GENDER INSPIRED TECHNOLOGY

An Interdisciplinary Research and Development Project

Deutsche Telekom Laboratories, EAF, IXDS
Project Report 2009/2010

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1. Introduction

Successful research and innovation processes largely depend on the capture and adequate implementation, maybe even prediction, of individual needs. Thus it is especially important to consider the preferences of diverse user groups at an early stage of an innovation process when developing new information and communication technologies (ICT).

Thereby one problem is often neglected: How does societal change affect individual needs related to ICT? Moreover, which new social utilization contexts thereby arise? In particular, the change in gender roles and the increasing market power of female consumers are seldom taken into account as reference point for technology development. The perspective of female customers is rarely explicitly integrated in the innovation process.

Therefore we conducted a one-year strategic research project in an interdisciplinary team composed of design, diversity and innovation researchers as well as product developers. In our interdisciplinary research project we wanted to find out what expectations and needs women have in different life phases and ages with regard to ICT and what ideas and prototypes for market-relevant innovations can hence be developed.

The use of the internet shows that products and services for women are becoming an important growth market in the ICT sector among other things: In the beginning, women hardly used the internet. Meanwhile, in the USA and Europe, they use the internet more frequently than men (EIAA MEDIASCOPE 2009; NIELSEN 2009). The modified utilization habits are associated with gradual changes in understanding gender roles – and with the fact that women increasingly create their individual communication channels.

Our assumption was that women are very sophisticated users of ICT. Discussions about "technology" often presume that women are less "technophiliac", that they do not appreciate the technology for ist own sake and put great emphasis on applicabitlity (BUHR 2006: 7).

In addition they often have to arrange – due to socialization and a gender division of labor – gainful occupation as well as family and care work.

We therefore asked whether and how these findings shape their expectations in regard to ICT.

In the course of our research process it turned out that women's focal points and subjects are multi-faceted and cannot be captured by the apparently predominant paradigm "the more features the better". Aspects like the simplicity of technology, sensitive interpersonal communication, but also the reconciliation of work and family life or the protection of privacy play an important role for women.

A product that meets these high standards would probably have high sales potential not only among women, but also among men. Even men value a fast and simple use of technology in the course of societal changes. Moreover the reconciliation of work and family life has a growing significance for them. The overarching goal of our research project was not to develop specific product ideas only for women. In particular we wanted to generate product ideas and services for the entire market.

1.1 Project Partners

The study was conducted at the Deutsche Telekom Laboratories in cooperation with the EAF | European Academy for Women in Politics and Business and the Interaction Design Studios (IxDS) in 2009. The cooperation with the EAF was held in the context of the project "Gender and Diversity in Innovation Processes". The EAF project was funded by the Federal Ministry of Education and Research (BMBF) and the European Social Fund of the European Union. It is implemented in collaboration with five companies – including the Deutsche Telekom.

According to the interdisciplinary design of the research project the project partners were responsible for the following tasks:

The Deutsche Telekom Laboratories (T-Labs) have been in charge of the management of the research team and the overall methodological approach. As the central research and development unit of Deutsche Telekom in terms of innovation in the

entire field of ICT, the T-Labs will trace the further development of ideas and concepts as well as finished products or services.

The EAF was responsible for the conceptual design of the data ascertainment, the analysis of the experiences of the participants and the development of group-specific results and typologies. In addition, the EAF was instrumental in doing the conception and implementation of the ideation workshops. The acquisition, supervision and mentoring of the participants was also coordinated by the EAF during the project.

The IxDS – Interaction Design Studios were mainly responsible for the design and implementation of the design process. They developed – based on the incitations of the participants – concepts for new ICT products and services. In addition, IxDS created different use cases for the concepts as well as individual personas in order to better illustrate the typologies.

1.2 Project Basics

In designing the project we initially assumed that in the context of the increasing individualization and differentiation of society customers demand more individual pretentions of a product. Hence it is crucial to generate exact and distinct knowledge about individual customer groups (BESSING 2009).

Disciplines dealing with the development of products and services, try to integrate customers' perspectives. Innovation-research studies show that an early integration of customers' perspective significantly increases the probability of market success (LÜTHJE 2003). The Open Innovation approach even promotes to incorporate customers and users not only in the end of the research process (e. g. through market research). In contrast the approach intents to involve the consumer directly during every phase of the innovation process (REICHWALD/PILLER 2009).

A similar trend can be observed in design research. Designer often integrate the users directly as "co-designers" into the design process (EHN/BRADHAM 2002; REDSTRÖM 2006; SANDERS 1999, 2000, 2001, 2002, 2005; SANDERS/STAPPERS 2008). A direct customer integration into the innovation respectively design process leads to an advanced resource intensity and complexity of the process. Therefore a central question in our project was with which tools we can meet this challenge. At the same time we asked with regard to the methodological level which methods and results from gender and diversity research can be integrated in the practical development of new ICT products and services.

When studying the special needs of men and women, it is challenging not to reproduce stereotypes of "typically" male or female characteristics (BESSING/LUKOSCHAT 2007; BREDIES et al., 2008; BUCHMÜLLER 2008). We were therefore anxious to keep our research process as open as possible as well as to reflect – and even to revise if necessary – our conceptions. The incorporation of interactionist, ethno-methodological and constructivist gender theories (BUTLER 1991; GOFFMAN 1977; KESSLER/MCKENNA 1985; HIRSCHAUER 1996, 2001; WEST/ZIMMERMANN 1991) helped to identify causes for the establishment and consequences of female stereotypes. Thus we were better able to counteract these stereotypes.

As we followed an interdisciplinary approach, we tackled content-related as well as methodological questions from different perspectives which we tried to interconnect.

1.3 Thematic Focus on ICT

In order to concretize the research questions and topics, a preliminary study called "Women's Phone" was conducted in 2008. Within a framework of workshops and interviews, 8 women between 25 and 37 years were interrogated about their expectations and needs concerning ICT.

Three aspects of medial communication have been continuously mentioned:

Micro-Communication

In this research context, we define micro-communication as a specific sort of communication that is characterized by short duration,

high frequency and briefness of messages. This kind of communication could be mainly observed among the younger participants (approximately between 14 and 30 years old). In this vein they constantly keep in touch with their social network. One of our hypotheses was that micro-communication represents a paradigm shift of mobile communication per se by broadening and changing traditional communication forms like telephone calls or e-mails.

Privacy and Data Control

ICT sensitively shifted the detachment between privacy and public. Public is no longer restricted to the direct living environment. Via internet public also incorporates the global sphere. On the one hand, users are solely responsible for an individual definition of this relation. On the other hand, public space itself is pervaded by ICT. Therefore an accumulation of personal data is possible without an explicit authorization. Between these conflicting priorities the question about an individual control concerning the unauthorized access to personal data arises.

Non-Communication and Time-Out

ICT invaded the professional as well as the private life. Boundaries between private and public spaces, between private and professional life are blurring, inter alia by the use of information and communication technologies. By using a notebook and mobile phone, it is today possible to work from everywhere and to be (theoretically) always available. Gaps and spaces of time that could formerly be used for relaxing, time-out and confrontation with our own are now filled with new communication and interaction. We thus questioned how women of different ages experience these blurring boundaries and which strategies they develop in distinct situations.

Furthermore, it was important for us to remain receptive to new incentives, ideas and experiences that would maybe exceed the chosen initial topics or even contradict them. This is particularly taken into account by our research design.

1.4 Interdisciplinary Research Methods

Our research methods relied on a qualitative paradigm. This approach aims at examining the subject and its environment without a reduction on single variables and not under laboratory conditions. Rather the subject should be investigated in its everyday world and by means of ordinary communication processes (BOGDAN/TAYLOR 1984).

On the one hand, we wanted to generate comparable information about the demands and needs of women (and men). For this social science perspective respectively market research we used classical methods of empirical social research that collect data about conscious attitudes: e. g. questionnaires, focus groups or observations. On the other hand, we also wanted to gain information beyond the existing and general and that would let us anticipate potential and future ideas. In particular, regarding the development of concepts and prototypes, we had to find different levelled links for the concrete generation of ideas concerning new and future fields of application for ICT. A design-centered perspective additionally demands not only verbal respectively textual information, but also visually or haptic-graphically communicating research results. Wishes or visions are not always directly accessible for classical methods of empirical social research. It is thus necessary to work with certain methods that allow uncovering these deeper thoughts and making them observable. This is why we decided to apply methods like "Cultural Probes" or "Prototyping".

Finally, four female user groups of different ages were clustered. Due to time and personnel resources in the project, it was not possible to include the same level of corresponding male groups. In order to better classify and contrast the results, at least one group of men consisting of different ages with the same methodology could be investigated.

Since we intensively integrated real users, our research approach can be tagged as Participatory Design (SANDERS 1999, 2001, 2002, 2005). The participants thus became co-designers. An equal relationship between users and designers is constitutive for

the Participatory Design approach (EHN/BRADHAM 2002). From this emancipatory perspective, we regard our test persons as experts of their daily life.

1.5 Incentives for Innovative ICT Development

Our initial thesis that women make manifold demands on ICT and that they are sophisticated users could be confirmed by our study.

We noticed already during the investigation process that the women – particularly in the ideation workshops – anticipated less than the male group the given technical limits. The female groups dared to create visions and realized them in their prototypes and role playing games. Moreover, women integrated their experiences from very different areas of life (children, family, travelling, etc.), whereas men mainly referred to their professional life and hobbies.

1.6 Micro-Communication

We found out that micro-communication – especially within the young female customers (14 to 28 years old) – particularly determines the formation and affirmation of self-confidence in their own peer group and family. Today, togetherness is less achieved by the involvement in local groups like sports clubs or youth centers, but rather by the interconnectedness via ICT. These young women communicate a lot and in short intervals. Particularly the internet (chats, communication platforms, e-mail, etc.) is used more intensely for micro-communication.

» Women between 29 and 50 years old (middle-aged users) use micro-communication for the coordination of private and professional life.

» In general and through all generations, micro-communication serves for self-assurance of the own social network and is also a consequence of mobility, flexibility and individualization.

» The younger and middle-aged users therefore demand more services and software that support and provide ways of flexible, fast and mobile micro-communication.

» In contrast, micro-communication via ICT played a less important role for the investigated elder women (50 to 65 years old). A generation shift in ICT use becomes obvious in here.

1.7 Privacy and Data Control

Our study showed that women of all generations want to have more control over their personal information and data in private life (private telephone number, e-mail-address, etc.). They would like to have new service ideas and technical solutions for this purpose. For example, fast communication via e-mail and short messages is often also experienced as a disadvantage, namely when incorrect messages have been sent too fast and cannot be recalled. In public life, many users of ICT services and products do not want firms to collect their personal data and to abuse it for marketing purposes. Therefore they try to reveal as less personal details as possible, for example when using internet platforms. The conscience for the dangers of data abuse is strongly pronounced through all age groups. Nevertheless particularly among the young women, these intentions are however not realized consequently.

1.8 Non-Communication and Time-Out

Availability via mobile and e-mail is very important for the young women (14 to 30 years old). It is crucial for their self-confidence to communicate a lot. ICT has an important function as a medium

for experimenting with different roles in school, family, job and their circle of friends. The internet is additionally used as a source of information especially about free time activities (cinema, concerts, bars, etc.). Moreover the internet is asked for advice in different situations. Our study reveals that the young women have problems to distance their selves and to take conscious communication time-outs. In many situations, they are overstrained and stressed by the mass of communication.

The middle-aged participants (30 to 60 years old) also mention that they are sometimes stressed by ICT, but they search more systematically communicative time-out-zones. These recreation areas are important for concentration, regeneration and creativity. They often want to be alone or just together with friends or family members.

The group of elder women (60 to 65 years old), that are partly already retired and have less family duties, use ICT far more seldom and are thus hardly stressed by it.

1.9 First Conclusion

We can conclude that the investigated women in general value the ICT induced advantages like greater flexibility and rapidity higher than the occurring disadvantages of constant availability and an increasing communication stress. The wishes and demands within the younger female generation are related to a fast, flexible and secure management of their personal contacts. The organization of daily life (e.g. shopping, coordination of appointments, advices in difficult situations) is a core issue for middle-aged women. Due to time pressure, they mainly wish to save time with new ICT solutions.

Throughout the generations all women would like to have the possibility to express emotional closeness and intimacy to their families and friends quick and mobile by ICT services and software.

In general, our qualitative, design-oriented research approach allowed us to open up new perspectives on ICT that go far beyond a mere further development of the technological basis. The research process and in particular the evaluation of the multifaceted qualitative data require a lot of resources. Nevertheless, we judge them to be necessary to illustrate the various different needs of the heterogeneous group. The close cooperation and the experimental, sometimes playful dialogue with different women (and men) were central for the whole research project in order to open up new accessions to innovation development. Differentiation of interpersonal communication by ICT and organization of family, security and privacy have been topics that came up in this dialogue. They mirrored another situation of needs than most actual ICT offers are satisfying. We thus succeeded to create an approach for new developments that we now apply to start design projects.

1.10 Composition of Documentation

Our documentation is structured as follows:

- After the introduction in the first chapter the second chapter illustrates the empirical, theoretical and methodical background of our "G – Gender inspired Technology" conception. The Participatory Design approach as well as our qualitative proceeding is pictured. Last but not least, we explicate our understanding of the terms "gender" and "diversity".

- The concrete research and design process is sketched in the third chapter.

- The fourth chapter is then dedicated to the results of the research process and accordingly the fifth chapter to the ones of the design process.

2. Participatory Design Research for Gender-Sensitive ICT

In this chapter we reflect on our project G from a meta-perspective. This means we outline our research and the design philosophy which guided our concrete research and design process, the research focus and the selection of methods. In the following, we show which models and mindsets we referred to and in which way they contributed to our research and design goals. We aimed at gathering gender sensitive information and inspiration as a basis for future ICT products and services which addressed the main research questions:

» Which approach and methods are appropriate to consider gender-specific aspects?

» Which methods generate information about different female demands and desires without reproducing gender stereotypes?

Fig. 1: *A Participatory Design Approach for Gender & Diversity*

» Which research methods and tools provide inspiration for future ideas and design concepts?

In this case we had different knowledge goals. On the one hand, we wanted to provide knowledge for the research community about appropriate approaches and methods to gather gender sensitive insights. On the other hand, we needed to provide information about the impact of ICT on the focused target group as well as inspiration for the design of ICT applications. For these purposes, we combined the gender and diversity perspective with a participatory design research process to our research and design approach *(Fig. 1).*

Within our research and design process, the gender and diversity perspective was reflected in the following way:

» We were a team of researchers from different disciplines (market researchers, social scientists, design researchers, design practitioners) who interpreted the research results from different viewpoints.

» We used an interdisciplinary mixture of qualitative research techniques addressing different ways of expression and eliciting different levels of the participants' experiences, demands and desires.

» These methods provided research results which differed in depth and quality. They provided verbal, visual and artifactual responses which revealed explicit as well as more unconscious and tacit values and desires.

» We used methods for field exploration as well as methods for laboratory inquiries.

» We used a sample of 55 female participants and a sample of 18 male participant as the comparison group in order to emphasize the female perspective within the male dominated fields of ICT.

» The participants of both samples differed in age, education, cultural background and lifestyle. The samples provided manifold insights, including ambiguity and contradictions.

Our participatory design research process was based on the following aspects. Our participants were actively involved throughout the whole research and design process:

» During the research phase, they were self-investigators of their communication habits, social networks, attitude, demands and desires of ICT based on the method of Cultural Probes.

» During the design phase, they created their future communication device within an ideation workshop, presented communication problems and their solutions within role playing games, evaluated design concepts for ICT products and services, and took part in the production of video prototyping.

In the following, we want to argue why we chose this particular approach and which reflections, assumptions and thoughts accompanied our research and design development. We show how the aspect of gender and diversity can be considered within research and methodology in order to become an informational and inspirational basis for future ICT applications. Moreover, we explain why a Postdesign Mindset (SANDERS 1999, 2001) and a Participatory Culture (EHN/BRADHAM 2002; JOHNSON et al. 1990; SANDERS 2002, 2005) fulfilled gender and diversity requirements on a methodological and practical level. Finally, we show why our research for gender sensitive ICT design was a qualitative, interdisciplinary, participatory approach.

2.1 Problem & Knowledge Gap: About the Absence of a Gender & Diversity Perspective in ICT Design

Although there are some prior studies reflecting ICT design from a feminist point of view (BRATTETEIG 2002; CLEGG/MAYFIELD 1999; OUDSHOORN et. al 2004; ROMMES 2000; TRAUT 2006), the gender and diversity perspective is still not considered enough within the fields of HCI and design. This problem results from the fact that technological research and development in Europe is still conducted by very homogeneous research teams which are dominated by middle-aged male engineers and software developers (EUROPEAN COMMISSION 2006). In 2005 only 26% of the staff in the research and development sector was female. In the business sector the percentage was slightly lower: 18% of the people working in the R&D division in the business sector were female. The percentage of female researchers in the business sector amounts to 11%. The following table *(Table 1)* gives an overview of the research and development staff. In particular, we shed light on the employees working in the business sector (BMBF 2008: 559).

This homogeneity has serious consequences for the technological progress:

» It decreases the innovative power and inventiveness because of missing opponent, ambiguous or even conflicting viewpoints (COX/BLAKE 1991; RASTETTER 2006).

» It increases the pitfalls of "I-Methodologies" (ARKRICH 1995), which means that the producers' assumptions become more or less consciously the leading benchmarks for technological developments instead of real users' needs and demands.

» For this reason, it is very probable that ICT development conducted by men ignored female experiences, demands and desires.

1 This category includes the private/business, academic and public sector. Moreover this category includes researchers (scientists), technical and miscellaneous employees. Whereas researchers own an educational achievement, technical employees provide technical supportive jobs. Miscellaneous employees are people who do not belong to the first two groups (secretaries, purchasing agents, etc.).

	TOTAL STAFF IN R&D[1]	BUSINESS SECTOR
TOTAL (MALE AND FEMALE)	480.758	304.502
THEREOF FEMALE	123.428	55.905
RESEARCHERS IN R&D	277.628	166.874
THEREOF FEMALE	48.205	18.284

Table 1: *Percentage of female employees within the R&D and business sector*

When we talk about ICT development, we do not only have to focus on engineers and programmers, but also on designers. Although they claim to be advocates for the users, there is still a lack of practical knowledge on methods and tools that deal with gender and diversity. This problem is illustrated by a lot of product examples which explicitly address female or male customers. These products frequently confirm gender stereotypes (BRANDES 2001; BRANDES/STICH 2004; BUCHMÜLLER et al. 2008, 2009; BUCHMÜLLER 2008; BUCHMÜLLER/JOOST 2009; KIRKHAM 1996; ZFBT 2006) instead of providing user friendly solutions that allow for gender diversity.

For example, UTA BRANDES analyzed examples from design practice where the aspect of gender was only addressed in a superficial way to gain attention, e.g. through sexual connotations. Referring to technical devices, e.g. mobile phones, which explicitly address female customers, we discovered a design strategy that corresponds to the cultural stereotype of femininity: this strategy denies the technical character of the device by e.g. disguising it as jewelery (BRANDES/STICH 2004; BUCHMÜLLER 2008).

Moreover, design in this sense is reduced to interfacial cosmetics. "As recent product developments show, often stereotypes determine women's needs (...): As soon as product designers are engaged in research and development focused on women, the newly developed products all look the same: cute, tiny and pink" (STEIN/BESSING 2009: 99). Moreover designers are often unaware of gender, or gender blind, if they unconsciously design products for the (male) norm in society; as high pitches of the voice were not taken into account during the development of voice recognition systems, the newly designed and launched product was not successful as it was not able to recognize high – normally female – pitches of the voice (NATIONAL CENTER FOR WOMEN AND INFORMATION TECHNOLOGY 2003). This exemplification shows that it could be worthwhile to focus on different customer groups at an early stage of the innovation process as there is a positive correlation between market success and customer orientation (LÜTHJE, 2003: 37). Furthermore, it shows how research and development decides about social inclusion or exclusion.

Criticizing a stereotypical and superficial design practice, we want to emphasize with our research that the formula 'shrink it and pink it' (ROHD 2008) is not as a female appropriate design strategy at all. In this respect, we have to question these stereotypes and reflect their cultural construction by empirically investigating if they really exist and asking if they are really wanted by female or male customers.

For these reasons, we searched for a way to reflect our own gender assumptions which are mirrored more or less explicitly in research tools (BREDIES et al. 2008) and finally in designed artifacts (BRANDES 2001; BRANDES/STICH 2004; BUCHMÜLLER et al. 2008, 2009; BUCHMÜLLER 2008; BUCHMÜLLER/JOOST 2009; EHRNBERGER 2007; KIRKHAM 1996). We chose the gender and diversity focus in order to avoid the reproduction of stereotypes and to pluralize the basis for ICT development.

2.2 Gender & Diversity for ICT Pluralization

The gender and diversity focus was a fruitful way to reflect our own assumptions about ICT users, context of uses and the field of ICT itself. This perspective had at least four effects:

2.2.1 Questioning the Concept of "User" as a Universal and Neutral Being

When we reflected the concept of user in reference to this focus, it lost its universal and neutral character. When we talk about "user", we have to deal at least with a man or a woman in western societies. Belonging to the one or the other category determines a certain relationship towards technology. This is not a causal effect of the respective nature, this is a part of the cultural construction of femininity and masculinity which can open or restrict the accessibility to and the usage of ICT. But gender is not the only aspect which makes the difference referring to experiences, demands or desires towards ICT.

2.2.2 Avoiding Stereotypes by Exploring Diversity

We reflected the aspect of diversity by recruiting (female, later also male) participants who differed in age, profession, educational and cultural background. Moreover, we drew attention to potential users who represented different aspects of today's individual experiences in everyday life, e.g. living single, as a couple or in a family. The diverse personal insights indeed reduced a stereotypical view in favor of individual, sometimes ambiguous and contradictory findings. They made us understand the participants' lives, ICT demands and desires in an empathetical way.

This also offered the possibility to set different parameters in relation to each other, because not all differences in ICT usage, preferences and demands result from the aspect of gender. In this respect, we also had to make sure that our interpretations of research responses did not (re)produce differences by analyzing them according to cultural stereotypes. Consequently, we did not only focus on differences, but also on similarities between the diverse female and male participants.

Referring to a social constructivist perspective, sex differences are considered to be "produced" in social, cultural and historical contexts. Gender roles are automatically linked to an individual or sex of an individual (BOHAN 2002; KIMMEL 2000; KRELL 2008). Butler calls it "the compulsory order of sex, gender and desire" (BUTLER 2007: 8). She reveals the seeming congruency between the biological and the cultural aspect of one's gender identity as a cultural construction which is disguised by a "rhetoric of naturalization". As a consequence, merely the *differences* between men and women were focused on when considering gender aspects in R&D projects. Such a perspective runs the risk of overlooking similarities between the sexes (STEIN/BESSING 2009: 99) which is illustrated by the following example: At the "Bundesgartenschau" (BuGa) 2006 in Munich, a personal digital assistant (PDA), called "Buga-Butler", provided information for the visitors.

At the beginning of the research the researchers assumed a different affinity for technological devices like the Buga-Butler between men and women. After an exit poll, the researchers found out that the similarities between male and female users exceed the differences (BESSING/LUKOSCHAT 2007: 70). The example shows that "(diversity) refers to a mixture of items characterized by differences and similarities" (THOMAS 1996: 5), and it is necessary to take the differences *and* similarities into account (ANDERS et al. 2008: 14; BESSING/LUKOSCHAT 2007: 72; KNAPP 2008). Moreover, studies tend to exaggerate the identified differences between men and women, although there are only minor differences between the sexes which may derive from the unquestioned familiarity with our own binary gender-segregated culture. Consequently, we had to be aware that differences or similarities in the use of ICT do not only result from being a man

or a woman. They very much depend on other factors like age, profession, educational and cultural background. For this reason the aspect of gender has to be carefully embedded in a superior diversity concept.

2.2.3 Reflecting the Cultural Change of Gender Roles

Referring to the aspect of gender and diversity also meant to consider cultural changes of gender roles within our society. This also included a critical reflexion on the hierarchical segregation between men and women. On the one hand, women are still mostly in charge of the household, child education and care for family members, although they have entered the professional arenas striving for self-realization and economic independence. On the other hand, men are more and more actively involved in child education, housekeeping and family organization. Consequently, female and male lives become more and more similar to each other. One can identify three (gender) alterations and trends in society which are prominent for almost every industrialized and developed nation (STEIN/BESSING 2009: 100):

1. *The increasing importance of female customers:* As the market power of women is increasing, it becomes more essential to deal with their preferences. Studies point out that women pursue higher standards of design, user friendliness and service of technical support than man do (e.g. HORX 2003).

2. *Traditional male or respectively female markets are changing:* Nowadays, the traditional task sharing – women decide about convenience goods and men about major investments – is not appropriate anymore as families and people living in relationships decide together on consumption. Moreover, there are growing individual needs of women and men.

3. *The individualization of societies:* Due to the demographic challenges and shifts of the different markets, the customers require individually adaptable products. Therefore it is essential to become aware of the diverse conceptions and forms of life and to avoid stereotypes (BESSING/LUKOSCHAT 2007: 74 et seq.).

That also poses new challenges for a reconcilability of professional, private and family life. In the latter respect, we claim that women are currently even more experienced in shifting between private and professional spaces. For this reason, we think that considering female experiences and demands enlarges ICT applications and contributes to the increasing challenges of daily organization and coordination for both genders.

2.2.4 Focusing on Women Expands the Opportunities for Everyone

Because of the fact that technological development is still a male dominated area and reflecting the changing gender roles, we particularly focused on female experiences and demands towards ICT. This is mirrored in the sample of 55 female participants in contrast to the male group consisting of 18 men. Referring to other studies about women, we wanted to know if they are a demanding customer and user group in several respects:

» Some studies say, that women evaluate technology by purpose and usefulness, which means they less use technology for its own sake (BUHR 2006: 7; SHEIL 2008).

» Moreover, they have a higher demand for ecological sustainability than men (KUCKARTZ/RHEINGANS-HEINTZE 2006).

» Finally, they still have different life conditions and perspectives: more often than men, women have the need to reconcile professional duties and care taking.

Women therefore promise to diversify ICT development by providing new viewpoints which enriched the spectrum of user profiles and scenarios for innovative product and service ideas. But putting women in the center of attention does not necessarily mean to produce 'female only' products and services. Reflecting the ongoing change of gender roles, we suppose that ICT products and services which meet female demands also address male users, because technological practicability, usability, ecological sustainability and the better management of professional duties and care taking also serves men in their daily lives.

2.3 The Change of Design Research: From Users to Co-Creators

Within the Design Research community, there is a noticeable shift from user-centered design to Participatory Design and Co-Creation (REDSTRÖM 2006; SANDERS 2002, 2005; SANDERS/STAPPERS 2008) in the field of Human Computer Interaction (HCI) (BOEHNER et al. 2007; JOHNSON et al. 1990). This is due to the fact that from a market perspective, there is no longer such high value in triggering research and development exclusively from a technology perspective, because just adding new technical features to exiting technology does not guarantee user acceptance and market success. Researchers therefore were in search of new methods for exploring user needs within their everyday life environment to adapt ICT development more closely to actual demands. But standard methods from the quantitative market research as well as qualitative questionnaires, for example, failed to deliver such insights.

Consequently, these research approaches reached their informational and inspirational limits. The question was now how to gain prospective insights about people's needs and desires as starting points for future technological improvements or even inventions. Referring back to the first approaches of Participatory Design from the 1970's (EHN/BRADHAM 2002; JOHNSON et al. 1990; REDSTRÖM 2006; SANDERS 2002, 2005), researchers in HCI applied the framework of Co-Designing to come up with new ideas for technological development. The shift from user centered to participatory and co-creative approaches did not only have practical reasons. It referred to a particular philosophy. Sanders already talked about a new Mindset at the end of the 90's, called Post-design (SANDERS 1999, 2002). It is based on certain assumptions which necessarily lead to a participatory culture and co-creation which changed the concept of the "user", the relationship between user, researcher and designer, the methods applied and the qualitative outcome of research results. This mindset is based on the following assumptions:

- People are experts of their everyday life. They can inform about their experiences, habits, demands and desires.
- Experiences are contextual, meaning that they result from one's personal experiences within one's environment.
- Everyone is to a certain extent a designer. Designing from this point of view is regarded as a basic human property and not a professional skill.

Regarding people in this way makes them no longer objects of investigations, nor consumers to be served. They have to become an active part of research and design in order to articulate and express themselves. This requires an emancipated relationship between "users", "researchers" and "designers" (EHN/BRADHAM 2002; REDSTRÖM 2006, 2008; STAPPERS 2009). Moreover, these three roles become blurred. Researchers are no longer translators of research results and designers are not only product and service generators. In this context, they just provide the infrastructure for others to express themselves. On this level, they become facilitators and "tool designers" (STAPPERS 2009: 6, 10) to provide appropriate means for unwrapping everybody's creativity, which leads to new spaces of mutual interactions and collaborations between all stakeholders.

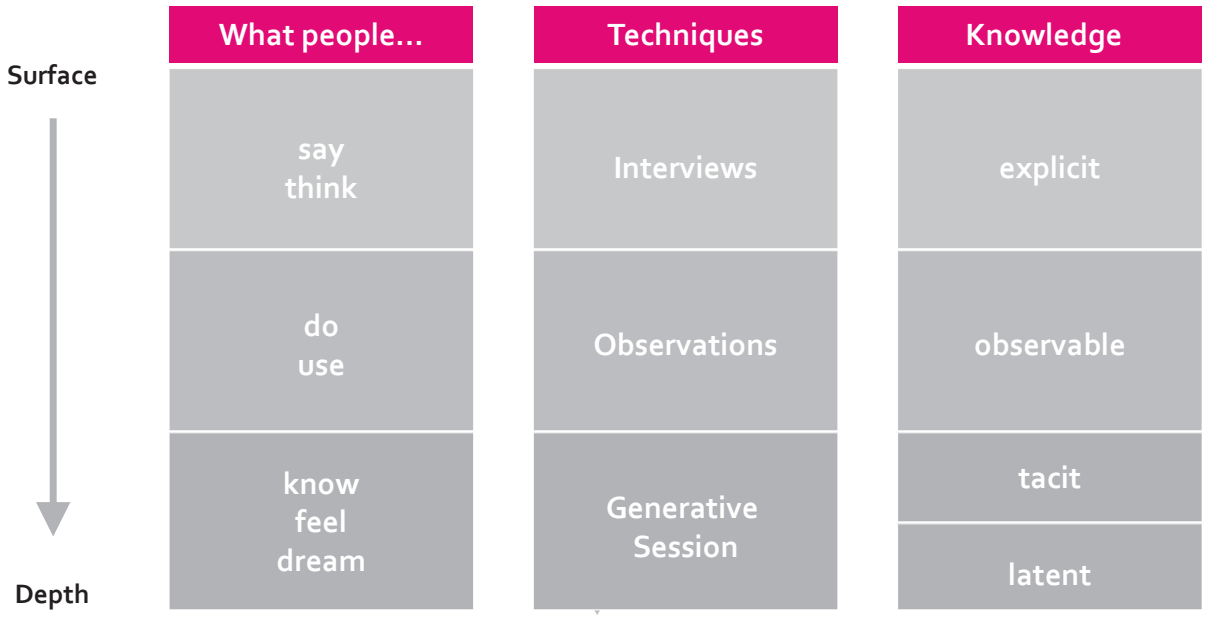


Fig. 2: *Different levels of knowledge about experience are accessed by different techniques.*

2.3.1 Research for Information & Research for Inspiration

Participatory approaches within the context of HCI and design are different from participatory approaches in social and cultural sciences. Although they share the same attitude about people and potentially aim at a democratization for all stakeholders, they differ from the basic research models which they refer to. Analytically and ideally, we can differentiate two basic types of research: research for inspiration and research for information (SANDERS 2005). While research for information strives for knowledge about the way it is, research for inspiration strives for prospective knowledge about what could be. Referring to explorations in a social scientific context, we have to deal with research for information in the traditional sense of knowledge production. In the context of HCI and design, we do not only strive for information, we also do research for inspiration with regard to new technological opportunities for people. While the preliminary type of research provides knowledge on the basis of rational understanding, Sanders claims that the latter type generates empathy as the basis of emotional understanding (SANDERS 2005).

Which knowledge we gain also depends on the research methods we select. The scheme *(Fig. 2,* SLEESWIJK-VISSER et al. 2005: 4) below shows the relationships between research techniques, the addressed human expressions and the depth of insights. While research techniques which access the verbal or behavioral level of human utterances address the explicit and conscious level of human experiences, the so called "generative tools" also reveal unconscious needs and desires. These effects depend on the tools themselves. They present uncommon stimuli the participants have to think about and interpret and also offer verbal, visual and haptic ways of expression. In this case, generative tools provide

knowledge in form of maps, collages, symbolic prototypes, etc. (SANDERS 2000; SANDERS/WILLIAM 2001; STAPPERS/SANDERS 2003). Consequently, they make tacit demands and latent desires visible which can't be expressed in words. From a strictly scientific point of view, they are very messy research instruments because of their playful, ambiguous, uncertain, sometimes even provocative character. From an inspirational and design specific point of view, they offer a kind of language which provides a common ground for interaction and communication between designers and non-designers. Because of the more design related research responses, they offer manifold benchmarks for the process of ideation. Research results generated in this way are characterized by their diverse and multisensory quality which refers to people's – more or less conscious – attitudes, preferences, values and desires. For this reason, they are inspirational and prospective sources for the process of ideation. Participatory Design Research itself becomes a design process for all stakeholders.

2.4 Interdisciplinary, Qualitative, Participatory Design Research in the Context of G

In our project, we followed the described methodological trend. This finally led to a qualitative, interdisciplinary, participatory design approach for the following reasons.

2.4.1 Satisfaction of Different Informational Needs Through Interdisciplinary Research

We were an interdisciplinary team of market researchers, social scientists, design researchers, design practitioners, female and male ICT users. These different stakeholders had different informational needs, project tasks and goals which were mirrored within the research and design approach, the selection of methods, as well as the analysis of research results.

- From a social scientific and design research point of view, we strived to develop methodological knowledge about how gender and diversity can be reflected within research and design processes beyond gender stereotypes.

- From a market research point of view we were interested in cumulating our detailed insights into ICT user profiles or typologies. In this context, we focused on current habits, attitudes and preferences towards ICT.

- From the perspective of design practice, we strived for the development of user appropriate ICT application for the enrichment or improvement of people's life. For this reason, we strived for prospective and inspirational insights.

These different research and design goals required insights which differed in quality and depth. For this reason, we used common research tools like questionnaires and focus groups to gather explicit and verbal information about the participants' habits and behavior in dealing with ICT. We also used design specific methods like cultural probes and symbolic prototyping to access unspeakable, tacit and latent levels of participants' demands and desires which can be better articulated in a non-verbal, visual or artifactual way. By using this mixture of research methods from different disciplines, we could compare them with regard to their informational and inspirational contribution. Moreover, the insights deriving from different methods also offered the possibility of triangulation not necessarily with regard to the reliability of the research responses, but with regard to the multifaceted perspectives they offered.

2.4.2 Qualitative Exploration of the Others' Point of View

Within our project G, we followed a heuristic and qualitative research paradigm for at least two reasons:

1. Referring to the gender and diversity topic automatically links to social constructivist, ethnomethodological and interactionist gender theories (BUTLER 1991; GOFFMAN 2001; KESSLER/MCKENNA 1985; WEST/ZIMMERMANN 1991). From this point of view, the gender specific relationships, demands and desires of technology are not considered as natural expressions, but as cultural phenomena which are influenced by different personal and social experiences within certain contexts. In our case, we did not really know about female habits, demands and desires toward ICT. Therefore, we had to enter the field, focus on different women and explore the role of ICT within their daily life from their point of view.

2. Research for design has to provide inspirational and prospective information as a basis for future design concepts. General descriptive statements about the ICT usage of average users often provided by quantitative market research are too unspecific for our research and design purpose. They inform about general tendencies or the status quo, but they do not inform designers about what could be. Research for design therefore has to be qualitative and prospective to deliver benchmarks for future design concepts.

Qualitative social research is a particular, theoretically underpinned and methodologically led way to explore the empirical world (BOGDAN/TAYLOR 1984). It is different from quantitative social research which is based on a natural scientific and positivist research paradigm. Whereas in quantitative research the typical quantification or measurement of observed parts of reality aims at a verification or falsification of certain hypotheses by determining their statistical significance, qualitative research focuses on subjective analysis and interpretation striving for a holistic understanding of people's world from their point of view. Consequently, qualitative researchers reject quantitative criteria like validity, reliability and objectivity as benchmarks for the quality of research.

They follow the principle of openness and flexibility referring to the "object" of research and the research process (MODROW-THIEL 1993). That means to generate, dismiss or modify hypotheses, to identify research issues and to adjust the research approach depending on the gathered insights and experiences made during the ongoing research process (FLICK 1995; LAMNEK 2005; GLASER/STRAUSS 1967). This also implies taking the researchers' preliminary assumptions into account, which may also be modified or dismissed during research.

Considering the principle of openness and flexibility, we adapted our research procedure and tools in reference to the participants' feedback on preliminary test sessions. Moreover, we generated and modified our hypotheses, research issues and ideas for ICT applications during the research process. Consequently, our research process was not straight forward, but circular and iterative. It was more of an interaction and dialogical collaboration between researchers in order to explore the respective demands and desires from the researched point of view. This has an impact on the general relationship between the investigator and the "subjects of investigation", which becomes a non-hierarchical and emancipated one *(see Chapter 2.3)*.

2.4.3 Participation through Self-Investigation, Co-Creation and Concept Evaluation

We followed the trend towards participatory design research and used it for a gender sensitive ICT development.

In the context of Gender Studies or feminist research and practice, participatory approaches and methods are commonly used as democratic tools to integrate women in communal or organizational contexts. On a political level, this strategy is called "Gender Mainstreaming" when referring to institutional contexts, or "Managing Diversity" in economical contexts (SCHRAUDNER/LUKOSCHAT 2006: 6). Our approach is different in two respects:

» We used participation for emancipatory purposes. But in this case, we did not strive for a socio-cultural, institutional integration of women. We aimed at a consideration of female experiences and demands as a basis for the development of ICT products and services (BÜHRER/SCHRAUDNER 2006).

» Secondly, we based the participatory approach on generative design methods. In this case we used Participatory Design Research and Co-Creation as the methodological framework for a gender sensitive ICT design. As described, these methods provided not only information about the current role of ICT within women's life, but also inspiration for future scenarios and concepts inspired by diverse female perspectives.

Following the Postdesign mindset, we actively involved our participants within the research and design process: They became self-investigators during the research phase and later on co-creators within the design phase. Next to common qualitative research methods, we used the following "generative tools":

» During the research phase, the participants observed themselves within their "natural environment" with the aid of so called ***Cultural Probes.***

» During the design phase, the participants articulated and created their vision about future communication and organization in several respects:

› By materializing their future communication and information desires in ***symbolic prototypes*** and presenting them within an ideation workshop;

› By ***performing*** communication problems and their solutions ***in role-playing games*** during the ideation workshop;

› By ***evaluating design concepts*** which were already developed on the basis of research findings;

› By ***participating*** in the development and production of ***Video Prototyping*** about future ICT services and usage scenarios.

The individual and deep research responses as well as the intensive involvement of participants contributed to a very personal atmosphere among all stakeholders. For Sanders (SANDERS et al. 1996; SANDERS 1999, 2002, 2005) empathy is a key component in the context of participatory design and co-creation. For her, it is crucially important for the process of understanding which does not only happen on a rational, but also on an emotional level. In our case, we regarded empathy as a fundamental precondition to overcome gender stereotypes in favour of diverse individual findings. This was one reason to choose this approach for a gender sensitive ICT development, while generating ideas and design concepts inspired by the experiences and demands of real users was another.

We regarded participation based on the mindset of Postdesign as a fruitful way to gather experiential knowledge and develop ICT concepts according to the participants' demands and desires.

2.4.4 Research through Design

During the research phase, we simultaneously adapted and diversified our design concepts according to new insights and the participants' feedback which we invited for concept evaluations *(see Chapter 3.2).* In this case, we benefited from design as part of research; the participants' feedback about the concepts generated further reflections and knowledge about their demands and desires.

From a design research perspective we followed the model of "project grounded research" (FINDELI et al. 2008) to integrate the projective competences of design into the research process. This model includes the design project as an inherent part of the research framework. In our context of G, the guiding design question was: How does a design solution in the field of ICT look that would support women's daily communication and organization? One of the research questions was: How, in general, can we find out about future demands and desires of female ICT users as a basis for designing appropriate ICT applications?

Through the design project (that is most often a practical design "Entwurf" – a draft or prototype) the researchers found out about projections that reply to design problems (FINDELI 2008).

As in action research, designer researchers do not only analyze existing situations, but want to transfer their findings to actions, e.g. to design interventions that are introduced to the field. Designers as well as design researchers look at the world, as Findeli puts it, with a "diagnostic" point of view, striving for an improvement of every day life situations or simply to enlarge people's opportunities. Consequently, "Project grounded research" (FINDELI et al. 2008) embraces two different goals: from a research point of view, it aims at the production of knowledge; from a design point of view, it aims at the production of solutions or new opportunities in form of ideas, sketches, concepts, and finally, products. Therefore, the output of the design research process results in a design answer in form of an artifact. Referring to the two knowledge goals, this artifact plays a double role: As a design answer it is an invention or solution that is hopefully relevant for the market improving potential users'/customers' lives. As part of research, it is an epistemological carrier which makes human experiences and actions observable and visible. In the latter respect, it provides experiential knowledge about potential users, their behaviors and contexts which provide a research answer or poses new research questions: "Within a research-through-design approach, often a prototype is developed as a means to learn about the level in question" (STAPPERS 2009: 9). Artifacts in this case are research tools which make experiential knowledge accessible by adding new experiences to the world. When conducting a "project grounded research", "doing design" is an integral part of "doing scientific research".

Research on the basis of generative methods is necessarily Research through Design. In this respect, our advocacy for this approach which establishes design as a basic component not only for practical, but also for epistemological purposes, was a logical consequence.

2.5 Conclusion: Our G Assumptions

As a conclusion, we extracted the following statements from our preliminary reflections. They can be regarded as the fundamental assumptions which guided our research and the design approach of G.

Everyone is an expert and designer.

- People are experts of their daily life.
- Everyone is a creator and designer in different respects. Consequently the ability to design is a human property and not a professional skill.
- People are the benchmark and source of inspiration and ideation.

Gender & technology as cultural constructions

- There are not only differences between female and male users, there are also similarities. Some gender differences result from a stereotypical perspective which sometimes evokes different perceptions of same phenomena.
- Being a woman or a man is not the only and not necessarily the most influential aspect which causes differences (with regard to technology). They can also result from other aspects like age, education, cultural or professional background, lifestyle, personal experiences, etc.
- Females have different relations, demands and desires towards technology than men, not because of their natural skills, but
  - because of the cultural construction of femininity and masculinity.

› because of their socialization which leads to different experiences and viewpoints.

Participation means co-creation and accessibility for everyone

› Participation in this sense is co-creation with all stakeholders.

› In this context designers are facilitators, enablers for people's design skills.

› Participation in the context of G also means to make ICT accessible and usable for everyone. This requires considering female experiences and perspectives within the male dominated ICT field by female professionals as well as female users. It generally requires integrating diverse female and male perspectives by a co-development of ICT in interdisciplinary, gender mixed teams of professionals and ordinary people (customers, users, addressees).

3. The G Approach

In this chapter, we describe our concrete participatory design research approach for gender sensitive ICT based on the preliminary reflections and assumptions.

The chart *(Fig. 3)* shows the way from research to results: the research process consists of the focused research issues, the segmentation of test groups and the participatory research phases. The research responses were analyzed from three different perspectives according to the interdisciplinary viewpoints and with regard to different deliverables. They resulted in detailed insights and visualizations about the participants' attitudes and preferences towards ICT, accumulated into user typologies, personas *(see Chapter 4),* and mirrored in use cases, design concepts and prototypes for future ICT products and services *(look at Chapter 5).*

3.1 Research Process

3.1.1 Research Requirements

The following research requirements guided our selection of methods and tools. We defined them according to our research and design goals considering a certain perception of "the user" as required by the gender and diversity focus, the postdesign and participatory mindsets:

- Focus on female and male ICT users in their personal contexts and environments
- Investigation of diverse users to avoid a stereotypical view
- Consideration of participants as experts of their lives, needs, demands and desires
- Incorporation of participants as co-creators
- Use of research methods which
  - Explore the impact of ICT on the participants lives within their daily environment
  - Provide information about their needs, demands and desires towards ICT
  - Provide prospective and multisensory inspiration for future ICT concepts and applications
  - Provide evident and explicit insights as well as tacit and unconscious needs and dreams as benchmarks for future ICT development

3.1.2 Composition of Research Samples

The gender and diversity perspective had a crucial impact on the samples. Moreover, they were also influenced by certain assumptions and hypotheses we had about users of ICT:

- We expected that diverse women have different experiences, habits, attitudes and demands towards ICT.
- We supposed that these differences do not only refer to aspects of gender. Differences might also be influenced by other aspects like age, social background, education and profession or lifestyle.
- In this context, we expected that the facet of age, indicating or correlating with a certain phase of life, fundamentally mattered. In particular, we assumed that the impact and usage of ICT primarily depends on age and the (corresponding) life phase.
- We also claimed that focusing on women also includes other user groups. Considering issues like usability, sustainability, security, data and communication control within the ICT development are especially important for women, but could also be desirable for other customers.

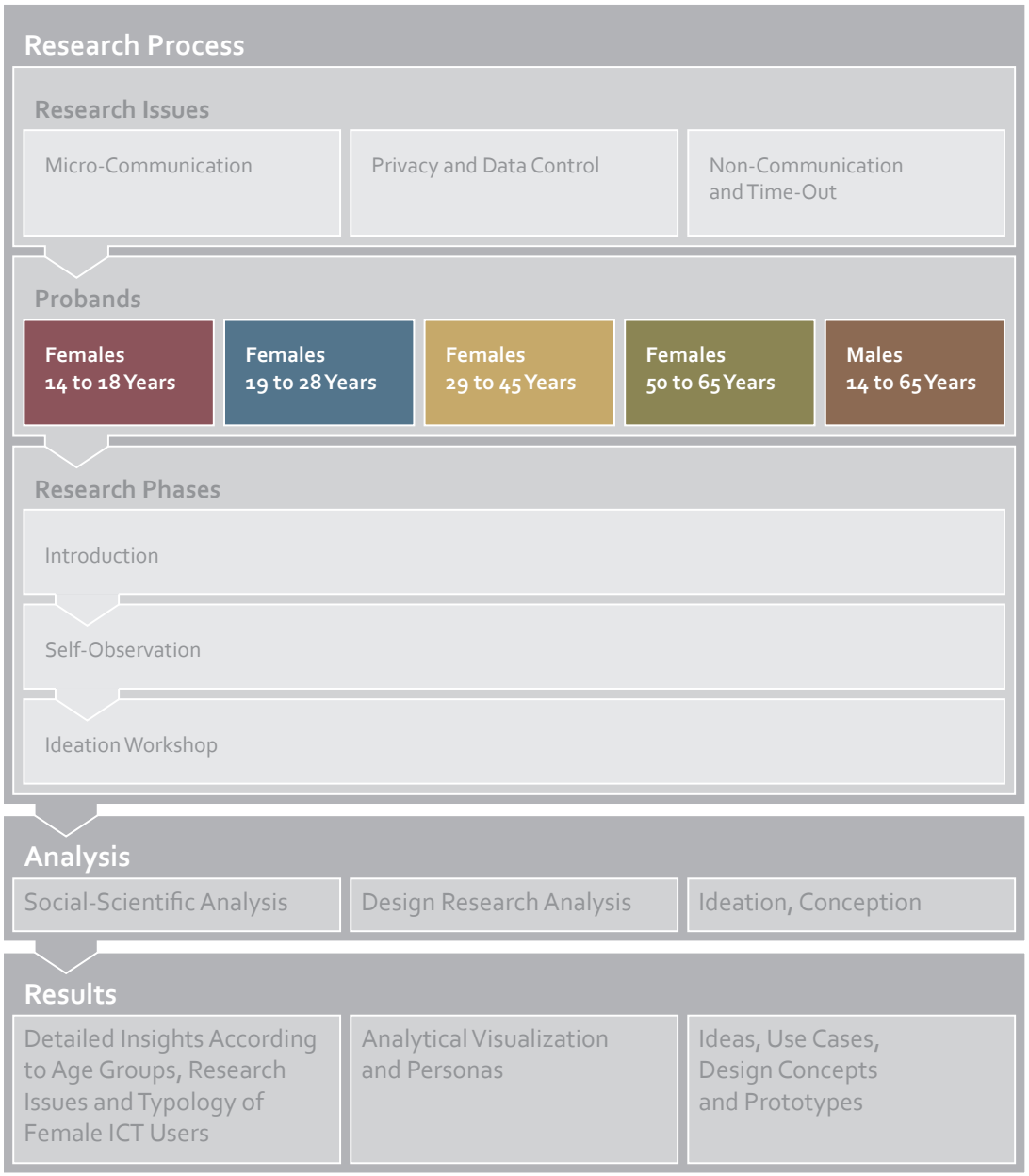


Fig. 3: *From Research to Results*

GROUP	GENDER OF PARTICI-PANTS	AGE RANGE	PHASE OF LIFE	NUMBER OF PARTICIPANTS ACCORDING TO RESEARCH PHASES*	
				SELF-OBSER-VATION	IDEATION WORKSHOP
1	Female	14 – 18 years	phase of school, education	13	12
2	Female	19 - 28 years	phase of academic or professional education, early professionals	13	12
3	Female	29 – 45 years	phase of family, advanced profession ("rush hour of life")	15	14
4	Female	50 – 65 years	late phase of family, late professional phase, early retirement	14	12
5	Male	14 – 65 years	5 males per phase of life (see female groups 1–5)	18	16

Table 2: *Overview of age and gender groups in reference to the number of participants of the respective research phases*

» Consequently, we claimed that female and male ICT users do not only have different demands and desires, but also a lot of similarities. In this context, we also shed light on male ICT experiences and desires. Furthermore, we also considered other influential aspects like age, education or lifestyle, etc.

In reference to these hypotheses, we basically recruited female test persons which were clustered into age groups *(Fig. 4)* according to central phases of life *(Table 2).* Each of the four female groups consisted of about 12 to 15 participants who were mixed with regard to education *(Fig. 5),* cultural background *(Fig. 6)* and lifestyle (living as a single, within a shared flat, within a relationship or family, etc. *(Fig. 7).* We also recruited a male comparison group consisting of 18 participants aged from 14 to 65 years. This group was also mixed according to life phase, lifestyle, educational and cultural background. The male comparison group allowed us to focus on differences and similarities. In particular, we tried to localize if they were influenced by aspects of gender or other facets like age *(Fig. 4)* or other aspects.

* Generally, the test persons within an age group were the same throughout the whole research process. It consisted essentially of a self-observation phase and an ideation workshop which lasted over a period of four weeks. The number of participants changed during this time frame. Consequently, we refer to different numbers of test persons in the following chapters according to the research phase we relate to: passages which focus on findings from the self-monitoring phase based on Cultural Probes refer to more participants than passages which refer to findings from the ideation workshop. This also affects the results in the next chapters e.g. resulting from standardized questionnaires which were collected during the ideation workshop. When we speak about the female and male sample in general, we refer to the number of participants of the self-monitoring session (Cultural Probes).

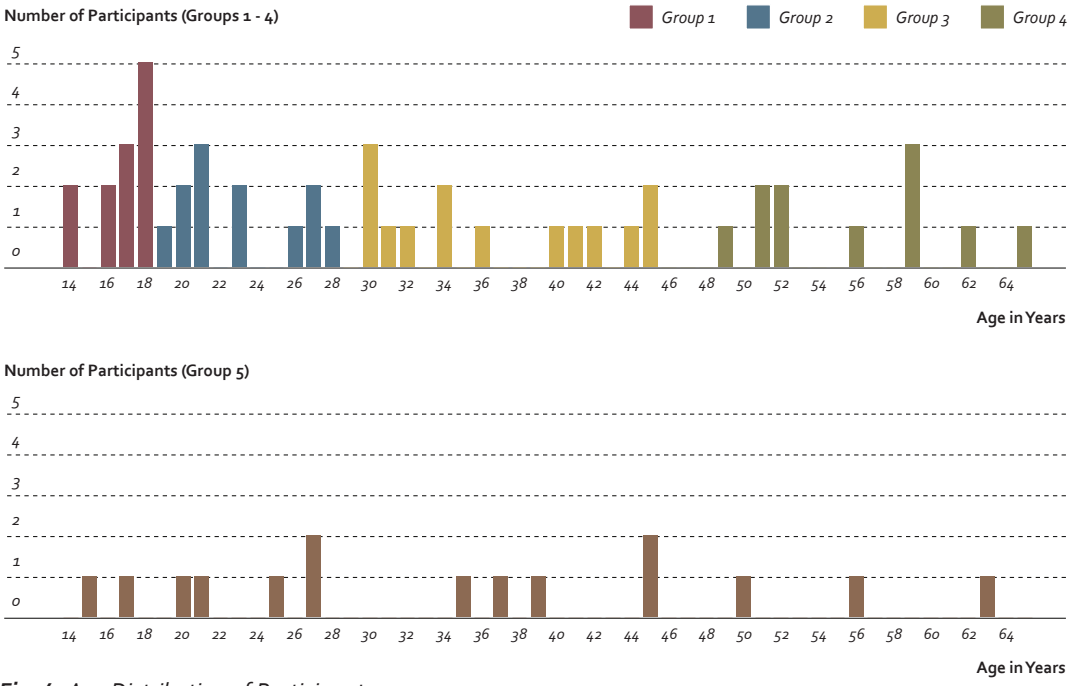


Fig. 4: *Age Distribution of Participants*

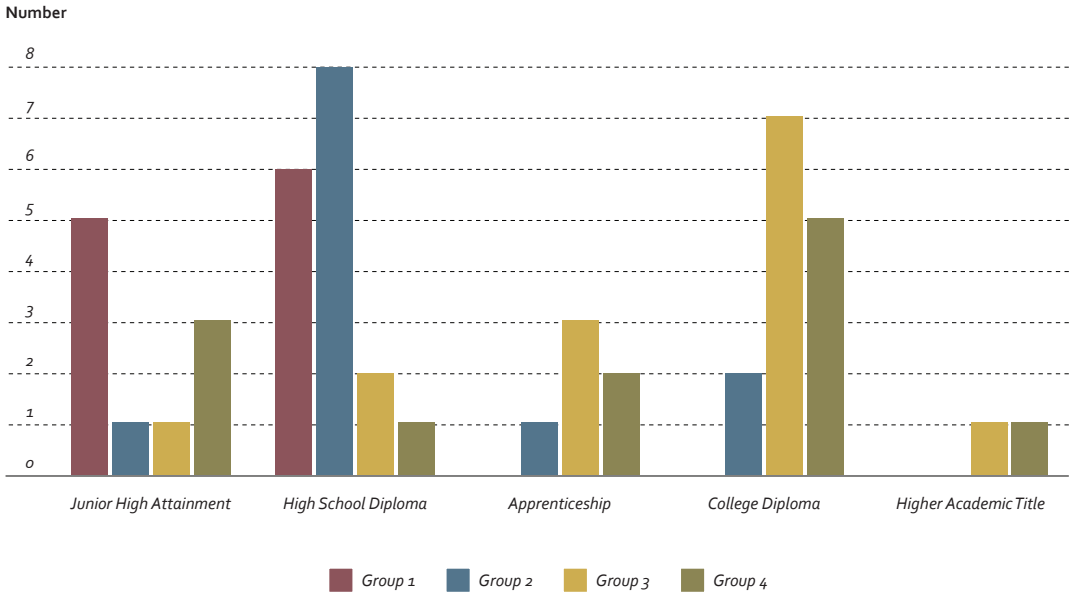


Fig. 5: *Aspired / Present educational achievement*

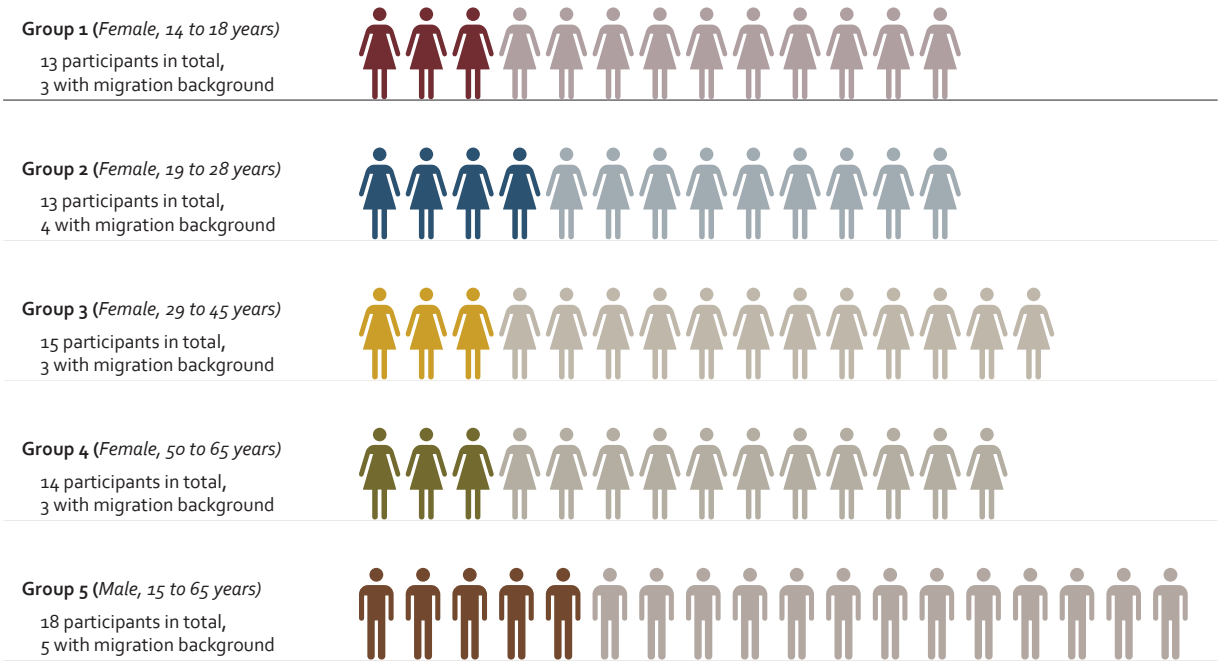


Fig. 6: *Participants with / without Migration Background*

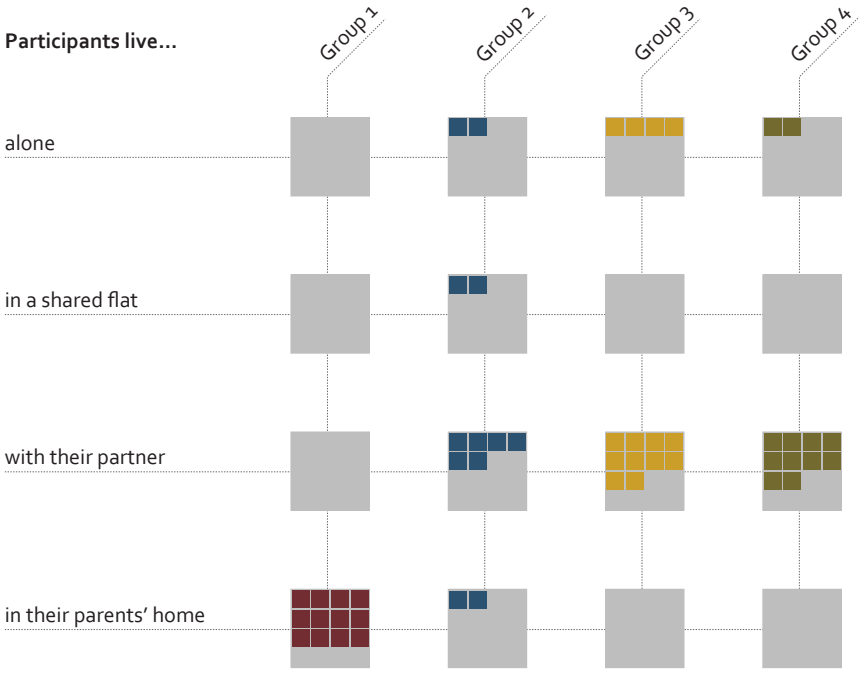


Fig. 7: *Living Situations of the Group Participants*

3.1.3 Research Issues

Within our project, we focused on three issues. We labeled them in the following way:

- Micro-Communication
- Privacy and Data Control
- Non-Communication and Time-Out

These issues, next to some others, were identified within our pre-study called "Women's phone". Their relevance was reaffirmed by semi-structured interviews that we conducted with selected participants. Furthermore, we did desk research comparing our research findings with other studies referring to female needs and demands towards design and ICT. In the following, we define the respective phenomenon from our point of view and refer to our hypotheses and respective research goals.

3.1.3.1 Micro-Communication

Presumptions: We defined "micro-communication" as a frequent exchange of short messages or as quick, but numerous communications with friends or family members. The main purpose is not exchanging information, but staying in touch with one's peer group. This form of communication seems particularly popular among female teenagers or young women.

Micro-communication – this is one of our hypotheses – serves to reassure oneself being a part of a social network which has to be experienced virtually. We hypothesize that this phenomenon is a result of the increasing impact of ICT, local mobility and individualization which leads to a decreasing integration into local groups or social networks like sports, youth clubs or neighborhoods. Consequently, we think, that "micro-communication" is a cross-generational phenomenon which indicates a fundamental change and expansion of mobile interaction transcending digital communication forms like voice-calls, e-mail and SMS. We also suppose that the purpose, form and content of micro-communication change depending on women's age and lifestyle.

While young girls may use it in order to stay in contact with their friends, older females may use it to organize the daily duties between job and family.

Research Focus: We were interested in different forms of micro-communication and its underlying reasons and motives. Consequently, we also focused on digital as well as analogue communication habits or rituals. This also included verbal and non-verbal ways of messaging within the animated as well as physical environment (e.g. posting messages via sticking notes at the fridge, via T-Shirts, talking by the coffeemaker in the morning, etc.)

Referring to today's change of gender roles, we were particularly interested in how women use ICT as a link between private and public professional life. In this context we also wanted to reflect on the ambiguity of the expansion of mobility and independence on the one hand and the increasing expectations of permanent availability on the other hand.

3.1.3.2 Privacy and Data Control

Presumptions: ICT has seriously modified the demarcation between private and public as well as local and global spheres. On the one hand, the users are themselves responsible for how they deal with these circumstances; on the other hand, ICT penetrates all areas of life within western cultures. The usage of and accessibility to ICT nowadays decides on socio-cultural participation which restricts the self-control of the management and distribution of personal information. These phenomena pose new questions about how to prevent misuse and how to control where and to whom one's data is spread. Moreover, ICT makes communication possible everywhere. That imports the private space into the public. As a consequence, private space sometimes extends the public and one might involuntarily become witness to people's personal problems or intimate stories.

We learned from our preliminary research and desk review that women are very sensitive in spreading personal data such as their telephone number or pictures of themselves. They want to control and canalize their own data in order to adhere to privacy, especially in public life. We hypothesize that women's sensitivity changes depending on age and their virtual activity on and experiences with platforms like MySpace or Facebook that may basically influence their sensitivity about what is regarded as intimate and publicly accessible information.

Research Focus: We wanted to know how much women are sensitized to this issue, how they deal with it and what they do in order to protect themselves from the misuse of personal data. We also wanted to find out what they wish to have or do in order to decide on the distribution of their personal information within private and public spaces, and what they would like to have to control communication in general.

3.1.3.3 Non-Communication and Time-Out

Presumptions: ICT has not only penetrated and linked private and public life – it also dissolves the barrier between professional and private spaces. Working is possible at any time and anywhere and we have become permanently available for everyone. Within our interviews, we found out that women regard breaks, boredom or loneliness as necessary requirements for concentration, contemplation, recreation, relaxation and creativity. Consequently, they appreciated to be sometimes on their own or only physically together with friends, instead of being additionally virtually somewhere else. Women who have "communicative professions" especially emphasized a need for non-communication and spare time without ICT connection. We assumed that this need varies according to age and life phase. We expected that female teenagers are not as much disturbed by permanent communication and interaction. We even supposed that they were more dependent on ICT communication and even threatened by its absence, which probably makes them feel lonely or not enough socially involved.

Research Focus: We wanted to find out about the impact on the women's daily lives by asking them about their emotions and attitudes towards ICT, their spare time activities, ways of relaxation as well as about the value of being on one's own in order to estimate their dependence on ICT. In this case, we also wanted to know about their daily dependency on ICT.

3.1.4 Approach & Methods

Using a participatory design research model with a mixture of common market research tools and design specific ones promised to be fruitful for our research and design purposes in four respects:

- They provide a common ground of communication between all stakeholders participating within the co-creation process.
- They address the whole range of human experiences/knowledge from explicit to latent levels.
- They provide qualitatively diverse research findings which deliver information as well as inspiration and therefore satisfy different informational needs of the stakeholders – in our case: market researchers, design researchers, interaction designers, business as well as marketing people and finally ("female") customers and users.
- They support rational as well as emotional understanding which leads to empathy and finally to a deeper understanding of the researched, which promises to overcome gender stereotypes.

3.1.4.1 Methodological Framework

We used ELIZABETH SANDERS' model of user involvement (SANDERS 1999, 2001, 2002) to structure our research process and

SANDER'S MODEL			G-PROJECT	
WHAT PEOPLE...		LEVEL OF EXPERIENCE, KNOWLEDGE	APPLIED METHODS & TOOLS	
			LABORATORY SITUATION (WORKSHOP)	DAILY ENVIRONMENT
Saying	say think	explicit	Questionnaires Focus Group Concept Descriptions of Prototypes	Cultural Probes (self-observation of ordinary life)
Doing	do use	observable	Participatory Observation, Role-Playing-Games, Prototype-Presentation	
Making	know feel dream	tacit	Symbolic Protoyping	
		latent		

Table 3: *Relation between people's expressions, accessibility of experiences and the applied methods within the research project "G"*

to choose research methods. This model was supposed to meet our essential research requirements for highly individualized insights into real needs and demands as well as for multisensory inspiration for user appropriate ICT products and services. Furthermore, it helped us to gradually sensitize the participants for the research purpose and increased their self-involvement and design activity step by step. Therefore, we selected different methods to enable the participants to express themselves in different ways ("saying", "doing"/"performing", "making/creating"). SANDERS describes (1999) the relation between people's utterances and the addressed level of experiences in the following way *(Table 3)*.

We selected different research tools in order to access the specific level of experiences. The particular research questions were translated into different research tools like postcards with tasks, questionnaires, or diagrams. This approach enabled us to triangulate the research responses, not with regard to their validity, but with regard to the multitude of perspectives they offered.

Besides accessing different levels of knowledge, we also gathered knowledge in a more design relevant way than pure textually documented information: We made the participants express their thoughts in multisensory ways using Cultural Probes (GAVER et al., 1999) and generative tools like Prototyping in order to encourage the test persons to articulate themselves not only in a textual, but also in a visual way, or by creating an artefact symbolizing their future communication demands and desires.

Moreover, we offered different research environments – self-observation within the daily life as well as laboratory situation during the ideation workshop – in order to estimate which answers and ideas might be individual and which ones were developed in contact with other persons. We started with the self-observation phase in order to make each test person concentrate on her/him) self. We hypothesized that this may reduce the influence of others during the workshop. This hypothesis was proved by the very individual prototypes that were produced during the workshop.

Fig. 8: *Toolkit of Cultural Probes*

3.1.4.2 Process, Methods & Tools

Phase I – Introduction ("Saying"): Within the first meeting, we sensitized the participants to the research purpose and issues. In order to get to know about each other, everyone was asked to choose an object within the room which was then used to introduce oneself. Moreover, the participants were given a toolkit of Cultural Probes with different materials and tasks, which were explained in detail. These probes are the basis for the second research phase.

Phase II – Self-observation by Cultural Probes ("Saying", "Doing", "Making"): The participants had two weeks time to observe themselves by Cultural Probes. These research tools (GAVER et al. 1999) are a set of playful and visually-oriented tasks and questions that offer different possibilities to express and document the everyday life, behavior and habits. They establish uncommon views on daily routines which make the addressees think and express themselves verbally, visually, spatially via maps, or in an artifactual way by collecting objects with personal value which can even have olfactory qualities, like samples of flavor. All these data refer to certain demands, personal preferences, tacit desires and latent visions. In our case, these manifold samples of data should inform about ICT demands and preferences to inspire ideas and concepts for innovative ICT applications.

The Cultural Probes were tailored to the specific research context, the addressed participants and research purpose. By creating them, the research process itself became a design process. Cultural Probes can generally be regarded as materialization of the design researchers assumptions and hypotheses.

The self-observation phase does not originally belong to Sanders Participatory Design approach. We added it to gather data within the daily environment of the female participants without being influenced by a laboratory situation. BILL GAVER et al. (1999) – the inventors of Cultural Probes – use them as a pure source of inspiration for design actions. We use them as part of Participatory Design and human driven innovation, believing that they did not only provide inspiration for future communication concepts, but also information about the participants and their lives.

The *Tables (4–7)* give an overview of the relationship between research issues, research tools and the purpose and expected findings.

RESEARCH ISSUE: MICRO-COMMUNICATION	
RESEARCH TOOL & TASK	**RESEARCH PURPOSE**
Photographic documentation of ***alternative ways and means of communication,*** e.g. messages/instructions via post-its, funny or political communication via T-Shirts, self-communications, talks to pets and kitchen aids	Alternative ways of communications besides ICT; analogue communication scenarios and means; differences in comparison to ICT mediated communication referring to addressees, location, content, communication purpose, motives, situations
A ***social map*** with colored self-adhesive dots and pictograms to visualize one's social network (friends, family and colleagues) and preferred ways of communications with each person (e.g. Face-to Face, computer aided communication, phone calls, etc.)	Geographical and social density of one's network; preferred ways of communication (face-to-face, via phone, online, postal); locality/internationality/ cultural influences; personal focus
Leporello to document ***one-day-in-a-life-ICT-communication*** referring to attitudes, emotions and the caused level of stress	Daily impact of ICT; activity and intensity of communication; purpose of ICT usage and communication; communication behavior, habits and attitudes; accompanying moods, feelings; estimated stress through the impact of ICT; social network

Table 4: *Research tools, purpose and expected findings referring to the issue "micro-communication"*

RESEARCH ISSUE: PRIVACY AND DATA CONTROL	
RESEARCH TOOL & TASK	**RESEARCH PURPOSE**
"Super-Eliminator" to symbolically distinguish shaming/ unpleasant messages or content like videos, photos, etc.	Personal, private or intimate issues, content, data, shaming scenarios, misuse of ICT
Framing intimate locations, scenarios as 'private', disturbing scenarios as 'barrier'	Diverse understandings and scenarios of privacy, intimacy; situations and scenarios of disturbance and intrusiveness of ICT

Table 5: *Research tools, purpose and expected findings referring to the issue "privacy and data control"*

RESEARCH ISSUE: NON-COMMUNICATION AND TIME-OUT	
RESEARCH TOOL & TASK	**RESEARCH PURPOSE**
Leporello for ***one-day-communication diet*** to abstain for a whole Saturday from ICT mediated communication and interaction, with documentation of the missed messages/calls and reactions the next day	Differences of every day life without ICT; advantages/disadvantages; estimated impact of ICT; ICT dependency/independence; estimated level of stress and documentation of reactions, emotions, feelings during the phase of non-availability; reactions, expectations from others referring one's availability; impact/intensity of ICT as measured by missed communications
"Relaxation box" to collect objects & scenarios which provide relaxation or time-out	Relaxation means, strategies, locations, activities; spare time activities: together or alone; value of being on one's own; impact of ICT on relaxation; reasons to avoid communication; social contacts

Table 6: *Research tools, purpose and expected findings referring to the issue "non-communication and time-out"*

RESEARCH ISSUES: MICRO-COMMUNCATION, PRIVACY & DATA CONTROL, NON-COMMUNICATION & TIME-OUT	
RESEARCH TOOL & TASK	**RESEARCH PURPOSE**
"Postcards" with questions to be asked and scenarios to be commented on addressing all of the three research issues	Attitudes and reflections about the impact, role of ICT and its usage referring to the core issues of micro-communication, privacy and data control as well as non-communication and time-out

Table 7: *Research tool, purpose and expected findings overarching all research issues*

Phase III – The Workshop ("Saying", "Making", "Performing"): After two weeks self-monitoring, the participants attended an ideation workshop. Ideation workshops are an adequate method to develop new ideas and solutions. Within the two day workshop the test persons were slightly directed by a coach. Different creation techniques, presentation and moderation methods which also referred to the Cultural Probes collected, structured and combined several solution ideas again and again. In this vein, the participants were encouraged to build a prototype of their desired "future communication device". We offered a large studio with a wide range of different materials to work with. ***Prototyping*** is a tool of Participatory Design and Action Research regarding users as experts of their experiences and co-designers. It aims at the production of data in the form of objects which inform in a multisensory way about the respective personality, preferences, values, visions and desires. This method addresses the imaginative and projective abilities of the test person, which also makes those tacit desires visible which cannot be expressed in words.

The participants were also invited to ***role-playing*** games referring to several issues such as dating, sharing happiness, conflict & conciliation, sharing secrets, security, time-out, avoidance of communication, etc. *(see Table 8).* This "participatory theater" as a research tool studies narratives of identity and group behavior. Moreover, it structures and illustrates social experiences and actions. Consequently, self reflexivity arises because of the double role of being inside and simultaneously outside a role. Within groups of three persons, they had to stage a communication problem and its solution. Self-reflection resulted from the players' double role as being actors and observers at the same time (STAHLKE 2001). In the context of Action Research, role-playing games are used to observe identity constructions, power structures of social groups and collective behavior. It also serves to illustrate ways of actions and experiences. Within our project, we put the participants of each sample into small groups of three persons and asked them to perform a communication problem and its solution according to certain topics which were related to our research issues *(Table 8).* In this case, we used role playing games to generate communication scenarios and use cases.

During the workshop, ***different observations*** (ERLHOFF/MARSHALL 2008; FLICK 1995; SCHNELL/HILL/ESSER 2005) with regard to statements, the general atmosphere, group dynamic and behavior were made. One researcher and two designers observed

RESEARCH ISSUES	SUB-THEMES FOR ROLE-PLAYING GAMES
Micro-Communication	» Making an appointment » Dispute & conciliation » Organizing / planning » Spreading happiness
Privacy and Data Control	» Secrets / insiders / personal codes » Safety, security
Non-Communication and Time-out	» Rest areas in public spaces » Time-out » Non-availability, strategies of avoidance

Table 8: *Relations between Research Issues and Themes for Role Playing Games*

in a non-participating way. One further researcher observed – disguised as a test person – in a hidden participating way, while another observed and participated visibly in the workshop. The prototype presentation and also the role-playing games were recorded with a video camera for later analysis.

We also distributed ***questionnaires*** during the workshop which asked the participants about the impact of ICT on their private and professional life, about their usage habits for mobile phones and Web 2.0 services, about strategies they use to avoid communication, about their sensitivity referring to the online distribution of personal data and about their gender identity within virtual spaces. Finally, they were asked to describe their desires and visions of future communication.

The workshop ended with a ***focus group discussion*** where popular ideas and concepts – materialized in several prototypes – were discussed with regard to their individual and social consequences in case of their realization. Finally, the participants evaluated the whole research session through a questionnaire which was a basis for methodological and organizational optimization.

3.1.4.3 Evaluation Method and Process

The Cultural Probes, observation minutes and the prototypes of the participants were evaluated and interpreted in a written form. Based on the Cultural Probes a synopsis was firstly generated for every participant. Subsequently the individual evaluations were summarized into one analysis containing the most important characteristics for the whole age group. Moreover, we set up an individual and anonymous profile for each participant. These personal profiles included information about the relevant features of the participant's prototype as well as demographic characteristics. In the end it was therefore possible to devise a very precise picture of each participant group.

3.1.4.4 Analytical Visualizations – A Design Related Way of Analysis and Interpretation

Additional to a social scientific, market focused and practical design analysis of the research responses, we established a third way of analysis and documentation. Referring to EDWARD TUFTE'S reflections about and examples of information design (1990, 1997, 2001, 2007) and inspired by the information graphics of B & C (2008, 2009), we established a more design related way of analysis which we called "analytical visualizations". On the one hand, we aimed at preserving the individual, visual quality of the research responses in order to avoid bias which might be caused by a media change, e.g. textual interpretations. For this reason, we tried to work with the original quality of the research findings as much as possible. On the other hand, we interpreted the research findings from a more design specific point of view to consider design relevant criteria.

The analytical visualizations revealed differences, particularities and similarities between participants' preferences at one glance. Consequently, the research responses became easily comparable on a visual level. Within our project G, we could easily compare the different age groups with regard to several aspects like industrial design preferences, functional demands, personal values and desires. In this respect, they could be regarded as visual archives which generate new insights that would not have been discovered by textual descriptions, though some of them were generated on the basis of textual interpretations. But nevertheless, the visualizations are not illustrations of the social scientific interpretations. They have to be regarded as an independent way of analysis. Consequently, they sometimes reveal different or even contradictory phenomena. For this reason, we consciously refused a mutual unification of both ways of interpretation. Moreover, we regard them as different point of views which desirably stimulated an interdisciplinary discussion about the research results within the team.

Basically, the analytical visualizations can be regarded as experiments to deal with research results in an alternative way. It has to be evaluated to what extent they provide information and

inspiration for design within comparable settings. We can already confirm that designers are very familiar in dealing with this kind of visual language. In our project, they could quickly decode and read the results represented in this way. We will see if we establish this format as a kind of standard to transfer multisensory research results into design practice.

In the following *(Fig. 9–13)*, we present and explain three examples which use different ways for visualizing participants' research results.

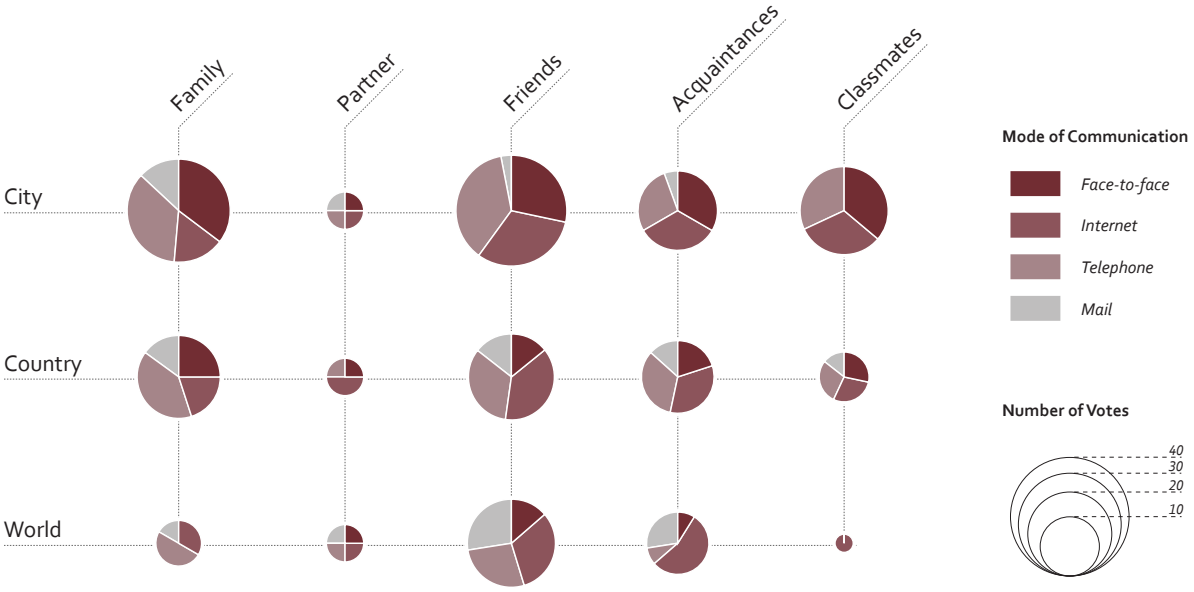


Fig. 9: *Communication Group 1 (Female, 14 to 18 years)*

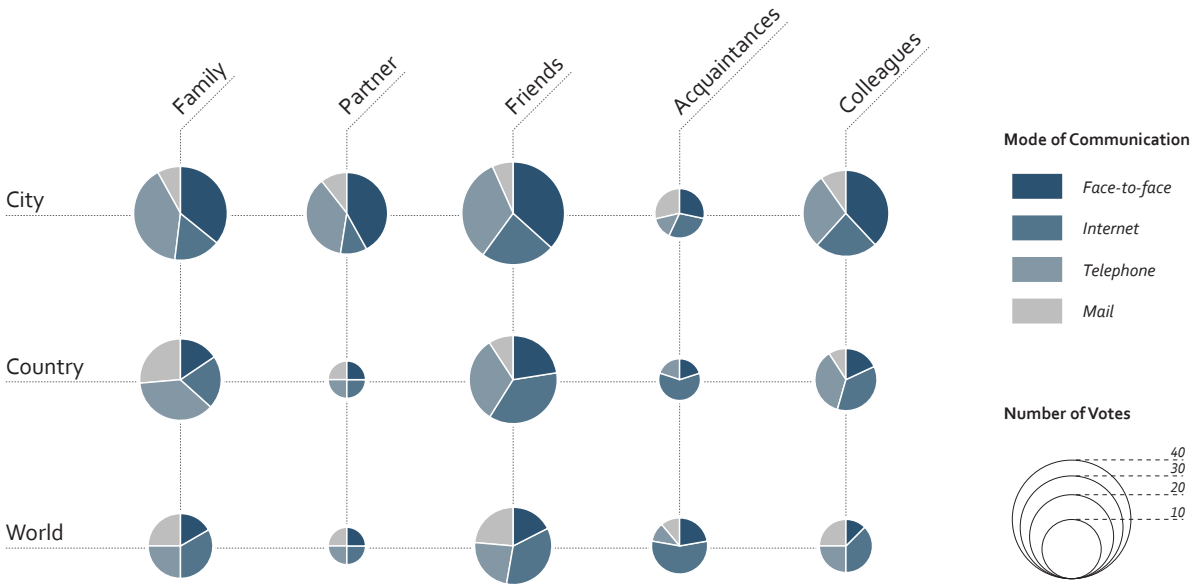


Fig. 10: *Communication Group 2 (Female, 19 to 28 years)*

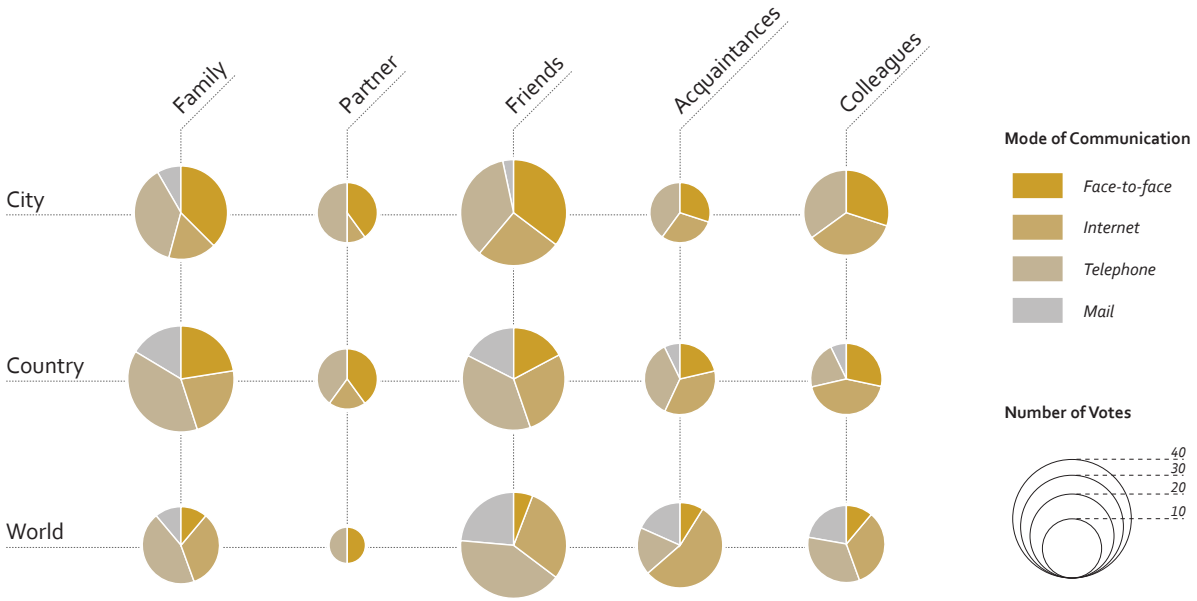


Fig. 11: *Communication Group 3 (Female, 29 to 45 years)*

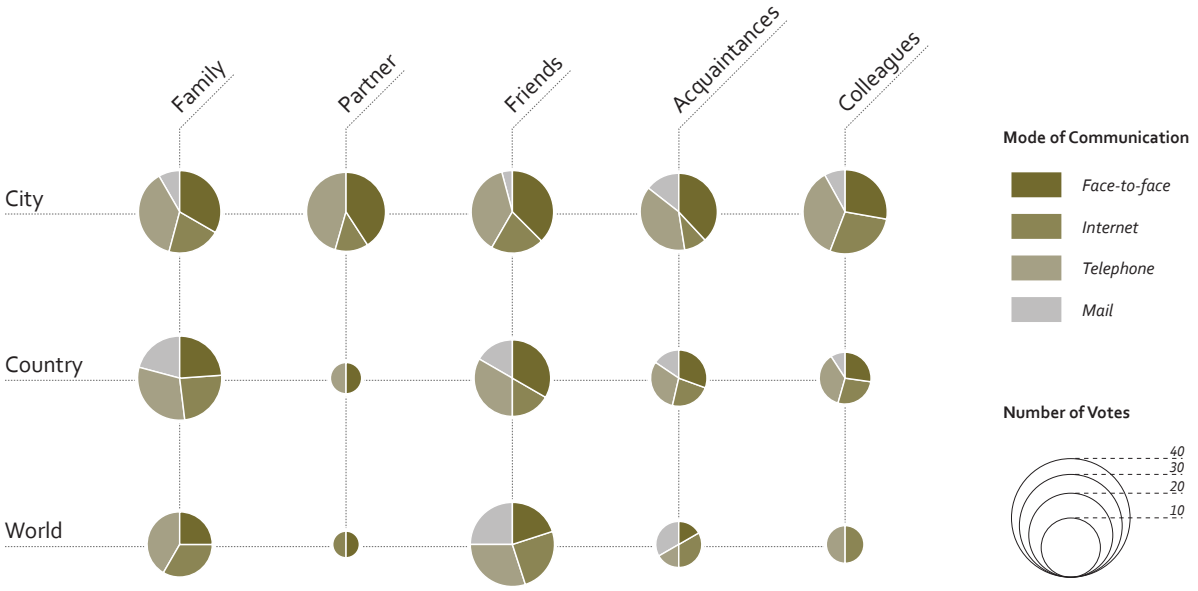


Fig. 12: *Communication Group 4 (Female, 50 to 65 years)*

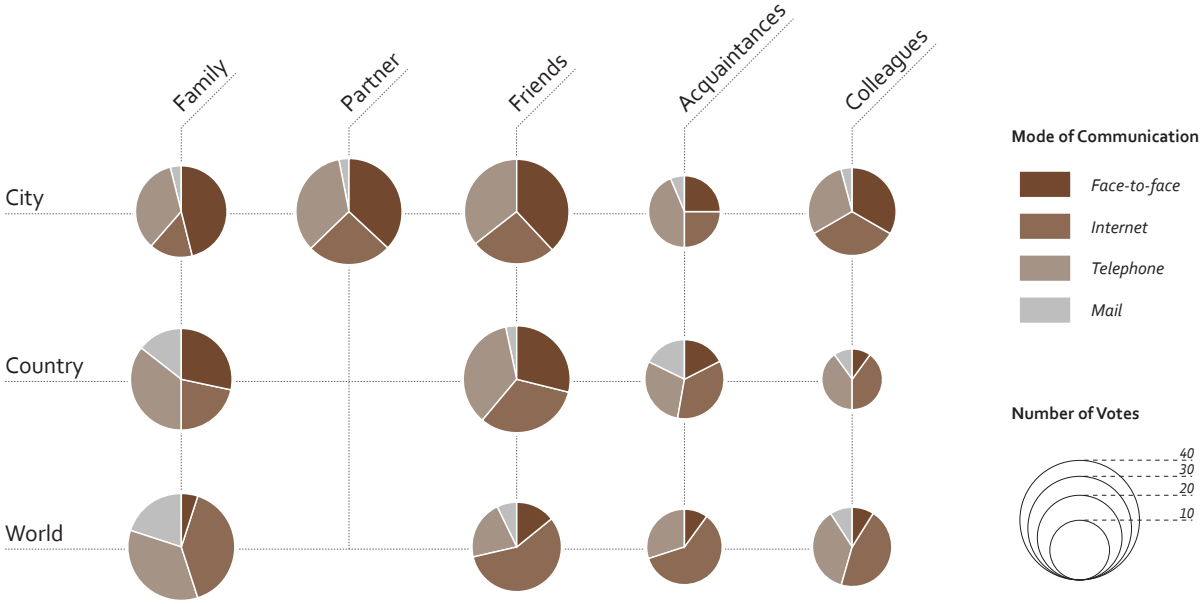


Fig. 13: *Communication Group 5 (Male, 14 to 65 years)*

3.1.4.4.2 Overview of Symbolic Prototypes

The symbolic prototypes result from the ideation workshops where the participants materialized their future communication desires and visions. The prototypes were voluntarily named by the participants. Consequently some of them have no title. These groupwise overviews *(Fig. 14–18)* are less interpretative and analytical then the preliminary visualizations. However, they are ordered in a certain way. The prototypes of a group are allocated according to their level of abstraction: From the top left-hand corner down to the right, they are arranged from more object related to more symbolic or metaphorical concept ideas. These prototypes offer much more options for design related visualizations e.g. according to formal-aesthetic criteria like shape, size, color, texture, etc. which we have not done yet.

Blueberry Glam

Gold Flower-Power

no title

Freaky

Fabulous

P10

Libron

Walk-and-Change Phone

Der Alleskönner

Eye Cube 10

Pillow Phone

ICU

Fig. 14: *Symbolic Prototypes, Group 1 (Female, 14–18 years)*

Woody

Handsome

Lieblingsstück

Viviennes stylische Wunderbrille

Life Manager

Vaeska

Julyversal

D 2803

Mein Sandmännchen

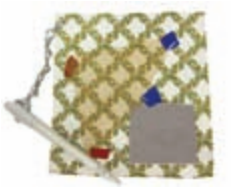
Fototyp

Techic

All in One

Dimi

Fig. 15: *Symbolic Prototypes, Group 2 (Female, 19–28 years)*



Cyber-Papyrus

Alfa – Arbeits-, Lebens- und Freizeitsautomat

Individual Communicator

Modulator

Kommunikationsuhr

MuFuBa – Multifunktionsband

Buddy

Kommunikationstörtchen

The Invisible Allrounder

Grün

no title

Multi-Ball

Light and Easy

Cyber Helmet

Fig. 16: *Symbolic Prototypes, Group 3 (Female, 29–45 years)*

Dandy

Jardo

Multitalent

Fully

Bernolin

One in All – El Mundo

BID – Bin immer da

Pinky

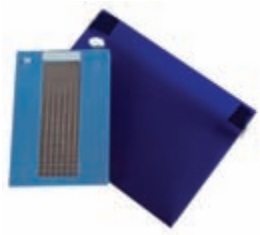
Goody

Multimaxima

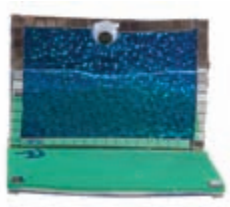
Flexi Maxi

Fig. 17: *Symbolic Prototypes, Group 4 (Female, 50–65 years)*

Lucky



Yanic



Buggi

PeLiMan – Personal Life Manager

Universal Tool 5000

Solo 14

Ultracom 600 SE

Rudi

James, mein persönliches Butler

The Cyborg

Zauberbrille

#2

PZ1

Projekt EVA

Futuregame 0915 (FG)

Ahora („jetzt")

Fig. 18: *Symbolic Prototypes, Group 5 (Male, 14–65 years)*

3.1.4.4.3 The Frequency of Key Terms from Concept Descriptions of Symbolic Prototypes

The participants did not only create prototypes, they also described them. We identified key terms within the concept decriptions of each group and visualized them in form of tag clouds *(Fig. 19–23).* The size of a term corresponds to its frequency of use within the concept descriptions of a test group. We suppose that the frequency of a term could indicate its importance or relevance with regard to desired functions, behaviour or properties of future ICT products and services.

* The dominace of the term "handy" within the concept descriptions of the first group resulted from the way the moderator guided the first ideation workshop. In this case, she focused on mobile communication. In the following workshops, she subsituted this focus in favor for a general view on future communication and information desires.

Fig. 19: *The Frequency of Key Terms from Concept Descriptions of Symbolic Prototypes Group 1 (14–18 age bracket)**

Fig. 20: *The Frequency of Key Terms from Concept Descriptions of Symbolic Prototypes Group 2 (19–28 age bracket)*

Fig. 21: *The Frequency of Key Terms from Concept Descriptions of Symbolic Prototypes Group 3 (29–45 age bracket)*

Fig. 22: *The Frequency of Key Terms from Concept Descriptions of Symbolic Prototypes Group 4 (50–65 age bracket)*

Fig. 23: *The Frequency of Key Terms from Concept Descriptions of Symbolic Prototypes Group 5 (Male participants)*

3.2 Design Process

In the following, we describe our research-led participatory design process *(Fig. 24)*, which we set up to extend the direct involvement of the participants into the creation, review and testing of solutions.

3.2.1 Ideation

During the ideation process we applied a wide range of proceedings and methods which allowed us to dive deeply and quickly into the first insights of an age group, to sketch ideas, and to evaluate and merge them with refined and innovative concepts and prototypes. Such a process does not always follow a given order: new methods come in and some steps may even be taken recursively within the ideation process. In the project G, developed concepts for instance were re-evaluated and extended for other age groups. Ongoing reviews of external research and interviews continuously fed in. Participatory protoyping methods helped to divert from tracks that might be easy short cuts, but did not always lead to good solutions.

The range of steps described below is therefore exemplary but not necessarily a strict framework for the development of innovative concepts.

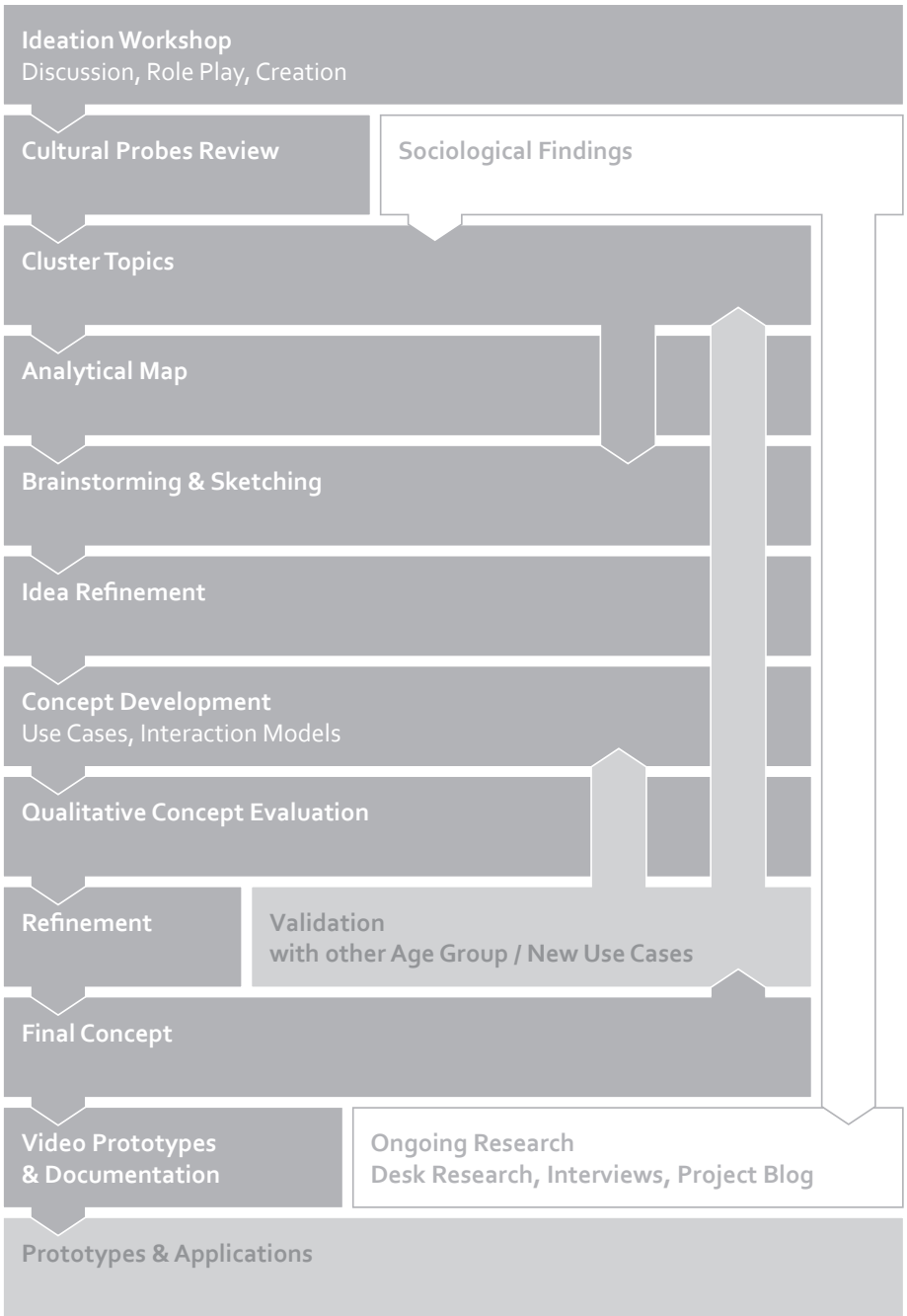


Fig. 24: *Ideation Process*

3.2.1.1 Participating in Ideation Workshops

We took part in all ideation workshops. As the participants worked in groups as well as individually, we had the chance to get to know their personal concerns, unconscious needs and peculiarities, as well as the disposition of the whole age group. This experience helped us later on in the process to distill concrete personas, their needs and potential uses of our concepts.

3.2.1.2 Reviewing Cultural Probes

The returns of the Cultural Probes refined our impressions from the workshops and provided us with more details of everyday behaviors, wishes and problems. The elaborateness of the processed probes varied strongly: some women had used the probes like personal diaries, while others made only very short notes.

It was helpful to have a steady group of reviewers who would already be familiar with the probes of previous groups, as this made it easier to identify and discuss similarities or surprising findings and compare different interpretations.

3.2.1.3 Clustering and Identifying Topics

The insights and quotes that we gained from the Cultural Probes and workshops provide a rich basis to identify main topics for each age group, such as organization, security, tech dreams, fears, personal strategies, etc.

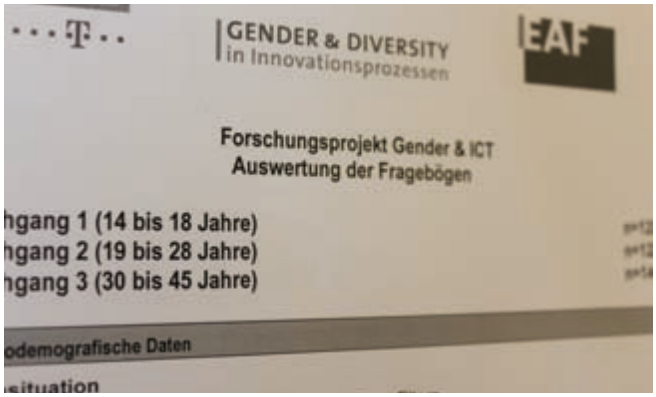
The findings were also sorted according to our main research issues (micro-communication, privacy and data control, non-communication and time-out; *see Chapter 3.1.3)*. Through this process, initial ideas emerged at this early stage and the step to brainstorming became very fluent.

3.2.1.4 Desk Research, Interviews and Project Blog

During the whole process, we collected online and printed information like scientific research reports, surveys, popular articles, etc. about current technological or product innovations or gender topics like shopping criteria and behavior, product preferences, etc. This helped us to position our own findings within a larger context of observations and presumptions.

Documenting these findings on the project blog helped to inform research partners and to initiate a public discussion. Furthermore, we had interviews with women from all over the world who had different technical backgrounds and expertise to gain more specific and personal insights.

For more information, take a look at our project homepage http://www.gender-inspired-technology.com/ .



3.2.1.5 Analytical Maps

Based on the compiled research, we gained an image of each age group with its most apparent social and behavioral characteristics. These findings were summarized in form of graphical visualizations – a method that did not give a complete picture, but helped to overview central aspects and relationships among them in order to evaluate ideas later on. They also made it easy to communicate and discuss the findings with peer researchers and to see whether they had congruent impressions and interpretations.

3.2.1.6 Comparison of Findings

Working with the EAF as an expert for social scientific and market research, we had the great benefit of consulting their analyses and comparing their interpretations with our findings. This was a very crucial process which contributed to a refinement of the picture we gained, and sometimes it enforced assumptions or highlighted aspects that seemed to be less important at a first glance.

For example, we had the impression that the female participants aged between 50–65 years regarded their mobile phones as less important than the other age groups. However, the survey by EAF revealed how much this was true: more than half of the group would not consider going back home to fetch the phone they had forgotten, not to mention the significant number of women who wouldn't even switch on their phones at all or leave it at home on purpose.

3.2.1.7 Brainstorming and Sketching

With all the insights that we gained from the Cultural Probes, workshops and sociological analyses, we set up a space for brainstorming in a small group of designers. It proved to be fruitful to go to an off-site environment immediately after the Cultural Probes review, play with different methods of creativity techniques, elaborate on first ideas and sketch out possible scenarios. For these brainstorming sessions we regularly invited an expert to divert the process from the beaten tracks.

Every seed of an idea was sketched on cards and integrated in use cases where possible. This way allowed us to easily pick up initial ideas and to return to them again many weeks later. They could also be used for brainstorming on ideas with participants from different age groups.

3.2.1.8 Transfer Across Age Groups

When the first concepts were developed, it was important to check them with the needs and living conditions of other age groups. This was helpful to identify if concepts would be particularly tailored to a certain age or also worked for other age groups. Most of the concepts were adaptable to different contexts, sometimes through extensions of the original idea.

3.2.2 Refinement and Results

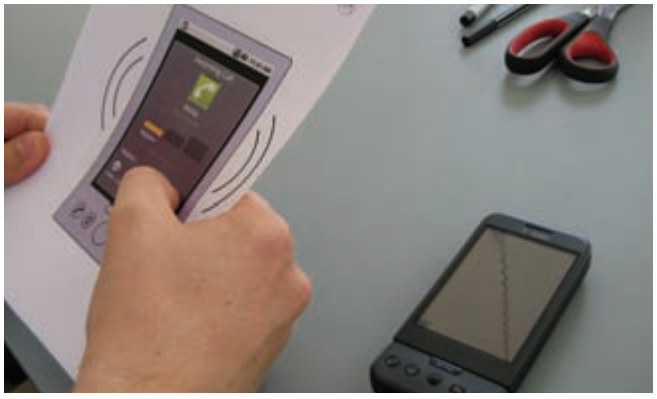
Due to the large amount of insights that we gained from the extensive background research, it was important to choose a clear form of depiction. For communicating the concepts we therefore used a range of intertwining methods as final forms of presentation.

3.2.2.1 Video Prototypes

Video prototyping is a common and approved method when it comes to demonstrating and evaluating concepts of interaction in a short and enjoyable way. It is an effective medium to communicate a problem, show relevant situations and the flow of interaction.

There are different levels of video prototypes. While most of them sketch a concept in its essence, more elaborate forms can reach the quality of short films with actors, music, animation, etc. in order to communicate the cases of use for a complete understanding.

We chose women as actors who participated in the self-observation phase and the ideation workshop. From our perspective, this made the production of the video prototypes very effective, authentic and rewarding. They were familiar with the research issues and sensitized to their own behavior, desires and daily situations, and consequently we expected them not only to act out scenarios and interactions far more naturally, but even to give input on how a scene should be demonstrated. This was particularly important in younger age groups, as the concepts were very much based on moods and feelings. The more abstract a concept, the more important it was to involve people who "live" the idea.



3.2.2.2 Paper & Mock-Up Prototypes

Sketching out concepts in a tangible way transfers ideas from imagination to the table. This can be in the form of simple cardboard mockups, role plays, spatial arrangements or paper prototypes of screen designs. This allows for interacting directly with a product concept, where test users can react spontaneously and show unconscious behavior. It also triggers unexpected insights, which reveal new aspects and improvements that remained hidden before. Transforming a concept into tangible objects requires clear decisions (e.g. on form factors and interaction flows) which contribute to further clarification and refinements.

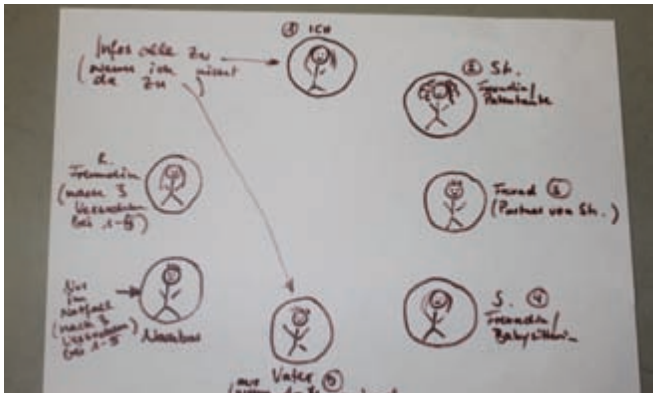
Through this method we were testing for example how people would preferably connect their phones: what gestures, what kind of feedback they prefer, in which situations, and so on.

3.2.2.3 Physical & Software Prototyping

Beyond the outcomes of a traditional research project – such as scientific publications and presentations – the "G – gender inspired technology" project went a step further and transferred two selected scenarios into a real working prototype.

Based on the user insights gathered within the participatory design research process a number of concrete concepts for future (software) services were developed during the the ideation phase. Those concepts have been sketched mainly by using video prototypes and initially evaluated with a small user group afterwards. Two of the most compelling concepts – named "Tactful Calling" and "Shake&Share" – were selected for further development towards an App. Thus, in a parallel activity a team of designers and developers began to realize the concepts. The development started with a high-level specifications using wire frames, continued with a visual design and a feasibility check, and developed the software code by using "Android" – an open operating system designed for mobile devices. Finally, both Apps will undergo a fine-grained user testing.

By performing this user-inspired and design-led development process, we did not only prove the concept from a technology point of view, but also added additional feedback loops with known and unknown users who participated in the research process or were invited without any preliminary briefing.



3.2.2.4 Participatory Concept Evaluation

For receiving initial feedback on new concepts, we invited a mixed group of reviewers: "novices" who were not involved in the G research and design phases and who were therefore less reflected in their daily communication experiences, as well as women who took part in the whole participatory design research process consisting of the self-observation phase and the ideation workshop.

The first phase sensitized their perception for communication behaviors, social relationships, their wishes and worries, and thus made them ideal candidates for a test group in an early stage of concept development. They are more aware and more critical of exemplary use cases and potential solutions.

Through their participation in the ideation workshop, the "experienced" reviewers were also familiar with different levels of abstraction, thus not sticking to preconceptions of what is technically feasible, but focusing on the potential use of a concept with its benefits or drawbacks. This enabled fruitful discussions not only between facilitators and reviewers, but also among the participants themselves.

3.2.3 Executive Booklets

We documented the core aspects of the design solutions and all related information in form of booklets which include the current problems, insights from participants, description of the concept with use cases, user feedback from each age group, technical requirements, related work and potentials. Extracts of the concept documentation are shown in *Chapter 5*.

4. Research Results

4.1 Results Differentiated According to Age Group

In this chapter we display the needs and demands of the different female samples with regard to our three main areas of research: "micro-communication", "privacy and data control" as well as "non-communication and time-out". For this purpose we begin with the distinction of each age-group. Subsequently, we elaborate significant similarities and differences between the different groups.

In addition to our three main areas of research we aimed through our qualitative and user-centered research approach for wishes and demands of the women which we initially did not explicitly take into account. These unexpected impulses of the women are also analyzed in this chapter. Finally, we illuminate tangible suggestions from the ideation workshops attached and in note form.

4.1.1 General Information About the Different Age Groups

4.1.1.1 First Group (14–18 years)

The women aged from 14 to 18 predominantly live at home with their parents. Sometimes they already have a boyfriend; sometimes they do not. One part of the sample is still going to school; the other part is already in training.

In this phase of life the young women are especially dealing with their identity; in particular they are busily engaged with finding their personality and their part among the adults. Moreover, they (carefully and doubtfully) try to define their part and identity. They experiment with their different characters in various areas of life.

ICT plays a decisive role in all these areas of life. On the one hand, the young women use ICT for direct communication via e-mail, in their various communities, blogs and so on. On the other hand, ICT is relevant for information and advice seeking. ICT becomes an important medium while the young women learn and test their own roles in school, family and their circle of friends. In this respect ICT has a socializing function.

Particularly with regard to this group, community and chumminess are much more created through ICT than in all the other groups. The principal function of a computer, mobile device or the internet is communication with others and the management of different relationships. It is very much important to be available via mobile or internet. In this respect, the young women do not differentiate between their own availability and the availability of their community: it is imperative for everyone to be available. For their self-esteem it is fundamental to communicate via ICT. Therefore, this group is observed to be very addicted to ICT. Furthermore, the first group is very much disturbed and stressed by electronic communication. They are even threatened by its absence and this fact makes them often feel lonely or not enough socially involved.

4.1.1.2 Second Group (19–28 years)

The social network of the second group is more widespread than in the first group: it is not only concentrated in the city where the young women are living. In detail, the second group has many more contacts and relationships nationwide and worldwide. In comparison with the first group, communication with others more often goes beyond the sake of communication ("just called to say hello").

The young women aged 19 to 28 do – to a greater extent – have their life under control. They act self-confidently with the requirements of job and private life. They are less disturbed and stressed by electronic communication. In addition they are much more able to separate from ICT, although they use electronic devices more often than the first group.

The assigned priorities are relocated in comparison to the first group. The requirements in training and everyday life are becoming more and more important. The women in this phase of life

wish for more practical, fast and mobile ICT support. Thereby they attach great importance to assistance in their leisure time (e.g. during shopping or their hobbies). The job-related context is far less important. The management of communication and contacts is still more essential than in the older groups. However, it does not have the outshining importance of the first group.

4.1.1.3 Third Group (29–45 years)

In this phase of life most of the women make their career and start a family. It is the so-called "rush-hour of life".

It is remarkable in this group that each day is meticulously scheduled. Most of the women report that they have to fulfill an abundance of duties and responsibilities during the day. In this regard the stress tolerance of the women is very notable and also their self-conception about child care and housekeeping: they are often solely responsible for child care and housekeeping in addition to their job. Infrequently and rarely are they supported by their husbands or partners. Unfortunately, this is not critically reflected. Quite the contrary: it is accepted as a matter of course. Hence, it is not surprising that especially the women in the rush-hour of life wish that ICT provides support, more synergies and in particular more economy of time.

In this context ICT should also incorporate family duties, housekeeping and leisure time and make life easier all in all. It is notable for this group that wishes, desires and demand with regard to ICT stretch out over child education, family and housekeeping. Moreover, the women coordinate the appointments of their partners and children in addition to their own duties and responsibilities.

4.1.1.4 Fourth Group (50–65 years)

Similar to the first and second group, the personal circumstances of the third and fourth group are analogous. The percentage of women between 50 and 65 who are under time pressure is increasing in comparison to the third group. Occupational responsibility and higher positions are the cause for such a development, as they often require more presence and time. In addition, their children still live in the same household and/or the women are responsible for the home care of elderly family members or even partners.

Approximately one third of the test persons in the fourth group are already retired. They enjoy more spare time as they do not have any occupational responsibilities and/or their children stand on their own feet.

Due to the fact that a lot of the women did not grow up with ICT and dont need to use it in the business, the elderly women between 60 and 65 are not used to modern internet and communication technologies; an affinity to mobiles is not strongly distinctive. Nevertheless the women of fourth group regularly communicate via mobile and/or the conventional telephone network. Moreover, they correspond via e-mail, surf the internet and use various internet services (e.g. Skype). However, they only use a few internet services and the management of the technical details is incumbent on their husbands, partners or children. Discussion forums, blogs, games or internet pages for the exchange of photos and videos as well as social communities on the internet are hardly ever used. Hence a generational change is apparent.

4.1.2 Needs and Expectations

4.1.2.1 Micro-Communication

We defined "micro-communication" as a frequent exchange of short messages or as quick, but numerous communications with friends or family members. The main purpose among the younger women is not exchanging information, but staying in touch with one's peer group. This form of communication is particularly popular among the first two groups (14–28 years). Micro-communication plays a decisive role in their circle of friends. The communication of the teenagers and younger women goes beyond the sake of communication ("just called to say hello").

Parents and their children often exchange short, frequent and informal information: the children as well as the mothers report parental controlling calls or instructions (e.g. shopping lists). In this context, it is obvious that ICT offers various utilization options for the young women on the one hand. In particular, ICT amplifies "the window to world" for the teenagers as they enjoy the higher flexibility based on ICT. On the other hand, our research provides an indication that especially parents try to enhance their control density through ICT (e.g. controlling calls).

Moreover, it became apparent that ICT and micro-communication altered the organization of their daily routine. We found out that both the first and the second group often arrange lax appointments: date is focused; time and place are not further concretized. Binding agreements are often fixed last minute via text message or e-mail. Consequently, you need to stay in permanent contact to your social network. Hence stress and frustration is omnipresent. Therefore, it is difficult for younger people to participate in social life if they do not own access to ICT. They are hardly available for short-term rearrangements.

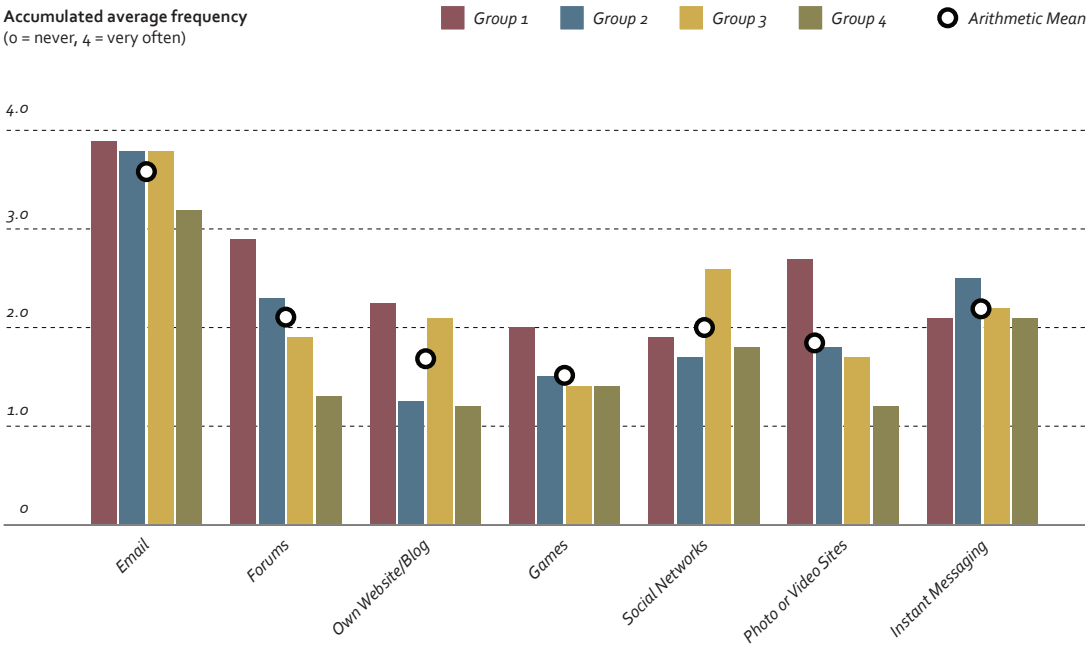


Fig. 25: *Internet Usage: How often do you use the following functions and services on the Internet?*

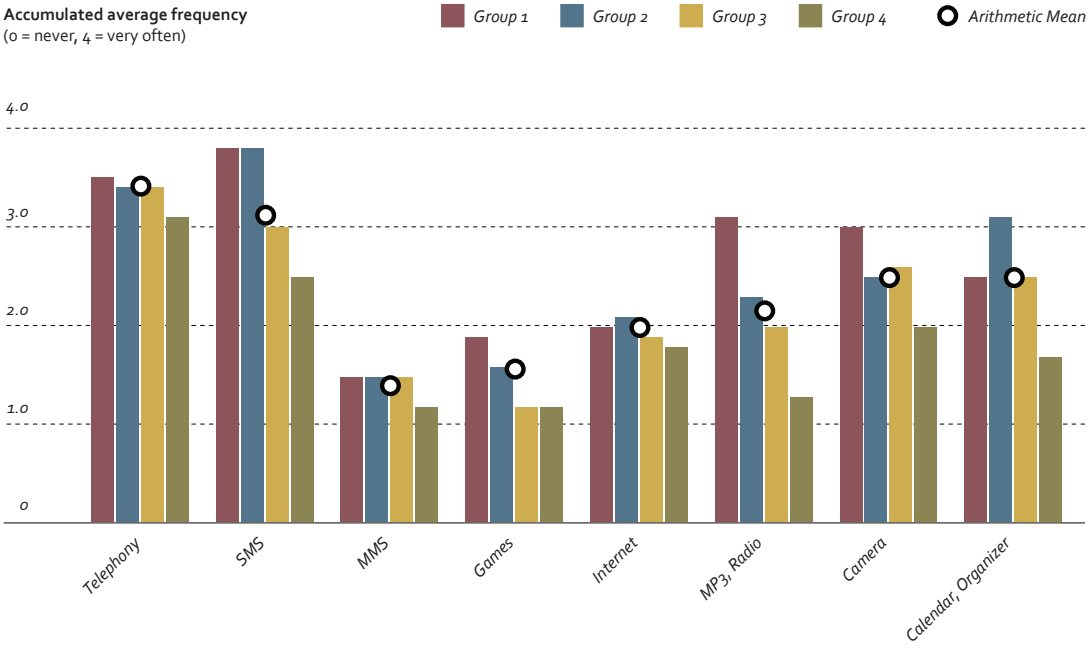


Fig. 26: *Mobile Phone Usage: How often do you use the following functions and services on your mobile phone?*

Women in the rush-hour of life (30–45 years) use micro-communication in order to coordinate their professional and private life. Primarily they practice it with their partner and children.

In general micro-communication reassures every generation of their social network and it breeds even more mobility, flexibility and individualization. Especially the teenagers and the younger women ask for services and software which enlarge flexible, frequent and mobile micro-communication via new channels. For the elderly women (50–65 years) micro-communication rather plays an underpart. In this context a generational change is apparent.

4.1.2.2 Privacy and Data Control

ICT influences and partly dominates daily routines as it is omnipresent in public and private life. This does not mean that technical innovations and possibilities provide only benefits and improvements. Every test person realized that the information and data are recorded electronically. Hence, data abuse might be possible. The users are looking for strategies to control and administrate data in public and private life as they fear that other persons could hand personal information (e.g. photos) on to others without permission.

Therefore, all women stated that they act very cautiously with their personal data. The Cultural Probes convey somehow another picture: the majority of the women from the first and second group implicitly allow personal data to be circulated without critical reflection. Their awareness of the threatening danger through data abuse is somewhat distinctive. In addition, a conflict of aims – especially for the first three groups – becomes evident: on the one hand, women want a felicitous and meaningful personal profile with detailed information about their personal life and/or professional career on the internet. On the other hand, this procedure is only conditionally compatible with privacy protection.

The awareness of privacy protection as well as protection against data abuse and the circulation or sale of data to unauthorized third parties increases with the age of the women. The participants of the third and fourth group feel that their privacy is more often invaded both in public and private space. Consequently, they want to exercise more control over how their information and data are used. These women explicitly accentuate the need for protection of (their own) electronic communication devices.

Furthermore, the senior test persons in our study reported on so-called "unwritten communication rules". These rules are seldom directly articulated, but non-observance leads to decreasing sympathy for the other person.

The most important unwritten "ICT guidelines" are the following:

- Telephone calls with a withheld caller ID are disrespectful and bothersome.
- Iterative calls at frequent intervals although there is no emergency are annoying. Often the women are not in the mood or even do not have time to pick up the telephone. Consequently, they intentionally refuse to answer the telephone call.
- The women report that they have fixed rituals at a certain time of the day (breakfast, lunch(time), dinner, after 10 pm, ...). Telephone calls during the rituals are extraordinary annoying.

Moreover the women feel bothered by:

- jingly telephones during a personal conversation
- vociferous dialogues of other people in public space (e.g. in the subway),
- the use of a mobile at improper places (cinema, library, etc.),
- talking to someone on the phone as a road user, and
- unrequested telemarketing and opinion polls.

In particular, the 19 to 45 year old women wish to control and canalize such inconvenient communication with the help of new or improved services. Women with children ask for ICT solutions which help to protect their children from data abuse on the internet.

The women tell that they often send e-mails and text messages too fast and thoughtlessly. Afterward, they regret the content or mistakes, especially in a professional context (rather the third and fourth groups). Love declarations and imprudent defamations are in particular embarrassing for the teenagers and young women (first and second groups). On the basis of such experiences the women articulate the need for services which make eliminations possible after sending.

Video surveillance and security at public places, for example, have a main priority for the women. Therefore, they accept such an invasion of their privacy through surveillance for their own safety. Only one third of the test persons in the third and fourth group critically scrutinize the public monitoring. However, they accept the invasive act in order to feel safer.

4.1.2.3 Non-Communication and Time-Out

The first group is very much disturbed and stressed by electronic communication. In comparison to the other groups they report the most stress based on the use of ICT. They suffer from

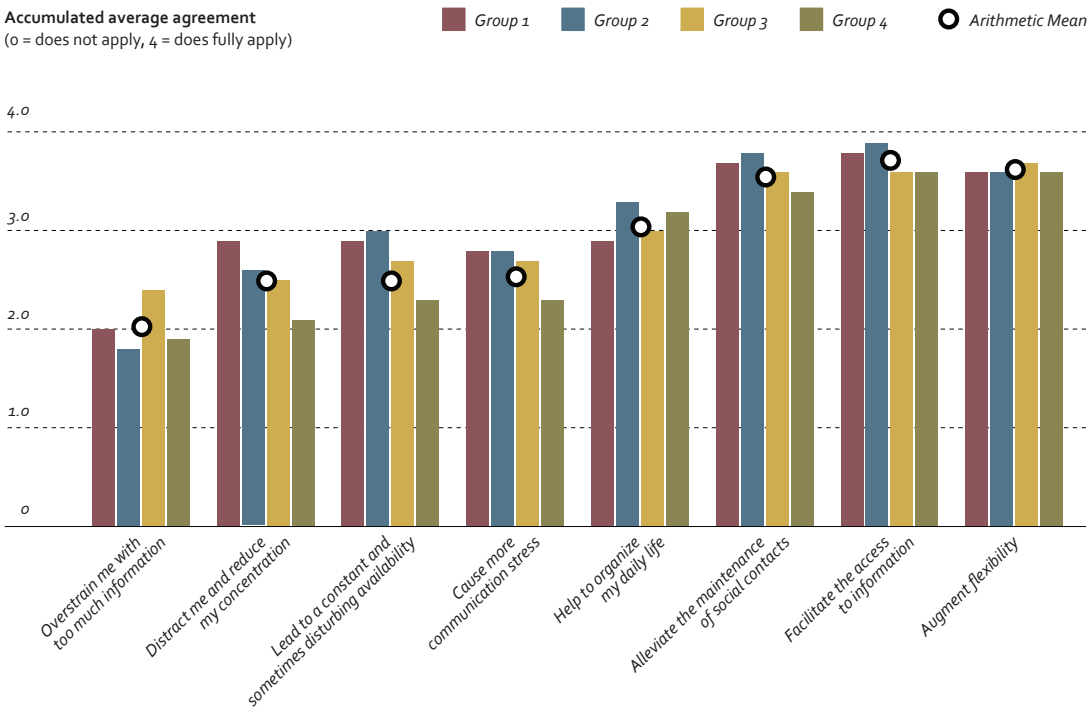


Fig. 27: *Everyday-Life Usefulness of ICT Information and Communication Technologies*

a feeling of obligatory availability, decreasing concentration and an overwhelming amount of communication. This is particularly astonishing regarding the fact that the older groups, especially in professional contexts, use ICT more frequently than the younger ones.

Further research should thus be dedicated to the question to what extent a large amount of communication, an ample social network and the attitude of being "stressed" by ICT has become a status symbol for young people.

Availability via mobile is important for young women's personal self-esteem. This is also reflected in the expectation the women have towards other people. Within circles of friends, a mutual expectation of constant availability can be observed. Thus, the first group is more addicted to ICT than the other groups. On the contrary, they are also more overcharged and disturbed by ICT than the other groups. The crucial role of ICT in building and sustaining social contacts implicates furthermore that young people who don't own a mobile and/or personal computer might be socially excluded.

Some of these results are similar between the first and the second group; as well as the teenagers, young women (19–28 years) emphasize the importance of availability and experience the related ambivalence. On the one hand, they try to be nearly constantly available and appreciate being frequently contacted via ICT. On the other hand, abundant communication causes stress and interferences.

It is not easy for the young women (14–28 years) to withdraw from ICT. The "communication diet" has been particularly difficult for these two groups. One half to one third of them could not stand the diet. Otherwise they are, as illustrated above, stressed out by unrequested calls, interruptions, etc. This fact thus shows ambivalence in the use of ICT. Many of the participants, in particular the younger test persons, became much more aware of the importance that ICT has in managing their everyday life and their social contacts through their two weeks of self-observation with the cultural probes. Before they did not realize that they were that much interfered with by ICT.

Overall, an intergenerational learning process seems to arise. The older the women are, the more they reject being constantly available and create personal relaxing spaces/times that are defended confidently against any disturbances. Nevertheless, many older women would like ICT solutions that improve opportunities for non-communication and time-out.

Women who use ICT mainly for professional purposes tend to avoid it privately and resort consciously to alternative communication forms.

Only mothers with underage children and women who tend to relatives voluntarily ensure constant availability, due to the lack of differentiated services. Hence, mothers and women with care taking responsibility wish to be available ONLY for the respective group of people. Therefore, they wish that ICT could provide easily manageable filter-functions. Furthermore, many participants between 30 and 65 years would like have communication devices that are able to separate several parts of life by using different interfaces, phone numbers, etc. This would substitute the necessity for the use of one private and one professional mobile.

We also directly asked about means and strategies for relaxing. Surprisingly, young women did mention entertainment technologies, but no further ICT as means for relaxation. All participants were asked to fill out a "relaxation box" during self-observation. Within the two older groups we found indications for relaxation with ICT in the form of unstressed telephone conversations or chats. In general, people rather associate consumption, entertainment technologies, wellness, sports – and particularly in the fourth group also baking and cooking – with recreation. Especially mothers complain about the high significance that young children already attach to ICT. They are annoyed by industrial advertisements that – in their perception – aim too aggressively at this audience.

The older the participants are, the less they express feelings of stress. Women occasionally practice mobile diets on their own, etc. The project-related diet has rarely been interrupted within the older groups. Their everyday life proceeds much more planned in comparison to the younger women. In addition, purposive strategies are used to relax during the day.

4.1.3 Further Wishes referring to ICT-Services

4.1.3.1 Supporting the Management of Professional and Private Contacts

In all four groups various ideas and helpful suggestions concerning the management of private, familial and professional communication were developed in order to improve personal relationships. In this context the women wish to establish or forge close links with others via ICT both in a professional and private context. In particular, this issue was given a top priority by the young women (14–28 years), whereas the other two groups attached decreased importance (second or third priority) to this topic. In addition to the difference between the four groups, various intergenerational similarities could be identified. An intergenerational issue was the necessity to transmit fast, flexible and above all authentic emotions via ICT within their family and circle of friends. In this context the women named a real hug or a protection shield against bad moods or stress. Moreover, the women want to express their emotions through a changing color or temperature of the mobile of their counterpart.

The most important ideas in a nutshell:

The communication device...

- » retains characteristics and displays this information when the person is calling.
- » automatically transmits specific messages for family members or friends (weekly, monthly), e. g. congratulations.<
- » is a so-called "handsome": You share a "handsome" with another person (everybody gets a part). In this way emotions like "thinking of you" could be easily transmitted.
- » has a button for direct outward dialing to their children or partner (like a walkie-talkie with an inbuilt camera).
- » makes an arrangement of dates with friends through a common calendar; in such a common calendar with a release for a specific circle of acquaintances you see what responsibilities the others (already) have.
- » enables a more flexible configuration and management of contacts: e.g. blocking and clearing of certain groups at a specified time (no professional contacts after 8 pm, etc.).
- » automatically transmits excuses or apologies if the person is not able (or willing) to conduct a conversation.
- » eliminates communication mistakes, e.g. belated erasure of text messages, photos, e-mails, etc.

4.1.3.2 Supporting the Organization of the Daily Routine (Professional and Private Context)

In particular, women who are heavily involved in their career and/or family articulate the need for services and communication devices which support the organization of their everyday life both in private and professional contexts. The other women also developed ideas with reference to this context.

The majority of the test persons in the second, third and fourth groups wished for an intelligent and mobile communication device. They are somehow looking for a virtual assistant with the ability to process information automatically, to answer questions or to provide information.

The most important ideas in a nutshell:

The communication device…

- knows about the preferences and problems of the user. Adapted to this background information the mobile provides data and advice in every circumstance (e.g. suggestions for activities harmonizing with the personal profile)
- processes unwritten and written information concerning service and advice at the right place and in the adequate situation.
- possesses a individual style and clothes counselor.
- offers a personal fitness coach (e.g. measurement of vital parameters).
- is a psychological adviser with the ability to read your mind and give advice on the basis of the given information.
- easily adapts to your age and life course, making lifetime learning possible.
- serves as a shopping assistant: it knows what is missing in the fridge, declares ingredients, shops around and forewarns allergic persons.
- counts calories.

Moreover, the device…

- regulates various electronic equipment at home and in the office even when you are far away:
  - Starting the washing machine
  - Drawing oneself a bath
  - Scanning the content of the fridge
- disposes of different user interfaces and has separated interfaces for business, leisure time, family, different countries (including multiple address books), etc.
- eases calendar management:
  - Planning and feeding the appointments into the computer using voice control
  - Outstanding to-do lists blink and bleep until the assignments are done
  - Management of your daily routine with the help of a virtual assistant
- owns a virtual travel guide:
  - By pointing to a building, statue, etc., it provides information about the focused tourist attraction and supplies further links and information about the vicinity.
- consists of a modular system for specific professional groups:
  - Architect: Program for diagrams and sketches
  - Journalist: Program for paraphrasing and translation
  - Teacher: Program for the development of exams, automatic spelling program, laptop with an interactive blackboard which is able to process information

The women controversially discussed the following issues:

- Payment with a mobile device
- Identification (identity card, driver's license, insurance card) with a mobile device
- The mobile device also serves as set of keys (for automobile, accommodation, office, etc.)

Some of the test persons thought it would be inefficient or impractical and also dangerous to have a communication device which incorporates all essential features. Provided that it is possible to have all-time access to the data (although the device is not working) and that the personal data and information are protected from data abuse (e.g. with an electronic finger print or voice recognition), the women would appreciate such an all-in-one solution.

Another aspect which was especially discussed in the first and last group, was the security topic (e.g. at night in a lonesome district). In every group the women asked intergenerationally for an emergency interface which functions even when the battery is already empty. Another idea referred to an intelligent mobile device which is able to recognize dangerous situations. Thereupon it independently switches on and sends an emergency call.

4.1.4 Additional Wishes in Reference to Hardware and Design

The women were asked to name additional and principal wishes relating to hardware, design and accessories. It was astonishing how similar the requirements were in the different groups. Therefore the frequently articulated wishes and demands are listed in the following.

Hardware:

- Voice control
- Talking and responding mobile
- Emergency key
- Touchscreen
- Touchscreen which can be used as a mirror
- Modular system, e.g. charm bracelet
- Improved protection against humidity, sand, etc. ("unbreakable")
- Key for perfume
- Lightweight
- Low or free of radiation
- Solar energy or body heat as energy source
- No need to charge the battery
- Higher storage capacity

Design:

- Unbreakable, scratch-resistant, shock-proof
- Individual (form) design
- More colors and styles
- Flexible form which is adequate to the situation
- Color change is possible
- Flexible surface for stress reduction
- Device functions as earring or bracelet

Accessories:

- Mirror
- Integrated pepper spray
- More fantasy and diversity
- Furthermore, all test persons argued that ICT products should address all senses in the future.

4.2 Typologies and Lifestyle of the Four Researched Groups

We did not solely focus on women of different age groups. Within each (age) group we also emphasized various demographic characteristics, e.g. educational background, employment status and income situation as well as their attitude towards life. Moreover, in every group we had women with migration backgrounds (for detailed information about the socio-demographic data of the test persons, *see Chapter 3.1.2).*

We were able to discover intergenerational similarities and differences with regard to the living conditions and attitudes of the women. We tried to summarize these findings in so-called typologies. The typologies provide more incisive insight into the different lifestyles and the therewith conjoined attitudes and requirements of the women. With these typologies we were particularly able to develop various ideas and concepts for different target groups.

Note that the typologies constitute an ideal aggregation and abstraction of the real and rather complex lifestyles and living conditions of the test persons. Furthermore, the typologies may have different specifications and alternatives according to phase of life, educational background and earnings. It might be possible that one women features specific characteristics of different typologies. However, we assume that in general one particular lifestyle and consequentially a specific type is dominant. Moreover, we suspect that one woman passes through different concepts and typologies in the course of her life. Therefore, the typologies should not be mistaken as static and unchangeable identities, but rather as an aggregation of lifestyles and attitudes which are constantly alterable by the women.

4.2.1 First and Second Group (14-to-18 and 19-to-28-Year-Olds)

Occurrence of three typologies within the first two groups

As described above *(see Chapter 4.1),* the women of the first and second group are mainly concerned with their orientation in life. In comparison to the third and second group, impressions about private, familial and professional constellation have not yet solidified.

Nevertheless one might already observe three different principle types.

4.2.1.1 Young Superwoman

- College-preparatory secondary school or secondary school
- Stressed out by school and hobbies
- Socially high valued and diversified free-time activities (horseback riding, piano, etc.)
- Contacts abroad are maintained and highlighted; exchange year
- Pen pals
- Status-oriented, also with regard to their choice of ICT
- Attaches great importance to brand name or designer clothing (depending on their income situation)
- Typical after-school job: private lessons
- Average ICT user

4.2.1.2 Relationship-Oriented Female

- All graduations
- Medium-sized to large circle of friends
- Particularly close relation to the mother
- Pets
- A lot of family tasks and activities
- Attaches importance to feminine styling
- Socially involved
- Typical after-school job: babysitting or shop assistance
- Average or rather sparse ICT user

4.2.1.3 Freaky Individualist

- College-preparatory secondary school rather than secondary school
- Rather loner with limited circle of friends
- Frequent sophisticated films and books beyond mainstream
- Attaches importance to individual, "freaky" styling (e.g. in the design of ICT)
- Early detachment from parental home; extrovert
- Typical after-school job: journal delivery or waitress
- With regard to ICT use she has an affinity for the internet, does not attach great importance to latest technological standards

Fig. 28: *ICT prototype for the younger women (14–28 years old)*

4.2.2 Third and Fourth Group (29-to-45 and 50-to-65-Year-Olds)

In the phase of life between the age of 30 and 65 the living conditions and therewith the attitudes and requirements with regard to private and professional life are established.

We were able to discover four different concepts of life which will be described in the following: "modern family manager", "stressed superwoman", "socio-critical individualist" and "empty nester". As we did not observe the women over a longer period of time, we are not able to make a statement about the enhancement of the types derived from the first and second group. It might be absolutely conceivable that a "young superwoman" will rather decide to live as a "modern family manager". Subsequently, when the children grow older and she attaches (again) more importance to her career instead of attending to her family responsibilities, she might live as a "stressed superwomen". Moreover, every other combination is possible.

4.2.2.1 Modern Family Manager

» Rather relationship-oriented

» Worries about her responsibility for children, parents and friends rank first

» Caring for the family is more important than fostering the own career

» Family care is performed with a professional attitude

» A substantial income is often connected with social engagement

» The majority is gainfully employed; longer periods of non-employment occur while parenting small children

» Employment is relevant for a positive self-esteem, but should not interfere too much with private and familial goals

» A distinct boundary between private and professional life is important

ICT Requirements

» Main function: organization of family's everyday life supported by ICT

» Information and organizational services (e.g. support of daily shopping or housekeeping)

» Easier communication with family and children

» Water-resistant and sand-resistant (for the sand box) mobiles

» Protecting children from ICT-related risks

» Separating private and professional life by means of different user modes/interfaces

» Protection of privacy

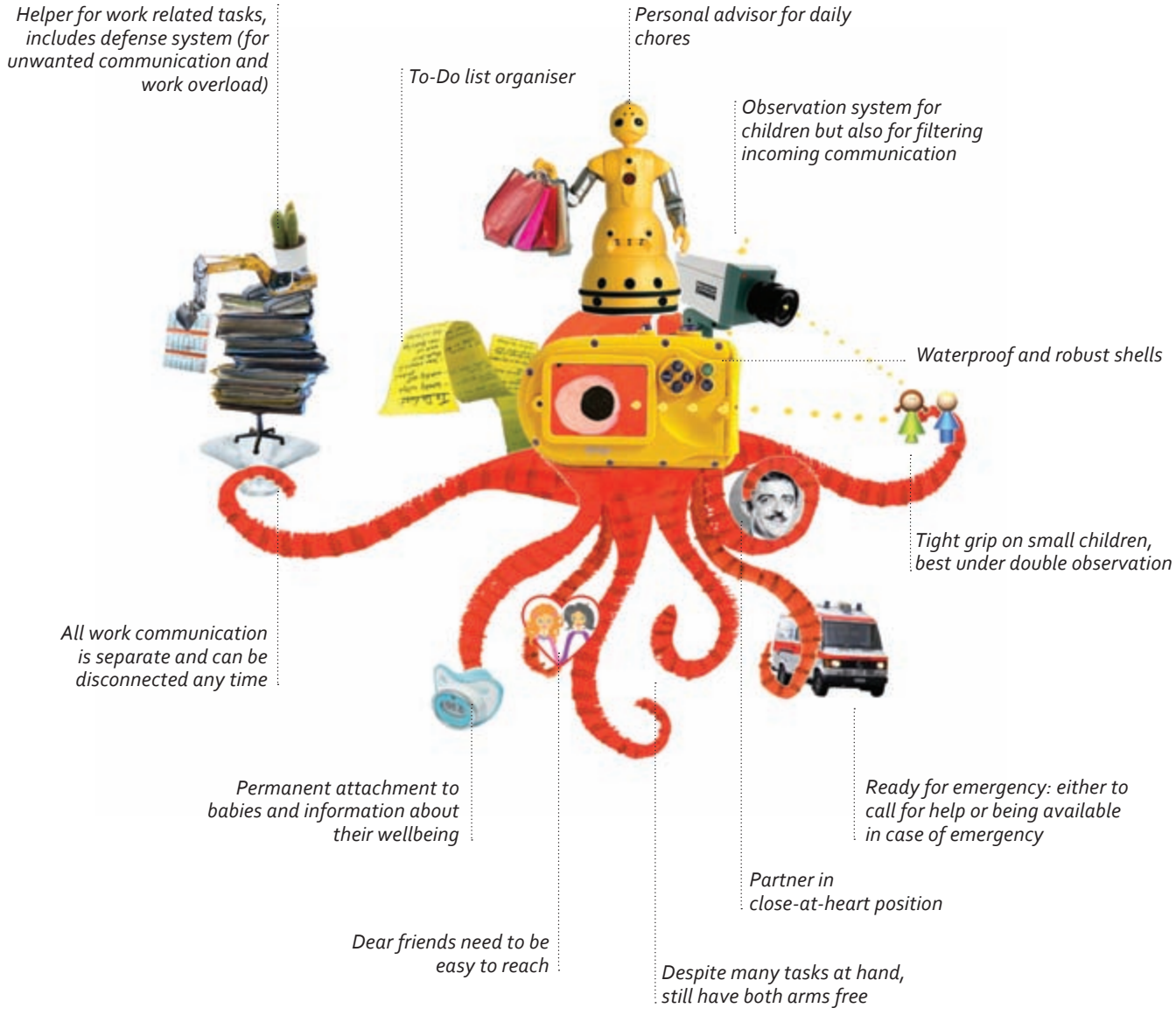


Fig. 29: *ICT prototype for the modern family manager*

4.2.2.2 Stressed Superwoman

» The focus on career and family is either the same or career orientation is more distinctive

» Partially with, partially without children

» Demands a great deal of herself and others

» More status-oriented than the other types

» Wants to perfectly live up to all role models

» Wants to reach the optimum level in all areas of life, no compromises

» Private and professional life overlap more often than in the other groups ("transgressing" is more prevalent than in the other groups)

» Wishes to achieve more synergies between her different areas of life

ICT Requirements

» Main function: information and planning

» Time saving and improvement of professional appearance

» Improved planning and coordination

» Better and faster access to information with the help of mobile communication devices

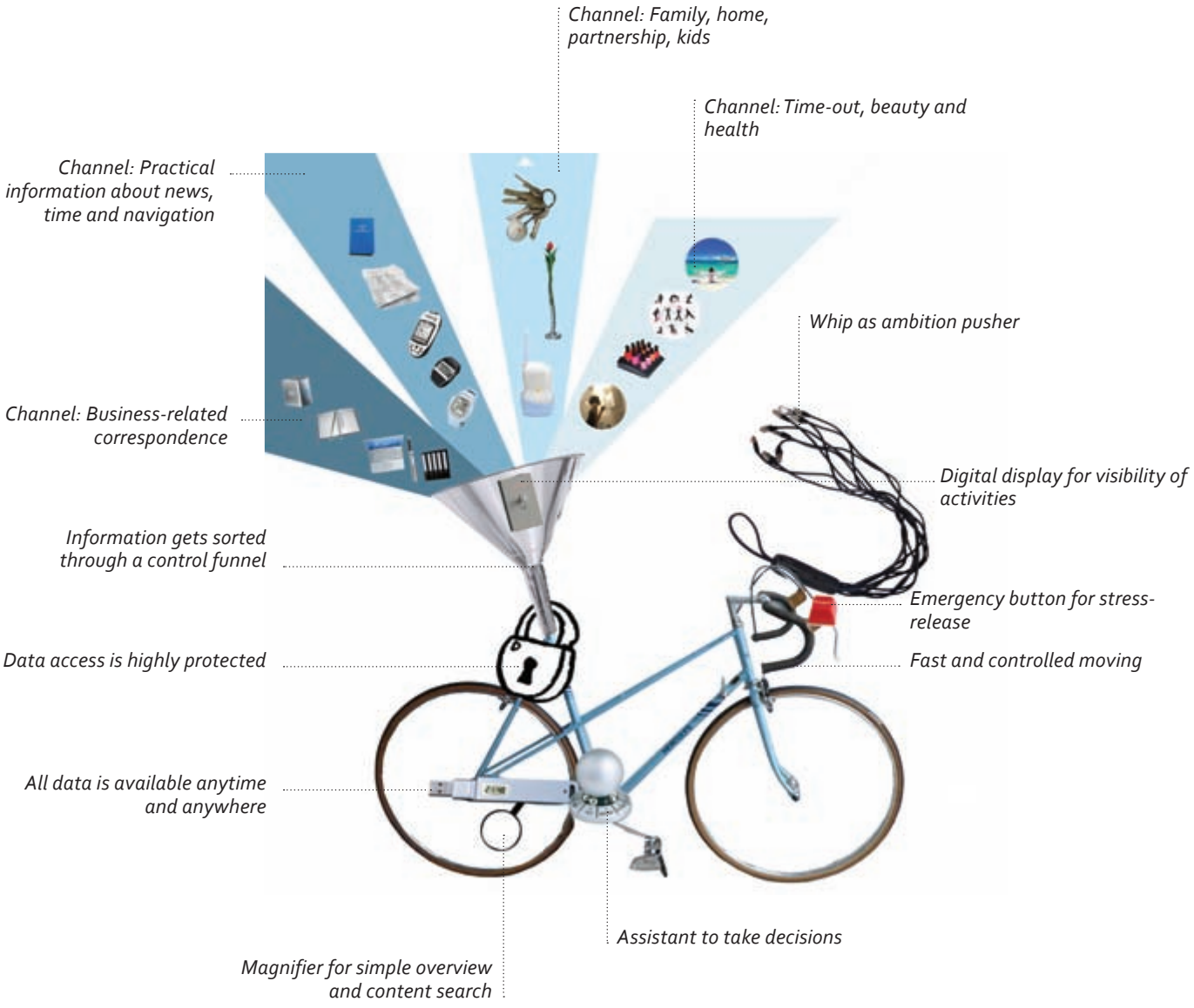


Fig. 30: *ICT prototype for the stressed superwomen*

4.2.2.3 Socio-Critical Individualist

» Autonomy of the individual is accompanied by social standards

» Gives self-fulfillment top priority (in professional and/or private context)

» Focuses on human relationships beyond the model of a traditional family

» Group of single-parents, blended families, childless people and singles is outnumbers

» Alternative orientations: sustainability and a close affinity to nature are important; sometimes also religiousness, esotericism, etc.

» Wants the society to be changed

» Is into other cultures; likes to travel much and often

» Has a creative job or works as a scientist

ICT Requirements

» Main function: virtualization (no devices, telepathy)

» Sustainable, ecological

» Inspiring/creativity enhancing: more do-it yourself services, e.g. individual ring tones instead of standard ring tones

» ICT enables control over own life

» Often uses ICT

» Sets herself apart from the mainstream as she does not dress trendily

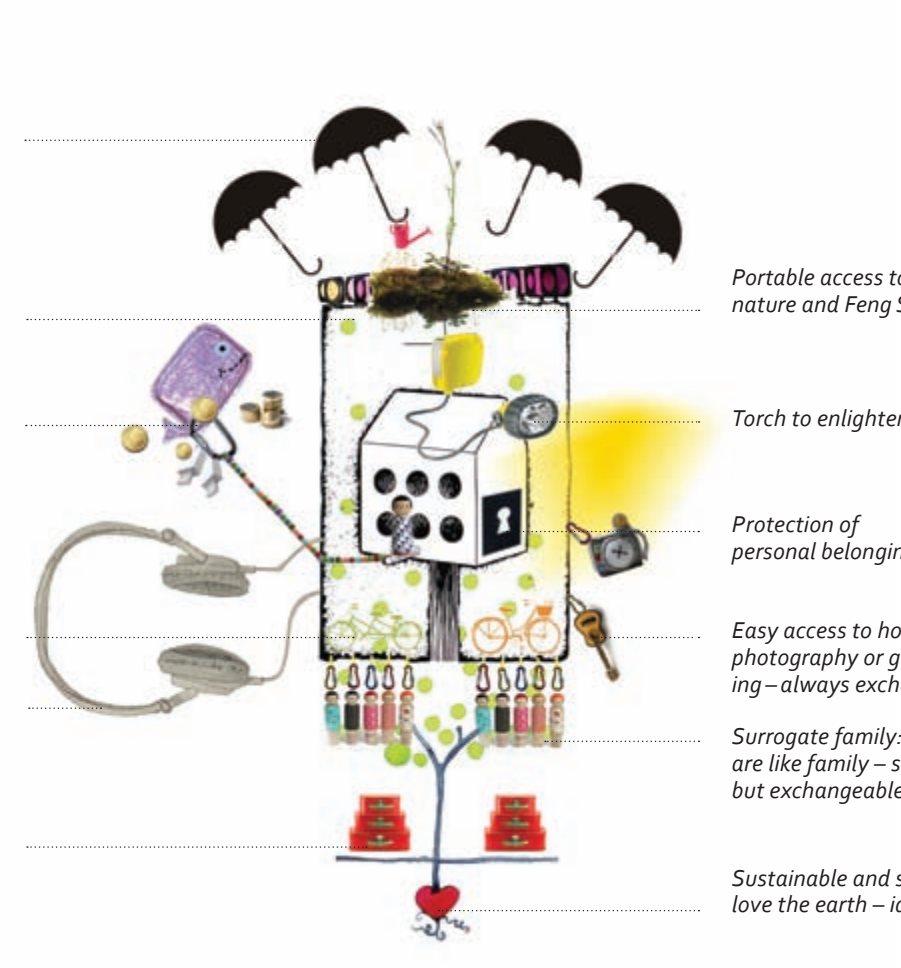


Fig. 31: *ICT prototype for the socio-critical individualist*

Analogous to the first and second group, the personal circumstances/lifestyle of the third and fourth group are similar. However, there is an additional typology for the fourth group. This type could only be identified among the elder women:

4.2.2.4 Empty Nester

- The nest is empty (she has children, but they already left the household) or the children are already able to fend for themselves
- Her husband is retired
- Was or is working part-time
- Enjoys her free time
- Cares about her grandchildren
- Often meets with other women
- Is still healthy and active
- Affinity for athleticism
- Low stress level
- Enjoys to travel
- Financial security through her husband/marriage

ICT Requirements

- Only humble requirements
- Wishes for a mobile in order to talk to someone over the telephone
- Feminine styling

Main use: Making phone calls

Special connection and place for grand children and giving them gifts

Helps to keep fit and active, subscription for favorite magazines

Helps finding directions in daily life and on journeys

Clear readability and usability

Very distinct SOS trigger and other safety features

Helps to keep budget together through different services

Displays personal attachment to pets and manage their health

Clear overall structure, easy to find functions

Fig. 32: *ICT prototype for the empty nester*

The typologies "stressed superwomen" and "empty nester" are the major groups in the fourth group.

The percentage of the typology "stressed superwomen" is slightly higher than in the other groups as the women already made their career (more responsibilities and time pressure). Moreover, they have to care for their children who still live in the household and/or have caretaking responsibilities for relatives.

4.3 Comparison with the Male Sample

A group of 18 male participants was investigated within the study framework likewise. They got the same tasks and materials as their female counterparts. In contrast to the latter, the male group contained participants of mixed ages: Users were between 14 and 65 years old. We compared the four female groups with the male group to get first ideas about the extent of difference or similarity between the genders concerning their ICT-needs and demands. We also wondered how women and men might answer questions concerning their ideas, needs and habits; if they act differently being test persons.

Due to the few cases involved, the results are not representative, but they certainly give interesting impulses for further research.

In general, basic needs of women and men are considerably akin. Also age-induced differences could be observed within the male and female groups alike.

Young men have proven to be very focused on communication within their peer group, but also (in contrast to young women) on ICT-entertainment (gaming, soccer- and sports news etc.)

Elder men then set priority – like elder women do – on daily life support by ICT. As well as women of this age, men in their "rush-hour of life" would like ICT-tools that offer daily life information, consultation and organisation independently, intelligent and adjusted to the user's individual profile.

We noticed that men communicated more online than the female participants and that the former considered ICT as a mean for entertainment through all generations.

Another important issue has been the protection of personal data. Some men actually refused to give information about private details. Basically, the male participants dealt far less ambivalently with issues like data control, availability and protection of privacy than the women. This fact is also reflected in men's work on Cultural Probes: They normally didn't regret any communication and renounced to delete it subsequently. The "Supereliminator" inside our Cultural Probes was not used by the majority. Furthermore, the investigated men normally didn't experience (non-)availability as a problem. It was judged as a conscious decision to be available or not; since one could always go offline or switch off the mobile phone.

The male participants related ICT-use less to the care for others or emotional connection to family and friends. Men's wishes and needs were almost invariably self-referential (their jobs, health, entertainment, etc.). Women often emphasized their want to support others by ICT use, for example by sending emotions or hugs. The facilitation of family work and household chore by ICT was mentioned by the male group only in regard to the daily shopping and the control of housing technique. Children as ICT users have been taken into account exclusively by the female participants.

But men and women also had a lot of similar approaches concerning their concrete ideas for prototypes. Both would like for example:

» More use of solar energy

» ICT supported Telepathy

» Voice controlled ICT

» Intelligent, self learning ICT assistance for various circumstances (Health, sports, daily shopping, administration of contacts etc.)

» Different interfaces for private/professional life

» Indestructible surfaces

» Biometric protection of personal data

» Better security mechanisms against thievery

We noticed already during the investigation process that the women groups – particularly in the Ideation Workshops – anticipated less than the male group given technical limits. They dared to create visions and to realize them in prototypes and role play games. Women's experiences from very different areas of life (children, family, travelling, etc.) were incorporated whereas men mainly referred to their professional life, entertainment and health. All female groups stressed environmental subjects much more often than the male one did. On the other hand, men's proposals were qualified by more technical details and a higher degree of differentiation.

Prototypes also differed regarding their exterior design. Women tended to design fancy, colourful artefacts of various materials and forms. Men in contrast created colour reduced, sometimes metallic and rather square shaped tools.

Nevertheless there have been some (however few) exceptional cases in each group where women and men acted not accordingly to the gender stereotypes: A couple of men experimented with colours and forms and some women set a high value on reduced colours (metallic, black, white) and square shapes.

Our initial thesis that women are very demanding users who are able to introduce multifaceted perspectives has been confirmed by the final comparison with the male group. More than their male counterparts, women – besides their experiences from professional life and free-time – also reported on their special needs accrued from household chore, family management and home care. They were in addition more apt to abstract from the given technical limits and to fantasize in an uncommitted way. Unlike the male participants, they shared even personal, intimate details with us. The former however developed interesting ideas and approaches that were characterized by higher technical creativity and accuracy.

We can thus conclude that it makes definitely sense for the innovation process to incorporate women *and* men systematically in R&D processes. Furthermore, their needs and demands should be studied according to their genders. Men and women partly have similar but to some extent also differing perspectives concerning the use of ICT. Further research that goes beyond our qualitative study design should be dedicated to these issues.

The most important ideas in a nutshell:

Hardware

» Battery is automatically charged by eye tracking

» Battery is automatically charged by body heat

» Self-charging by use of renewable energies (e.g. solar energy)

» 100% recyclable

» Comprises all functions for private and professional ICT (incl. entertainment)

» Data is not saved directly on the mobile, but on a extra-server (higher capacity and security)

Software and Services

» Voice control

» Intuitive handling

» ICT supported telepathy: Conversations hold by thoughts

» User control from the inside of a 3-D projection

» 3-D display

» Holograms

» Identifies moods and needs and reacts independently

» Is teacher, coach, playmate (that interacts with me), personal assistant; depending on the respective situation

» Collects, filters and processes information independently

» Plans and organizes appointments automatically; in general wider organizer function

» Answers appointment requests and fixes dates automatically

» Definition of distinct availability stages

» Ordering function: Games, films and photos are automatically settled

» Social network instead of address-book; shows contacts with their history

» Independent transmission of important information to others: e.g. "I'm single"

» Locates and announces free car parks

» Communicates with all other electronic tools and can inform about this (has broken- down, needs new batteries)

» Control of housing technique by mobile

» Saves and adjusts personal settings automatically

» Automatic shopping-list

» Independent daily shopping

» Shopping scanner

» Supervises the user's state of health and warns about health risks (e.g. high pulse)

» Alerts allergic persons to pollen concentration etc.

» Observes the user's environment and prevents dangers

» Proves user's identity, functions as means of payment

» Has an own voice and personality

» User control: only authorized persons can use it

» Biometrical user control (e.g. by a fingerprint)

» Separation of private and professional life

» Can be used by every family member with personalized interfaces

» Can be located in case of loss

» Simultaneous translation of foreign languages

» Security mechanisms against thievery: raises an alarm when used by an unauthorised person

» Can be found by acclamation

Design

- Eye controlled
- Indestructible surface (waterproof etc.)
- Weather-resistant
- modular
- adjustable size and weight
- small and nearly invisible
- Can change colours
- Integrated storage of drinks
- All senses are addressed
- Added cocoon to hide user from the outside world
- With bag
- Low-radiation
- Can be used as a pillow
- Gives massages, Solarium
  Contains magnet: adheres to desk surface and is cushioned when falling down
- Enclosed in a membrane: scratch-proof, resilient and individually adjustable
- Emits flavourings for a better ambient air

4.4 Personas

To make the preliminary typology more concrete and to get a picture from the different living conditions, demands and wishes of the women in our samples we developed Personas. These Personas are not real women of our samples because we wanted them to stay anonymous. But every persona contains characteristics of different real women in oure sample that can be allocated to one of the preliminary defines types.

4.4.1 Persona Matrix

First and Second Group (14-to-18 and 19-to-28-Year-Olds)

Young Superwoman

Relationship-Oriented Female

Freaky Individualist

Third and Fourth Group (29-to-45 and 50-to-65-Year-Olds)

The Modern Family Manager

The Stressed Super Woman

The Socio-Critical Individualist

The Empty Nester

Young Superwoman

Christina, 28

MAIN FEATURES

» lawyer
» successful
» single
» always reachable
» career-minded
» rational and controlled
» well-funded

LIFESTYLE

» Hates to be called Tina
» Has done internships in Washington DC and Mexico City
» Drives an Audi S5 (company car)
» Law degree with distinction. She works for a publishing house as a contract attorney
» Speaks five languages
» Has career plans, definitely doesn't want family before the age of 35
» Calls her parents by their first names
» Travels a lot for business reasons
» Communicates with friends mostly via SMS or internet, hardly has time to meet up
» She has an iPhone (for private use) and a Blackberry (for work)
» She madly loves her little sister Silke (22)
» Because she's moved to a new city, she's separating from her 4 year relationship with Frederik, ("it's better like this" – very rational)
» She's always reachable for colleagues and clients, also during her holidays
» She regularly goes to the gym and always conquers her weaker self

Relationship-Oriented Female

Rike, 14

MAIN FEATURES

» protected
» shy
» prepubescent
» orderly
» in a phase of finding herself
» Rike's mother Barbara had started studying architecture but then dropped out because she got pregnant, and remained a housewife thereafter since Victor was already an established lawyer

LIFESTYLE

» She has two brothers: Lukas (8) and Philip (17)
» Her brothers annoy her – "the older one cause he's patronising her and the younger one cause he's always allowed to do everything he wants."
» Rike's leisure time is very organised and sometimes stressful: clarinet, ballet, basketball
» Sometimes she secretly dances like Madonna
» Her girlfriends all go to the same school as she does, or they live in the same neighbourhood
» The reason she has a cell phone is just so her mom can keep track of her
» Her parents pay 10 Euros monthly for the prepaid card
» Every now and then Rike goes babysitting on weekends so she can make some extra money
» She likes writing emails to penpals abroad, so she can improve her English and French skills
» Rike thinks that she's still too young for dating. Actually, she likes Christoph from the ninth grade, but would never admit this to anyone, because almost everyone finds him cool. But she's very happy having a group picture on her phone with him on it.
» Just like all her friends, Rike is a member of Facebook, where she exchanges news, especially during the evenings and on weekends
» In the little free time she has, she most likes meeting up with her friends and often helps them with their homework. It drives her crazy if her friends don't keep their word, or don't let her know when they're going to be late. On the other hand, she often cancels dates herself.
» She's hardly ever bored
» Her preferred nail polish at the moment is dark blue. She's not really allowed to put on make up – but she also doesn't really want to

Relationship-Oriented Female

Zoya, 16

MAIN FEATURES

» Speaks three languages
» Is part of multiple cultures
» Has fixed venues for meeting friends
» Rebellious
» Responsible
» Large circle of friends
» Is always out of credit

LIFESTYLE

» She's the daughter of a Russian and an Ethiopian
» Lives in Hamburg
» Likes meeting with friends in her quarter
» Zoya has a half-sister in Russia, but never met her
» She likes experimenting with her clothes and re-tailors her garments regularly
» Her best friend Peggy is 18 and she already has a child. Zoya often takes care of the baby as well and feels like a second mom
» She speaks three languages but has problems at school. Impatiently, she awaits graduation
» Always has her mobile phone with her, although she keeps being out of credit
» She doesn't have plans yet for the time after graduation. Maybe she will become a fashion designer one day. Or singer in a band. Who knows.
» She already set up a MySpace page with photos and some amateur recordings. Who knows – maybe she'll be discovered!
» Boys like her, but she's more into older guys – especially Björn, but he's already 22 and already in a relationship
» She's been suffering from eating disorders since she was 13, and had to be treated in the hospital a year ago

Relationship-Oriented Female

Jessica, 24

MAIN FEATURES

» In a relationship with Patrick
» Works as an assistant tax consultant
» Close ties with her mother
» Closest friend is Jeanette
» Loves to dance
» Her mobile phone is always on

LIFESTYLE

» After middle school she started her apprenticeship
» She lives together with Patrick. They would like to get married as soon as they can and move into a new home
» Her parents divorced early and she's not in touch with her dad anymore
» With her mother Gabi she has a very close relationship (they call each other every day)
» She's a single child
» Since her apprenticeship she works in the city administration. She likes most of her colleagues
» Once a week she goes out for cocktails or dancing with her closest friend Jeanette
» She goes regularly to the sunstudio and manicure
» Twice a week she goes dancing with Patrick
» She likes wearing sexy underwear
» She's very much concerned about her looks and takes time taking care of herself
» Jessica gets a new phone every two years from her provider. She has a protective casing for it
» Jessica is talented in arguing on the phone, preferably with Patrick and her mom
» Her phone is always on, which bothers no one at her work

Freaky Individualist

Heike, 17

MAIN FEATURES

» Feels like a grown up
» Currently in vocational training
» Child of divorce
» In a phase of finding herself
» Responsible

LIFESTYLE

» Her mother Elke works at the Postbank at the counter
» Her dad Thilo took up with a new wife eight years ago (they live in the same neighborhood). They have new kids together.
» Bettina is her little sister and drives her crazy
» Heike is currently training as bike mechanic
» She has her own small motorbike and she likes to go on rides on weekends
» She also participates in bike races
» Enjoys finally making her own money
» She still feels too bound at home as "second parent"
» She had an affair with Giorgio from the Italian restaurant next door, and one with Cornelia on her holiday on Westerland island
» Her mobile phone gives her the feeling of uncontrolled space, where she can talk with friends freely and make dates
» She suspects that Bettina searches for secret SMS and photos on her phone, therefore never leaves it lying around

Freaky Individualist

Nele, 27

MAIN FEATURES

» Studying special education
» Lives in a shared apartment with three roommates
» Has a large circle of friends
» Single
» Likes traveling
» Varied interests
» Latently lazy

LIFESTYLE

» She's studied 9 semesters and now really wants to get going, her scholarship is running out
» She has a very strong relationship with her room mates, they often cook together
» She's a passive member of Greenpeace, the monthly magazine is always in the shared apartment's restroom
» She would never give away any personal information online, that's also the reason why she doesn't purchase things on the web
» She's fluent in Spanish after a Voluntary Year of Social Service in Peru
» Nele works twice a week at Krümmel Café, and more frequently during semester holidays
» Calls her parents by their first names
» She has a younger brother (24)
» Sometimes she plays acoustic guitar
» Likes hanging out with her friends
» She's been single for a long time, but she doesn't care, or that's what she says
» Smokes pot every now and then
» Secretly watches the TV show "Forbidden Love" on the internet
» She has a mobile phone but doesn't use it so much, she prefers calling from her landline at home: she wants to take time for her friends

Modern Family Manager

Sabine, 38

MAIN FEATURES

» Married
» Two children
» Housewife
» Active in the PTA
» Loves her garden
» Saturday is family day
» Cellphone means always reachable in emergency

LIFESTYLE

» Sabine lives with her husband and two children in a single-family home in a suburban area. She studied economics and had worked for Unilever but stays home since the birth of her daughter Paula. Her family always comes first for her
» When everyone's left the house in the mornings, she takes care of the household chores and the garden (her favorite place)
» Paula is now in first grade and her dad drops her off on his way to work. Sabine is active in the PTA and goes to a meeting once a month
» Paula takes music lessons once a week. While waiting for her daughter, Sabine has time to enjoy a cup of coffee and read the news.
» Sabine takes her son David to Kindergarten every day and picks him up again. If anything comes up in between those times, Sabine's mum jumps in
» David goes to the kids' gym every Monday and Thursday. Sabine takes turns with Brigitte, whom she knows from post pregnancy gymnastics class: Mondays she takes Brigitte's daughter, on Thursdays Brigitte takes David
» Saturday is family day, time for trips like going to the zoo. Sundays she talks to relatives and friends on the phone who don't live in the same city
» Dinner is the time for the family to sit and talk together. Sabine is very much concerned about healthy food
» The mobile phone makes her feel certain that she's always reachable for her family while she's out. The landline has an answering machine. During dinner they don't take phone calls

Modern Family Manager

Monika, 51

MAIN FEATURES

» She is the center of her family
» And the family is her center
» Two daughters: Meike (22) and Sarah (19)
» One grand child
» Part-time employee in the family business
» Education and social company of the kids are essential

LIFESTYLE

» Considers herself tradition-conscious. Monika's husband Roland (54) is very busy in their medium-sized business. She helps out there every now and then as a book-keeper. Although she prefers to manage and interact with customers, she doesn't like being at work too often. It's Roland's territory.
» She has known Roland since her high-school days.
» After graduation, her daughter Sarah went to the USA to do an internship. It is very important for Monika that her daughters study at a university. She often helped them with their homework as well as paid for private coaching, ballet classes, horseback riding and piano lessons.
» She never held back with her opinion about her daughters' different girlfriends. Proper social contact to her is very important. She was even more critical with potential partners and didn't want her daughters to engage in any serious relationships. Nevertheless, Meike got pregnant at the age of 17, which was a tough time for the whole family.
» Meike grew up quickly and now studies in Munich where she lives with her daughter Lili
» In the meantime, Monika is proud of her "black sheep".
» Through Sarah's stay in the USA, Monika got used to new forms of communication (such as Skype) and now gets a lot of information from the internet about American politics.
» Monika uses her mobile phone almost exclusively for making calls, she finds texting too tedious.
» She has a monthly ticket for the city pool and now meets old friends more often. They giggle lots and make gossip and joke around.
» She considers getting involved with a civil initiative for a bypass road
» For many years she had a tense relationship with her mother, and always wanted to do everything differently from her. Now she visits her more often at the senior residency St. Martin, so she won't have to blame herself later

Stressed Superwoman

Anni, 41

MAIN FEATURES

» Independent
» Distant relationship
» Does sports four times a week
» Career is more important than family
» Friends are family

LIFESTYLE

» Anni works in the marketing department of a bank.
» Her parents moved from Poland to Germany in the 60's
» She's a single child and always wished she had an older brother
» She's the first one in the family who studied
» After her studies in London she lived for two years in Zürich where she still has good friends
» Anni lives a very consciously independent life and likes to go out by herself sometimes
» She travels a lot for private as well as for business reasons. Travel time is always time to work on documents or write emails
» For two years now, she's been having a long distance relationship with Erik. They meet every other weekend.
» Anni is the godmother of Anne (4), the daughter of her best friend who lives 400 km away
» She loves spending an extended weekend in the idyll of her friend's family, however is always happy to go home again
» After a stressful day, she likes to work out hard at the gym
» In cases she's home early, she likes to talk on the phone with friends
» Her mobile phones are always with her. Actually, she intends not to answer the work phone on weekends, but she doesn't always stick to her plan
» She does not like to put on make-up on weekends
» Sunday evenings she's addicted to watching HBO series

Stressed Superwoman

Gudrun, 59

MAIN FEATURES

» Independent
» Divorced and living by herself
» Well funded
» Two children
» Active and dedicated
» Working
» Very organised and effective in her daily work

LIFESTYLE

» Since the Berlin Wall came down, Gudrun has been employed as a financial advisor for Citybank. Over the years she's worked her way up into higher management. Previously she was the director of a bank in Dresden.
» Gudrun has two children, Christian (31) and Silvia (28). The son is a lawyer, the daughter a prospective physician.
» She was married for 31 years to Karl-Heinz (62) but divorced four years ago. She has been working all her life.
» Gudrun has one close friend (Katrin) from her time at the university. She lives only 10 minutes away by car. They meet regularly for sports activities and are very close emotionally. However Gudrun is more of a listener, she doesn't like talking about her feelings so much.
» She still has a tattoo next to her belly-button that she got in her twenties
» Gudrun lives in her own home in the exurbs. The house is actually too big for her since the kids and Karl-Heinz have moved out. But Gudrun finally has her "ironing and stuff" room as she calls it
» In her male-dominated work environment she had to deal with prejudice almost every day and had to grow a thick skin over the years. That sometimes makes her appear harsher than she is
» Due to her work she has a Blackberry. She hardly ever uses her personal mobile phone.
» If she doesn't understand something, Gudrun reads the instructions or looks up information on the internet
» Her colleagues respectfully call her "the snake", which is meant in a positive way: that she somehow regularly winds her way to unconventional solutions.
» She prefers taking care of her household chores by herself. She doesn't like it if someone lends her a hand.

Socio-Critical Individualist

Nora, 34

MAIN FEATURES

» Divorced single mother
» Three children: Ben (7), Eva (9), Daniel (12)
» Best friend is an important element in her everyday organization
» Currently unemployed

LIFESTYLE

» Nora split up with Christoph, the father of her children 18 months ago. However, both still have a friendly relationship.
» Christoph has a new wife. He lives together with her and her children. His own children are at his place every Tuesday and every second weekend.
» Eva likes going to school, she has many friends she likes to bring home to share lunch
» Eva is dyslexic and gets coaching two afternoons per week
» Daniel plays trumpet in an orchestra. In the afternoons he likes meeting his friends for skateboarding.
» Every Tuesday it's Nora's "My-Day". In the evenings she goes running with a group and meets her friends
» Nora is so busy with everyday chores and job hunting that she can't imagine having a new relationship at the moment. In the evenings she sometimes chats on dating websites, but doesn't really have a serious interest.
» Her best friend Bea is like a sister to her, who helps her in organizing her everyday life
» Nora hardly has any contact with her parents
» Ben, the youngest, just started going to school and still suffers from the divorce – he doesn't like being separated from his mother. He doesn't like staying overnight at his friends, then he usually gets homesick and wants to be picked up
» Nora has a mobile phone but tries to keep costs low
» Daniel would like to have a mobile phone and Nora's afraid he might steal one if she doesn't buy one for him. She wants to talk to Christoph about it

Socio-Critical Individualist

Sybille, 54

MAIN FEATURES

» Extroverted
» Politically active
» Scientist
» One child
» Educated
» Lives in a shared "old people staying young" house.

LIFESTYLE

» Sybille works at the university in the field of political science. In the late 80's she separated from Lars, the father of her child and since then is in a relationship with Greta (61). For eight years, she's been living in a "staying young shared apartment", together with Jürgen (65) and Marcello (62). Her son Frank (23) lives with Lars where he grew up.
» She's very extroverted and enjoys making an "appearance"
» She has a friendly-distant relationship with Frank. He doesn't feel quite as ashamed of his mother as he used to, but nevertheless, doesn't introduce his girlfriends to her. This hurts Sybille, but she somehow understands him. "He has to become more mature", she says.
» She likes walking barefoot
» Sybille knows very well how to handle the VCR and her computer. She uses her mobile phone mainly to coordinate appointments. Sometimes however she forgets the phone at home which makes her think that she can actually live quite well without it.
» She loves French movies and has signed up Greta and herself for a French class (this will be her Christmas present)
» Small animals such as spiders make her panic. She will scream hysterically.
» Enjoys listening to retro pop, that's truthful music for her.
» Now she's getting politically more active again. She had her "wild" period in the 80's and is looking for an appropriate venue together with Greta. She doesn't want to return to the Green Party however.
» Together with Greta and Jürgen she participates in a spiritual singing circle, but would never claim herself being "new-age" – the singing is simply good for her.

Empty Nester

Christa, 63

MAIN FEATURES

» Fulfilled housewife
» Mother and grandmother
» Buoyant
» Enjoys traveling
» Price-conscious
» Fond of animals and children
» Active in her neighborhood
» Two marriages
» Three children from her first marriage: Daniel (29), Katja (32) and Jürgen (38)

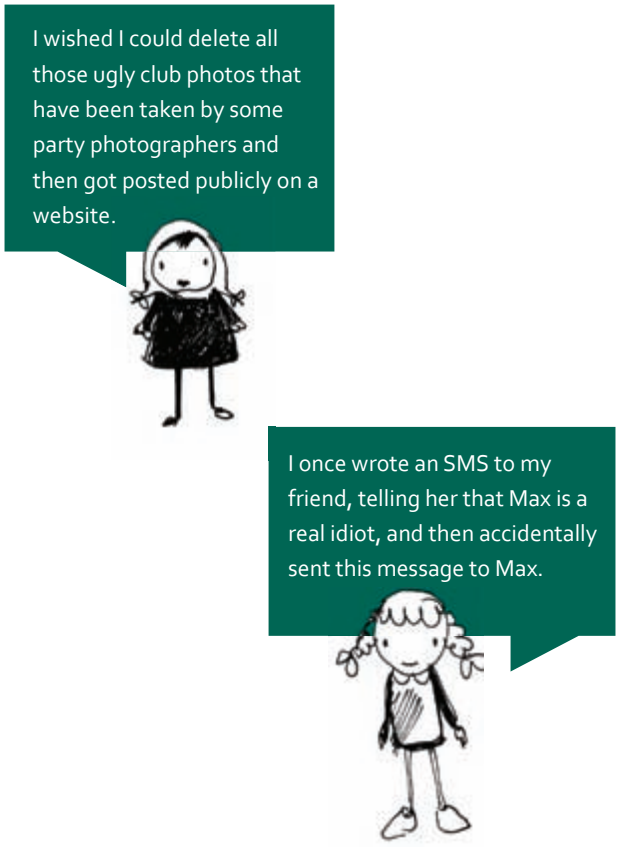
LIFESTYLE

» Has been married twice, she left her first husband when he went to jail for fraud. Her second husband died early. Now she has Manfred (57) – but she doesn't want to get married anymore. The grandchildren stop by twice a month and get pampered. She finds that Rita, her daughter-in-law, is just too strict and therefore always has extra Nutella for the little ones at home
» She also likes pampering Manfred, which shows more and more
» On Thursdays she goes to Aquafitness
» She finds GPS in the car very convenient
» Both she and Manfred like travelling: one city tour per year, one hiking trip and a week on Mallorca in May. Her dream is to go on a big cruise ship.
» They talk about having Manny retire early, then they'd have more time for bigger trips, e.g. to Egypt
» Christa isn't very interested in technical things, and is happy that Manfred takes care of everything that is concerned with devices in the household, including their purchase
» It was different with her first husband Eberhard, she always had to take care of everything herself and make sure to remind him of chores
» On Sundays she and Manny go to Ikea for breakfast – "that's good quality and cheap!"
» She likes taking walks with the dog, during which she has long phone conversations with her friend Doris. Doris has the same provider so the calls don't cost anything
» Once a month, Christa has frozen food delivered by Lindemann & Sons. That's very practical

5. Design Solutions

Based on the insights from different sources – the collaboration with our participants (e.g. cultural probes, ideation workshops), and the extensive research on existing products, projects from other research institutions, emerging technologies and development in other technological and cultural areas – we undertook an iterative design process for each age group *(see Chapter 3.2).* For each of these groups a range of 10 to 15 early concepts were formulated, sketched out and presented to the participants for feedback. Out of nearly 60 concept ideas, 10 were finally selected to be developed as design solutions in depth. For each of these 10 concepts, we produced video prototypes to demonstrate exemplarily how they work in everyday life situations.

Matching those again with the established personas *(see Chapter 4.4)* resulted in about 85 use cases with new potentials for concept extensions. On the following pages these 10 design solutions are illustrated with stills from the video prototypes and presented together with extended use cases for different personas as well as findings resulting from male test users. We invited eight men, aged between 15 and 51 years, who were divided into two test groups. In each group, two men had been participating in the self-observation process through Cultural Probes and the ideation workshop, and therefore had been sensitized to issues around digital communication, while the other two men were completely new to these questions and therefore represent a less reflected position. These conceptual evaluations show that most of the design solutions based on insights of female experiences and demands are also suitable for men. The main findings are exemplarily illustrated with an extract of original quotes we recorded during the feedback sessions.



5.1 Backtracks: Organizing Friends and Memories

5.1.1 Concept

Having lots of friends means having many shared pictures, videos and messages. But who has what, where did it go and where did it come from?

Backtracks is a permission system for messaging where various levels of access can be granted to individuals. This person based history makes it easy to track back where things have come from and have been sent to.

With Backtracks, data is not stored locally on the phone, but online on an external server. Based on this capability, it is possible to "lend" messages. This means, you can "take back" messages at any time. Furthermore, you can add forwarding protection to pictures or texts you don't want to spread.

Pictures that are given as a "gift" cannot be taken back, giving them a higher emotional value for the recipient.

In addition to access controls, Backtracks affords the possibility of "mobile advising". You can ask friends to check the content of a message and give their OK before sending to the end recipient.

***Insights** gained from Cultural Probes and Ideation Workshop on February 21–22 2009 with 14 participants, aged 14 to 18.*

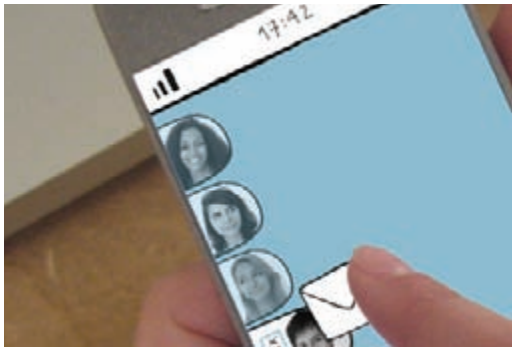
5.1.2 Use Cases

#1: Friend-Based History

Susan is unsure whether she already sent Paula the photos of her birthday party. She picks Paula from her menu and checks the history she shares with her: photos, videos, SMS they have exchanged in the past.

In the Inbox, she finds the things Paula has sent to her, in the Outbox she can see what she has sent to Paula. As there are no photos from the party, she sends them.

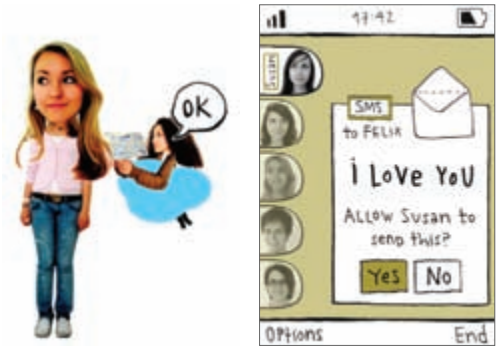
#2: Taking Back Unread Messages



Susan wants to confess her love to Felix in an SMS. She keeps rephrazing it for one hour and finally sends it off.

Two seconds later, she's already panicking and "takes back" the SMS to Felix, since he hasn't yet opened it.

#3: Friends as Message Filters



Susan wants to send an SMS to Felix and confess her love. She types the text and addresses it to Felix, but first sends it to her friend Nora. She should have a look whether this message should really be sent out. Nora reads the message to Felix and thinks "finally, Susan is taking the step!" and gives her OK. Felix then receives the SMS just as if Susan had sent it directly to him. She on the other hand can see it's being forwarded, so she knows that Nora gave her approval.

#4: Reclaim Lent Images

Paula met Giovanni on her holiday and sent him a picture that shows her sunbathing at the beach. Back home, after the holiday, she finds that actually Giovanni isn't such a nice guy after all and shouldn't have a picture of her. So she takes it back since luckily she had just lent it to him.

Since Paula also added the forwarding protection, she's certain that Giovanni hadn't been able to forward the picture to all of his friends.

5.1.3 Extended Use Cases

The concept is adapted to the following personas.

Christina, 28
Likes having an overview of what she has sent to other people. She would like to combine it with text files and other media, so that everything is compiled together.
Integrated organizing tool. Not only for photos but other types of media.

Sabine, 38
Would like to have more control over the pictures and data that her children send out. She's afraid that they might get into trouble now or in the future by posting data or images on the internet that are too personal.
Safety check for children

5.1.4 Feedback From Male Test Persons

In the following we present the main findings from the conceptual evaluation of the male test group.

Finding 1:
Generally, the participants had no personal experience regarding misuse of data. However, they do have a strong awareness of keeping control over private contents.

> *Very personal things I only give to real friends. (Kilian, 15)*

> *There are people who don't have the awareness for such things and sue others right away. There are also companies that set up whole files about their employees including photos of their leisure time. (Thomas, 40)*

Finding 2:
Especially very young and older participants of the feedback group found the features of lending and copying protecting images very relevant.

> *Just like in the "real" world, it would be good having control over things I give away digitally, always knowing what I gave to whom. (Peter, 51)*

> *Backtracks would make sense for all photos I'd post on the internet, not only those I'd take with my mobile phone. (Justin, 30)*

Finding 3:
Being able to retrieve data that has already been sent was appreciated particularly for business contexts and for protecting family members. Having mails and text messages retrieved from one's own device was only partly reflected.

> *As parents feel increasingly more like knowing about their kids' activities online, the data retrieval function would be very interesting to them. I could imagine this feature also for project teams. (Thomas, 40)*

> *Retrieving SMS is a must-have. (Miguel, 27)*

Finding 4:
Having messages checked by others was positively seen for business contexts. A reviewed message should always go back to the author before being sent out.

> *Having an SMS checked by someone would be cool, but that person should only comment and not forward it directly. (Kilian, 15)*

> *I find that having an SMS checked for personal reasons is a gimmick but very valuable for business contexts. (Sebastian,28)*

I love when I go online and find someone has written to me, commented a photo or made an offer for friendship. It is a courtesy and feels good to know someone is thinking of me.

Hugging my friends at school is my morning ritual.

I only talk with close friends about my favourite music.

Rituals make family unique.

5.2 Wink 'n' Blink: Collecting Memories for Friends and Meeting for Sharing

5.2.1 Concept

Winking means collecting memories for friends

Sometimes you hear a song, take a picture or watch a video you'd like to share with a friend next time you see each other. But then you meet and you completely forget about it.

Winking means saving a song, picture or video for a friend.

So next time you meet, you can remember what you wanted to share. A Wink is the little indication the friend gets, so he knows that you're thinking of her and have something to share.

In the Wink Menu you can see how many things other people have winked for you.

Blinking means meeting and sharing winked memories

Each mobile phone has an object associated with it, called a Blink Token. Through the tokens, blink connections with other phones are established.

Once blinked, photos, videos or songs can be shared, but the contents always remain on the phone they are stored on – unless they are intentionally copied.

There can be as many phones blinked as friends are around!

Wink 'n' Blink supports a feeling of community where group activities, insider rituals and sharing in person are essential.

***Insights** gained from Cultural Probes and Ideation Workshop on February 21–22 2009 with 14 participants, aged 14 to 18.*

5.2.2 Use Cases

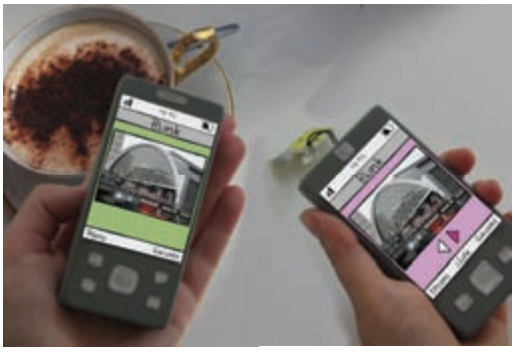
#1: Winking Memories for a Friend

Paula is on holiday and takes lots of pictures.

She wants to remember to show some of them to her friend Susan when she is back, so she winks her with the photos. Susan who's at work receives a Wink Alert – an indication, that Paula has some pictures that she wants to show her, next time they meet.

One week later, Paula is back in town and she and Susan meet up in their favourite café. They blink their phones and view the holiday photos together.

#2: Sharing Winked Images



Paula and Susan are at a café and have their phones blinked, in order to look at some photos together. Paula took them on her holiday and winked them to Susan. Their friend Nora passes by and decides to join them for coffee. Paula invites her to the Blink session, so Nora can see the pictures on her phone as well. After the slideshow, Susan asks Paula whether she can keep a couple of the pictures. Paula is ok with that and copies them over to Susan's phone.

#3: Blinking Songs and Holding on to Winks

Nora and Susan meet on the train. Nora received some Winks from Susan on the weekend and is curious about what is now waiting for her. It turns out that Susan's been to a concert and took a lot of pictures that she wants to show to Nora.

But she hadn't just Winked her the photos, but also a song she had downloaded to her phone. As they blink their mobiles, they view the pictures and listen to the music together. Two stops later, Nora has to get off the train before having finished the song and seeing all the pictures. Susan therefore keeps the Winks for Nora, so they can finish the session later that night.

#4: Spontaneous Group Blinking

A group of six friends finish school for the day. Three of them go for food, while the other three go shopping for clothes, taking lots of pictures of each other as they try on different outfits.

They do not wink the pictures at the time, but when they meet the other girls a couple hours later, they blink their phones and do an instant photo sharing session.

5.2.3 Extended Use Cases

The concept is adapted to the following personas.

Rike, 14
Knows that her grandma is always happy to receive photos from her grandchildren. That's why she winks the photos she takes and blinks them onto a digital picture frame for her.
Blinking photos onto an external medium

Christina, 28
Uses Wink 'n' Blink to remind herself and colleagues of to-dos. Since she usually has many Winks for different people, her mobile phone indicates the Winks when she meets them.
Business context, organization tool, extension of reminder function, link to calendar

5.2.4 Feedback From Male Test Persons

In the following we present the main findings from the conceptual evaluation of the male test group.

Finding 1:
If people take pictures, they do sort them.

> *Yes, I do that – first taking lots of pictures and then sorting them afterwards (Peter, 51)*

> *The pictures I take with my phone always remain there, because I don't know how to get them off again. (Justin, 30)*

Finding 2:
Winking stimulates social bonds but also risks overload and high expectations.

> *The reminder function is a good idea. (Muaz, 15)*

> *If you rely too much on technology for being reminded, you'll be left alone once the technology fails. People tend to stop thinking and remembering things themselves. (Thomas, 40)*

Finding 3:
As a Blink interface, the participants preferred invisible or screen-based solutions, via stickers or infrared light with no extra object attached.

> *Girls have accessories hanging off their phones – boys don't. (Kilian, 15)*

Finding 4:
Sharing a screen and content with only one other person is an intimate activity. Blinking would be useful in groups of at least three people.

> *Having many monitors on one device is practical. (Peter, 51)*

> *I think this is a good system, linking media and contacts, and the streaming idea is interesting. The social aspect might get lost a bit, but maybe not. (Miguel, 27)*

***Insights** gained from Cultural Probes and workshop with 13 participants, aged 19 to 28.*

5.3 Me 'n' You: Special Status Messages for Different Contacts

Current Issues

With friends and contacts dispersed all over the country and all over the world, it gets harder to keep in touch as everyday life proceeds. Also, telling each person one-by-one about the same situation becomes a redundant and time-consuming exercise, with some people often being forgotten.

It is not only the information itself that makes friends feel connected. Much more important is the notion that you are still a part of the other one's world – even when you don't speak to each other very often. Additionally it seems to be more important to communicate with trusted friends and small groups than to a huge number of people.

5.3.1 Concept

Me 'n' You is a service that lets you stay up to date with contacts in your addressbook via small status entries. You can share your thoughts, situations or moods with others, and casually follow what other people are up to.

As some entries are only meant for certain people, contacts can be assigned to different Me 'n' You groups.

Having this service on the mobile phone, it's easy to update status entries during idle times, such as when waiting for the bus. These are important opportunities for contacting others, as we previously learned conducting user research with people from younger age groups.

5.3.2 Use Cases

#1: Share Me'n' You With People in Your Address Book

Martha doesn't always want to give everyone the same status message. Some entries are only meant for very dear friends. Therefore, she divides the 23 contacts into two groups: the Rubies and the Rocks.

The Rubies are her very close friends, who she wants to share more personal status messages with. They are sometimes even allowed to follow her location via GPS.

On the other hand, the Rocks are her more casual friends, so she only shares less personal Me 'n' You messages with them.

#2: Staying in Touch

Martha has moved to Berlin for her studies, and finally found a flat. As she could use help from anyone available, she sends messages out to both the Rubies and the Rocks: "Who will help me move on 13th?" This message simultaneously serves two purposes: recruiting helpers for Martha, and informing all her contacts that she will soon be moving into a new place.

#3: Shifting Contacts Between Groups

Martha misses her old friends. She sends "I miss u all" to the Rubies, who soon respond with text messages and calls, trying to make her feel better.

Only her friend Susan nags that it's Martha's own fault – why did she have to move so far away ...

From this moment, since Martha doesn't feel like sharing personal feelings with Susan anymore, she shifts Susan to the Rockies group.

#4: Responding to Me 'n' Yous

After a while, Martha gets to know more and more people in Berlin but still likes to follow what her old friends are up to.

She's browsing her addressbook for new Me 'n' You messages, which are highlighted.

She finds out that Patrick's just about to run the Shanghai marathon and sends a response to his entry with an SMS.

5.3.3 Extended Use Cases

The concept is adapted to the following personas:

Nora, 34
Has only little time to search actively for job postings. That's why she's happy about the news posting from the "single parent" group by which she is informed regularly about events and new postings from the job agency.
Newsletter, community concept

Monika, 51
She developed a new form of communication with her friends in which they exchange little personal jokes every now and then. She also shares small intimate moments like this with her daughters. She prefers to use icons, since typing on the small device is too tedious for her. She also doesn't have to worry about time shifts since Sarah can read the message whenever she wants.
Time-independent communication without words

5.3.4 Feedback From Male Test Persons

In the following we present the main findings from the conceptual evaluation of the male test group.

Finding 1:
Status messages are not really used by this group of participants. They generally value a more reflective and deeper form of communication.

> *I use Twitter but don't tell everything to everyone. In Skype I add links as a mood message. I understand people who use this excessively but when I'm away, I'm really away – "out of sight out of mind". If I go abroad I really want to make the experience autarchically. Some of my friends have the expectation of receiving news and I've had some problems with that in the past. (Miguel, 27)*

> *I write a letter two times a year, where I tell everything that happened and take time formulating the stories. Then I'm also in touch with some people via Skype who also know more about what's going on. (Justin, 30)*

Finding 2:
Since status messages are not considered an essential part of daily communication, the men of this feedback group wouldn't consider using a Me'n'You service or clustering the contacts of their phone address book

> *That's a lot of admin work, which only makes sense if you have really many contacts. (Peter, 51)*

> *I always get mailings from a group of regulars (Stammtisch Gruppe) even though I don't live there anymore. That's really annoying. I'd rather use something like this on the Internet and not on my mobile. (Sebastian, 28)*

I like it when products not only communicate on a functional level, but also on a symbolic one.

I keep having a bad conscience, for there are always friends I should really call up. When I have a free evening I do contact most of them.

A friend of mine once recorded a CD for me with tracks that expressed how he felt.

I moved to Hamburg for my new job. I spend hours staying in touch with my friends back in Berlin. On the one hand, this is stressful, but on the other hand I´m afraid of losing my strong connection to them.

I make a lot of post-its at work to remind myself of things I need to do.

***Insights** gained from Cultural Probes and workshop with 13 participants, aged 19 to 28.*

5.4 WeWall: Creating a Shared Background on Mobile Phones Together

Current Issues

Staying in contact with a person via mobile phone means deciding between SMS and a call. There is no "in between"– something more subtle than a call and something more emotive and less prosaic than an SMS.

An SMS is not a perfect tool for conveying nuance, and can promote misunderstandings.

MMS is currently the main way to communicate through pictures. However, it's hard to have an ongoing communication evolve through MMS.

We seek a new kind of communication that is rather continuous and allows for a more personal tone.

5.4.1 Concept

A WeWall is a shared message board that lives on idle screens and background screens of mobile phones. It is shared between two or more people – for example a couple or a small group of friends.

It is easy to add a new entry to a WeWall, so everyone in the group can be updated at a quick glance with news, to-dos, or emotive messages.

Or it can simply be used for decorating their shared phone backgrounds. WeWall is a visual messaging platform that can be used either ambiently or more practically.

It's different to MMS or SMS as it's an ever-overlaid board of notes and images an drawings.

WeWall is a very personal and exclusive space that requires a trusting relationship between members of the group, and therefore manifests a feeling of belonging.

How it works

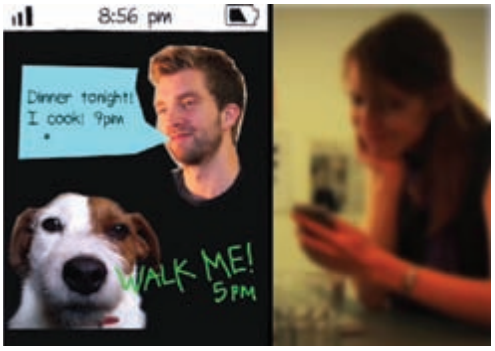
Anyone who is sharing the WeWall can easily add a photo, type a message or make a drawing. The items are placed on top of each other and overlay just like on traditional message boards.

The phones that share the WeWall get automatically updated.

WeWalls can be used as mood or message boards on the background and idle screens of mobile phones As a WeWall image is being created, people can grab and save the image whenever they like.

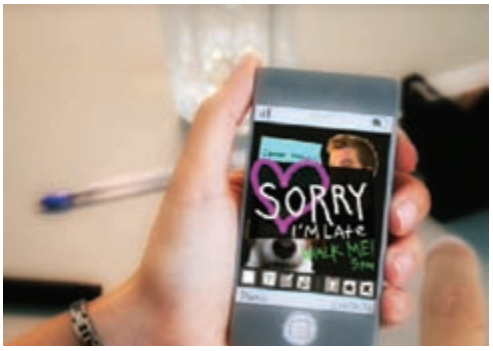
5.4.2 Use Cases

#1: A WeWall as an Organizing Tool



Judy and John are a hard working couple. They only have a limited time that they can spend together. So they like using the WeWall as an organisational tool to arrange their everyday to-dos, such as walking the dog, buying food or arranging their evenings.

#2: A WeWall as Emo-Transmitter

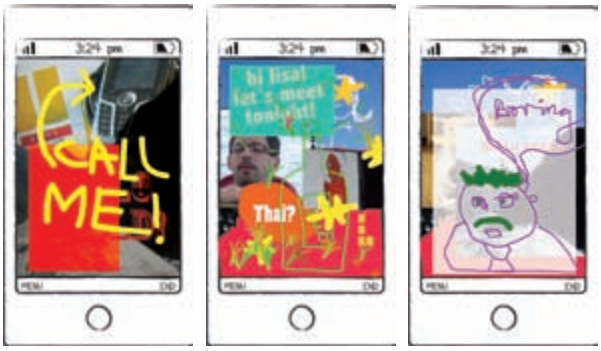


Sometimes Judy and John also make drawings on their WeWall for each other, or hang pictures there that have a special meaning (especially in stressful times or while one of them is away ...). It simply means they're thinking of each other without calling and talking directly.

#3: A WeWall as News Channel

When there's something exciting happening, Rebecca, Kim and Laura share the news on their WeWall. This way they can be sure the others will see it and can comment on it by writing, drawing or adding a photo.

#4: Capturing and Saving a WeWall



Any time there's a WeWall display that they like, people can capture and save it, creating an archive of shared messages.

5.4.3 Extended Use Cases

The concept is adapted to the following personas.

Heike, 17
Has several WeWalls. Through the one that she shares with her father, she can, to some extent, be part of his new family as well, which is very important to her following the divorce of her parents. Currently her love life is also messy and she has to make sure that both her affairs will not find out about each other. That's why their WeWalls are deeply hidden within the structure of the phone.
Multiple WeWalls, hidden place in phone

Gudrun, 59
Uses the WeWall in her work context. For each project there's a CollectingWall where everything is saved that is relevant but doesn't have to be discussed immediately
Black board, collecting ideas

5.4.4 Feedback From Male Test Persons

In the following we present the main findings from the conceptual evaluation of the male test group.

Finding 1:
In relationships where children are present, men exchange to-dos with their partners through lists and SMS. In general messages remain more practical, men don't use SMS for emotional messaging as women do.

> *My girlfriend and I leave a lot of messages for each other, and she gives me a To-Do list every morning. We also keep updating each other during the day via SMS. (Justin, 30)*

> *I hardly send emoticons or emotional messages via SMS. Maybe a smiley, but that's it. (Miguel, 27)*

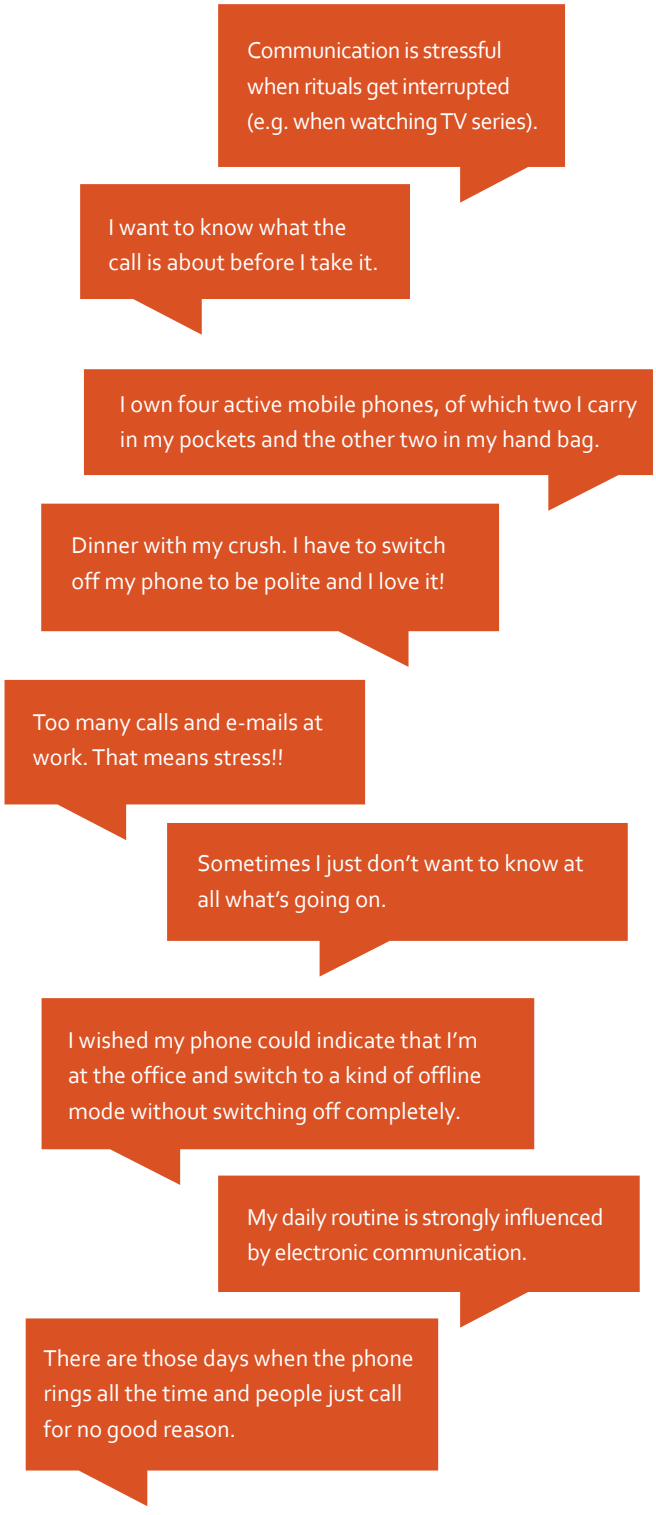
Finding 2:
Despite the clear lack of interest in sending emotional messages via SMS, the participants genuinely appreciated the WeWall, either for reasons of creative stimulation, fun, practical use or its casual nature.

> *This could be good in a partnership, but also in a project group I find the aspect of updating each other good. (Jakub, 25)*

> *I'd need to receive an alert that something has changed. (Peter, 51)*

Finding 3:
There's one exception to *finding 2:*

> *I don't see the added value. (Peter, 51)*



***Insights** gained from Cultural Probes and workshop with 13 participants, aged 19 to 28.*

5.5 Tactful Calling: A Discreet Way for Signaling the Urgency and Duration of a Call

Current Issues

When women enter this age group and start their professional careers, they begin to use electronic communication for work related issues and not just for private reasons. Often work communication becomes so voluminous that private conversations get pushed to the periphery. Even though too many calls and SMS messages can be stressinducing, women still always want to be reachable, will always answer the phone, and will not consider switching off their mobiles.

In particular, calls during inconvenient situations, late hours or with undisclosed numbers are seen as stressful and a violation of the private sphere. And for reasons such as this, the wish to control incoming calls is very strong.

5.5.1 Concept

Tactful Calling is an application on the mobile phone that let's callers indicate the urgency of their call as well as the time frame they would like to have for the conversation.

5.5.2 Use Cases

#1: Now and Short

Robert is once again lost between the food options at the supermarket. He knows that Hannah is still very busy at work but he can't decide whether to get a Quiche for dinner or fresh Tortellini. He calls Hannah and indicates that he wants an urgent but short conversation.

#2: Soon and Long

Martina just found a new love called Mario, and now being all alone at home she's going crazy, not knowing where to put her excitement. She calls her friend Yukiko to talk to her about it. But only if Yukiko is relaxed and not in some situation like on a train during rush hour.

She sets Tactful Calling to "urgent" and "long time frame" and hopes that she'll pick up.

#3: Anytime

It's time for another alumni reunion soon and Catherine wants to see if Jackie will go to the event as well. She calls her up, however indicating that it's not very important to talk right away, and would need a medium amount of time.

Jackie is actually right at that moment at the car mechanics with the two children driving her crazy, so she doesn't answer immediately as she can see it's not as important.

Initial user interface sketch

5.5.3 Extended Use Cases

This concept is adapted to the following personas.

Zoya, 16

Zoya and her friends are using Tactful Calling to communicate secretly in school.

They developed their own sign language. For example, ringing twice with „now & short" means: let´s meet at the kiosk in the next break! If they need a more detailed info they use the subject line of Tactful Calling. It is shorter, but cheaper than a standard text message.

Non-verbal communication, coding, Subject line

Anni, 43

Tactful Calling is very helpful for Annie's business meetings. She sets up her phone so that anyone who is not calling urgently automatically receives a message that she is currently busy and will call back as soon as possible.

Management, Time Out

5.5.4 Feedback from Male Test Persons

In the following we present the main findings from the conceptual evaluation of the male test group.

Finding 1:

When asked about answering calls in inconvenient situations, we found that each of the participants has his own strategy for dealing with it.

> *I find the time aspect of how long the call will last more crucial than the significance of the call. (Jakub, 25)*

> *I use my voice mail a lot, otherwise I just pick up. First I need to see who it is, then I can estimate how important it probably is. (Sebastian, 28)*

Finding 2:

Tactful Calling would be very relevant in both young and middle-aged groups. Older men seem to tend to make calls only when there's a practical need and keep it short then anyway.

> *In our generation we also make a lot of phone calls that are not exactly important – but just for exchanging news. (Kilian, 15)*

> *This would be a great function, because hanging up on people usually leads to a communication crisis. (Sebastian, 28)*

Finding 3:

There should be a clear scale for estimated significance and duration.

> *The subject line could be via voice input. (Kilian, 15)*

> *If the context is missing, I might have a different feeling of what's important than the other person. (Sebastian, 28)*

***Insights** gained from Cultural Probes and workshop with 13 participants, aged 19 to 28.*

5.6 Q 'n' Thru: A Way to Manage Contacts and Avoid Messing with Numbers

Current Issues

The current system of phone numbers being a direct line to a particular person has brought many fantastic possibilities, but also some mishaps. Being available to anyone at anytime can cause uncomfortable or even stressful situations.

From the participants of both test groups we learned that people now often first verify who is calling, before they decide whether they pick up or not. Receiving calls from unknown numbers leaves people feeling uncertain: who was the person? Should I call back? Was it something important? Mostly people do not call back an unidentified number.

Further, many people don't remember their own numbers and have to keep looking them up.

Today, where giving away one's personal mobile phone number in any social situation, but also in online communities, i.e. an enormous crowd of potential callers, it needs a rethinking of direct access and of personal mobile identification.

5.6.1 Concept

An ID in place of a number

"Hold on, I have to look up my phone number" – a common situation when people give away their mobile phone number. Rather than abstract numbers, people will have nicknames as a personal identifier. It is commonly used in instant messaging, urls, and online gaming identities. Why not as a phone contact as well?

In the Q'n'Thru concept, it's also easy to generate a temporary ID. This will come in handy when leaving a contact online or in other public situations.

Contacts with different permissions

Q'n'Thru is about making a distinction between two types of contacts. In the THRU group are mainly people who you like to talk to on the phone, just as you do now. However, there are some people who you want or need to have as your contacts, but you prefer not talking to directly. (E.g. your landlord, applicants for flat sharing, ex-boyfriends...) These contacts would be assigned to your Q group. Whenever they call, they will be directed to your voicemail by default, or they can send a text message.

Unknown callers are automatically treated just as Q contacts. Naturally, settings and permissions can be altered at any time for any contact.

5.6.2 Use Cases

#1: Exchanging an ID

Margaret meets George at the train station – they haven't seen each other in ages. Then George has to run for his train and shouts: "Call me, I'm George78!"

This will be an easy ID for Margaret to remember and search for his contact.

#2: Saving a Contact as Either Q or Thru

Margaret finds "George78". Since she's a first time caller, she only can leave a message on George's voice mail. As at first she wants to find out how George will respond to her message, she saves him as George S. in her Q group.

#3: Changing a Status From Q to Thru

George sends a lovely SMS to Margaret. That makes her decide that she wants to be in touch with him more directly, so she upgrades his contact from Q to Thru. Now he can call her anytime and reach her directly.

#4: Creating a temporary ID

Margaret wants to offer two places in her car on carsharing.org. She generates a temporary ID that only works for this purpose. Once she finds two fellow passengers, she disables this ID.

5.6.3 Extended Use Cases

The concept is adapted to the following personas.

Anni, 41
Uses the service particularly for coordinating her business contacts. If she's in London, for example, her customers there are automatically shifted to the Thru-Group. Her other clients, such as in New Delhi, are informed by voice mail that she's in another time zone now and should leave a message.
Automatic settings by location, time zone message

Gudrun, 59
Gudrun's children are always permitted to get through to her directly. Otherwise she has strictly separated her work and private contacts. During working hours only her kids and business contacts can get through, and in the evenings and on weekends only her friends can call. The business-ID is saved with an extra security code, so that if she looses her phone, her contacts will be hidden.
Hierarchies, security settings

5.6.4 Feedback From Male Test Persons

In the following we present the main findings from the conceptual evaluation of the male test group.

Finding 1:
Just like women, men feel awkward when asked directly for the mobile phone number and rather give email address where contact can more easily be controlled.

> *Such a situation is always embarrassing. I rather give my email address then or think up excuses, like "I will change to a new phone contract soon". (Kilian, 15)*

> *I have two mobile phones and four numbers. These represent important/not-important private and important/not-important business contacts. I also have four email addresses and forwarding services. (Thomas, 40)*

Finding 2:
IDs would be interesting to have, as long as names could stay simple.

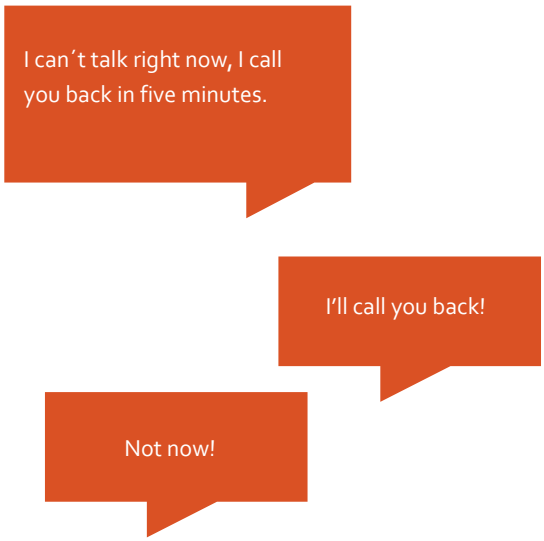
> *The ID concept is quite good, just like in chat culture. The question is whether it's practical with so many participants – at some point the names will also become difficult to remember. I would have then an ID depending on the use, no temporary IDs. (Sebastian, 28)*

> *If there's a good search function with intelligent names it would save a lot of time and make things a lot easier. (Thomas, 40)*

Finding 3:
Feedback on keeping contacts in waiting position was regarded with mixed feelings, depending on personal social and work situations.

> *What do I do if I want to talk to someone urgently and I'm in his Q group? (Kilian, 15)*

> *A business card with a first temporary number would be cool, and then giving the real one later. (Jakub, 25)*



5.7 Call Shifter: A Way to Manage Incoming Calls in Inconvenient Situations

Current Issues

While queueing at the supermarket checkout, squeezing inside an overcrowded bus, changing your baby or driving a car... our mobile phones might ring at any given time, 24 hours a day, 7 days a week. And we always want to answer them! In a world of constant availability, it is almost impossible not to answer a phone call, even if it's inconvenient. Denying a call makes one feel rude, as there is no way to hang up politely. Therefore a ‚hello' may turn snappy.

5.7.1 Concept

Instead of answering an incoming call when busy, Call Shifter allows the callee to inform the caller that he will be called back, or should try again after a certain period of time.

The main feature of the Call Shifter interface is a slider/controller that appears when a call comes in.

Besides answering the call directly, one can now set the time frame for how long the call is postponed, indicating a good time in the future to contact each other.

For example, this can be "asap", several hours (Please call back in two hours), or even days (Sorry, these days are so busy, I'll call you back when it's calmer again).

Either caller or callee can be reminded to get back in touch again after this period of time.

***Insights** gained from Cultural Probes and workshop with 13 participants, aged 30 to 45.*

5.7.2 Use Cases

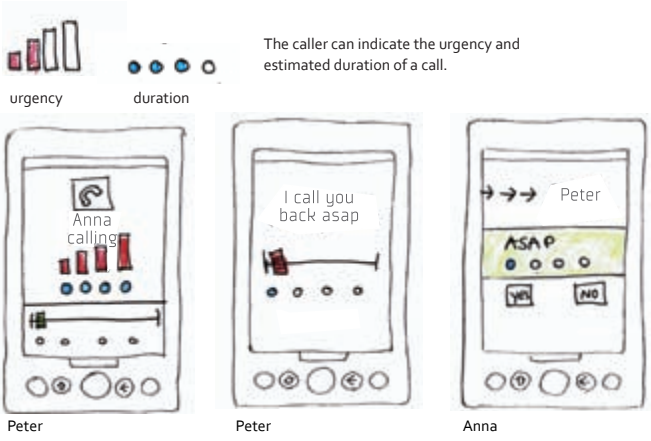
#1: Please Call Again

Anna needs to reach Peter. But he has no time to answer the call right now. He moves the slider to 20 minutes. After 20 minutes Anna will be reminded to call Peter again.

#2: I'll Call You Back

Anna needs to reach Peter. Peter has no time to answer the call right now. He informs Anna that he will call her back in 2 hours. After 2h Peter will be reminded to call Anna.

#3: Tactful Calling & I'll Call You Back



Anna is calling Peter. She needs to talk to him badly, but only when he really has the time. Peter is too busy for a long conversation (which may well last three hours when talking to Anna). He lets her know that he can call her back right away, but has only little time.

Anna can now decide whether she wants the callback to last for a short or long time.

5.7.3 Extended Use Cases

The concept is adapted to the following personas.

Zoya, 16
Often shifts her mom away. However, her mom has set Zoya's shifter so that after she calls three times, Zoya will have to answer. That's mean, but as long as the mother pays the bill, she'll be in charge.
Settings for blocking

Monika, 51
Finds that her mobile phone is far too fiddly and therefore uses the CallShifter-wheel. She likes the tactile clicking of the wheel that indicates to her "how far" she's shifting the call.
Tactile Feedback, fine tuning

5.7.4 Feedback From Male Test Persons

In the following we present the main findings from the conceptual evaluation of the male test group.

Finding 1:
From our Feedback sessions and observations of female users, we found that women always answer the phone, no matter what. Men seem to be more casual about that.

> *Hanging up is impolite. (Kilian, 15; Muaz, 15; Peter, 51)*

> *If it's inconvenient, I hang up on people. I've told everyone that it's nothing personal – but some people still demand explanations. (Thomas, 40)*

Finding 2:
Receiving CallShifts would be okay. Reminders should be for the callers.

> *It's good to have some feedback, at least you know that the one you called is reacting. (Jakub, 25)*

> *The one who's calling should be reminded. I don't want to call back all these people. (Kilian, 15)*

Finding 3:
The interface should be as simple as possible.

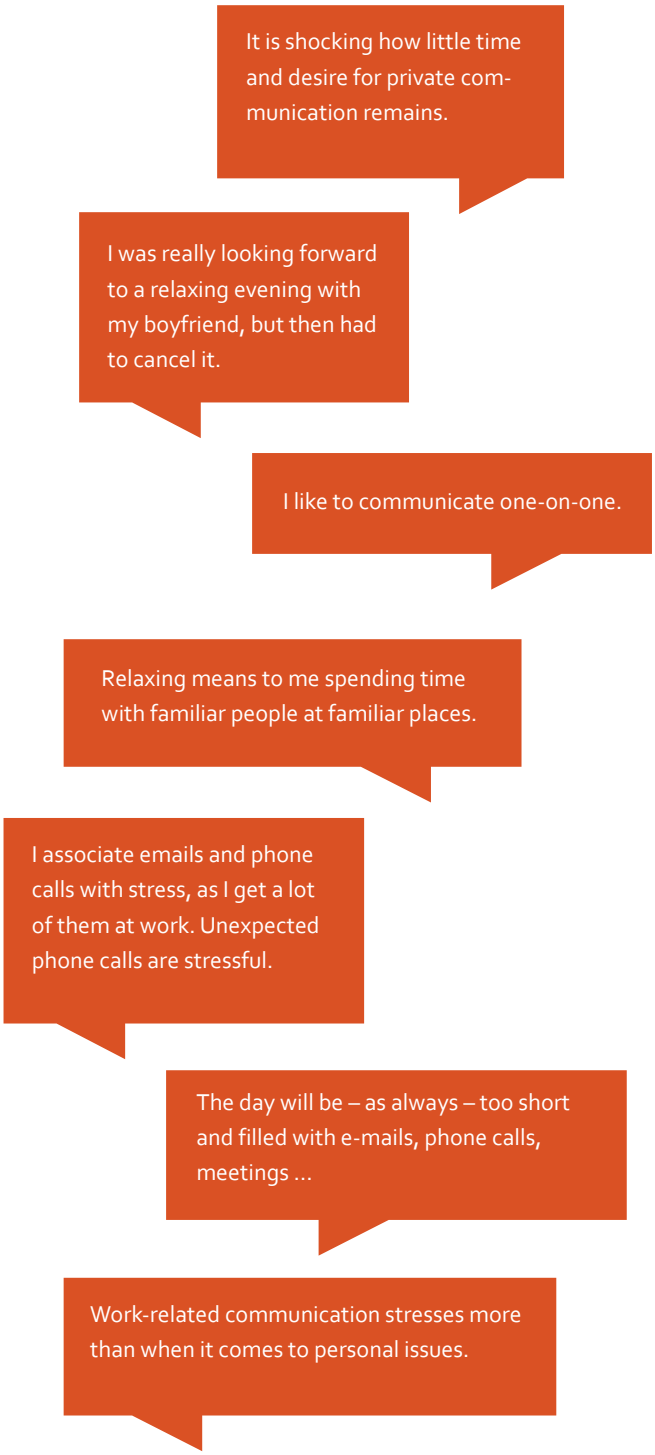
> *The layout should not be complicated. The background should just glow red for example if it's important – so not having extra text to read. (Jakub, 25)*

> *The slider would be better for setting the time. (Kilian, 15)*

Finding 4:
Generally, the concept was much appreciated.

> *This would be the dream tool for time-management-centric people. (Thomas, 40)*

> *I'd definitely use this. I hate hanging up on people. (Justin, 30)*



***Insights** gained from Cultural Probes and workshop with 13 participants, aged 29 to 45.*

5.8 Here & Now: Taking Spontaneous Action During Freetime

Current Issues

As we learned from our participants, most women between the ages of 30 and 45 plan each day carefully with to-do lists, calendars and notes, and like to use their computers and mobile phones for doing so.

However, many times these plans need to be rearranged, especially when children are involved. Therefore the women need to be very flexible in the oganisation of their daily planning. At the same time, unorganised leisure time gets more and more limited. Even though face-to-face meetings are highly important to them, it is difficult to fit them into daily-life organisation.

5.8.1 Concept

Here & Now is a service that helps you to set up spontaneous meetings with nearby friends or colleagues in unexpected spare-time via small status entries on your mobile phone.

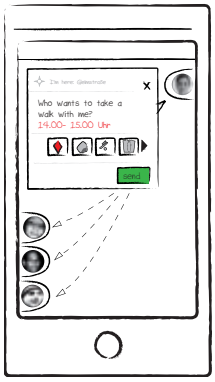
It also gives access to local services that offer spontaneous appointments, such as hairdressers, doctors or mechanics.

Here & Now works as an extension to the Me 'n' You concept, where people in the addressbook are assigned to different groups and can receive different status messages.

Thus one can decide easily which group members should be contacted when sharing a Here & Now status message.

5.8.2 Use Cases

#1: Meeting up spontaneously



Susanne has a full day of appointments waiting for her. On the way to her lunch meeting, she gets a call that the meeting is cancelled. The next appointment is in 90 minutes, not enough time to return to the office.

She opens the Here & Now App. This automatically identifies her location. She enters: "You got time? Who wants to go for a walk?" and sets the time to 2–3 pm.

She chooses the group she wants to send the message to.

Two minutes later she recieves an SMS answer from her friend Nina: "I will! See you in ten minutes."

Both, Susan and Nina, are very happy to see each other so spontaneously. They had tried to meet up several times over the past months, but always one of them had to cancel in the end.

Answering: New posts will be indicated and show up first when opening Here & Now. Answering to a post can be a call or an SMS.

#2: Leaving a Text or a Voice Message

Pia and her 5 year old son are on the way to his kids gymnastics class. On the entrance door they find a note: "Kids gymnastic is cancelled for today due to illness."

David immediatly starts crying, he was so looking forward to the course and playing with his friends, specially with Mario, who is such a fast runner.

Pia opens Here & Now and chooses the group "Gym-Daniel".

She posts: "Alternative gym-course around the corner on the playground. Daniel and I are looking forward to seeing you there."

#3: Scheduling With Colleagues

Hanna's conference call got cancelled a the last minute and so she has an unexpected open spot in her timetable. She now has an hour until the next meeting.

Her to-do list is replete with items, however they all will take more time than an hour to process, except for the short feedback sessions with various work groups. If she could move one or two of them forward, she might be home early enough for dinner tonight.

She opens Here & Now and chooses the group "Company internal". She posts: "One hour time now for short feedback sessions."

After ten minutes she gets an answer in a pop-up window on her desktop from her colleague Mr. Friedrich: "We will take the first twenty minutes."

Colleague Schmitt adds "we will take the following twenty."

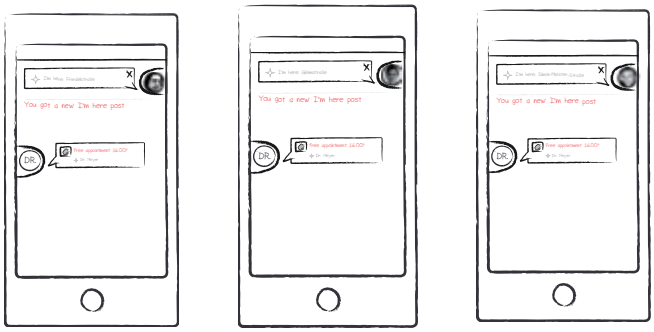
#4: Free service appointments

Paula stops at the school to pick up her son Max, but he doesn't show up. Suddenly she remembers that he has his final rehearsal for the Christmas performance this afternoon. That gives her two hours.

She takes a deep breath, what to do with the unexpected extra time? She could go to the supermarket, but then all the groceries will have to survive in the car. If she had her swimsuit, she would have gone for a swim in the outdoor pool next door.

Paula opens Here & Now and chooses the service option. Free hairdresser appointments with time and price range.
Her request is sent immediatly to the hairdresser shops with a free appointment close to her geographic position.
She gets three answers, linked with a rating system of former customers and confirms one of them.

#5: Waiting List Shortcuts



Miss Berger works as a medical secretary for a neurologist, who only takes care of private patients. She is in charge of scheduling appointments.

Every morning, she posts short-notice appointments on the Here & Now account of the doctor.

The available spots then get sent to the patients who had subscribed to the waitinglist.

When a patient takes one of them, Miss Berger receives a confirmation, and the option disapears from the list.

5.8.3 Extended Use Cases

The concept is adapted to the following personas.

Zoya, 16

For Zoya, the Here & Now App is very practical since she's often out of credit. As her friends post a lot, she's always well informed about where they are and who's doing what.

Passive use

Christa, 63

Uses Here & Now with her dog walking group. Whenever a member wants to go for a walk, he or she can ask for company. Or they use the service to find someone to take their dog along.

Community, Network

5.8.4 Feedback From Male Test Persons

In the following we present the main findings from the conceptual evaluation of the male test group.

Finding 1:
Having spontaneous free time is an issue some men in our feedback group face regularly. About half of them try to reach other people in such a situation.

> *I've had this situation lately and then called around for people to meet up. But no one had time. (Jakub, 25)*

> *I have that situation quite regularly. Then I call different people and look for a café with WLAN. (Justin, 30)*

Finding 2:
Although status messages are not very popular with men, having a status message service such as Here 'n' Now to arrange spontaneous free time for meeting friends would be interesting for most participants of our feedback group, irrespective of age.

> *We make our evening arrangements at school. It would be handy though having an easy way to notify everyone if something changes spontaneously. (Kilian, 15; Muaz, 15)*

> *What happens if many people call back? Then you'll have an awkward situation. (Jakub, 25)*

Finding 3:
The feedback very clearly showed that including third parties in the Here 'n' Now service would be highly appreciated.

> *The doctor-use case is the most interesting one. (Everyone)*

> *For business people it would be interesting anyway since you could make use of time gaps. (Thomas, 40)*

[Typical stressful situation] School is calling: kid is sick. Organising to pick her up.

I'm always somewhat nervous when I'm not reachable on my phone, that I might get an important call from my children, needing my help.

If I forgot my phone I won't get informed if anything's happened with my kid.

Typical situation: The phone is ringing; I see it's my son. Maybe something bad happened! But then everything's fine. Whew.

I always answer the phone if it's the kids – something might have happened.

__Insights__ gained from Cultural Probes and workshop with 13 participants, aged 29 to 45.

5.9 Family Wheel: Taking Spontaneous Action During Freetime

Current Issues

For many people, asking for help feels embarrassing or intrusive. Often friends or family members would jump in and help take care of things, but it's cumbersome trying to reach them. So people tend to take care of everything themselves, and end up stressing out.

Based on our observations of the age group 30–45 we found that it's still even now mostly the mothers who organise the family.

Even if husbands are more involved in household chores, and if there are supportive grandparents, neighbours, and babysitters, it is sometimes hard to coordinate all the activities and people.

Having to call everyone to just ask a small favour might become more tedious than actually doing the task oneself, as well as just informing the others that a special task has been settled.

5.9.1 Concept

The FamilyWheel functions like a shared voicemail and message board among a group of closely connected people. It is particularly relevant for organising everyday chores, unforseen events or small tasks, and helps distribute these democratically.

Generally, audio or text messages can be left for the whole group and everyone available is informed that a new request has arrived. So members who have time or are at a convenient location can handle the request.

If the FamilyWheel is contacted by a regular phone call, then members are called one by one until someone picks up. This is especially convenient when young children are part of the system: they can call the family through a dedicated device and can be sure to reach somebody.

Members can naturally set their availability individually, and not receive messages while they are busy or away. Also, before someone sends a particular message, he can take members out of the loop, in case the request wouldn't be appropriate – for example not sending to Ralph if the request is "pick up the cake for Ralph's surprise party".

5.9.2 Use Cases

#1: Spontaneous Organisation

Little Bob gets sick and his mom Rebecca has to take him quickly to the doctor, but she needs a baby sitter for Charlie!

She opens the FamilyWheel, where she can already see that her boyfriend is currently busy and therefore deactivated. So the Wheel skips this contact and first calls grandma Elma. But grandma Elma is out on the sea and cannot take care of Charlie right now. So the Wheel calls further. Mrs. Hulbert, the neighbour turns out to have some spare time and she comes running over.

#2: Leaving a Text or A Voice Message

Besides calling, members of the FamilyWheel can also be reached via text or voice messages. Grandma Elma for instance forgot to pick up her meds at the pharmacy.

She leaves a voice message asking whether anyone could pick it up for her, and sets a timer on it. So the message gets automatically deleted at 7pm, since that's when the pharmacy closes.

Elma's grandson Luis is out when he hears her message. He replies that he'll pick it up later.

#3: Adding a FamilyWheel Member

The members in the wheel can be changed anytime. That is practical, because for example, aunt Jane has just arrived in town and would like to help this week whenever she can.

So Rebecca places her on position 1 of the FamilyWheel.

#4: The FamilyWheel Doughnut

Little Bob often walks home from school by himself, but sometimes he's too frightened – especially when there's a thunderstorm. For such occasions he has the FamilyWheel Doughnut with him. He only needs to squeeze it and the wheel calls one member after the other, until one of them picks up and can take care of him.

That's not only convenient for Bob, but also for his mum – she's always afraid that her kids might not be able to reach her immediately, like if she happened to be in a cell-phone dead zone when something comes up.

The FamilyWheel is flexible to use – one might have even several wheels for different networks. It provides a discreet, conve-

nient, and spontaneous way to ask for help and lend a hand. And because the wheel reinforces mutual presence, it strengthens the bonds of the members in the network.

5.9.3 Extended Use Cases

The concept is adapted to the following personas.

Christa, 63
Has an external Wheel as an emergency button which she always carries with her. In case something happens, the Wheel first calls her partner Manny, then her son and finally the emergency doctor.
Emergency Wheel

Rike, 14
Uses the Family Wheel to inform the parents of the children that she babysits if she suddenly has time. She's also a member of the babysitter network and will automatically be placed on public babysitting wheels.
Subtle offer, Public Wheel Services

5.9.4 Feedback From Male Test Persons

In the following we present the main findings from the conceptual evaluation of the male test group.

Finding 1:
Not only mothers, but also men often get overwhelmed by workloads, demand for flexibility and multi-tasking. This is true for those with children and without.

> *This is my daily life – I know this situation very well and always have to rearrange things. (Justin, 30)*

> *It depends – for my job I have to rearrange very often. I also have a 48 hour emergency hotline for some clients and have to be very flexible for them. Depending on the situation I handle it differently, improvising, calling people, etc. (Thomas, 40)*

Finding 2:
Just like in the feedback of women, men would like to have several wheels for different groups. It is practical as long as their Wheels would be flexible and adjustable to suit different situations.

> *It's also a matter of the kind of issue – for different cases different wheels would be needed, as well as info regarding the other people's location. (Peter, 51)*

> *I don't think it's reasonable if something has to be taken care of within a short period of time. Often you need the info instantly whether someone takes care of it or not. (Kilian, 15)*

Finding 3:
The men of this group see the Family Wheel as a support in strengthening social responsibility in local communities and regard this as a major benefit.

> *This is a great concept - it's fantastic as it strengthens connections between people. Distributing work would be so helpful. I just might forget to re-activate myself again in the Wheel. (Miguel, 27)*

> *It's an active way and much more honest than saying "oh, if you need me, I'll be there for you" – that's often just a phrase. (Justin, 30)*

Finding 4:
The Family Wheel could be relevant for work groups.

> *Could be also interesting for logistics companies. (Thomas, 40)*

> *As a musician you're always on call, so a "musician-wheel" could make sense there. (Jakub, 25)*

I make notes to myself of who I want to ask what.

The reminder function of the calendar is most important.

At the office I work a lot with post-its so I can remember what I need to do, or see at a glance what's inside a folder.

I practice important phone calls before I make them.

5.10 Memo Call: Book and Remember Them Upon Call

Current Issues

Not only women of this age group, but most anyone likes to remember things they want to tell or share with their contacts.

But up to now, making notes relating to people takes place either in the analog world, or on other platforms (PC). Often these notes aren't important enough in themselves to merit and extra phone call or message. And some things require following up in person.

5.10.1 Concept

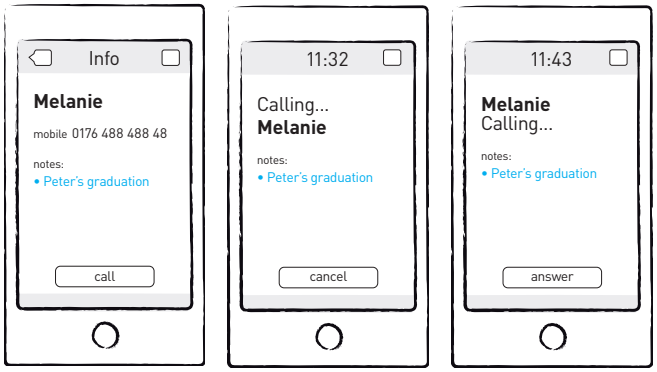
With MemoCall, notes and calendar entries are linked to the contacts on the mobile phone's address book.

As a contact is called (or vice versa) the entry is displayed immediately, so even before talking to a person one can see at a glance if there's something that needs to be mentioned.

Insights *gained from Cultural Probes and workshop with 15 participants, aged 50 to 65.*

5.10.2 Use Cases

#1: Linking Contacts with Notes

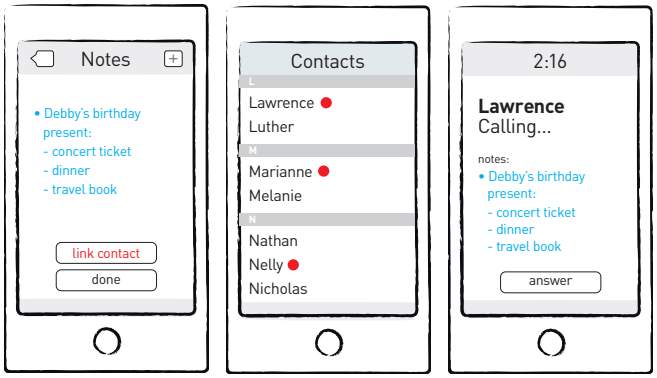


Melanie's son Peter will have his graduation soon and Linda wants to remember to ask her about it, next time they talk.

So she makes a note on her phone and links it with Melanie's contact info.

When she's calling Melanie – or Melanie's calling her – the note will be displayed so she will be immediately reminded about it.

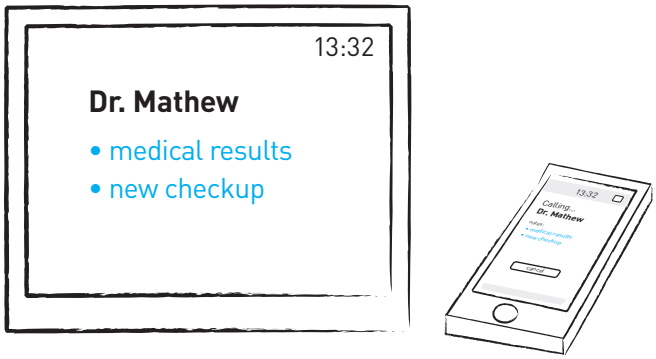
#2: Linking Notes with Contacts



Soon it will be Debby's birthday and Linda, together with her friends, wants to arrange a nice present. She collects ideas for a gift and links the notes with her friends' contacts.

So whenever she's talking to one of them on the phone, she will be reminded about the ideas and can discuss them.

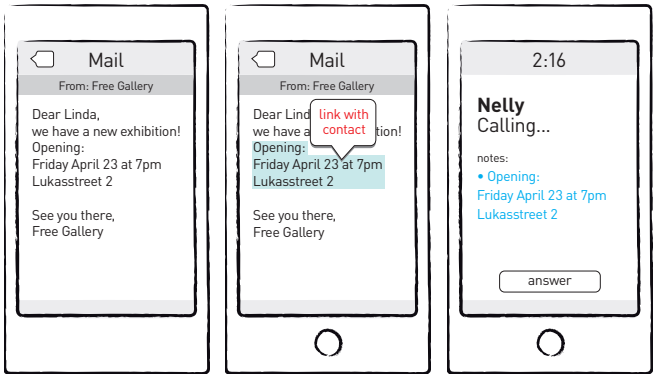
#3: MemoCall Display



Linda's mother Teresa also uses the MemoCall service on her home phone. She has a larger display connected with the phone, so she can easily read the notes she has made.

So she's no longer afraid she'll forget to mention things she's been wanting talk about – both with friends and when making calls to administrative offices, banks, lawyers etc.

#4: Email Content as Note, Linked to a Contact



Linda has received an invitation to an opening via email. She wants to tell Nelly about it and convince her to come along.

She marks the main info from the mail and links it to Nelly's contact. She will call her up anyway sometime soon and wants to make sure she won't forget mentioning it.

5.10.3 Extended Use Cases

The concept is adapted to the following personas.

Anni, 41
Anni uses Memo Call on the go, as well as for making notes for her colleagues at the office. She reminds them to mention certain things when talking to clients and transmits those notes on their systems.
Forwarding, Organization

Zoya, 16
Zoya uses the "making notes visible" option, so her friends can see right away what things she doesn't want to forget talking about.

It's always a pain for Zoya to remind her friend Lizzy about the money that she needs back from her. Now when Lizzy is calling she can see the note already and mention it herself.
Subtle Notification, Public Note

5.10.4 Feedback From Male Test Persons

In the following we present the main findings from the conceptual evaluation of the male test group.

Finding 1:
The situation of reminding others of promises and chores is familiar to men, for instance to finally return a DVD that's been lent.

> *I know this situation, forgetting to remind people of stuff. (Kilian, 15)*

> *Who doesn't know this situation! (Peter, 51)*

Finding 2:
A MemoCall service could work for private use but would be relevant in particular for business contexts.

> *Would be great for both, private and business use. An individual small-talk helper, especially when it takes longer periods for people to get back to you. If you have to type a lot it might be a pain. Therefore some voice controlled hands-free version would be good as well. (Thomas, 41)*

Finding 3:
Having a reminder would be practical – as long as it's easy to manage.

> *It's like a note in your calendar – you just synchronise it with your mobile. (Jakub, 25)*

> *It also takes time to maintain such a thing. So not sure I'd use it really. (Peter, 51)*

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Project Partners

Deutsche Telekom Laboratories

The Deutsche Telekom Laboratories are the central research and development unit of the company. Organizationally, Telekom Laboratories belongs to the central Product and Innovation division of Deutsche Telekom. It is simultaneously a scientific institute organized under private law and associated with the Technische Universität Berlin (TU Berlin). This concept promotes interaction between science and enterprise. Currently, more than 300 experts and researchers work in the Laboratories: among them 125 Telekom employees, 65 postdoctoral staff and around 80 postgraduates, research students and students from all over the world. They collaborate closely with business and international research establishments to engineer innovative solutions for simpler, faster and better communications.

In 2005, Gesche Joost joined the Deutsche Telekom Laboratories and established Design Research as an additional part of the interdisciplinary research portfolio of the institute.

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EAF | Europäische Akademie für Frauen in Politik und Wirtschaft Berlin e.V.

GENDER & DIVERSITY
in Innovationsprozessen

The EAF is an independent and non-profit organization in Berlin. We promote and work for a society where women and men can live their potentials in all areas of life.

The EAF combines designated scientific expertise with long-standing experience in providing advisory services and professional development. With our innovative career building programmes the EAF advances female future leaders and supports women and men in their career planning and reconciliation of professional career and family life. Since 2003 the EAF has conducted two research projects, which aimed to integrate gender and diversity in innovation processes of industrial R&D. In addition to the research expertise the EAF consults clients in business and politics in terms of gender equality, innovation and diversity as well as work-life-balance.

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IxDS Interaction Design Studios GmbH

IxDS is a Berlin-based design research firm, specializing in the development of innovative interactive services as well as mobile and tangible interfaces.

Through previous work with T-Labs, IxDS had already come to a deep understanding of gender-focused design. For the G research project, IxDS employed a form of contemporary design practice which emphasizes the direct involvement of the participants in the creation, review, and testing of solutions. Building on thorough research, the IxDS Interaction Design Studios developed concepts for products and services to address the emergent needs and opportunities in mobile communicaton for women today.

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