BuddyBeads

Mediating social relationship through mobile communication

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I dedicate this thesis to my parents, Miriam and Moshe Kikin

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Abstract

The extremity in teenagers' attitudes and actions coupled with the opportunities of mobile communication creates new behaviors and re-shapes existing ones. But however meaningful the phone is in teenagers' lives, it is not designed to support their need for emotional communication and group identity.

The BuddyBeads project suggests alternative communication forms among teenagers, which emphasize their social structures, behaviors and needs. BuddyBeads are techno-jewelry items that facilitate non-verbal and emotional communication among group members, through codes and signals which the group decided upon together. Each group member has a matching jewelry piece and can use it to communicate her emotional state to the other group members.

Contents

1 Introduction

My research question

In which ways can mobile communication mediate social relationship within groups of teenagers.

Why did I choose my topic?

My goal is to in this thesis was to investigate and build on behaviors within teenagers groups and see how mobile communication technologies can come into play in a way which is meaningful to them and which will support their needs. Today's teenagers are growing up in a cellular world where what adults call "New technology" and "New perception" is the only reality they know. The way teenagers perceive mobile communication is very different from the way which adults, who were introduced to them in later stages of their lives, perceive it. The phone is their playground, their classroom and their social club. They quickly adopt the latest features and create new and unexpected uses for them. It's inseparable part of their life, and they are emotionally dependant on it. However meaningful the phone is in the teenagers' lives, it is not designed to support their needs, and issues such as emotional communication and group identity are overlooked.
We all know that adolescence is a time of transition, when alternating periods of crisis and exultation help the teenagers build their identity and sense of self. In these turbulent times, adolescents turn to their peers to get support and to find role models. The group, and belonging to a group is an essential part of a teenager life, and each group develops its own behavior codes and etiquette. Communication between group members is intense both in volume and in frequency and great part of it is for communication's sake. The coupling of the extremity in teenagers' attitudes and actions with the opportunities that mobile communication provides creates new behaviors and re-shapes existing ones.

2 Theoretical framework

In the following chapter I will describe the work assumptions and theoretical background which my design concepts are based upon.
I will examine how new technologies were catalysts for social changes, explore the role of social groups in teenagers' lives, look at the importance of nonverbal and encoded communication among humans and see what is the connection between fashion and phones.
I will then review some of the new trends which are relevant to my thesis. These trends emerged as the result of the dispersion of mobile technology, and influenced the teenagers' behavior.

2.1 Technology and social change

"Technological change is not additive; it is ecological. A new technology does not merely add something; it changes everything"
Neil Postmen, "Ten Principles of Technology" [19]

There has always been a connection between technological advancements and social change. For example, the discoveries of new materials like steel, and new forms of power like the steam engine, were the driving force behind the industrial revolution the 19th century. The social change these technologies resulted in was paramount: the work place has changed, factories were built and new economies emerged; the family structure was transformed accordingly, shrinking to the nuclear family that enabled better mobility. Religious Institutions lost power, while new forms of governance developed and new political movements came to life. *[15]* Society was moving "from the small scale to the large, from the rural to the urban, from the socially cohesive to the individualized; from the local to the global." [9]

Another relevant example is the automobile. By enhancing mobility it changed the perception of distance, and allowed businesses to move outside city centers and to people live, work, shop and worship in places distant from one another.
New industries and services were introduced: road infrastructure was developed, gas and service stations popped up everywhere. Environmental issues were quickly to follow, as the atmosphere was polluted by gas fumes and the greenhouse effect increased. The neighborhood lost its role as social context and "communities of interest" replaced "communities of propinquity". The car liberated youth as it allowed them to interact and

socialize through greater distances, which brought up the need for better coordination. *[15]*

When looking at computer and telecommunications technology from this perspective we can see that they lead to further spreading of the society, by detaching it not only from geographical limitations, but from temporal restriction as well, thus enabling people to create and sustain societies anytime and anywhere.

Researchers like Castells look at these new communities as existing only in terms of connections (or 'information flows') between remote individuals *[3]*, and Wellman defines community "*as network of interpersonal ties that provide sociability, support, information, a sense of belonging, and social identity. I do not limit my thinking about community to neighborhoods and villages. This is good advice for any epoch and especially pertinent for the twenty first century" [22]*

A new form of community or "tribe" has emerged, based on contexts instead of locations. Sport, music, sex and brands are the new catalysts for creating communities, coupled with the need of being together. These Neo tribes are emotion-based, internally diverse and temporary. The communities do not share place, but have strong social relationships based on mutual aid, conviviality, and professional support. Each community builds an ethics, which creates "ambiances *[16]*

Mobile communication devices are the optimal vehicle to support these types of communities, as they provide a ubiquitous contact, both in social terms and in terms of access to information. When the technology is coupled with a social need, a cultural shift is happening.

2.2 Adolescence and groups

Adolescence is a time of big changes and inner turbulences, where emotions are strong and need to find an outlet. Communicating with others is a way to release these tensions.

An overview of various adolescence theories and approaches is presented in Rolf E. Muuss' seminal book "Theories of adolescence" *[17]*. I will relate to the ones which are relevant for my research.

The noun "Adolescence" is rooted in the Latin Verb "Adolescere" which means "to grow" or "to grow towards maturity". From a sociological perspective, Adolescence is a transition period from the dependent childhood to the independent adulthood. Psychologically wise, it is a "borderline situation" within which one is adjusting himself to distinguish between their child's and adult's behaviors within a defined society. Chronologically, this is the time span between the age of twelve or thirteen to the early twenties according to individual and cultural variants. Girls usually go into adolescence earlier than boys and adolescence ends earlier in primitive societies.

Physical changes indicate the beginning of adolescence but it is much harder to point out when adolescence ends because no physical phenomenon is associated with it. The ending of this period and the parameters for maturity differ in various societies and are related to social and financial status, building a family and independency.

G. Stanly Hall (1884-19240), describes adolescence as a period of contradictions, when an energetic and ecstatic mood is replaced within moments with depression and indifference, when the adolescent can be selfish and conceited but at the same time also vulnerable and shy. It is time of drastic shifts between altruistic and egoistic behaviors, between rebelling against all authority and fanatically following idols. Bloss has stated that "maturity can be achieved only through conflict" *(106)*, The adolescent is torn between purity and temptation, between seeking solitude and finding himself involved in intense social activities. At this time in his life, the influence of peer will be the strongest. Hall calls this period "Sturm und Drang" – storm and tension *(35-36)*.

According to Erikson, adolescence is the time in life to develop a personal identity. He defines identity as the ability of the self to estimate its value and weaknesses and accordingly decide how to operate and react. Having an identity means having a sense of unity and succession among the past, present and future of the self. One must put constant effort in order to develop one's identity.

When traditional structures of family and community existed, the adolescent often turned to the elderly in search for role models, but in modern society, when these structures have collapsed, the role of peers have become significantly more important in one's search for identity. Adolescents are highly influenced by their peers' impressions and evaluation of their character and behavior; fulfilling the expectations of their peers helps the adolescents to try on different social roles and find out what are the ones they feel comfortable in.

The peer group, the gang, and the lover, all help the teenager to find identity, by providing both the role models and the social feedback for his or her behavior. An example for this special feedback can be found in the endless phone conversations teenagers tend to have which fulfill basic psychological needs.

The tribalism and lack of tolerance for those who are different is explained by Erikson as necessary defenses against the threat they represent when one is lacking a coherent identity *(75-76)*.

The peer group is a source for confidence, support and values, but it can also turn to tyranny when the individual has to submit and obey the inner codes and ethics in return for the support given. The peer group demands conformity, which is the price to pay for getting the support that teenagers no longer draw from their families. The group offers "Motivation, belonging, loyalty, devotion empathy and resonance" (Bloss,

1967). The group becomes an emotional replacement for the family and the risk is that the problem of emotional dependency will remain even though the supporting entity has changed. Rebelling against the conformity model exposes the adolescent to scorn, rejection and disrespect from his or her peers.

2.3 Coded communication

"We feel the meaning of things before we think them. This is why empathic communication exists in all things"
Del Coats, Watches tell more than time

People communicate with each other directly in physical encounters or remotely by using mediating technologies. The communication can be verbal or non verbal. Nonverbal communication is comprised of all of the messages other than words that people use in interaction (Hecht & DeVito, 1990) *[5]*. It includes body language and gestures, voice patterns, signs, symbols, and cultural and private codes. For example, one's body gestures can hint that someone is welcomed, or imply that someone is being laughed at. A rose given to a woman is a symbol for courtship. Psychological approaches lend great importance to nonverbal communication, and its estimated share in a conversation ranges from 31% (Philpott 1983) to 93% (Mehrabian & Wiener, 1967). When meeting face to face, the entire body is an active participant in the communication, while when communicating remotely, the body is absent and aids such as emoticons – icons and symbols that express emotions – (Herring, 1996) *[10]* are used to replace the emotional and paralinguistic cues.
Codes are widely used in human communication as representations and shortcuts to meaning. Canfield defines them as "hidden set of rules or symbols, physical or social, which when interpreted give meaning to an event, body, behavior or activity". Codes can reside in the symbolic level of words (use of metaphors or group lingo), in body language (nodding means NO), in rituals performed (a wedding ceremony) and in objects which are involved in these rituals (wedding rings). Their meaning is constructed arbitrarily, and can differ among cultures, social groups and even among individuals.
An example for a coded language was reported by Japan.com in 2004.

Figure 01: sample of Gyaru Moji script

A secret mobile-texting language emerged among Japanese girls. Its name is 'gyaru-moji' or 'Girl's talk', and it is a mixture of Japanese syllables, numbers, mathematical symbols and Greek characters which resemble

hieroglyphs and is only understood by the girls. It is interesting to note that writing in this language is twice time-consuming than common texting. A Japanese teenager who was interviewed about 'gyaru-moji' explained why the effort was worthwhile:

"People who want to read over my shoulder cannot understand gyaru-moji, and in this way we keep our group language." [20]

To understand codes we should also look at the field of semiotics, which is the study of "how meaning is expressed in signs, the smallest element of meaning. A symbol is a type of sign. Codes are sets of signs and rules. Assumptions about signs and codes lead to human action" [2]. Emotions are often displayed in a coded way: a smile represents happiness, a frown is an expression of discontent and a red face may mean anger. Context also plays part in how signs or codes are interpreted as red face can also mean that the red faced person is just after physical exertion.
The act of expressing one's feelings is important. I will not describe the research done in the field of emotion, but I will note that a discipline of emotional literacy or EQ (emotional quotient) that deals with how people feel, understand their emotions and control them has been developed in the last decade (Goleman, 1995). A study conducted for Italian children's rights group "Telefono Azzurro", which operates a national hotline for children and adolescents in Italy, noted that "Irritability and mood swings" caused frequent cell phone use among teenagers [29].

2.4 Phones and Fashion

Figure 02: A variety of trendy phone accessories for the fashion savvy, StrapYa.com

Fashion and being fashionable is important to teenagers. Fashion items, such as clothes, project the selected aspects people want to emphasize about themselves. Goffman calls it 'putting on a face'. Clothes and accessories contain a symbolic meaning which is expressed by the way people dress for different occasions such as weddings or funerals. Fashion helps us establish a "front stage" where a deliberate façade is created and used in contact with the outer world. This façade is a projection of a

particular image of ourselves, the way we want others to see us *[8]*. Ling compares the mobile phone to clothes in the sense that both provide the observer a way to categorize the other person and contextualize them within the culture. Ling presents the sociologist Georg Simmel's analysis of the social dimensions of fashion. Simmel regards fashion as a mixture of two simultaneous and opposing dimensions; the one is isolation: the longing for individual statement and the other is union: the need to belong to a group. [15] Fashion enables teenagers to make a statement about themselves as well as helps them to understand their own identity, [11] while groups use symbols, codes and visual etiquette to define their boundaries and to create a "group Spirit" that all members are obliged to. Fashion is dynamic and feeds from the tension between the avant-garde and the popularized, so to use fashion in its correct form one has to adopt it in the right time. [15] A phone is a status symbol; its model and novelty matter and reflect on the owner's image in his friends' eyes. Phone customization is also important, and stickers, phone straps, backdrops and ringtones play part in creating the right presentation of self and give a sense of one's fashionability. Personalize your phone or don't, either way is perceived as a statement. [9] But fashion stretches also to the phone usage, and those who receive higher volumes of messages and calls have higher prestige. Hulme is referring to a study by Peter s. Alexander from 2000 who notes that the importance of the symbolic aspects of style and fashion as a catalyst for social interaction increases among teenagers as they feel uncomfortable to communicate verbally in certain social situations. To conclude, the mobile phone is a fashion item and a status symbol in its technological level, its appearance and its usage.

2.5 Emerging behaviors and trends

The new communication tools and in particular mobile communication technologies are being adopted and re-appropriated by teenagers who use them to fulfill their personal and social needs. As a result, some old behaviors have metamorphosed and new behaviors have emerged. Here are some representing examples. Each of them either represents a new way of thinking, or has the potential to become a cultural shifting behavior.

2.5.1 Always on, full-time intimate community

'Q: How many names do you have in your address book?
Sara: 120
Q: How many of them do you call on a regular basis?
Sara: Mother, father, brother and four close friends…'

Misa Matsuda, the Japanese researcher coined the term "Always on, full-time intimate community" which refers to a small group of friends that is in continuous contact through phone messaging. The important aspect is that the community members are constantly aware of each other's emotional and physical state and that the real content transmitted in these messages is intimacy [12]. Ito and Okabe wrote about the fact that teenagers have loaded address books, but communicate regularly with up to 10 people. They lubricate their relationship by sending small messages that don't require specific answers such as 'I am walking up the hill now' and they use it as a way to affirm their intimacy and to evoke a feeling of ambient accessibility.
It's a social space which is built and maintained as long as the communication keeps flowing, a 'virtual peripheral vision'. This type of communication can sometime substitute the lack of private physical space, as in the case of teenage couples. Responses to the messages are expected to be received quickly, and if not, a social uneasiness is evoked. An apology for the delay is the appropriate thing to do as availability and presence are key to relationship. There is a need to set boundaries for this availability without damaging the delicate social texture. [13] The Australian social researcher, Hugh Mackay, talked about young people who grow up in a world of instability, fragmented families and economic crisis, finding comfort and strength with their peers, and doing so by using communication tools such as SMS and email chatrooms: '*They are the most intensely tribal, herd-based generation of young Australians I've ever known... It's the early sign of a genuine culture shift away from individualism to a more communitarian kind of culture.'* [31]

Some questions that emerge when looking at the "always-on" phenomenon are:

- Will the fear of being alone grow?
- How will the constant contact influence on individuality and its perception in society?
- Will people become addicted to contact? A girl in Italy lost the ability to move her thumb after writing more 100 SMSs a day. [26]
- Will communication rehab centers emerge?

2.5.2 Demonstration of social networks

'Q: Do you give your phone to other people to look at?
Marta: No. I mean, friends like them (points at the other girls in the room). can read my phone. But I don't like when people come and say "Can I look at your phone?" it has become a trend now, to look at other people's phones.'
Marta, 15, Ivrea

Having social connections is important at any age but it is essential as a teenager. It is not only important to have a social circle, it is also important to show your peers that you are in the right one. A Hebrew proverb says 'Show me your friends and I'll tell you who you are'. This power of this saying is amplified in Donath and Boyd's paper about the public displays of connections. They point out that when people display their social connections they also expose information about themselves and their preferences. Mutual social connections are often used as a means to build trust in a new relationship. Because social connections are so important, people look for ways to display them in order to gain prestige and to find other people's connections so they will be able to evaluate these people's status. Signal theory, which is rooted both in biology and economics describes the relationship between a signal and the underlying quality it represents. In the social context, these signals enable one to assess the other person's qualities and status, and decide if their company is desired.
There are signals which are more reliable because they demand investment and effort. Those signals will be used in important cases they are called honest or assessment signals. An example for that in the social context might be inviting people to a dinner party. It is likely that the host and the guests really know each other. For everyday use, it is more likely to use conventional signals, which rely on a set of assumption that already exist around the signal. Name dropping can be an example for that. The name dropper might or might not actually know the people mentioned, but a social control mechanism, in the form of reputation can prevent the name dropper from deceiving the listener. Bad reputation can be a harsh punishment in a closed social environment. [6]

"**Phone Swapping**" is a common way of disclosing social status. Teenagers swap phones between themselves so others can see their phone's content, read their SMSs, look at their pictures, play their games etc. Peeking inside someone else's phone can reveal both types of signals:
The **address book** supply the viewer with conventional signal, assuming that the fact that you have someone's phone number means you know them.
Looking at other people's **inbox** and reading their incoming and outgoing messages gives an honest signal, since faking them takes a lot of intentional effort, and the risk of bad reputation is high.
The phone, and its content, has become a means to demonstrate the ties between social groupings and, occasionally, the status of friendships or possible rivalries. [1]

'The phone keeps all the messages that I receive, all the secrets. It's like a secret diary.'
Marta, 15, Ivrea

A similar phenomenon to phone swapping was known in the pre-mobile days when friends used to swap their diaries, but if by showing diaries they exposed their thoughts, now it is an exposure of their communications and social relationship.

2.5.3 Digital valuables and gift Giving

"I keep around 200 SMSs in my phone. I copy the nicest ones to my diary"
Sara, 14, Ivrea

Social capital is the currency of relationships. It describes the structure of expectations, reciprocity and trust that exists among people in a specific social network, and it affects the social actors' relationship and position within this community. The more the participants can trust their peers, the better the group operates. Vocabularies and rituals of interaction are formed and distinct one group from the other and the group's identity affects the member's identity. The advantages of society rich with social capital is the system of mutual help and support the members can use, the downside of it would be exclusion and rejection of outsiders and people who don't conform to the status quo.
While researchers like Putnam talk about social capital as a community builder, others (Like Rasmussen) point out that our society is becoming more and more fragmented, or individualized, thus connections are made and communities are formed between people from different parts of the world, in different stages in their lives. Theses connections are based on interest. Sometimes these connections are formed artificially, for

example by Amazon.com that binds together people according to their literature preferences, and sometimes they form out of real interest like web communities such as Slashdot.org [15, 177-181]

Gift-giving is generally described as the exchange of material objects that embody particular meanings. It is also viewed as subject to the obligations to give, receive and reciprocate, and available as a means to demonstrate social ties and allegiances.

Being part of a group is an important experience for the adolescent, and gaining the group's appreciation is crucial. Advising, Communicating and offering emotional support are some of the ways to gain social capital. Ling says about mobile phones: "It's a technology that supports the intense, informal and local social interaction that is characteristic of the adolescent phase of life. The mobile telephone is also a totem for teens. It provides social integration at the symbolic level, and it provides the individual with a sense of self. In this way the mobile phone nurtures at least some forms of social capital" [15, 184]
Phones and, in particular, text messages are thus seen as sentimental objects with emotional and social value. They can be looked at as "**Digital gifts**", and as with gifts, the value is not merely determined by the object's material features but also through its presence in and contribution to social exchange. [15] Examples for digital gifts that are sent through the phone are good night messages, courting messages and pictures (taken with a camera phone).

2.6 Relevant projects

As part of the research I looked at various projects in the areas of non-verbal and emotional communication, connecting groups, mobile products specific for teenagers, and wearable technologies. I will review the ones I found most interesting for me:

Emotion Communicator

Figure 03: Emotion communicators by Philips

Emotional Communicators are devices that allow people to communicate an expression of love or support to a loved one or friend in a variety of ways. 'Kid Pager' - special emotional communicator was developed for kids and was visualized as little friendly animal like characters to be worn around the neck. Parents can send simple messages of love to their children; kids can send friendly messages to each other. These messages are based on icons and words displayed on both sides of the Kid Pager. Project was developed by Philips Design, 1995
http://www.design.philips.com/about/design/section-13559/index.html

handJive: a device for interpersonal haptic entertainment

HandJive is a handheld object that allows remote play through haptic input and output. HandJive is a device fits in one hand and moves in interesting ways (so you can fidget with it) and receives movements from another HandJive device [7]. It targets “friends isolated in silence” – for example, mates in the classroom, hospital patients etc.
The project was developed at Interval research, 1996.

The projects described above put the emphasis on intimate and highly emotional communication between a parent and a child, between distant lovers and between friends. I found these projects inspiring in the explorations they made in giving emotions a physical presence, but these projects were addressing one to one relationships, between two individuals, and I was interested in relationship among groups.

IDEO Kiss Communicator

Figure 04: Kiss communicator

The kiss communicators are pairs of palm size devices that transmit patterns of light which were created by a person on one end to their distant partner. The patterns are created by blowing on the surface and determined by the strength of the blow. Once a message is played it disappears. Its objective is to exchange emotional information and convey intimacy just like kiss or touch on the arm.
Developed by Heather Martin and Duncan Kerr for IDEO, 1999

White Stone

Figure 05: White stone

White stone is a pair of interconnected stones which are used as a means of intimate and non verbal communication between two people. When one holds the stone in his or her hand, the other stone warms up. After the second stone is touched, the first one reacts and warms as well.
Designed by Konrad Tollmar, Stefan Junestrand, Olle Torgny, Interactive Institute's Smart Studio in Stockholm, Sweden, 2000.
http://smart.interactiveinstitute.se/smart/publications/pubs/dis2000-emcom.pdf

Connexus: exploring tactile, non verbal messaging tools

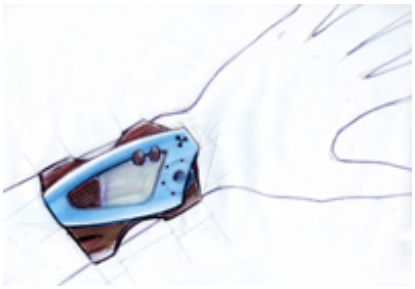


Figure 06: Early Designs concepts for Connexus by Chris Myers

Connexus is a wrist device that translates heat, touch and heartbeat transmitted from a second device into patterns of light, sound and vibrations, signifying the other person's actions and presence.
The project's objective was to use senses to create an ambient feeling of "being together" when being apart. Its target audience are couples and very close friends
Connexus was developed by Eric Paulos in intel research labs at Berkeley, 2002
http://berkeley.intel-research.net/paulos/research/connexus/index.htm

Sissy fight: Relational aggression

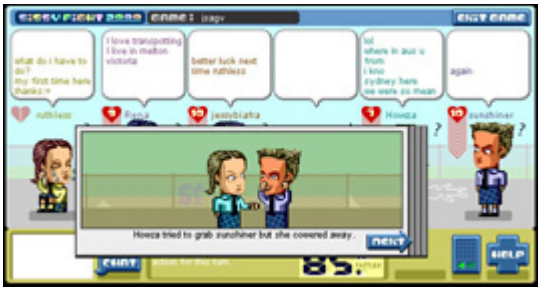


Figure 07: Sissy Fight 2000 screenshots

Sissy Fight 2000 is an online multi-user game that mixes competition and cooperation, where girls fight and abuse each other through verbal aggression. The game's objective is to achieve total social dominance.
Social dynamics is a key aspect of my project, and this game is interesting because it builds on the darker side of it. It was a good reminder for me when designing my project.
The game was designed by Eric Zimmerman for Word.com
http://www.sissyfight.com

Nokia Medallion (2003)

Figure 08: Nokia Medallions

Nokia medallion necklacedisplays up to 8 digital images that were uploaded by its owner. II can be worn as a necklace or wristwatch. I liked the fact that this piece of jewlry leaves open ends for the user to intervene and create something that is unique. The medalion, however is not a means of communication and is used for aesthetic reasons.
http://www.wired.com/news/gizmos/0,1452,60605,00.html

BuddySync: a 3G service for teens

Figure 09: BuddySync Screenshots

BuddySync is a 3G mobile service for the US teen market.Teens can express emotions remotely, send handwritten notes, share a writing space with friends for real-time scribbling, find information on movies, events, bargains, find a match using specialized agents. The communication can be shared between two individuals or among a group. I found the group aspect interesting, but BuddySinc is a screen interface, and it lacks the physical qualities of the interaction.
Project developed by Point forward for Ericsson Cyberlab Singapore, 2001
http://www.pointforward.com/cases/experience_ericbuddy.html

3 Concept development, design and implementation

3.1 Inspirational interview: the MICS

Figure 10: photos from an Interview with the MICS, and pictures they took themselves

The research began in reading about the topics of mobile communication, teenagers and groups. Then it was time to go and meet my user group. The first interview was conducted early in the process, with a group of four girls from Ivrea. This was an open ended interview and my goal was to get a sense of the relationship teenagers have with their friends, and the role of the phone in these relationships.
To get a sense of their actual use of the phone, I gave the interviewees disposable cameras and diaries where they were asked to note any kind of phone activities they had during a week, and take pictures of these activities.

"Q: What are your favorite things?
A: My make-up, my clothes, my Jewelry. I love my phone"
Marta, 15, Ivrea

They were four friends, 14 and 15 years old, and they referred to themselves as the MICS, which is the combination of their initials. The MICS have a close relationship with rituals such as having a weekly sleepover, wearing friendship rings, writing in turns in a shared diary, and extensively communicating daily during school hours, over their phones, and in physical meetings in the afternoons and evenings.

Behavior codes inside the group are different than the interaction with outsiders. For example, they often swap phones among themselves and know the exact content of each other's phones. They rather not expose their phone's content to peers who are not part of the group, as they perceive it as private information. Interesting to note is that phone swapping is an exposure of their communications and social relationships, unlike diaries swapping by which their thoughts and feelings are shared. Although they all had dozens of names in their phone's address books (120 to 250 contacts) they communicated regularly with 5-10 people only, including their family. SMS is their main communication channel, and SMS abbreviations language is used in face to face conversation. For example: using the term "Risp" at the end of the sentence, which is a shortening of "Rispond" - answer me. The girls valued the messages they received and kept as many as their phone allowed them to and it's part of their shared culture:

"The girls always take my phone and look at the pictures inside"
Sara, 14, Ivrea

Phone is definitely a fashion item for them and they personalize it by putting on stickers attaching phone straps and using backdrops with pictures they have taken themselves. It fulfils a part in their emotional lives when they use it to give attention rings ("Squilli) "to each other, fight with friends over SMS, Dump boyfriends and be courted.

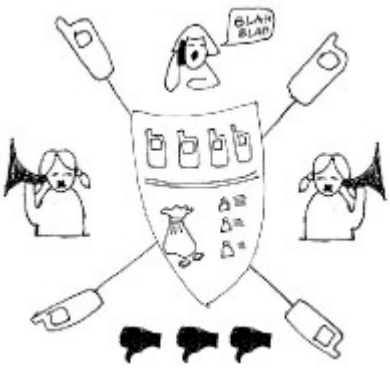
"If the lesson is boring I do "Squillo" (ring) just to say hello"
Chiara, 15, Ivrea

When one of the girls' phone batteries died during the interview, her mother and her boyfriend reached her through her friend's phone – She was expected to be available at all times, even when her phone wasn't.

3.2 Concept generation

The findings from the interviews, inquiries and brainstorm sessions lead me to develop a series of concepts, which catered for a range of social situations. These concepts explored diverse communication modes (one to many, one to one and many to many), action types (individual or collective, situated or remote), interaction forms (tangible to virtual), usage frequency, and lifespan of the service or device. Each of them is connected to one or several of the social behaviors I have identified earlier in the research. Here are a few:

The group phone



The group phone is rooted in the family landline metaphor. All group members share one phone number. Only one person can speak in any given time, a private and parallel communication channel is available for group members' use, any conversation can be voted off and terminated by the other group members if the majority feels that it is not worth the group's resources, the group has a shared address book and they manage it together.

Actors: Phone Operator, The teenagers group
Format: operating system and applications
Motivation for users: Strengthen the group's identity, Controlling friends
Supported behaviors: Control, Obligation, sharing
Time of use: Always
Longevity: As long as the group exists

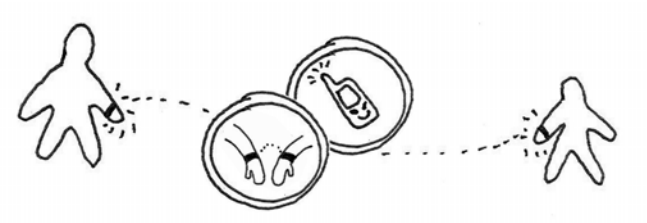
Collectype

A phone application for collective creation of text messages (and maybe more...)

Actors: Phone operator, Group members
Format: Phone application
Motivation for users: Possibility to collaborate
Supported behaviors: Group Identity, Always on, Codes and rituals
Time of use: Occasionally
Longevity: As long as the group exists

Pain cord

An invisible "cord" links the group and serves as a painful reminder when communication intensity level drops. The link is expressed through special

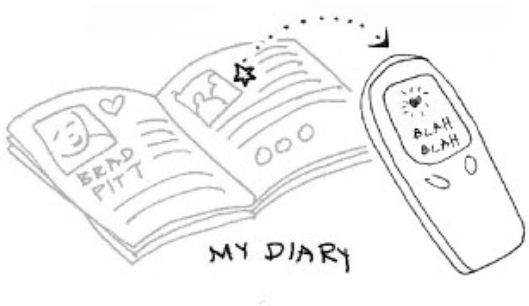


friendship bracelets that send painful shocks to group members when there's insufficient phone communication, insufficient physical encounters or delay in replying to SMSs. Being part of a group is as much a commitment as it is fun.

Actors: Phone operator, Bracelet manufacturer, Group members
Format: Bracelet, Phone application
Motivation for users: Strengthening group identity.
Supported behaviors: Group Identity, Always on, Obligation, Codes and rituals
Time of use: Always
Longevity: As long as the group exists

Physical-digital diary

A physical diary is enhanced by a layer of digital information (images, texts, video etc) which is stored as URLs on special stickers. The information on the stickers can be accessed through a phone application



that reads the sticker and displays the link. One must be a trusted part of the group to be allowed to view the extra information.

Actors: Phone Operator, Stationary manufacturers, The teenagers group
Format: Semacode Stickers, Diary, Phone application, (web service?)
Motivation for users: The ability to create content by combining physical and digital elements
Supported behaviors: On-Line creativity, Codes and rituals, sharing
Time of use: Always
Longevity: Long term

Most wanted

Users leave trails in other people's phones by publishing content from their phone (such as their address book) to others in their vicinity. The content disappears when the peacock moving farther away from the phone holder.

Actors: Phone operator
Format: Phone application
Motivation for users: Displaying social connections
Supported behaviors: Fashion, Codes and rituals, contacts as status symbol
Time of use: When arriving to a new place
Longevity: Long term

Peacock tail

"Peacock tail" is an installation for public spaces (A bar, a club) that reflects the temporal popularity of people in the venue. First, it tracks the amount of communication a person receives in his/her phone (calls, messages etc.) and then it projects the person's name in a size that matches their elative popularity.

Actors: The venue, the installation's designer, Display object manufacturer, The crowd
Format: Phone activity tracking device, Display object
Motivation for users: 15 minutes of fame
Supported behaviors: Status symbol, Always on, Fashion
Time of use: When in venue
Longevity: Trendy

3.3 First investigation: The Mascot

The **Mascot** is a group creature who lives inside a "shell" - a small accessory attached to the mobile phone. The **Mascot** feeds on the amount and type of communication among group members (voice, texts, MMS, physical encounters), and its appearance is an embodiment of the group and the relationship of its members. The **Mascot's** appearance reflects the power dynamics within the group by visualizing its communication patterns. Each group member has a **Mascot**, and all the group mascots are identical. Changes in one **Mascot's** appearance affect the entire group. The **Mascot** reveals information that only group members can decipher such as who is more active in the communication, and its design takes into account social behaviors such as the need to show that one is part of a group and using the group as a status symbol. By exposing the communication among the group (without revealing the content) the members can see who are the active members and asses their position within the group and change that.

What interested me about the mascot was what would have happened if teenage group would actually use it. Will they learn something from it? Will they try to influence the looks of the **Mascot** by changing the communication among themselves? Would it change the dynamics within the group for better of for worse? What will happen if an individual will notice that their part in the communication is small?

Actors: Phone Operator, Device manufacturer, The teenagers group, **Format:** Phone accessory, **Motivation for users:** Build and strengthen the group's identity, Status symbol, **Supported behaviors:** Belonging, Identity, Always on, Status symbols, Codes and rituals, **Time of use**: Whenever there is communication in the group, **Longevity:** As long as the group exists

3.3.1 The design process

I've designed the process which the group goes through when it starts using the **Mascot**. It was important to me to figure out how the group could create a unique image through the Mascot. Using color seemed as a good solution. Each group member would have a mascot shell in different color. These colors will appear in the background of the Mascot creature, and thus each group will have its distinctive color combination. The relative amount of the color in the background can be an indication for the activity level of its owner in the group's communication.

Figure 11: Establishing the connection between the group and its mascot

Figure 12: I've created foam core prototypes to investigate form and interaction possibilities.

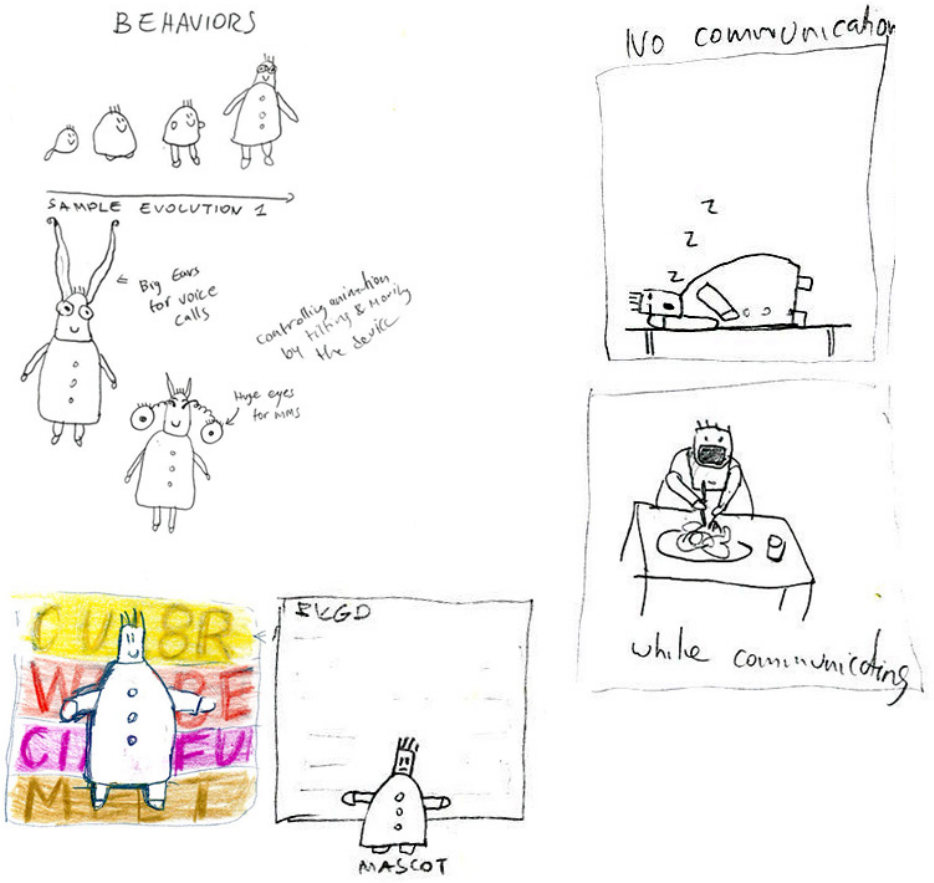


Figure 13: Then I explored ways the Mascot can develop in. How will it evolve? What happens when there is no communication? I made some sketches, and prototyped it

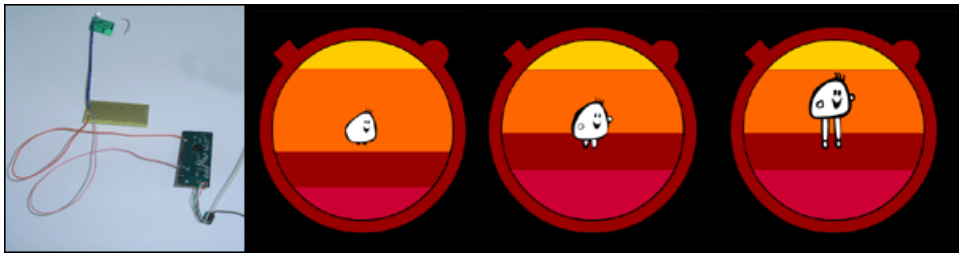


Figure 14: interface investigation: a Mascot in various growth stages. The color strips in the background indicate the communication levels of each of the group members
A mobile phone radiation sensor was used to indicate calls and messages sent to the phone and controlled the changes in the interface.

At the same time I was working on another concept "BuddyBeads" which I will soon describe. I decided to proceed with developing the "BuddyBeads" concept and stopped working on the Mascot. I still believe

in the Mascot's potential as an interesting concept, but having limited amount of time and resources I focused on developing one idea.

3.4 BuddyBeads

My objective in this project was to create a communication tool for groups that supports informal, non-verbal communication and is based on internal group codes.
I chose jewelry as the communication tool because they are expressive media; personal objects that share similarities in the symbolic level with the phones.
BuddyBeads are emotional and coded communication accessories in the form of jewelry pieces that allow group members to communicate in an emotional way, with codes and signals they decided upon.
Each group member has a matching jewelry piece (for example: a bracelet) made of beads. Each bead carries a message inside. Examples for messages can be "I'm having a bad day"; "I'm talking with the coolest guy" or "Professor Alarm!" These messages are decided by the group in advance and construct a secret internal code among its members.
Once pressed, the beads transmit their message to the other group members. The messages are constructed from a combination of the bead's shape (which remains the same) and varying sequences of vibrations which are formed according to the sender's way of pressing the bead, and enhance the message with another layer of meaning. The combination of the visual and haptic information conveys the sender's state of mind. The friends receive the message in their own bracelet in the form of a correlating bead which lights up and vibrates. Even though different groups may use the same bead shapes, they will mean different things in each group, according to the specific group's culture and vernacular.

3.4.1 Co-creation session

Figure 15: Co-creation session

To test the idea of the codes communication bracelet, a co-creation session was conducted. Three teenage girls participated. The purpose of the session was to understand the possible uses of BuddyBeads by the girls, in which situations they will use it and what type of messages and emotions the girls would like to express through the codes. The session started with a warm-up that was used to gather some personal information, map the girl's social connections and learn about their phone usage and communication related behaviors. Then the communication bracelets concept was introduced, and the girls were asked to imagine **f**or which situations it would be appropriate to use the bracelets and to tell related stories from their lives.

After the storytelling, each girl was asked to create heir own codes by drawing or sculpting them with play-doh. They showed the codes to each other and together created codes for the entire group. These group codes were used to simulate real life situations, while wearing the bracelet. They were asked to think of how would they use the bracelet in the situation and what would they expect to receive back from their friends? What kind of message would the receiver expect to receive? How?

To conclude the session, they were asked t for their opinions, comments and suggestions for the concept.

The conclusions from this session were that the girls liked the idea of the bracelet. It was important for them to create their own group codes, and they wanted to assemble their group bracelets. Though group codes were important, they expressed the need to send messages to individual recipients and not to the whole group at once. Trust and inner group dynamics issues were brought up in this context.

3.4.2 The design

These sessions and interviews informed and influenced the design guidelines that were created: The BuddyBeads is a structured but open system that supports social dynamics and changes, and is based on inner group codes. Key features would be system modularity, using a combination of visual, tactile and haptic cues for interaction, enabling the users to send messages without looking and creating a product which is desirable and fun to use.

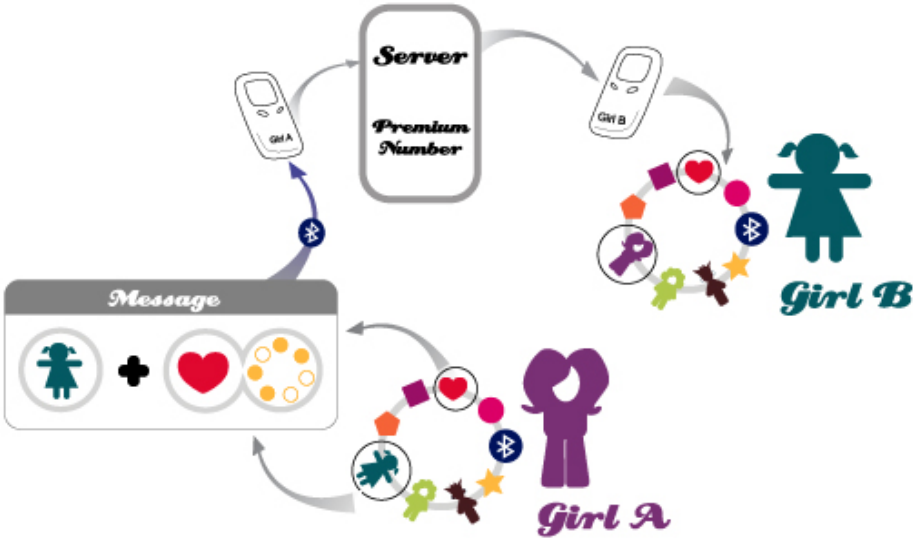


Figure 16: The BuddyBeads System. Girl A chooses the type of message she wants to send (for example: I'm talking to the boy we like), records a sequence of presses that conveys her current mood (Excited) and sends it to her friend, which receive the message in her bracelet as a combination of light and vibrations. The phone is a transparent mediator in the communication

These guidelines led to a design which is comprised of a basic bracelet structure, with attachable beads. There are two types of beads: *friend* beads and *message* beads. Message beads are used for specifying the message sent; Friend beads are used for sending the message to a specific friend. Another layer of communication, which is immediate and varies with each message, is added when the user presses the message bead according to her current mood. The press sequence is recorded and sent as part of the message.

For example: short and intensive presses may convey stress, while long presses might convey importance. It is possible that some group members will use this method to create their own private signals on top of the group codes. The fact that beads can be added and removed from the bracelet supports the dynamic and flux structures of teenager groups. As the group changes, so does the bracelet's composition. When two girls are no longer friends, they can remove their friend's bead from the bracelet and keep it as a memory of their friendship. When they become friends

again, few weeks later, the removed beads can be added to the bracelet once again.
Being able to send a message without looking at the bracelet is important in situations where other people are involved and the sender wants to comment about the situation but doesn't want the others to notice that she is engaged in another communication. This can be the case when a girl is talking to a boy she likes and want her friend to know, or when few group members are talking with someone who is not part of their group and they want to comment about the situation.
Wearing such a bracelet signifies that the wearer is a part of a group. The fact that the meaning of the bead shapes change from one group to the other and even change over time defines a boundary around the group members and supports their feeling of belonging.

3.4.3 Basic concepts:

Here are some basic concepts I would like to introduce. These terms will be used for explaining the project.

Communication bracelet:

The device that the user is wearing. It is used for communication with other bracelets, and is composed of a basic structure with small attached units which are called beads. There are two types of beads: *friends beads* and *Message beads,* which can be attached or removed from the basic bracelet structure according to the user's will. The bracelet is paired with a specific phone via BlueTooth.

Friends bead

The *friends beads* represent the other group members. They indicate to whom the message is sent, and from whom it is received. Each bead has a unique ID number and is associated with a phone number in the *Server application*.

Message bead

The *message beads* are the units that communicate the coded messages that the group members share. Each bead has a unique ID number which is sent to the phone application when the bead is pressed. The bead records the sender's presses

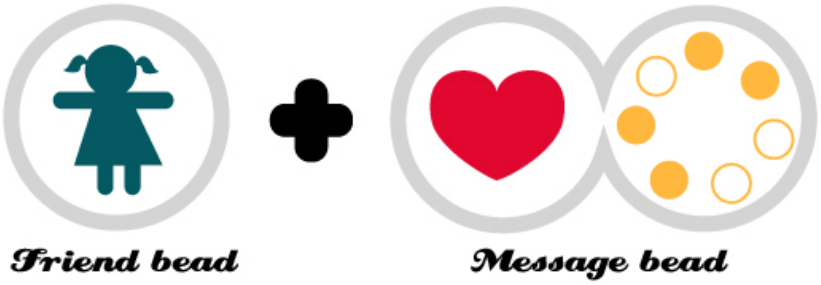
Mood Signifier

The *mood signifier* records the bead presses of the sender on the message beads and translates them to vibrations in the receiver's bracelet.

BuddyBeads server application

The application sets up and manages the bracelet's communication among the group. It reads the data that the sender's sends to a premium number via SMS, identifies what is the message and who is the receiver, and uses mobile data services to transmit messages to the other person.

Message



A message is comprised of two elements: temporal and permanent.
The **permanent** element is the bead shape, which represents an agreed message within the group. The **Temporal** element is the user's presses on the *message bead* which creates a one off pattern that represents the sender's mood at a specific moment.

Sending a message

To send a message, the user presses on the desired *message bead*. Then, she presses once on the *friends bead* which represents the friend she wants to send the message to.
A short vibration in the bracelet signifies that the message was sent.

Receiving a message

When a message is received in the bracelet, the user receives an indication in the form of a short vibration in the bracelet, and a glow of the relevant *friends bead* and *message bead*. The beads glow until the user presses the *message bead*, and activates the *mood signifier* which repeats the sender's sequence of presses as vibrations and flashing lights. Each message can be played only once.

3.4.4 Prototyping

I used different kinds of prototypes in the process, which differed in their purpose and in their forms. Some prototypes were used as tools for thinking and brainstorming. Some were created as ways to emulate specific aspects of the concept, or the experience of its use. The goal was to create prototypes that will convey the concept to a level where users can understand it and react to it.

Formal prototypes

A simple foam bracelet prototype was used in the co-creation session. Its purpose was to test the initial idea of group codes with teenage girls, and to initiate a dialog.
Additional wristwatch, necklace and some more bracelets were assembled and shown to users.

Figure 17: Foam and plastic prototypes: Bracelets, wrist watch

Functional prototypes

Various formal and functional factors were taken into account such as elements size and placement, electronics elements size and their distribution in the bracelet etc. The next step was to test possible materials and shapes while considering functionality and technical feasibility.

Figure 18: Silicone molds test, checking for component sizes, first working bead unit

Several prototypes were built to simulate the functionality of the system. The first was a breadboard prototype. A simulation of the bracelets was

built, using breadboards, some LEDS and buttons. The rules of the system's behaviors were coded in Wiring language.

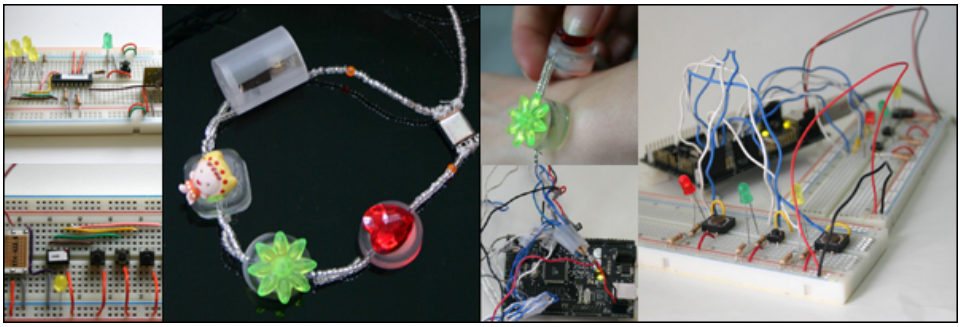


Figure 19: prototypes in different stages

Then the first bracelet was built, connected to the Wiring board and able to record, transmit and receive messages. The message beads lit up and bracelet vibrated when a message was sent.

Behavior prototypes

"I now realize that my childhood wasn't complete" Yaara, 24

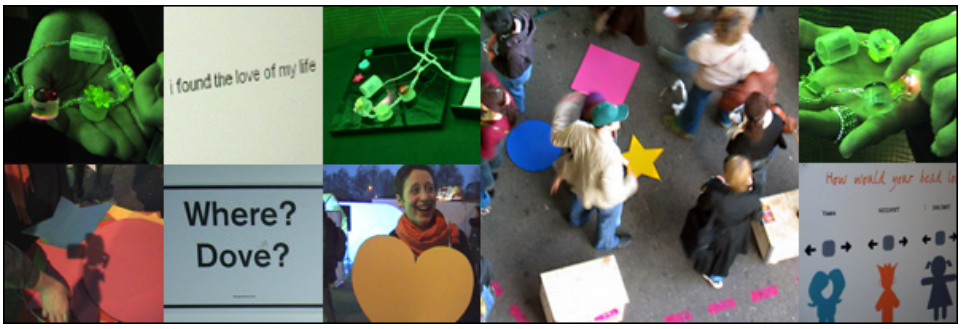


Figure 20: Experience prototyping in San Siro, Milan

A great opportunity to test group behaviors, expose the bracelets to users and get feedbacks was during "Circular" event which was part of "Salone Del Mobile". The exhibition lasted for six hours and dozens of people experienced BuddyBeads.

In the event, BuddyBeads were exhibited alongside Nathan Waterhouses's improvisational interaction design thesis. We took BuddyBeads's context and problem and showed it using improv performance, testing methods developed in Waterhouse's thesis. Improvisational interaction design draws on improvisational methods used previously in the design context and performing arts, combined with improvisational techniques and props which were developed by Waterhouse. This method aims to aid the invention, testing and development of interaction design-related concepts and products.

The goal for the exhibition was to look at ways groups behave when choosing messages, what types of messages would be chosen and when and how the messages will be used.
The experience prototype consisted of three parts:
1. Contextualizing the project for the audience and getting people into teenagers' headspace. Each participant chose a persona to identify with, and defined her location and general motivation (I'm in a party, feeling sad)
2. Using a computer application, each group chose bead shapes and decided on the message each the beads carry. Then they experienced the working bracelet prototype.
3. After the bead messages were selected, the group was engaged in various *Improv* games that explored the use of group codes in various contexts.

Some conclusions could be drawn from the experience although most of the audience was not teenager girls and the experiment occurred as part of an exhibition and not in a controlled research environment:
The reactions to the bracelets were very positive. The audience liked the idea, and many participants stated that they would love to have one now, or that they wish they had it as a teenager.

Different types of codes were chosen among groups of same-sex, close friends than mixed-sexes groups or Ad-hoc groups. The messages within intimate friends were coded and related to shared experiences, while the less intimate groups used more general and less personal references.

The choosing process supported various types of group dynamics: In some of the groups, the decision of the beads shape and content was taken jointly, in others; each group member chose the shape and content of a bead and "owned" it in the improve game that followed. Sometimes one group member chose all the beads and messages.

Assessment and feedback

Marta: "But the boys can't use it. And so, it's very good. It is only for the girls"
Chiara: "And because it's a secret language"

Figure 21: Getting feedbacks from 15 years old girls

Finally, I have tested the concept with three of the girls I met at first. They were presented with the BuddyBeads concept, they selected beads' appearance and meaning collectively with a computer application, and experienced sending messages with the bracelets prototype. Each girl was asked to imagine situations where she would send one of the messages they have selected and describe the situation, her motivation and her actions. The other girls would say how they would react when receiving the message from their friend. They were asked for their opinion about BuddyBeads and what would they change in it, if they could.

Key findings
The girls perceived the bracelet as a substitute to sending SMS, but thought it was better than SMS because:

- It is more fun
- It is coded, so no one else knows what it means
- It's a girl's thing and boys are not part of it
- The bracelets are fashion items
- It can be used in situations where SMS can't be used

Some concerns were raised about the size of the beads and will the bracelet be big enough. Another concern was financial one. How expensive will the bracelets be? How much will the communication cost?

It was interesting to note that the messages they chose changed over time. In the beginning they chose a mixture of specific messages like "let's have a sleep over tonight" and general ones like "help me", and during the session, they have changed the specific to a more generalized ones such as "let's meet", and added beads for replying "Ok" and "No".

The girls understood and liked the mood signifier's role and Sara explained: *"If it's something which is not really serious I just do 'Bip', and if it's tragic I do 'Bzzzzzzzzzzzzzzzzz'."*

Overall the response was very positive, and to put it in Marta's words: *°Will the bracelets be on sale in the shops? We hope so.°*

3.4.5 Economic study

Service structure

BuddyBeads is both a product and a communication service. The product is a modular system which includes **a phone application**, **a communication bracelet and communication Beads.** The user must have all three components to use the product, but the beads are replaceable, and can be purchased separately.

Possible stakeholders

The core stakeholder could be a joint venture of a youth **fashion brand** such as Diesel or swatch, and a **mobile operator** such as TIM or orange.

Figure 22: service diagram, Main stakeholders and their roles.

The fashion brand will design the bracelet and the beads and will attract teenagers with its brand. It will sell the bracelets and the beads directly in its shops and through affiliated store chains.
The mobile operator will supply the technology and infrastructure, and will be able to promote usage by offering attractive pay plans for using the bracelets, as well as offering bracelets as enhancements of family handsets purchases.

Other players might be companies such as **TV channels, film studios** and **music companies** that will license their teen idols actors and musicians as bead figures. Another option is to use **third party companies** for manufacturing additional beads.

The bracelets and the beads could be purchased either on-line through websites, in the fashion brand own stores and in other stores that promote youth lifestyles, or through the mobile operator as mentioned earlier.

Potential market analysis: youth market

BuddyBeads don't face direct competition, but they will have to compete indirectly with other trendy fashion products (such as jewelry and phone accessories) and with other means of communication such as SMS.

Phone penetration and SMS usage

Mobile phone penetration is rising steadily. Recent report from management consultancy Analysys Research [28], forecasts a 100% penetration rate in **Europe** by 2007, with higher percentage in some countries (more that one mobile phone per person). TDG, a market research group, estimates that the number of subscribers in the **US** will climb to 75% of the population by 2010, approximately 236 million users, and that US Youth market segment will double itself by then and reach 50 million subscribers [21]. Today, 44% of 10-18 year olds in the US own a mobile phone, the number raises to 75% in the 15-17 years old [27]. US SMS revenues reached $1 billion in 2004 [4].

In the **Asia-Pacific** region, youth spend 10-15% of their disposable income on mobile products, which replaces spending on traditional youth products like cloths, toys etc. The report from In-Stat [23], lists messaging, ring-tones, wallpapers and logos as key applications for Asia-Pacific youth, with messaging accounting for 40.3% of data expenditures, while ringtones, screensavers and wallpaper accounted for another 29.7% in 2004. The total youth mobile data services revenue reached $15.2 billion in 2004, and the forecast growth rate is estimated at 15.3% from 2004 to 2010.

The accessories market

fashion accessories for mobile phones are a big business in Japan with accessories like straps, antenna rings, photo stickers and fake gems. The price of these items starts with couple of dollars but mobile ohone straps from designer houses such as Hermes International, Gucci and Louis Vuitton can reach prices as high as $US300. StrapYa.com, Japan's largest online mobile phone accessory store, estimates the novelty accessory market alone is worth about Y6 billion ($58.84million), while headsets, chargers and other hardware worth another Y4 billion ($45.76 million). [14]

CEA (Consumer electronics Association) has published a study reporting that More than 70 percent of teens said they want something if a friend owns it:

"If all their friends are text messaging, then they're going to get a wireless phone they can text on. Price, features, lifestyle it's all important though."
Rebecca Gertsmark, CEA [18]

3.4.6 Technology

The main technologies that could be used for realizing the project are Bluetooth, for pairing the bracelet with the phone and SMS for sending the data to a server which handles the communication and from the server to the recipient's phone.

Blue tooth

Bluetooth is a technology for spontaneous creation of wireless networks and the discovery of services on these networks. Bluetooth uses short-range radio communication between electronic devices that are equipped with specialized Bluetooth chips. It lets nearly all devices talk to one another by creating a common language between them.
Devices such as cell phones, PDAs, pagers, stereos, and other home appliances can communicate and connect using Bluetooth technology to form a private, personal area network (PAN). [24]

Global System for Mobile Communications (GSM)

GSM is the most popular standard for mobile phones in the world. It is a cellular network that operates at various different radio frequencies. Mobile phones connect to it by searching for cells in the immediate vicinity. The ubiquity of the GSM standard enabled international *roaming* services which means subscribers can use their phone all over the world. GSM's signalling and speech channels are digital, and it enables voice as well as data communication. [25]

Short message service (SMS)

SMS is a service available on most digital mobile phones that permits the sending of short messages between mobile phones, other handheld devices and even landline telephones. SMS was originally designed as part of the GSM digital mobile phone standard, but is now available on a wide range of networks, including 3G networks. [30]

4 Evaluation and analysis

4.1 Research methodology

The project development lasted nine months from the initial research phase. During this time I have used various qualitative and participatory design research methodologies to inform and advance the design itself. My process included the following stages:

- Defining my research question

At this point I was looking for sources of inspiration to come up with research questions that can lead to interesting design opportunities.

- Gaining knowledge in subjects related to my question

I needed to ground my intuition with facts, identify cultural and techno-social trends and know as much as possible about my chosen area of interest.

- Concept generation

Translating the research into relevant design concepts
Choosing a concept to explore further

- Testing the concept

Exposing the idea to possible users, and brainstorming with them about possible directions

- Prototyping

Creating various prototypes to examine particular aspects of the system

- Testing the experience

Exposing prototypes to possible users and to get their reactions and feedback. Iterating the design according to results.

Different stages in the design process required different methods to achieve the specified goals. Here is a brief overview of methods used and their influence on the design process:

Secondary research

Purpose: To understand the theoretical background of the domain I was researching. Identify trends, and learn from previous research.
Used: Mainly in the question definition and knowledge gaining phases
Results: It was a good starting point to start thinking from. Taking multitude of different ideas from different areas and combining them into a structure that makes new sense according to my chosen criteria: My users, their social structure and the technology.

Internet surveys

Purpose: Get answers for very specific questions; gather information and facts about definite points.
Used: Mainly in the question definition and knowledge gaining phases
Results: Worked well for what I needed. Simple questions were asked, simple answers were collected.

Open ended Interviews

Purpose: Achieve a first hand understanding of the user group. Compare the facts gathered from books with real people and real situations. Be informed and inspired.
Used: In the question definition and knowledge gaining phases and at the concluding stage.
Results: The interviews worked well. The theoretical framework turned into real life situations and personas. Abstract concepts were materialized. It was a source of both inspiration for many ideas and of affirmation of their validity in the eyes of the user group.

Brainstorming

Purpose: Harnessing other designers' creative energy to develop ideas.
Used: Mainly in the concept generation stage
Results: Brainstorming sessions work best if all the people in the room understand the issue. The ones that worked best for me were the ones that I've put boundaries and set specific goals. When the session was too open, creativity tend to be abstract and swas harder to harness in favor of concrete ideas.

Co-creation session

Purpose: Bounce ideas to my user group. Test the validity of my assumptions; get feedback without asking direct questions.
Used: Used it as a way to test existing concept and include my users in the design process
Results: Good session. Giving the user group the chance to be very creative within a limited range made them come up with reactions that I could translate to design guidelines

Cultural probes (Camera, diaries)

Purpose: Get a peep hole into my user's lives and to their minds. What do they feel is important to document and why.
Used: In the knowledge gaining phases
Results: Using cultural probes requires a committed partner. In this project it worked partially. The interview after the artifacts were retuned was interesting and revealed new facts about the relationship in the

group. The probes were used as an excuse to go deeper, but were meaningless on their own.

Physical prototyping

Purpose: Concretize the idea, get reactions from users, and overcome problems before the idea becomes a product. Experience the physicality of the product. What works, what doesn't?
Used: prototyping phase
Results: The first prototypes were used for understanding the qualities of the interaction with the object, even before anyone else tried it. After the prototype was tested by users, I could draw conclusions which adjustments should have been done.

Body storming and Improv

Purpose: Draw conclusions about what the nature of the desired experience, by letting users to experience the system without having it built. Explore design opportunities that arise from physical activity as contrast to those which derive from analysis.
Used: Used in the concept development and prototyping phases
Results: I found it a helpful method to come up with usage scenarios and to understand how users experienced the project.

I found it important to work on the macro and micro levels in parallel. Understand the context and the possible uses, but also explore the tactile feeling of the object and the pleasure it conveys when used.

4.2 Design evaluation

BuddyBeads is a communication tool which was designed with groups in mind. The design took into account various aspects of relationships within groups and addressed topics such as group structures and group dynamics, starting and ending friendships, inner hierarchies and sub groups.

I have identified three main motivations for using the bracelets:

- The user is focused on herself - When the user feels she needs to express some kind of urgent feeling or message to her peers, such as "I'm excited".
- The user is focusing on her friends – Wants to send them a message to show them she is thinking of them, such as "I miss you"
- The user's focus is on the company she is with, which is not part of her group - using the bracelet as a way to let others know that the user is part of a group and to broadcast her social status.

The bracelets add two more layers of communication to the spoken language:
Agreed upon codes – Visual shapes that signify implicit messages
Tactile notes – vibration simulating the button presses, which signify the sender's state of mind at a given moment.
This means that moods and situations can be communicated to others without using spoken language, somewhat like body gestures and intonations used in a face to face encounters.

Socialization and identity are instrumental factors in teenagers' lives as well as in the design of BuddyBeads. The social play teenagers are involved in is reflected in the Buddy-Beads system.
For the individual it answers the need to express emotions instantly to a trusted friend and the need for reassurance she is part of a group.
For the group it is a tool which defines and strengthens its identity and boundaries. These notions are represented both in the physical dimension through the object and in the symbolic dimension with the group codes.
Incorporating teenagers in the design process has enriched the design and made it more appropriate for teenagers needs.

5 Conclusion

"Me and friends are 13 yrs old and think these BuddyBeads are great is there any chance they will be on sale they look great fun and will enphsise(spell!!) our lives and how much will they be please Thankyou!! Good Bye!!!"
An email received from Laura, 13, Birmingham

My goal in this thesis was to explore ways in which mobile communication could mediate social relationship within groups of teenagers. I chose teenagers because of several reasons. One was that mobile technology has always been part of their lives and this is their natural communication mother tongue. Another reason was that adolescence is a period in life when socializing plays the most important part. These reasons, coupled with the extremity in teenagers' behaviors and emotional states has created a promising field for investigation.

With BuddyBeads project I would like to contribute to shifting from efficiency and functionality focused ICT tools, to socially enhancing ones. I see my contribution to the shift in developing tools for using technology to empower users in their social context. The design of these new tools integrates people's social motivations, interests and needs. Many of these needs and motivations are emotional, such as the need to belong to a group and be reassured about one's place within it; some of the needs are not pleasant, like having to fulfill social obligations or trying to exclude a group member. Still, to design for people these needs should be addressed as well. I think that the fact that I was listening to my users throughout the design process made the final result desirable in their eyes. The reactions I got from teenagers convinced me that BuddyBeads is answering a real need.

I like to think about BuddyBeads as a physical object that accompanies a friendship through its different stages, from the recognition stage, where the acknowledgement of the friendship is made by creating the bracelet codes together, through the ups and downs of the relationship and until the friendship is over and the beads are just a souvenir of past events.

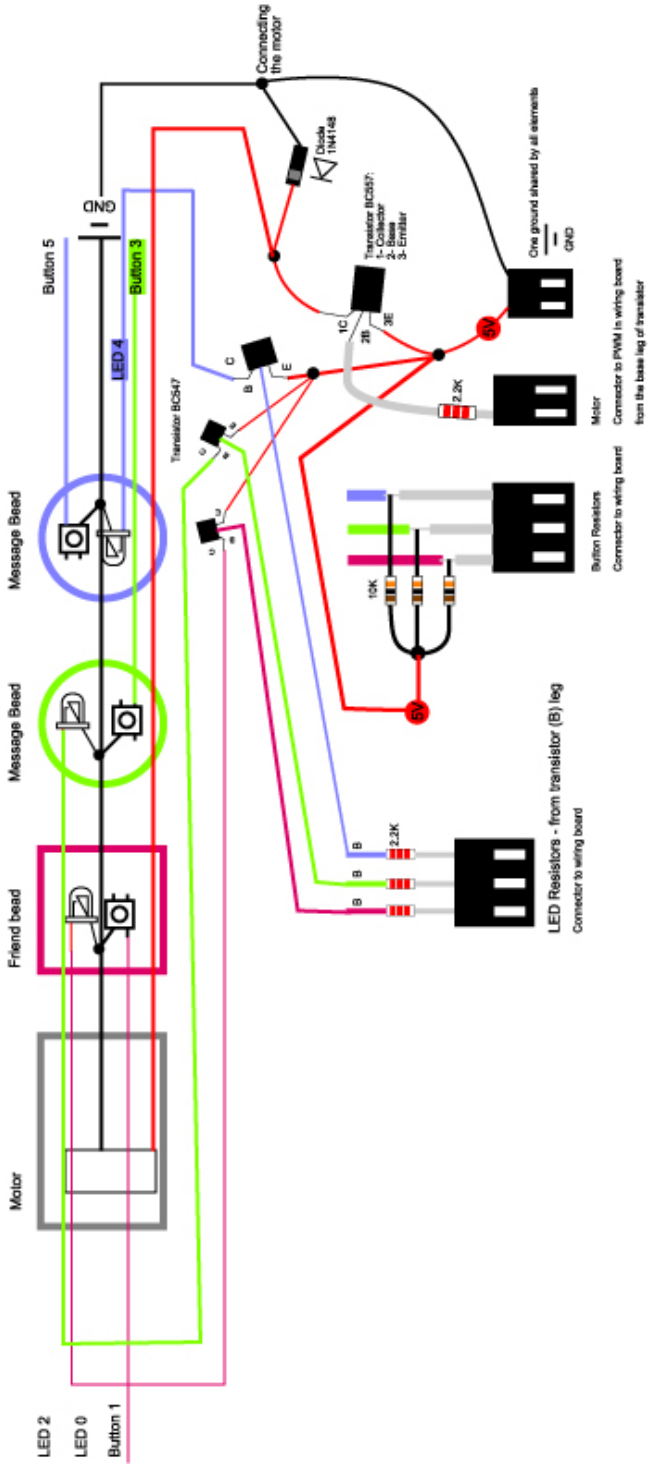
Taking this project to the next step would be to build a prototype robust enough to be handed over to a group of girls and see how they will use the bracelets, for which purposes, and which unexpected uses they will find for them.

Although this project was originally designed for teenagers, I can see a lot of potential for the adults to use it as well. In the adult world, the BuddyBeads could be used in different contexts where coded signals are preferable to verbal communication. They could also facilitate contact between trusted parties, such as a care giver and a patient with mobility or speech impediments, or even in a business environment (partners in a meeting with another company, signaling to each other).

BuddyBeads is an alternative communication platform, and I would love to see how it could develop in the future.

Appendix A

Bracelet circuit diagram



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