't want to pass on all your received messages right away you can choose exit. You'll be able to pass on the messages later on, and the program will be able to continue to receive postings.

Settings
You can access three different preferences in the settings menu that affect the sending and receiving of PosiPost. Once, they are set, these will be remembered even after start-up. To access the options in the settings menu, select 'options' with the left selection key of your phone and go to the right so that the options will be shown.
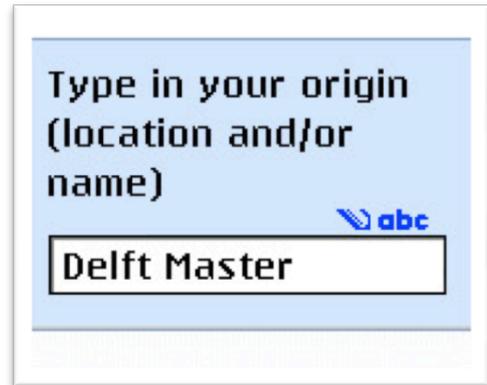

The settings options are:
• *Expiry filter*
• *Origin*
• *Group name*

Origin

Type in the description of your current location and/or name (e.g. Willem-Paul, HB 10.120 or Snoopy@TU Delft. This will be send with your PosiPost message.


Advanced settings

Expiry filter

You can specify a filter that limits receiving PosiPost that is older than a preferred number of days. Type in the number of preferred days old (for example 30) for filtering the receiving of messages. This means that you will not receive messages that were created after the specified number of days.

Group name

 Setting your Bluetooth 'discovery name':

- The default name for Bluetooth discovery is '(POSI)', which means that all PosiPost Be users who have '(POSI)' as part of their Bluetooth device name can send and receive PosiPost by Bluetooth. If you only want to share posipost within a particular group, PosiPost Be gives you the ability to do that by changing the group name. However, if you decide to do this, your Bluetooth name (outside PosiPost) will need to be changed and all the members will need to do the same. For the study it is advised to leave the group and Bluetooth name to (POSI).
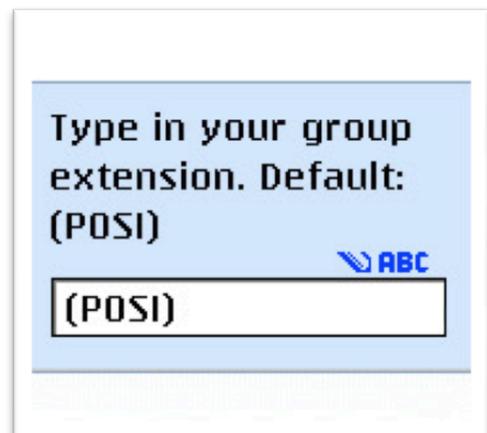
Serious and IMPORTANT stuff

Please note that our applications are just prototypes. Which is kind of the definition of a buggy, unstable system, full of interesting 'challenges'. Thus, the applications may not always behave like you would expect and could crash or do strange erratic things. When this happens, don't worry; it's not your fault. But please be forgiving. Also, a simple restart of the phone will normally fix this.

Crucial Do's
Some important tips:

- *DON'T FORGET to turn on Bluetooth!*

- It's best not to mess with the group name. To make sure that the group name is rightly set, you can type in the (POSI) name again in the group settings.

- Just a little patience: Please leave the program running for quite a while; messages should come eventually (as long as there is another posiposter in your proximity!).

  WAIT a couple of minutes before starting the program again. The invisible Bluetooth scanning sometimes works in mysterious ways and takes some time to quit.
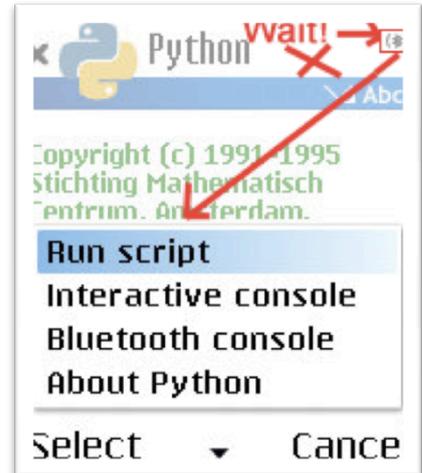
- Please IGNORE or delete the messages (called posi_post_temps, e.g. posi_post_temp12348.txt) that enter your normal phone inbox. Sorry, we just haven't figured out a way to remove the temp files in your inbox nicely without you noticing them.
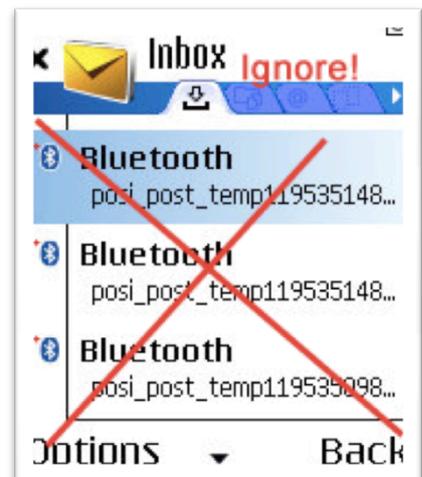
- It's OK to see just a white screen (and not a picture). The PosiPost Be program is still running and PosiPost Be's menu is still available.

Thank you for using PosiPost!