ICT-214793

TA2

Together Anywhere, Together Anytime

Large Scale Integrating Project

ICT – Networked Media

D8.1 Evaluation plan

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Abstract

TA2 will develop systems and products with which users will interact and are intended to enable enjoyable sociable experiences that can be shared by groups of people in separate households. An understanding of user experience and of social communication is required. The experiences we seek to develop TA2 systems depend heavily on mediated communication, hence an understanding of mediated communication is required.

This document provides an innovative analysis of these distinct fields of research. This work is focused on communications between groups of people, whereas current theory on social communications often uses a psychological perspective based on the perspective of an individual.

The evaluation plan is based on further work on the UX framework and the technical development of TA2 demonstrators in 2009 and the beginning of 2010, placed in a context of human centred design.

Target audience

This deliverable describes critical issues for evaluating and designing TA2 services and is interesting for everybody who has a stake in togetherness related to use and development of innovative, interactive digital multimedia products. It is especially important for vision holders and technical integrators within the TA2 project.

Impressum

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Executive Summary

This report results from work carried out in the TA2 project work package "Best Practice and Evaluation". This evaluation plan reports on the current status of the evaluations within the project. The work reported describes progress towards developing a framework for assessing the User Experience (UX) of the (prototype) applications being developed with the project. The report also outlines the timetable and plans for the evaluations of the five prototype applications being developed in the project.

TA2 will develop (prototype) systems and products with which users will interact. Thus an understanding of User experience as it applies to ICT products is relevant. Further we know these prototype systems/products are intended to enable enjoyable sociable experiences that can be shared by groups of people in geographically separated households. Therefore an understanding of social communication is also required. Finally the experiences we seek to develop all depend heavily on mediated communication, hence an understanding of mediated communication is required.

This document provides an initial analysis of these distinct fields of research. Useful published work is cited but is often found to be insufficient for the purposes of this work. For example this work is focused on communications between groups of people, whereas current theory on social communications often uses a psychological perspective based on the perspective of an individual.

User evaluations currently focus heavily on pragmatic and cognitive aspects of the user experience whereas the applications, which TA2 is developing, are expected to depend strongly upon a combination of emotional and cognitive aspects such as the meaning a user ascribes to the product or service in terms of emotional value. In this work the value of TA2 applications will be strongly affected by the user's predispositions, the context of use pragmatic and aesthetic aspects of design and the meaning of the product in everyday life.

Thirdly the media naturalness theory will also need extending or adapting to help provide insights for group to group communications.

These assessments provide an 'ingredients list' for a user experience framework and highlight some missing ingredients that can only be added through detailed further work. The nature and structure of this work is highlighted in this report and a preliminary timetable is given that anticipates the development of a User Experience (UX) framework by the end of 2009.

Finally a preliminary evaluation plan for the TA2 demonstrators is developed. This evaluation plan is based on further work on the UX framework and the technical development of TA2 demonstrators in 2009 and the beginning of 2010, placed in a context of human centred design.

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Definitions

Aesthetic experiences

Aesthetic experiences relate to the capacity of a product/service to stimulate and gratify our sensory modalities and can result in emotions such as thrill, fear, excitement, unease, awkwardness, etc. Aesthetic experiences are influenced by qualities such as its visual qualities (colour, form, and structure), tactile qualities and sound.

Design elements

The *product and its design elements* are features that a designer can manipulate, such as form, colour, sound, interaction flow and functionality. Design elements influence people's *aesthetic experience*, their *pragmatic experience* and their *experience of meaning*:

Experience of meaning

Experience of meaning refers to how people create, re-create and experience meaning in relation to products/services and to their use. Experience of meaning is related to higher order goals in life, such as acting according to one's norms and values or exploring, developing and expressing oneself (one's emotions, memories, ideas or knowledge). It's about self-realization, self-identification and image and how the product or service relates to these. It goes beyond mere product interaction and the direct fulfilment of desires and needs related to this interaction.

Game

A game is a system in which players engage in an artificial conflict, defined by rules, which results in a quantifiable outcome (Salen and Zimmerman 2003).

Game Play

The structures of player interaction with the game system and with the other players in the game. (Björk and Hopolainen 2005)

Play

Playing is an obligatory activity limited in space and time and outside 'ordinary' life, defined and fixed in advance. The course of playing cannot be determined, nor the result. Playing is unproductive in terms of goods or wealth, except for the exchange of property among the players. Playing ends in the same situation as it began. It can promote the formation of social groupings, which tend to surround themselves with secrecy and stress their difference from the common world (formulated based on the definitions in (Salen and Zimmerman 2003).

Pragmatic experiences

Pragmatic experiences refer to *interactions* between people and a product or service. More specifically, it refers to the way a person understands, interprets and experiences the product or service in relation to the intention for use. The intention for use can be task related (I want to write a document with this text editor). These task related intentions as often called extrinsically motivated. Or intentions for use can be intrinsically motivated (I want to relax for a moment and have a good time playing a game). In the latter case the intention for usage is directly related to the interaction with the product or service. The interaction with product or service itself creates a desired experience apart from the results the interaction delivers in terms of task performance

Sense making

The relationships between *product features or design elements, experiences* and *value* are created and re-created via sense making processes, such as: anticipation, connecting, interpreting, reflecting, appropriating and recounting.

Togetherness

Togetherness refers to the feeling of being close to another person or to other people, emotionally. The experience of togetherness is a person's momentary and lasting feeling of a social bond or relationship with another which emerges through (social) communication. It is the feeling of being close to someone, whether in the same room or while being miles apart from each other. Whether currently communicating with the other or only thinking about the other at specific moments in time.

User eXperience (UX)

User experience (UX) includes a consideration of a number of different experiences related to interacting with a product or service in daily life or work. Interacting includes using a product but also observing a product (or observing someone using the product) and cherishing a product. UX is much *more* than mere usability (which is task-performance oriented) and also includes satisfaction, enjoyment, a sense of community and identity created by the interaction, the product, and the like. UX is a result not only of technology, but of the *interplay* between people and technology in a specific context at a specific moment, and of people's sense-making processes that relates to this interplay.

Value

Value is the result of the complete user experience expressed in a negative (e.g. avoiding the product in question or preferring other products) or positive attitude towards the product in a certain degree (e.g. loyalty towards a product, wanting to use it again).

1 Introduction

The objective of TA2 is to develop new, ICT based media experiences that support the social interaction between families or groups of people who are already firm friends. With TA2 it should be easier for friends and families to remotely keep in touch and share moments of laughter and fun as well as moment of sorrow or unpleasantness. Both positive and negative experiences are part of the social contact people maintain in their daily lives and are therefore important to address. Especially when trying to provide people with a stronger feeling of being together while being physically separated.

An important challenge in TA2 is to develop application concept demonstrators that facilitate social interaction and are perceived as attractive, useful, natural and fun. This work describes how these application concept demonstrators can be evaluated on these aspects before, during and after product interaction. Giving a clear indication of what the value of these interactive demonstrators is on the social contacts maintained and a person's wellbeing in everyday life.

This deliverable aims to help the demonstrator vision holders and technical integrators to create concept demonstrators that deliver best possible value for the users. Based on evaluations, (re)design recommendations are formulated for the different concept demonstrators. Furthermore insights are developed which relate to Social communication, Togetherness and User eXperience (UX) and how to apply theories about these topics to the design and evaluation of new user experiences.

To realize these objectives different activities are formulated which together lead to the evaluation framework used during concept demonstrator evaluations. In a theoretical research track relevant Togetherness, Social Communication and UX aspects and their relations are clarified and new evaluation methods and tools are developed (chapter 2 and 3). In a practical track the different evaluations on the concept demonstrators are formulated and performed (chapter 4, 5 and 6). Based on which (re)design recommendations for the demonstrators are formulated.

1.1 Goal of the TA2 evaluation framework

The goal of the evaluation framework is to provide a systematic approach based on which informed (re)design choices can be made during the development of the different demonstrators. The evaluation framework is meant as the means to communicate and coordinate design, implementation and evaluation. The design recommendations based on the evaluation results help to create best possible applications and new user experiences within the whole of the TA2 project.

The evaluation framework and evaluations that follow from it will:

- Help concept vision holders and technical integrators to make better design decisions and facilitate the exchange of learning experiences between the different competences and demonstrators with regard to which design choices and solutions are key in creating new (good) user experiences.
- Organize the dialogue between the project and the outside world in terms of users and user research by performing user trials and evaluating the concepts in simulated and real-life living room settings.
- Create an integral vision on TA2 concepts based on lessons learned during the project.
- To provide general guidelines which are usable outside the project regarding the design process and concepts for intuitive and media enriched communication.

1.2 Intended relationship

All project team members should become acquainted with the Evaluation Framework. Especially all team members working in the work package 8 (Best Practice and Evaluation) should be able to use this Evaluation Framework in designing and implementing the evaluations for the different demonstrators.

This document provides the following:

- Chapter 2: A summary of previous work, on which this evaluation framework is (partly) based, together with a subchapter on current knowledge in the area of Social Communication, Togetherness and UX. These three theoretical concepts need to be addressed in the evaluations to add to the current state of the art (see also the subchapter 1.3).
- Chapter 3: The theoretical refinement gives a description of the theoretical developments and l research that needs to be performed to ensure that specific tools, methods, etc. are available and can be applied in the evaluations of TA2 demonstrators to test the concepts of Social communication, Togetherness and UX.
- Chapter 4: A description of the demonstrators and the research interests related to the concepts as expressed in these different demonstrators. Furthermore design and evaluation methods are formulated as possible measurements along the development trajectory of the demonstrators. These possible measurements address the key issues within TA2 related to the creation of 'new user experiences'.
- Chapter 5: An outline of the design process and the different design and evaluation methods that can be used during design and in developing and implementing the five demonstrators.
- Chapter 6: A short preview of activities to come in 2009.

1.3 Current state of the art

1.3.1 Current state of the art in UX

In the TA2 deliverable *D2.1 Design and Market insights* (August 2008, pp. 76-90), a *UX framework* building on the current state of the art is presented and discussed. This framework has been updated according to recent insights and research results and is intended to help researchers and designers to better understand *user experience*, the relationships between *design elements (product features)*, *user experiences* and *the resulting product value* expressed in a positive or negative attitude towards a system, application or service. See Figure 1. In this chapter, some key elements of *D2.1 Design and Market insights* will be revisited (for details, please refer to that report).

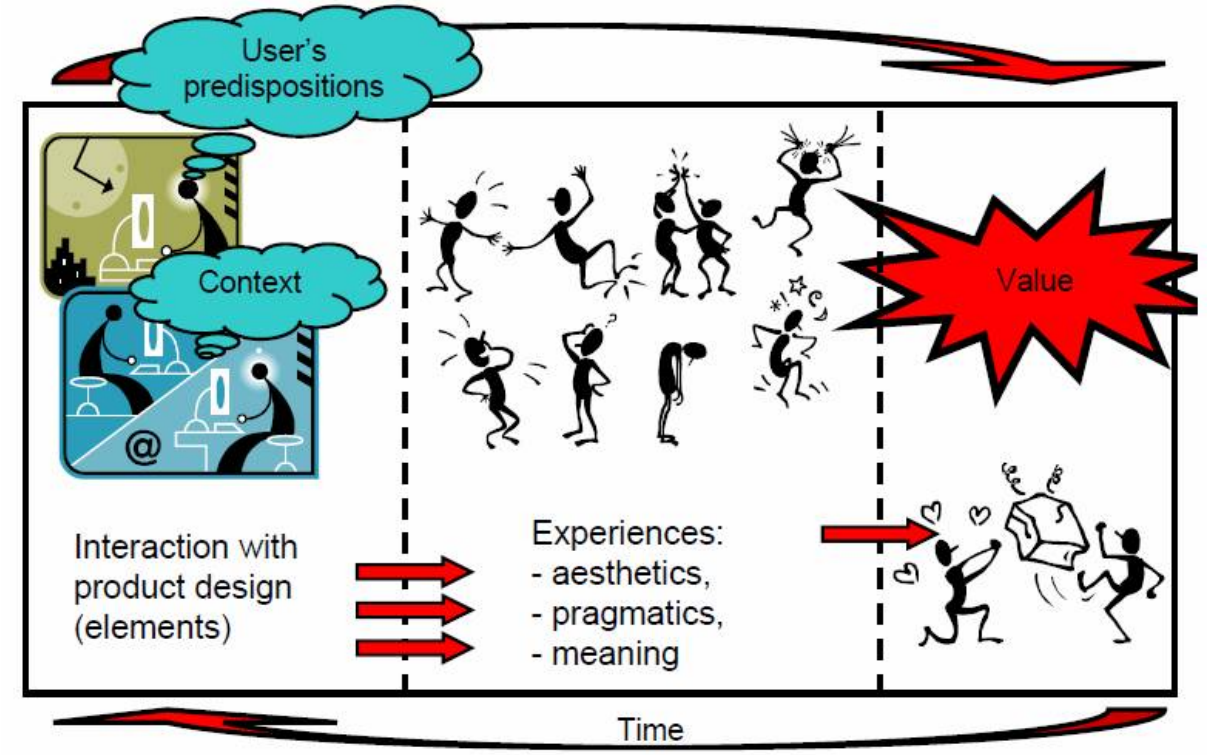

Figure: 1 UX framework

User experience (UX) includes a consideration of a number of different experiences related to interacting with a product or service in daily life or work (Norman 2004). Interacting includes using a product but also observing a product (or observing someone using the product) and cherishing a product (Desmet and Hekkert 2007). UX is much *more* than mere usability (which is task-performance oriented) and also includes satisfaction, enjoyment, a sense of community and identity created by the interaction, the product, and the like (McCarthy and Wright 2007); (Norman 2004); (Pals, Steen et al. 2008). UX is a result not only of technology, but of the *interplay* between people and technology in a specific context at a specific moment, and of people's *sense-making* processes that relates to this interplay (McCarthy and Wright 2007).

The UX framework consists of different layers:

- The *product and its design elements* with which a person interacts,
- E*xperiences* which emerge through a process of sense making based on the product interaction,
- V*alue*, the result of the complete user experience expressed in a negative (e.g. avoiding the product in question or preferring other products) or positive attitude towards the product (e.g. loyalty towards a product, wanting to use it again) (Pals, Steen et al. 2008).

The *product and its design elements* are features that a designer can manipulate, such as form, colour, sound, interaction flow and functionality. Taken together, these design elements influence people's *aesthetic experience*, their *pragmatic experience* and their *experience of meaning*:

- *Aesthetic experiences* relate to the capacity of a product/service to stimulate and gratify our sensory modalities and can result in emotions such as thrill, fear, excitement, unease, awkwardness, etc. Aesthetic experiences are influenced by qualities such as its visual qualities (colour, form, and structure), tactile qualities and sound, but also by the structure that defines

how a software-based product can be interacted with (a temporal quality), and how these various attributes and qualities are experienced together as a whole.

- *Pragmatic experiences* refer to *interactions* between people and a product or service. More specifically, it refers to the way a person understands, interprets and experiences the product or service in relation to the intention for use. The intention for use can be task related ("I want to write a document with this text editor"). These task related intentions are often extrinsically motivated, or intentions for use can be intrinsically motivated ("I want to relax for a moment and have a good time playing a game"). In the latter case the intention for usage is directly related to the interaction with the product or service. The interaction itself creates a desired experience apart from the results the interaction delivers in terms of task performance.
- *Experience of meaning* refers to how people create, re-create and experience meaning in relation to products/services and to their use. Experience of meaning is related to higher order goals in life, such as acting according to one's norms and values or exploring, developing and expressing oneself (one's emotions, memories, ideas or knowledge). It's about self-realization, self-identification and image and how the product or service relates to these. It goes beyond mere product interaction and the direct fulfilment of desires and needs related to this interaction.

The categories of experiences addressed above are defined based on the work and research of others such as Norman (Norman 2004), McCarthy and Wright (McCarthy and Wright 2007), Desmet and Hekkert (Desmet and Hekkert 2007); (Hekkert 2006), Hassenzahl (Hassenzahl, Burmester et al. 2003); (Hassenzahl, Lai-Chong Law et al. 2006); (Hassenzahl and Tractinsky 2006); (Hassenzahl, Lindgaard et al. 2008), Lavie and Traktinsky (Lavie and Tractinsky 2003) and our own (Kort, Vermeeren et al. 2007); (Vermeeren, Kort et al. 2008); (Law, Roto et al. 2008); (Lai-Chong Law, Vermeeren et al. 2009).

One might say that:

- *aesthetic experiences* are situated, primarily, in sensory qualities of the *product* (or service, application or system),
- the *pragmatics and composition* experiences are situated, primarily, in the moment of *interaction* between a person and the product,
- the *experience of meaning* is situated, primarily, within the *person ('s life)* in relation to the product.

The relationships between *product features or design elements, experiences* and *value* are created and re-created via sense making processes, such as: anticipation, connecting, interpreting, reflecting, appropriating and recounting (see D2.1 for a detailed overview of these processes) (McCarthy and Wright 2007).

The researcher and designer needs to understand the relationships between *design elements*, *experiences* and *value* and to use this understanding to influence (design, redesign, improve, alter) the design in order to effect specific experiences and to create best value. The evaluation framework described in this document sets the stage for the evaluations and should help to reveal insights needed to better design and redesign TA2 demonstrators throughout their development process. The evaluations provide input for the demonstrator vision holders and technical integrators to design better demonstrators.

1.3.2 Social communication and the experience of togetherness

Social communication addresses the part of communication that consists of psychological, social and behaviour skills and abilities to effectively communicate with others and thus influence and/or experience social relationships. The University of Washington, Department of Speech and Hearing Sciences developed the following model for social communication (see figure 2). One's *social communication competence or performance* depends on four interrelated components: One's *social communication behaviours* illustrate the execution of communication behaviours in social, interactive contexts. These are behaviours that can be observed (e.g. verbal and non-verbal actions such as yelling, being quiet, asking politely, etc). Underneath social communication behaviours are *social-cognitive abilities and language abilities* (skills and abilities needed to act in social situations and express one self on those situations). They are viewed as the skills or abilities that are necessary to be able to execute the social communication behaviours. Finally the *processing abilities and executive functions* are the necessary underlying processing operations that enable a person to utilize and manipulate his/her existing knowledge, along with organizing, managing and implementing incoming information in social situations.

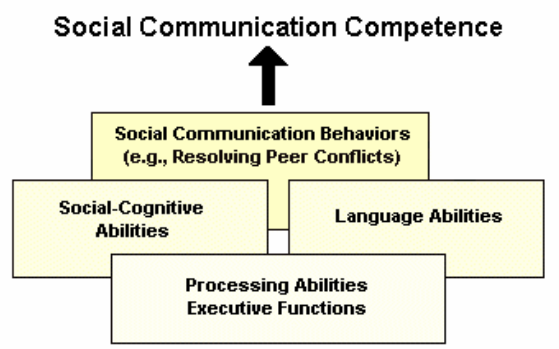

Figure 2: Social communication model

Social communication as presented here is observed from an individual's stance and dealings within social situations. Social communication is an individual acting within a social context. For TA2, whilst this is a good starting point from which to understand social communication within the applications (from an individual's perspective and experiences at least), this picture might be viewed as oversimplified from a sociological, anthropological or philosophical perspective. In other words, social communication and an individual's behaviour therein never exist in a vacuum. There is always the social situation or context itself influencing a person's abilities to understand and respond socially, there is a history of social interactions, knowledge and feelings based upon these interactions, resulting in the relationships as they currently are. This larger context in which social communication is taking place is therefore a necessary object to study as well to fully understand social communication in detail.

A social network perspective might be needed to understand the concept of social communication within TA2. A social network is viewed as a social structure made of nodes (e.g. individual people or groups of people), that are tied by one or more specific types of interdependencies, such as values, visions, ideas, friendship, kinship, dislike, conflict, interests, etc (Wasserman and Faust 1999); (Hogan, Carrasco et al. 2007). These social networks can be viewed as graph-like structures. Social network analysis (SNA) views these social relationships in terms of nodes (representing individuals or groups of individuals) and ties (representing their relationships) and provides different statistical techniques to compute the strength of the ties, the frequency of contact, the depth of the social relationships between individuals and groups, etc (Wasserman and Faust 1999).

The experience of togetherness is one of the key themes of TA2; and according to us refers to the feeling of being close to another person or to other people, emotionally. The experience of

togetherness is a person's momentary feeling of a social bond or relationship with another which emerges through (social) communication. It is the feeling of being close to someone, whether in the same room or while being miles apart from each other. Whether currently communicating with the other or only thinking about the other at specific moments in time.

There is currently little known about the experience of togetherness, togetherness is quite a new concept in social communication and ICT, though related concepts exist in various fields in social and behavioural science. The term social presence was introduced by Short et al. (1976), and has been used in HCI intermittently since that time. The focus of social presence is however mainly on the real-time communication and the cues that allow us to either project our mediated presence to others (objective), or the experience of others being present via a mediated channel (subjective). While the real-time issues are of importance to TA2, our understanding of togetherness goes beyond the immediate emotions as it is also related our relationships (or ties) to others as well as our feeling of identity. We hypothesize that a feeling of togetherness grows through social interaction, and in particular under certain conditions, such as when there is a shared focused activity, a common mood and mutual recognition of each others engagement

It is one of the results in which a history of social interactions with another person ends and is experienced. Furthermore we think that many different aspects are related or contribute to togetherness such as a feeling of connectedness and closeness to someone else, an awareness of the other and his/her current status, feelings and activities, the perceived presence of the other, the ongoing communications, empathy felt for the other, etc.

What the exact relation between these aspects and togetherness is and how the aspects just mentioned weight in creating the feeling of togetherness in a specific context will be discussed in chapter 2. A very detailed discussion of this subject is beyond the scope of this report, but we intend to investigate it further during the course of TA2.

1.3.3 Strong and weak ties.

Mark Granovetter (1973) introduced the concept of strong and weak ties as a way of characterizing qualitative differences in personal relationships to others, and his ideas has influenced many others. He argued that society needs not only healthy "strong ties" between relatives and friends but also ample and fluid "weak ties" between casual acquaintances. The recent interest we have seen in many online social networking sites, such as Facebook and LinkedIn, address exactly this need for nurturing one's weak ties. However, while weak ties are important, in particular in situations such as when one is looking for a new job, the strong ties to our closest family and friends are even more important to us and our sense of identity. While we communicate with our weak ties at certain occasions and using only certain communication channels, we tend to communicate with our strong ties frequently and using any means available (Wellman, 2005). But according to recent empirical research, the number of really close friends we have, the ones that we feel that we can share our deepest thoughts with, tend to be shrinking (McPherson et al, 2006). They write: "If we assume that interpersonal environments are important (and most sociologists do), there appears to have been a large social change in the past two decades. The number of people who have someone to talk to about matters that are important to them has declined dramatically, and the numbers of alternative discussion partners has shrunk." (ibid, p. 371). While we nowadays spend a great deal of time communicating with others, Wellman (2005) suggests that we are moving towards a society based on "networked individualism," where most communication is both mediated and conducted on an individual basis, as opposed to taking place in group settings. We recognize the need for supporting both strong and weak ties, and the weak ties networks are quite well supported through various online tools, but this is not the case for strong ties. Thus, TA2 explicitly focus on nurturing the strong ties in someone's network.

1.3.4 Social identity

In many real-life gatherings, such as family parties, vacation travels, etc, people participate not only as individuals, but also as part of a social group – e.g. their family, school class, sports club, etc. This strengthens the feeling of being part of a group, in some context, and how that group relates to other groups. It creates and maintains bonding between people and groups as well as a feeling of togetherness.

As noted particularly in the social sciences, humans are not only individuals but also social beings. Our sense of self – includes not just a personal identity (our sense of personal attributes and attitudes) but also collective identities. According to Social identity theory (SIT) (Tajfel, 1982), social identity is the individual's self-concept derived from perceived membership of various social groups (Hogg and Vaughan, 2005). We understand and evaluate ourselves partly by our group memberships. Having a sense of "we-ness" strengthens our self-concepts, and we seek not only respect for ourselves but pride in our groups.

Social psychological research has showed that human interaction has emergent properties that endure and influence other people, which can not be reduced to the individuals themselves (ibid.). Proponents of "symbolic interactionism" argue that the self emerges and is shaped by social interaction. SIT is mostly used to describe relationships in and between social groups, and in particular how in-groups ("us") tend to have a favorable subjective bias over out-groups ("them"). SIT emphasizes the importance of social identities, of being and belonging together with others in our in-groups, as a fundamental way to understanding who we are (ibid.). Unless we actively nurture these group relationships, they fade away, losing meaning and influence. In order to develop and maintain a sense of "us" rather than just "I", we must be together in some sense, either physically co-located or mediated in a way that supports group participation.

In TA2, we recognize that social identities, in addition to personal identity, are fundamental for humans. It is also clear that we spend less time socializing in group settings and more time socializing individually (Wellman 2005).

However, few communication technologies allow for relaxed mediated communications in group settings. Thus, we suggest that mediated group communications is an important area and a particular target for TA2.

1.3.5 Interaction rituals

Building on the early work by sociologist Emile Durkheim in the early 1900s and further expanded by Erving Goffman in the 1960s, Rich Ling (2008) suggests that both co-present and mediated communication allows for the execution of certain "rituals" that in turn result in increased or maintained solidarity, i.e. social cohesion. According to Ling, "the basic elements of a ritual are the mutual focus of a circle of participants and the engendering of a common mood. Further, there is generally a barrier to those who are not part of the group. This results in a kind of entrainment where there is engagement in the situation, but more importantly, there is mutual understanding of each others' engagement. Indeed, this mutual understanding is the key." (Ling 2008, p.83). Thus, seeing mediated communication as simply a facilitating technology is not enough for togetherness to develop. Having access to a means of communication is a necessary but not a sufficient condition for the development and nurturing of togetherness. As can be seen from the quote above, there needs to be a focus of attention for the participants and the development of a common mood, but most of all mutual recognition of each other's engagement in the common activity. Based on these insights, we suggest that merely enabling video and audio communication links in people's homes is not sufficient in itself, and indeed, video conferencing as such as never caught on in the domestic market. Thus, in TA2 we suggest to use games and other applications as triggers for focused social interactions. The games can provide and excuse to join together, even though it is mediated, and it also provides a focal activity that can lead to a common mood. Finally, the real-time audio and video links enable the exchange of

various communicative cues that can show the mutual engagement to the participants, leading to strengthened social bonds according to the sociologists mentioned above.

1.3.6 Proxy technologies

In D2.1 different proxy technologies (games, interactive or social TV, Web 2.0 applications and video and audio communication) in which similar concepts are used as in TA2 applications were analysed according to the UX framework. The analysis provided insight in the UX and the value of an application as perceived by the users. One of the goals of TA2 is to further our understanding of how these kinds of technologies can help create the experience of togetherness during TA2 application usage and how it can be maintained beyond the interaction with these applications as well. In literature research performed during the last months, starting from the delivery of D2.1 until now, we got a sense of understanding of UX, social communication and togetherness that indicates that these aspects might very well be related to each other in a somewhat causal fashion. Meaning that some aspects such as parts of aesthetics are preconditions for an experience of good usability (Lavie and Tractinsky 2003); (Tractinsky, Katz et al. 2000), fun and enjoyment and that the perceived usability influences the perceived cohesion of groups as is proven in, for example, online gaming communities (Hsu and Lu 2007). Many of these relations are not researched yet in great detail and therefore it is currently difficult to provide guidance on how to create experiences such as togetherness very effectively. Some major results and developments found during the research for D2.1 that are very interesting in the further development of the TA2 demonstrator applications are briefly summarized below (for a detailed description see D2.1):

- Gaming is developing into a social activity, e.g. when people who are physically together play with their Wii console or when people who are geographically apart play with each other via an online service. People can experience togetherness in terms of *cooperation* or in terms of *competition* and within virtual *communities*. The gaming experience as such provides a shared, focused experience based on mutual engagement, which helps to strengthen the social bonds. Gaming can affect both strong and weak ties.
- With interactive TV, information and entertainment services are added to the TV experience, and with social TV, social experiences are added. People can experience togetherness in terms of *communication*, in terms of *social awareness* or in terms of *shared experiences*; e.g. by creating and *sharing personal content*. Interactive TV primarily affects weak ties.
- In Web 2.0 applications, being able to *share personally created content*, being able to explore and share *social relations* (personal profiles and social networking) and being able to find people with *similar interests*, and being able to *communicate or cooperate* with them, are key ingredients of experiencing togetherness. Most social networking sites focus on a person's weak ties.
- Video communication has the potential to help people to experience togetherness, but has not yet fully delivered its potential in the consumer market. Key requisites for experiencing togetherness are: high quality audio and video, simplicity (user-friendliness), high reliability – and 'environmental excellence', in order to experience telepresence. In addition there are substantial privacy issues that must be dealt with in a way that satisfies the subjective experiences of the end users. Video communications address both strong and weak ties.

In additional research, more focussed on the experiences of togetherness, we've found many applications that intend to create direct or indirect experiences of togetherness. Many of the applications incorporate awareness systems, intended to support interpersonal relationships by making the user 'aware' of the context, location, activity, etc. of others. Some of these applications are already addressed in D2.1 such as video and audio communication means. Web 2.0 applications (Twitter Facebook, etc) encourage users to state what they are doing, what they are working on, or what their current location is, etc. Other applications specifically target the direct or indirect communication of

feelings and moods. Staying aware of each other's daily activities, experiences and especially moods or emotional states are perceived as socially significant information in small intimate groups of people (close friends, relatives, and intimate peer groups). Applications that support the indirect communication of moods or emotional states include, for example, *what music someone is listening to* (Social radio) and *the use of tagged music representing specific contexts, activities or moods of the person listening* (Social playlist). A more direct way of communicating current emotional states or moods is implemented in Buddy Beads (jewellery for teenagers) which are used in peer groups to communicate an individual's coded feelings within the group.

However, we think the experience of togetherness is not only based on creating awareness of someone else's activities, location and moods nor on being able to communicate with other people via advanced high quality ICT means. Many of the available applications seem to focus on one, or a limited number of aspects related to togetherness, overlooking other aspects such as relationships being based on shared interests, activities, blood-ties, and ties between groups of people. In the end, social communication does not exist in a vacuum but has a place in people's everyday life and it is this perceived place in everyday life which makes ICT mediated social communication ultimately successful. The success of these kinds of applications is not defined by their specific features and use, but in the perceived value they provide when used in everyday life.

1.4 TA2 contribution to current state of the art

1.4.1 Theoretical contribution to UX

UX is a broad and difficult concept to grasp. With the UX framework we have started to formulate, to structure and to model some elements of the UX and their relation to design and evaluation. The updated framework, presented briefly in this work (chapter 2), is a window through which one can view ICT products and services in terms of a wide range of aspects including those related to social communication and togetherness. Still many relations and concepts within the framework are unclear (the relations between aesthetic-, pragmatic experiences and the experience of meaning, their causal relations and their relation to the value as perceived by the user). Donald Norman states about the relation between aesthetic- and pragmatic experiences: "Beautiful things work better!" (Norman 2004). We found other relations in literature between the perceived ease of use (usability) and the willingness to participate in social (mediated) interactions (Hsu and Lu 2007). These are just two examples and there will be many others. Insight in the exact relations between different *design elements*, *experiences* in which they result and the *value* provided by these experiences in terms of everyday life, help to create better products and systems.

A theoretical contribution to UX that we will deliver in 2009 is a partial clarification between design elements, aesthetic-, pragmatic experiences and the experience of meaning. How these experiences related to each other and result in a specific value of TA2 demonstrators in daily life.

1.4.2 Contributions to evaluations, measurement tools and instruments

Many concepts such as the aesthetic experiences, pragmatic experiences and the meaning of applications in everyday life (in terms of, for example supporting social relations and their value as perceived by the users) are just emerging as topics in evaluations of ICT systems. Currently there are hardly any measurement methods, tools or instruments available to evaluate applications in these regards (except usability evaluations for part of the pragmatic experiences). There are especially, none that can be used throughout the design process (from the start until the end). Insights gained during the theoretical refinement will not only lead to a framework that better supports evaluations on a broader range of UX aspects but will lead to new evaluation methods and tools as well. These should support evaluations throughout the iterative design cycle. New evaluation methods and tools will be applied and tested before and during the TA2 application evaluations. The evaluations themselves and their

results lead to enhanced insights in the area of evaluation methods and tools for UX and the created value of social communication systems such as the TA2 demonstrators.

1.4.3 Contributions to designing social communication systems

Evaluations performed on the five demonstrators will enhance the insight in successful design of social communication systems for different target groups (children, (young) adults, elderly people, living together or alone, etc). Through evaluations, insight is gained in better design choices which lead to better user experiences (enjoyment, the experience of togetherness, etc). These results can be translated to design recommendations for social communication systems that create best value in their place in everyday life.

2 Defining UX, social communication and togetherness

In this chapter we summarize the results of a brief literature study into *social communication* and the experience of *togetherness* and map them on the categories of the UX framework as described in D2.1. In the State Of The Art of this document we already explained that *social communication* and its' resulting experience of *togetherness* can be incorporated in the UX framework. Other aspects addressed in the UX framework, such as the user's predispositions, the context in which the system is used, the interaction between user and system and the design elements that make this interaction possible will all affect the user experience. They will thus impact a system's ability to deliver the desirable outcomes such as good usability, having fun and delivering enjoyable interaction, as well as the experience of togetherness (Hsu and Lu 2007). In the second part of this chapter we explain in more detail how, bearing these aspects in mind, *social communication* can be placed in the UX framework.

2.1 The relation between UX, social communication and togetherness

One of the key desirable outcomes we hope to achieve through the demonstrators is togetherness. We hypothesize that social interaction can lead to the experience of a certain degree of togetherness. However, we have identified other concepts (e.g. perceived ease of use (Hsu and Lu 2007), awareness (Romero, Markopoulos et al. 2007)) that will have effect on or may affect the experience of the social communication and togetherness as well. This paragraph addresses the possible causal relations between these different experiences and argues why togetherness should be viewed as a part of the UX framework to understand different experiences and how they come to life.

2.1.1 A brief history of UX

The change in focus from the performance oriented *usability evaluations* towards the more holistic assessment of *User Experience* stemmed from a desire to better predict the true value of an interactive product to a user. There are two common methods used by usability researchers and practitioners to evaluate and to compare the value of different systems and design features; these are *objective performance measures* and *subjective user evaluations*. The two methods should yield similar results if usability was the only factor that determined the perceived product value. But this is rarely the case (Ben-Bassat, Meyer et al. 2006); (Karat 1997). Studies have shown that measures obtained by the two methods are only moderately correlated (Nielsen and Levy 1994) if not completely disparate (Frokjaer, Hertzum et al. 2000). The resulting discrepancy can be accounted for by other design attributes that affect perceived value besides performance or usability (Karat 2003); (Norman 2004). This has resulted in the interest in UX which incorporates alongside a cognitive, performance oriented focus, an emotional oriented focus as well.

The three categories of experiences addressed in the UX framework were *aesthetic experiences*, *pragmatic experiences* and the *experience of meaning*. These aspects seem to play a role in the perceived value of interactive products and services. In different articles and books more or less the same categories of experiences such as the aesthetic, pragmatic ones and the experience of meaning are found (Norman 2004). In a laboratory study of user's preference of Media player skins for example, Tractinsky and Lavie (Tractinsky and Lavie 2002) and Tractinsky and Zmiri (Tractinsky and Zmiri 2006) found that user's choices of media player skins were evaluated on at least three different dimensions: usability, aesthetics, and symbolic value. In these studies, the skins users chose were not simply those assessed as having the best usability. Norman addresses similar categories in his book "Emotional Design, why we love (or hate) everyday things". According to him emotions, as well as cognition, play an important role in the way we think about objects and products. Emotions serve as a

guide to appropriate behaviour, steering us away from the bad, guiding us towards the good (Norman 2004). His underlying dimensions of UX share aspects with those found by, Tractinsky and Zmiri (Tractinsky and Zmiri 2006): Visceral (concerned with appearances), behavioural (pleasure and effectiveness of use) and reflective (in which the rationalization and intellectualization of a product is considered). This research supports the view that a simple focus on the cognitive assessments of design and a neglect of the role of emotions leads to a poor estimate of the value of a product as perceived by the user.

There is evidence to suggest that the relative importance of cognitive and emotional aspects weighted by the user in determining the value of an interactive product is different over application domains. Research shows that intrinsic motivation for use (using an interactive product because the interaction itself is appreciated) emphasises the importance of emotional and hedonic aspects which positively affect the interactive product's appeal. On the other hand, extrinsic motivation for use (using an interactive product to fulfil a certain goal) emphasises the importance of usability aspects as well as emotional and hedonic aspects in determining the appeal of an interactive product (Hassenzahl, Kekez et al. 2002). We hypothesize that the differences in weightings of UX aspects is not limited to intrinsic and extrinsic motivation of use but includes other factors as well. Differences in weightings will probably also depend on the role the interactive product has in everyday life (its meaning and value). For example the importance of trust in the product, combined with good usability and aesthetics in the health care domain (e.g. the insulin pen which makes injecting insulin in public spaces less obvious but still very efficient). And even when the motivation for use is extrinsic, bad usability is not a guarantee for less value observed in everyday life. SMS and text messaging for example are often characterized by a lousy usability, though still perceived as very valuable for everyday life by many people.

2.1.2 The relation between social communication, togetherness and UX

The experience of meaning is something that goes beyond the mere interaction with a product. Meaning is a long lasting effect that stays with the user also after shutting down the system or interactive product. Meaning is what effects everyday life in terms of self expression, fond memories, a good and happy feeling, security, self realization, the feeling of being close to others, sharing a past with others, and living according to one's own norms and values. The experiences stemming from social communication such as togetherness are valuable in the context of everyday life and not limited to the moments of interaction with others. Experiencing togetherness therefore fits neatly into the category of experiencing meaning.

On the other hand, aspects addressed in the UX framework will affect the experience of the social communication and togetherness as well. In the Social Communication Competence model (University of Washington) are mentioned the user's social-cognitive and language abilities, these are based on previous learning and adaptation which are a user's predispositions in the UX framework. Design elements and the created perceived ease of use influence the perceived cohesion of online gaming communities (Hsu and Lu 2007), so pragmatic aspects possibly influence experiences of togetherness in TA2 applications as well. Ned Kock's Media naturalness theory furthermore reasons that "communication systems designed to support a more natural and face-to-face like communication result in less cognitive effort and less ambiguity in communications" (Kock 2004), (Kock 2005) and (Simon 2006). These communication systems that support a more natural and face-to-face like communication are very likely to enhance different pragmatic experiences such as the perceived ease of use of the social interaction as well, since the process of social communication is made more ease and natural for the user.

These arguments all support the incorporation of social communication and the experience of togetherness in the UX framework. The next chapter addresses social communication and the experience of togetherness in more detail in the context of the UX framework.

2.2 Social communication and the experience of togetherness

The experience of togetherness is one of the key concepts of TA2. According to us it refers to the feeling emotionally close to another person, or to other people. The experience of togetherness is a person's momentary or lasting feeling of a social bond or relationship with one other (or others) that emerges or has emerged through (social) communication. It is the feeling of being close to someone, whether in the same room or while being miles apart from each other.

Earlier, in the section describing "Social communication and the experience of togetherness" a model was introduced that described social communication from a psychological perspective. This model did not state which experiences result from social communication (such as togetherness). We have previously asserted the obvious fact that social communication does not exist in a vacuum. Instead it takes place in a context in which participants have their own personal and social history and they have their own predispositions that affect the social communication.

These additional aspects need to be taken into account in the UX framework. From the literature these context factors include:

A user's predispositions

The predispositions thought to be relevant for people participating in social communication using the TA2 demonstrators are listed below. Other predispositions are already addressed in D2.1:

- ***Personal knowledge*** of and ***past experiences*** with mediating communication systems will help users process, interpret and organise incoming information in social situations staged by such media (see figure 2). Mediated communication differs from face-to-face communication in many ways, as described (for example) in the Media naturalness theory (Kock 2005), (Kock 2004) and (Simon 2006). They often limit the ways in which one can express oneself and limit the ways one can observe the expressions of others. Messages or information can therefore more easily be misinterpreted, and we think previous experiences with these kinds of systems will help users to understand the limitations and more adequately deal with these kinds of communications. In terms of the Media naturalness theory, compensatory adaptation will occur which can even lead to more effective communication, but it will always cost more cognitive effort.
- The ***personal history of the social relationship(s)*** and the user's perception of the social relationship will help the social communication. Social relationships develop and each time a person communicates or interacts with someone else the history of the relationship influences the social communication and resulting experiences. Relationships can very in intimacy, familiarity, frequency and are placed in a social (status) structure or hierarchy. They can be emotionally based or based on very specific interests. One's relationship might involve people who share the same norms, values, culture, identity and associations or they may not.

Context

The context in which social communication is taking place also has a strong influence on the social communication. This includes not only the physical and social context (such as being on a train with others compared to being alone in your own room, etc) but also the virtual (social) context. The virtual social context includes considerations of whether other people/relations are online in a specific application; how much people are aware of each other's context, activities and feelings and their sense of belonging to a specific culture. Context will shape social communication among. Contextual factors identified in literature include:

- The ***social context*** includes aspects such as: the presence of others (physically or virtually) (Kort de, IJsselsteijn et al. 2007), the group structure (and its' organization) (Wasserman and Faust 1999) (Preece 2000), shared interests (Preece 2000), associations and shared identity with the group or groups, shared norms and values, shared cultural identity (Preece 2000), etc. These aspects influence how the individual perceives and acts in the social interaction and experiences this interaction.
- ***Atmosphere*** may also set the tone for the interaction. For example, is the context personal or business like, cooperative, reciprocal or competitive, etc (Preece 2000)?

Interaction with design elements

Design elements can have a large influence on the social interaction though the support they provide for specific aspects of the social interaction. Design elements are meant to enable specific (social) behaviours.

- ***Norms, values, rituals, codes, and signals***. These are the building blocks with which social communication systems express their social context and atmosphere. Furthermore it enables users to perform certain (suitable) interactions and activities such as participating in rituals (e.g. parties in online communities), or behaving according to the groups norms, values, etc (Preece 2000), (Kim 2000) (e.g. giving gifts to others at suitable moments, helping others at suitable moments). On the other hand it can prevent unwanted behaviours such as misuse of the system, deviant behaviour, and unequal treatment of persons, discrimination, intimidation and isolation (Kim 2000). We think the atmosphere created by social communication systems and the norms, values, rituals, codes and signals can be largely influenced by aesthetic design aspects (such as colour, form, appearance, structure, etc) as well as by the rules implemented in the system to guide behaviour (e.g. manifests of social communities, rules that make certain behaviour possible and prohibit others, etc).
- ***Awareness*** of others is a necessary pre-condition for good social interaction. Knowing where others are, what they are doing, how they can be reached, how they are feeling, what they are needing, etc. determine the moments suitable for interaction and the best way to go about this interaction. More directly related to the social interaction itself, the media naturalness of social communication systems creates a form of awareness as well. When nearing face-to-face communication people are more aware of each other, which makes communicating about complex issues/tasks easier, it asks for less cognitive effort, it limits the chances on communication ambiguity and it increases physiological arousal, often making the interaction more pleasant (Kock 2004), (Kock 2005), (Simon 2006). By supporting someone's awareness of the other, his/her context, activities and feelings, one communicates socially significant information that can trigger and streamline social interaction or provides content for this interaction. Many design elements can influence the awareness of other in social communication by providing the means to express oneself well and by providing the right feedback to users that leads to less ambiguity and effort in the interpretation, processing and reacting to others.

The different experiences related to social communication

In D2.1 different design aspects and resulting experiences were addressed. Here we will briefly address those that are specifically of interest in the context of social communication.

Aesthetic experiences

Aesthetic design elements such as form, colour and structure often set the tone within social communication systems. With aesthetic design you can create experiences such as a system being viewed as warm, welcoming, cold, distant, professional, cheap, emotional, intimate, personal, business like, clear, concise, clean, thrilling, tense, etc. The relation between aesthetic design and the resulting experiences is not yet clear cut but some theory can be found in the gestalt principles (Hekkert 2006) applied on, for example, websites (Hunt), (McClurg-Genevese 2005) and colour theory (Firstcoastcreative), (Visocky O'Grady and O'Grady 2009).

Pragmatic experiences

Pragmatic design elements are meant to limit the cognitive effort related to interacting with a system (e.g. providing good usability so a user can easily and quickly perform his/her task or realize his or her goal). However, the cognitive effort put into achieving the task or goal for which the system is used may be considerable (e.g. winning a game of chess). When the realization of the goal or task set by the user is challenging, but still within reach, and the usability is good, a state of flow, immersion and enjoyment can be reached (Salen and Zimmerman 2003), (Chen 2007), (Chen 2006). We think pragmatic experiences specifically related to social communication and a sense of togetherness work more or less the same way. Design elements such as social cues like facial and bodily expression, the presentation of the degree of co-location (being in the same virtual space represented as yourself (as in Child Play), etc. and the means to express oneself in the social communication (e.g. smiles only or can you actually look angry or happy because your facial expressions are transmitted to the other side) will trigger pragmatic experiences of really being aware of each other, and of having a real social conversation, a feeling of closeness and understanding during the interaction.

Experiences of meaning

Social experiences such as the experience of togetherness result from people interacting with each other, the efficacy of the interaction will be affected by the context influence mentioned above. We identified different social experiences that fall within the classification of meaning that we think are related to, or part of, the experience of togetherness. These are listed below, in their positive form though each has (of course) a negative counterpart.

- The experience of feeling part of a group or community; feelings of having a shared interest and a shared identity with this group and it's members without losing or setting aside one's own identity, but being able to express one's own identity in this group without any repercussions or too many concessions (Preece 2000), (Kim 2000), (Kort 2000).
- Having the feeling of being a group is shared. Others observe certain cohesion and unity as well (Hsu and Lu 2007).
- Appreciating others and feeling appreciated by others. One has the feeling of attention being paid to each other (Preece 2000), (Kim 2000), (Kort 2000).
- Having the feeling of being well informed about each other, of knowing the others and knowing about their well being, major current events and happenings or sometimes minor details that provide this feeling of knowing (Kort de, IJsselsteijn et al. 2007).
- The feeling of psychological safety. The group of people is a safe haven in which one can express oneself, in which disagreement can be managed, and in which people care for each other, accept each other, listen to each other and conflicts are well handled. Confidentiality is regarded as important or is handled with care.

- Feelings of a shared history, memories that are sometimes expressed in rituals (Preece 2000), (Kim 2000), (Kort 2000).
- Feelings of control, having an influence within the group and making a contribution and getting recognition for this.

Summarizing, we think social communication and the experience of togetherness can be viewed and placed within the UX framework. This is an important finding in two ways. Firstly, the experiences that arise from the mere interaction between a user and a product (or system) probably influence the experiences that result from the mediated interaction between people. It is therefore important to view experiences that arise from social communication in the context of user experiences. Secondly, this presumed influence and it's incorporation into the UX framework creates the means to develop an evaluation framework in which these relations can be further researched. In the following chapters the experience of togetherness will therefore be viewed as part of the complete user experience and we will only refer to the UX framework in which aspects of social communication and togetherness are incorporated.

3 Theoretical refinement

In this chapter we address some open theoretical required to develop methods for better evaluating the user experience (UX) and therefore the perceived value ascribed to a product or service by a user. The theoretical refinement as planned and described in this chapter is focussed on social entertainment systems (the TA2 demonstrators) and the experiences and value these create for their users.

3.1 How to further model and evaluate UX?

Many current evaluation methods pay insufficient attention to the wider range of aspects that are of interest in evaluating the UX. In the last chapter we underlined that users will not necessarily assess products or services with the greatest usability as having the greatest value. One of the goals of WP8 is therefore to create evaluation methods that indicate the design elements that can be improved to enhance the UX and clearly indicate in what direction the design elements need to be re-designed. To realize this goal the UX framework needs to be modelled in the context of the TA2 demonstrators.

Two activities are formulated to obtain a refinement of the UX framework. This will lead to correct theoretical relations between different design elements and experiences which need to be central to the evaluations.

- The first activity is to define a model in which aesthetic, pragmatic and meaning design elements can be related to the overall resulting value.
- The second activity focuses on developing evaluation methods that enable us to assess the UX design elements and the experiences and value they create. In the second activity the supposed relations in the UX framework between design elements, experiences and value are tested and evaluation methods are prepared for application in the evaluations of the TA2 demonstrators.

3.1.1 1st Activity: modelling design elements, experiences and resulting value

In deliverable D2.1 a first preliminary UX framework was formulated indicating possible design elements and considerations that enhance the UX of interactive products and services based on literature. In this deliverable the experience of togetherness is more prominently added to the UX framework, though the UX model still needs further refinement and confirmation to be truly of value in providing the needed insights for redesign. This activity focuses on this refinement. We can furthermore pose different requirements that this more detailed UX framework should meet:

- Design elements should be formulated such that they are easily recognized and usable in design itself. The definition of design elements at too high a level will result in confusion and indecision. The formulation must be practically applicable.
- Categories of experiences (such as aesthetics, pragmatics and meaning) should be clearly formulated and distinct (experiences belonging to one category should not appear in another category). Though we accept that there are (causal) relations between categories. The resulting model needs for example to clear up the overlap between classical aesthetics (on which many usability guidelines for interface design are based) (Lavie and Tractinsky 2003) and usability (pragmatic design elements and experiences). Either by proving (partial) causal relations (aspects that are related by one aspect (partially) predicting or causing the other) between aesthetics and pragmatics or by formulating new categories of design elements and experiences.
- Furthermore, the UX framework only consists of design elements and experiences that affect the value for social entertainment systems (the application domain of the framework is therefore limited to this project, but might nevertheless be generally applicable).

The next step then is to find confirmation for the UX framework and the relations within it through small scale experiments, preferable based on the TA2 demonstrators or otherwise based on related products/services.

3.1.2 2nd Activity: Formulating evaluation methods and evaluating the UX framework

Proving the relations between different design elements, experiences and their resulting value is performed in small scale experiments. In this activity the experiments are organized in cooperation with the TA2 demonstrator vision holders and technical integrators (or proxy technologies). Specific parts of the UX framework are going to be tested in a cumulative manner, starting with pragmatics, followed by adding aesthetics and ending with adding meaning and the overall value as perceived by the user. The order of addressing the categories of experiences over time is chosen according to the focus of design and development of the TA2 demonstrators. Pragmatic aspects such as interaction flow, game play, etc. are often implemented first. After that often a focus on the design of aesthetic aspects follows. Meaning is only experienced and evaluated on applications and services that are used over a longer period of time in real life. For evaluations this means the experience of meaning can be best tested when field trials are possible. Each experiment will lead to new insights that are directly adopted in the UX framework and translated to formal evaluations for the TA2 demonstrators. At the end of the TA2 project these activities (the first and the one addressed here) will result in a validated UX framework (for social communication systems), different new evaluation methods to evaluate UX and its resulting value and design recommendations.

3.2 Planning

The work planned for these two activities will mainly be performed by TNO ICT in cooperation with Interactive Institute. The first category of design elements and experiences we shall look at is the pragmatic, since this is often the first focus in the design of new applications and services. Since there seems to be a causal relation between aesthetic design elements and experiences (colour, form, structure, etc. stimulating the senses) and pragmatic design elements and experiences (through interaction created experiences such as ease of use, efficiency, enjoyment, fun, immersion, engagement, flow, etc), the next category of experiences to research are the aesthetic. The focus of this second refinement is therefore on identifying the aesthetic design elements and experiences and testing to see if there is a relation between the design elements and experiences on this level and those on the pragmatic level. By the end of March 2009 we will have created a first inventory of pragmatic design elements and experiences. There is already a lot available related to usability (design elements and experiences to a somewhat lesser extent), however there is not much detailed insight as to how to design experiences such as enjoyment, fun, immersion other then from game theory (Salen and Zimmerman 2003). By the end of April 2009 the hypothesis for the relations between pragmatic design elements and experiences are formulated together with the evaluation or experimental methods to test the hypothesis. By the end of May 2009 the experiments are performed and the results are made available.

Aesthetic design elements and their resulting experiences are inventoried in June 2009. In July 2009 the hypothesis and experiments are formulated to test aesthetic design elements and their resulting experiences, together with the pragmatic ones, building on D2.1, this deliverable and additional literature. At the same time the first TA2 early demonstrator prototypes become available and these will be considered for the evaluations. In August 2009 the experiments are performed and the results are made available, leading to a first insight in the causal relations between aesthetics and pragmatics and a refinement of both within the UX framework.

In the last 4 months of 2009 design aspects and experiences, related to meaning and especially the experience of togetherness and the value it provides, are going to be analysed in detail. During this

time period the first interactive demonstrator applications will be developed as more robust prototypes which can be tested in daily life situations by real users the year after. In September 2009 an inventory of design aspects and experiences related to meaning will be created with a specific focus on enhanced social communication and togetherness. In October 2009 the hypothesis and evaluations will be formulated and the evaluations will be carried out in the last 2 months of the year, providing demonstrators are available for testing in real life situations, preferable over longer periods of time (4 to 8 weeks at least). Results will be made available in December 2009 or during the first months of 2010. During these last evaluations not only meaning but the aesthetics and pragmatics of the demonstrators will be tested as well, providing insight and validation for the complete UX framework and the value as perceived by the users of TA2 demonstrators.

Table 1: Planning overview theoretical refinement

Activity	**Delivery date**
Pragmatics	
Inventory pragmatic design elements and experiences ready	March, 2009
Hypotheses and experiments for pragmatics formulated	April, 2009
Evaluation results pragmatics available	May, 2009
Aesthetics (in combination with pragmatics)	
Inventory aesthetic design elements and experiences ready	June, 2009
Hypotheses and experiments for aesthetics formulated	July, 2009
Evaluation results aesthetics available	August, 2009
Meaning (in combination with aesthetics and pragmatics)	
Inventory design elements and experiences related to meaning ready	September, 2009
Hypothesis and experiments for meaning formulated	October, 2009
Evaluation results meaning available	November/December, 2009 – beginning 2010

This is a preliminary plan and will be adjusted to take account of resource constraints that only become apparent as the work progresses.

4 Development and evaluation of five demonstrators

In the last chapter we described the theoretical refinement activities. These activities are key input for the evaluation of the five TA2 demonstrators being developed this year (2009) and for the coming years. Next to the open theoretical issues we have made first progress in formulating the evaluation questions for the different demonstrator trajectories as can be foreseen at this moment. There are currently many different User Centered Design methods and tools available that help to perform first evaluations right from the start of the demonstrator development. This chapter addresses these kinds of evaluations.

During the last few months, communication with the vision holders and technical integrators was started to gain a deeper understanding in the functionality provided by the demonstrators over 2009. Furthermore evaluation issues and interests that the vision holders and technical integrators themselves foresee were discussed. In the following, these communications are summarized per demonstrator as a first inventory to start the evaluation activities. The discussions with the vision holders and technical integrators that took place were partially based on a workshop during which togetherness was explored in the context of the different demonstrators and additions to the UX framework made during 2008. Further activities in the coming months for these communications are creating a description of the different evaluation methods currently available to address specific evaluation interests that can already be addressed with these methods. With this overview first evaluations can be formulated and started in an early stage of development.

There is a substantial role for the Ethical Advisory Committee (EAC) in this stage of the TA2 project. The EAC will provide guidelines before any evaluation can take place. Terms of Reference have been formulated; EAC representatives will review the setup of the evaluation as well as whether the procedures (e.g. consent forms) have been followed after the evaluations took place.

Chapter 4.1 briefly addresses the different demonstrators, their key functionalities, their intentions to support specific experiences and the main evaluation issues/interests. Chapter 4.2 addresses the preliminary planning of the demonstrator developments for this year, indicating interesting moments for evaluations.

4.1 TA2 demonstrators in 2009

4.1.1 Family Game (Space Explorers)

The goal of the Family Game demonstrator is to develop and evaluate a social gaming environment, which is engaging and immersive. People from different locations (or groups of people at different locations) can jointly play an online game and also communicate before, during and after the game. The game materials consist of a display (acting as playing board), cards and other physical materials which are recognized by the game system via RFID technology, so actions can be recognized and interpreted by the game system. To support communication between different locations a video/audio communication system will be used (see figure 3).

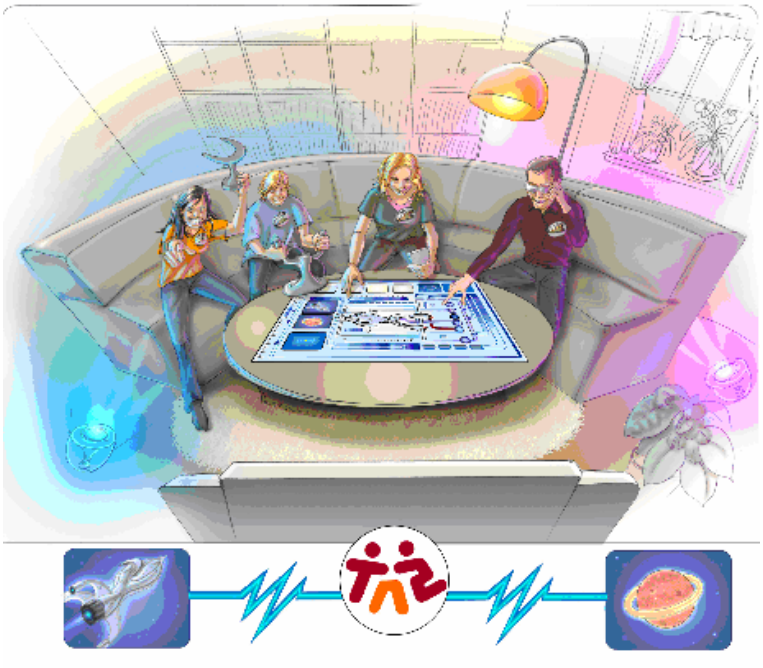

Figure 3: Family Game, Space Explorers

Some ***key features*** of this game to stimulate the emergence of experiences are:

- The group of people have a common goal (combat a common enemy), providing challenge and a certain degree of (necessary) cooperation to obtain this goal
- The game is short passed, approximately 15 minutes, supporting brief periods of playing and interaction, which stimulates regular play without too great demands on one's time.
- The game is turn-based. Players listen to an audio track that provides information about the attacking enemies and other dangers. While listening, they plan their actions together (cooperating). The actions are afterwards executed turn based providing time for players to communicate and evaluate the chosen strategy (though the steps taken are set and can not be changed). This results in winning or losing.
- The game is played from different locations. Players either are at the same location playing with others at a different location or all players are contributing from different locations. This introduces direct (people at the same location) as well as mediated (players at different locations) communication possibilities. More than 2 different locations are supported.

Some ***key experiences*** that are intended to be supported by this game are:

- The experience of enjoyment, fun and immersion.
- The experience of togetherness, through cooperation and communication with a lasting effect beyond game play.

Key evaluation interests are therefore:

- Does the game create good aesthetic experiences (beauty, well structured, nice forms and colours, etc)?
- Does the game provide the right level of challenge? Individually (is a player stimulated and challenged at the right level without encountering pragmatic issues that so to say 'spoil the

fun') as well as socially in cooperation with others (can players challenge and cooperate with each other in a good way).

- Do players, and if so how do players experience togetherness while playing and after playing? Does the experience of togetherness last after playing and what effect does it have on the social relations with others? Does it change social relationships? How does playing this game influence the feeling of togetherness when people know each other, partially know each other (some new players and some familiar players) or don't know each other at all?
- Part of the game is supported by a system (observing the rules and executing the planned actions), what effect does this have on players' understanding of the game (rules, system), the challenge provided, enjoyment, fun, immersion, the experience of excellence and expertise, etc. when part of the control lays with the system?
- With a combination of physical and virtual game elements and communication a different social setting is created from board games only and console based only multiplayer games. What is the effect of this mixed setting on the experience of togetherness, fun, enjoyment, immersion, etc? And the long lasting effects on social relationships?

The current ***ideas for evaluation*** are:

1. Evaluate the game rules/system with game experts to gain insight in mainly the pragmatics aspects of the game (perceived ease of use/understanding, attractiveness of the game system, rules and play, the challenge provided, etc). Methods that can be used for these kinds of evaluations are early or paper prototypes in an artificial setting (planned for Q2, 2009).
2. Evaluate the user interface with friendly users/gamers on its pragmatic aspects and resulting experiences as well as its aesthetic aspects. Methods that can be used for these kinds of evaluations are early or paper prototypes in an artificial setting (planned for Q2, 2009).
3. Evaluate the object recognition by the system with friendly users, gamers and see how people like the differences in control (pragmatic aspects: the system keeps track of the rules and the actions) and the more advanced aesthetic aspects. Methods that can be used for these kinds of evaluations are early prototypes (e.g. implemented in Flash) (planned for Q3, 2009).
4. Evaluate the mediated communication and game play at multiple locations on mainly pragmatics and meaning in terms of aspects creating an experience of togetherness during as well as after game play. In 2009 it will most probably not be feasible to test a system version in the field in terms of placing systems in the homes of people. However, different lab evaluations can be performed to gain an advanced insight in aesthetic, pragmatic issues and a first insight can be gained in the experience of togetherness in terms of first impressions. Though field trials remain the desired evaluation situation for testing the experience of meaning. Therefore field trials will be performed in 2010. Methods that can be used for the kinds of evaluations not applied in the field are simulations of settings such as players playing the game with each other from multiple rooms mirroring multiple locations (possibly supported by video/audio communication) and when the system is less advanced, let players play the game with each other in different groups according to a Wizard of Oz setting (in which the evaluators simulate part of the activity of the system) (planned for Q4, 2009).

4.1.2 My Videos

The goal of My Videos is to develop and evaluate easy-to-use tools and a secure infrastructure (security as well as privacy is a concern) that people can use to upload their personal video clips of an event (e.g. a school concert) and then combine and edit these into different video compilations ('narratives') of that event based on all the input delivered by different people to the system. People

can then, later-on, experience or re-experience that event and/or let others experience the event according to personal interests (see figure 4).

Figure 4: My Videos

Some ***key features*** of this system to stimulate the emergence of experiences are:

- Let people contribute their own created materials of events (video, audio, pictures, etc) that can be used personally or by or together with others to create different video narratives of the event in collaboration, stimulating the feeling of togetherness (during as well as after the event and during collaboration), shared memories, etc. Privacy and the experience thereof in combination with personal content are very important in this system.
- Let people share narratives of events with others that haven't participated in or watched the event such as family members and friend at other locations according to the interests of the other. It could for example be that a relative is not interested in all the people performing in the event, but just in his or her grand daughter's performance. Thus creating shared memories and enables other people to stay informed of others and their (daily) experiences, creating a feeling of awareness, closeness and togetherness.
- While creating 'narratives' people should experience fun and enjoyment, reflecting on the event, enjoying all the materials and creating something new from it (self expression and reflection on and sharing of fond memories, pride, etc).

Key experiences are:

- The created feeling of togetherness and how this is sustained also outside of direct use of the system. As pictured, shared narratives can keep people in touch, giving them the feeling to be up to date about life events of others. Furthermore this sharing can provide triggers for further conversation.
- The experience of privacy and psychological security are key issues in this system/application. People probably have clear ideas about what they would like to keep private and only share with family or friends and what content is more or less public. How people have influence on the availability of the original materials and created narratives and to whom the results are made available are therefore very important.
- The experience of creating something memorable via easy to use tools is a very valuable concept supporting experiences of pride and self expression as well as more social experiences such as sharing live events, togetherness and feeling close to others, feeling part of someone's life by receiving a narrative. We presume there is a careful balance between ease of use, challenge and social experiences that are closely related in the sense that they are all an important part of the social context shaping the different experiences.

Key evaluation interests are therefore:

- How do aesthetic features of the system, but also of the narratives created, influence aesthetic, pragmatic experiences and the experience of meaning (such as togetherness)?
- How are pragmatic aspects recognized and which pragmatic experiences emerge? In terms of for example ease of use but still providing a certain amount of challenge so one can be proud of one's work, etc? What cost-benefit relations will the users experience in terms of effort put into making materials available, effort in creating narratives and the results obtained in terms of pride, shared memories, etc?
- Privacy and psychological safety are important issues in the context of pragmatics and the social experiences like togetherness. With whom do people want to share personal materials and what feelings are related to the distribution of narratives to a broader public (also when someone else edited or created the narrative)? The way in which privacy and the feeling of psychological safety are implemented in appreciated can very well make or break this system's success.
- How does the creation of attractive, meaningful narratives, the re-experiencing and sharing of these narratives support or let experiences of togetherness immerge? Do they indeed contribute to the experience of togetherness? And trough what means precisely?
- Is the way privacy is implemented sufficient for people to use the system without having the feeling of 'not knowing what could happen with personal content'?

During the design of My Video's participatory design methods or co-design methods are used to develop the My Videos system, delivering first insights on the design (aesthetic, pragmatic and meaning aspects). Methods used are for example paper prototypes and card board visualizations (storyboards, storylines and use cases).

The current ***ideas for evaluation*** are:

1. In Q3 the system's basic functionality of annotating materials and creating narratives should be ready to be evaluated in a field trial. By the end of June 2009, 10 people (families whose children attend an elementary school) are given a camcorder to record materials during a school event (concert).
2. During July and August 2009 these inputs will be gathered and put into the My Video's system to make it available for annotation and creating narratives. Evaluations taking place during these months are aesthetic and pragmatic evaluations. They will obtain first insights in the aesthetic experiences of the system itself, the ease of use, challenge, fun and enjoyment of annotating materials and creating narratives together or by oneself. Furthermore the aesthetic, pragmatic experiences and the experience of togetherness in terms of shared memories, taking a peek in someone's life, etc.these create in others or among people are of interest. These evaluations are done small scale with a limited number of participants.
3. In September and October the system and tools are made available to participants (parents) and the experience of togetherness can be studied in more detail.

4.1.3 Child's Play (Jump Style)

The goal of the Child's Play system is to develop and evaluate a platform on which people can create and share video-clips in creative and communicative ways, including the possibilities of engaging in competition or cooperation. For example, two boys record a video of them dancing and send it to their cousin; he then practices his dance, records it and edits his part into the video and sends it back; and during this process they communicate and have fun. This system can be used to provide enjoyment

and a sense of doing things together with others for a wide range of interests as long as these are about physical movement (see figure 5).

Figure 5: Child Play, Jump Style

Some ***key features*** of this system to stimulate the emergence of experiences are:

- Provide a platform with which people can share and jointly act real time or asynchronous content in which they themselves feature (e.g. real time video of themselves is projected into a scene already existing or recorded elsewhere. Furthermore real time communication means such as audio are provided too). Thus creating an experience of doing something together, maybe even the illusion of being together close to a real life experience.
- The system is intended to support social interactions between children (kids (5 to 10 years) and teens (11-15 years)) and provide means to explore, express and share their interests with others real time or asynchronous.

Key experiences are:

- Doing something together, creating the experience of togetherness (either real time or asynchronous) through cooperation, sharing of ideas and interests, knowledge such as certain 'moves', shared activities or challenges (competing with each other or against others).
- Self expression, identification, pride, etc. through being able to show what you can do to others or by mirroring others in cooperation or winning competitions. Trough learning others new things and learn new things yourself (self development).
- Fun, enjoyment and immersion during the whole process of creating, cooperating, performing together and sharing.

Key evaluation interests are therefore:

- What kind of experience of togetherness is created? Do kids and teens really share more during this social communication of their interests and do they take pride in what they did and how affect these feelings the experience of togetherness?
- Do the effects of together performing an activity create a real life illusion of being together practicing a dance? And does it stimulate the feeling of togetherness after the interaction as well?
- Can kids and teens cope with the system in a pragmatic way? How do people experience the easy of use, how do they accept these new concepts of social communication and do they enjoy them? Do they find them immersive and fun to participate in?

The current ***ideas for evaluation*** are:

1. Interviews and focus groups, supported by simple sketches to explore the usability of this demonstrator (Q3 2009)
2. In a first (working) version kids can create and upload video clips asynchronously, others can watch these clips and can comment on them. The focus of evaluations will be on the aesthetic aspects of the system and of creating and sharing video clips, on the pragmatic aspects such as ease of use, enjoyment, fun and on aspects of meaning such as the experience of expressing oneself and sharing this with others who comment on it (planned for Q4, 2009). These evaluations are performed in a lab context (not real life contexts).
3. In a second version of this system kids will be able to cooperate or challenge each other in real time or asynchronously by sharing video footage in which that of someone else can immediately be projected (synchronously) or edited and later on be projected and shared (asynchronously). Next to the mentioned evaluation interests this second version is very interesting for evaluating the feeling of togetherness that emerges when people are creating, sharing and cooperating or competing synchronous and asynchronous. It is a very interesting topic to see how people experience these joined activities and what differences there are in the experience of togetherness in synchronous and asynchronous social communication via this system. Furthermore in the second version of the system delays are foreseen that might affect the user experience in terms of for example aesthetic aspects such as delayed moves, video and audio communications resulting in confusion and dislike or irritation. These issues might be solved by using different visualization techniques that make the observation of delays less prominent. It is interesting to observe how this will affect aesthetic experiences (planned for Q1 and Q2 2010). These evaluations will be performed during a field trial.

4.1.4 Sixth age (Pairs)

The goal is to develop and evaluate a series of 'casual' games, targeted at people in their 'sixth age' who are geographically separated, which are intended to help improve social communication between them, e.g. by enabling them to invite others to play and informal communication before, during and after the game. A first game implemented is 'Pairs' (see figure 6).

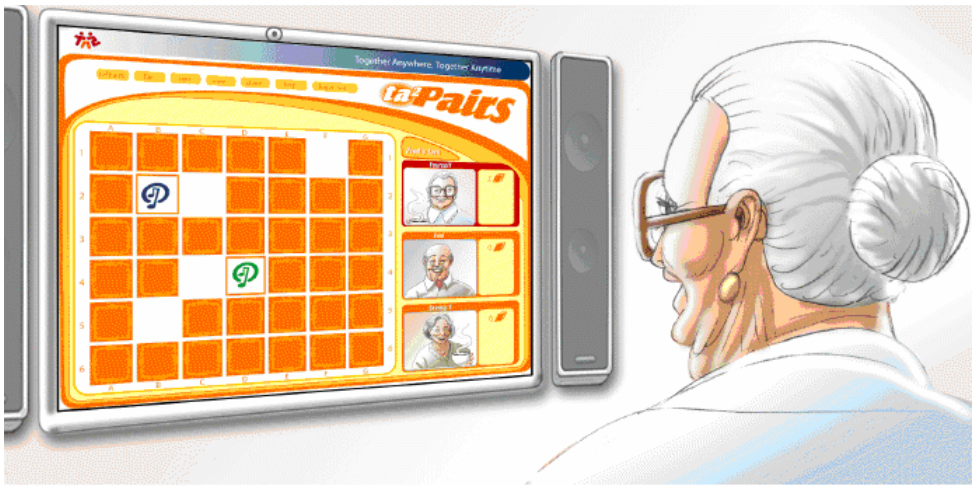

Figure 6: Six Age, Pairs

Some ***key features*** of this system to stimulate the emergence of experiences are:

- The "Pairs" game is turn based and takes relatively little time to play. One of the key features of this game is that people will be able to create their own decks of for example personal pictures. Your own deck of cards used in the game can trigger interesting communication about events you experienced in daily life, recently or in the past.
- Because the play time of the game is brief the game is turn based and furthermore video and audio communication are added, there's room for informal interaction, or everyday conversation during the game.

Key experiences are:

- Pictures in the decks can function as triggers for conversation during and after the game. The informal communication can lead to a sense of togetherness, sharing interests, memories, and personal identity.
- People might enjoy creating their own deck of cards and looking forward to using this in a game with others.

Key evaluation interests are therefore:

- How does this application support a sense of nurture and togetherness among the participants? How do people experience the engagement in playing this virtual, mediated game with others and at the same time converse about the pictures, daily events like they would share over a cup of coffee, etc? How does the social communication and game play support social relationships?
- Elderly people often do not have the most advanced knowledge of ICT applications. Universal or inclusive design of the application in terms of usability is essential. The main question here is how do elderly people adopt this technology? Can they cope with these new tools and do they enjoy their usage?
- How do people like creating their own decks of cards? What intentions and kinds of self expression are important to them and can they realize this through creating card decks and do they observe the benefits?
- Is the game played by different generations and equally enjoyed? Do grandparents play with their grandchildren? And how does each like the game play and ongoing conversations? Are their observable changes or benefits in the relationships between elderly and younger people supported by this application?

The current ***ideas for evaluation*** are:

- In March or April 2009 a first mock-up version of the application will become available which can be tested with elderly people alone or in combination with for example their grandchildren.
- In September 2009 a real life user trial can be performed, either in the UK ("Connected Borough") or in Sweden where the application is developed.
- During the development Interactive Institute will further design the application through participatory design methods (involving people in the development and evaluation process, and invite them to actively and creatively contribute to the design).

4.1.5 Connected Lobby

The goal of the Connected Lobby is to develop and evaluate a portal or entrance through which the other four applications are made available with additional functionality such as creating a kind of

awareness of people's availability, mood, context, current activity, etc. The awareness of others provided is meant to let people more frequently, at appropriate times and more effectively communicate with others, formally and informally (see figure 7).

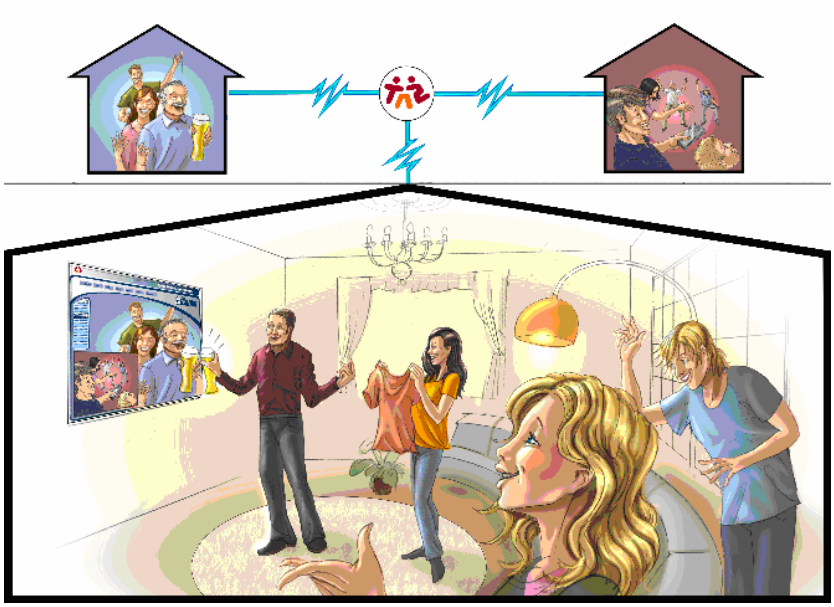

Figure 7: The Connected Lobby

Some ***key features*** of this system to stimulate the emergence of experiences are:

- People can see who is present, available, online and what their latest contributions, activities or content exchanges were (in some cases depending in privacy and psychological safety). A kind of awareness of others is created this way.
- People can communicate with each other through synchronous means as well as asynchronous (for example leaving a message for someone or a group of people).
- From the connected lobby people can start one of the other applications (Family Game, My Videos, Child's Play or Sixth Age), engaging in more specific interaction and game play.
- The connected lobby is also available on a mobile phone, so people can carry the awareness of others with them throughout the day. The possibility of continuous awareness supports initiations of information and social communication via other means as well (e.g. from the mobile phone itself).

Key experiences are:

- What does the awareness of other do for the informal and social communication? And how does it influence the use of the other 4 applications accessible through the lobby?
- How does awareness of others (even without communication) influence the experience of togetherness and more general, social relations?
- What does the connected lobby add to the other applications? What if the lobby wasn't there, how would it affect the usage of the other applications?

The current ***ideas for evaluation*** are:

- In a first version of the connected lobby the other applications are not yet integrated but a limited presence and awareness will be (planned for February 2009). In latter versions (planned for June/July 2009) the awareness will be more advanced in terms of location detection, sharing this location on a map and being able to take pictures of one's surrounding. However, parts of the awareness can be tested in different ways. For example, does awareness of others have effect on the communication with them? Does someone, being aware of the other, initiate communication via the mobile or stationary phone, chat applications, instant messaging, Twitter, etc? These latter applications are commonly used by a larger public and can easily be made available within the connected lobby.
- How do people experience privacy and psychological safety related to this application? People will share part of their context information with others, but which preferences do they have in doing this? And are there differences in groups of people that may view specific information?
- In September 2009 some other applications will be made available through the connected lobby and the combination of awareness and application usage can be studied in further detail together with the experiences that are emerging.

4.2 Research interests from UX framework and TA2 demonstrators

In the following table (table 2) we summarize our first preliminary research questions (generally formulated), the design elements found and hypothesized to influence certain experiences and possible measurements through which the experiences can be measured objectively or subjectively. This table serves as a starting point to further discuss and explore the theoretical and practical research questions that are related to the TA2 applications, with especially the vision holders and the demonstrator technical integrators. Chapter 5 elaborates on the development trajectory of ICT products/services and the methods that can be applied to obtain insight in users and evaluate products and services.

Table 2: Overview or research interests, experiences, design elements and possible measurements.

	Research questions	Remarks or design elements	Measurements
Predispositions of the user	Which predispositions are hypothesized to influence the UX of TA2 demonstrators? • Personal needs, desires, goals, tasks • Motivation for usage (intrinsic/extrinsic) • Previous knowledge and experiences (ICT skills, experience with different applications/mediated communication, social processing abilities and executing functions, skills and abilities to act in social situations) • Personal history/development of relationships • Cultural background	***Remark***: Predispositions of the user, as observed here, can not be influenced through design. They are given by the persons history and development based on earlier experiences. You try to design products and/or services that address these predispositions as best as possible. Predispositions do however change over time, when new knowledge and experiences are gathered. Predispositions are strictly personal and should be viewed as personal knowledge and how a person thinks about the world he or she lives in.	• Interviews • Questionnaires • Story telling
Context	Which contextual factors are hypothesized to influence the UX of TA2 demonstrators? • The different groups with which someone is associated and the social structure/hierarchy in these groups • Physical context. Are people in together or alone, at the same location or different locations • Virtual context: What virtual social network is available through different communication means other than TA2's and how is this social network presented through the means used?	***Remark***: Context is not meant to be designed; it should be viewed as a given factual status that is dynamic and can change over time. Context is everything outside of the person to which the person is somehow connected or related. Context influences the feelings, emotions, attitudes, what is found to be appropriate or not and the behaviour of a person.	• Observations/ethnographic research • Social network analysis • Interviews • Questionnaires • Logging of ICT applications/systems • Experience sampling • Diary studies
Aesthetics	Which aesthetic aspects are hypothesized to influence the UX of TA2 applications? What aesthetic experiences arise through which design elements? • Warm vs. cold impression • Arousing • Harmonious • Light vs. dark impression • Saturated vs. unsaturated impression • Well balanced vs. badly balanced • Sensual • Feminine vs. masculine • Contemplative • Serene • Active vs. passive • Pleasing vs. offensive • Intimate vs. distant • Business like vs. personal • Professional vs. cheap • Emotional vs. unemotional • Clear • Concise • Clean • Thrilling	• Form • Colour usage (theory: hue, saturation and contrast) • Structure • Sound • Conjunctive ambiguity • Use of metaphors • Most advanced, yet acceptable principle • Congruency/appropriateness of aesthetic elements	• Testing on Gestalt principles (structure/form) • Testing on synchronicity of different sensory sources • Interviews • Story telling • Questionnaires • Eye tracking studies • Testing on familiarity with applications, tools, systems

	• Tension • Attractive vs. unattractive • Familiarity vs. completely new • Congruence vs. incongruence		
Pragmatics	Which pragmatic aspects are hypothesized to influence the UX of TA2 applications? What pragmatic experiences arise through what design elements? • Ease of use (during interaction) • Efficiency / usefulness (during interaction) • Satisfaction about the interaction • Perceived naturalness of interaction • Fun / enjoyment / pleasure during interaction • Immersion / flow • Awareness (in terms of what is needed to perform the interactions)	• The behaviours supported by the interaction (made possible by the interaction) • Application flow / narrative / interaction flow • Metal models represented in interface and interaction • Providing challenges for the user at the right level (not too little, not too much), goal setting (cooperation, competition) • Pacing of the system (not too fast, not too slow, leaving room for the user to think, act, etc. according to personal preferences) • Feedback and concise presentation of information • Interactions that feel human, behave according to human norms/values • Degree of control (focus of control with the system or user). • Personalization means (fit the content and interactions to the user) • Create awareness of others' statuses as far as relevant for the interaction (telepresence) • Provide synchronous and asynchronous communication • Provide good, usable means to express oneself in social communication • See also D2.1 for an additional detailed overview of pragmatic design aspects	• Task performance (objective/summative) or subjective (formative) • Measure cognitive effort • Measure communication ambiguity, compensatory adaptation, physiological arousal • Interviews • Questionnaires • Observations • Story telling • Eye tracking studies
Meaning	Which aspects of meaning are hypothesized to influence the UX of TA2 applications? What experiences of meaning arise through what design elements and last beyond mere application usage? • Reciprocity (within and beyond interaction) • Awareness (in terms of being aware of other's feelings, state of mind, thoughts, major or daily events that are socially significant) • Presence (others being more present with TA2 systems then before in daily life by e.g. thinking about others more regularly) • Togetherness • Closeness to other person or group of people, feeling connected emotionally	• Provide a common goal • Provide means for cooperation/competition • Leave room for (informal) communication • Enable people to create something personal, to put a personal effort in the application that is rewarding in terms of self expression, personalization, self identity and/or can be used as a gift or for starting social interaction. • Privacy control means • (Psychological) security control means • Support informal	• Observations • Interviews • Focus groups • Questionnaires • Story telling • Diary studies • Logging • Experience sampling • UGC (user generated content) analysis

	(beyond mere interaction) • Experience empathy for others • Self expression • Self identification (with person, content or groups) • Psychological security (within the interaction but beyond as well) • Trust in other people (beyond the interaction as well) • Having the feeling of having shared interest with others • Emotions related to the application and it's function or influence on everyday life. • Feelings of living according to one's norms and values	interactions that can naturally come to life (more or less coincidental communication) • Competition in interaction and social communication resulting from it	
Value	Value is hypothesized to be expressed in certain behaviours and subjective opinions such as: • Repeated usage • Willingness to pay • Talking about the product/service with others • Recommending the product/service to others		• Interviews • Questionnaires • Logging usage • Focus groups • Story telling

4.3 General issues and development/evaluation planning of the demonstrators

During the interview with the vision holders and demonstrator technical integrators some other general issues were found, which should be taken into account during the further development. These are summarized briefly below:

- *Diversity of platforms, browsers, etc.*: Restricting technical developments of the applications to a limited number of supported platforms, systems, operating systems, browsers, etc. is highly desirable to prevent compatibility problems and ensure the correct workings of the demonstrator applications. Demonstrators are never finished products and not supposed to be universally compatible. These restrictions, when chosen wisely and communicated clearly to their users should not give any problems in terms of the evaluations.
- *An 'extra device'*: Using selected devices which guarantee to work with the application is desirable from a technical point of view since this limits compatibility issues and risks and therefore implementation efforts. However, additional devices given to users create a risk of users not seriously using the devices as they would normally do. Since the cost – benefits of personalizing a device such as a mobile phone, combined with the fact of 'having to return it after a few weeks' might out weight the observed advantages the demonstrator application provides. When it is decided to choose for a specific device and not use what people already have available it is strongly advised to give the devices to the users permanently so personalizing it will well be worth the effort.
- In the selection of evaluation methods and the evaluation activities for the different demonstrators, the available resources and time should be very well considered. During the ongoing discussions about the evaluations with the vision holders and the demonstrator technical integrators planned for the coming months this issue will be addressed. A document concisely describing different evaluation methods will give the needed insight and input for

discussing which evaluations are performed and by whom. In case vision holders or demonstrator technical integrators are going to perform evaluations, an evaluation protocol created by TNO ICT will provide specific guidelines on how to perform the evaluations.

- At this moment it is difficult to be very precise in what specific functionalities are implemented at what exact dates, since the demonstrators are still in a partially conceptual phase and the focus of the concept and the implementation that follows can therefore still be subject to change. In table 3 a preliminary planning is formulated, describing the expected available progress that can be tested in evaluations for the different demonstrators.

Table 3: Demonstrator development planning

	2009, Q1	2009, Q2	2009, Q3	2009, Q4	Early 2010	Later 2010	2011
Family Game (Space Explorers)		Paper prototype. Evaluate game rules, UI, obj. rec.	Implement logics, in Flash	Trial, working game rules, and basic UI and obj. rec.			
My Videos		Participatory design, in Amsterdam. June: give 10 parents camcorders	Jul-Aug: Usability testing of tools.	Sep-Oct: Trial: Parents use tools to create videos			
Child's Play (Jump Style)			Interviews or focus groups, with simple sketches	End of Summer: First version, asynchronous	Add video (if available). Add montage options	Second version, synchronous. Field trial	
Sixth Age (Pairs)	March-April: First version, without Lobby.			September: User trial, in UK and/or in Sweden			
Connected Lobby	February: Presence server and Ambient overview Focus groups, interviews, with simple sketches	June-July: Add: mobile phone; location detection, sharing (map)	Usability testing of parts of the application	September: Start to make other applications accessible	Field trials		

5 Understanding the design and evaluation process

In this chapter we briefly address different design cycles and the methods that can be applied within these design cycles. This is still work in progress in terms of formulating a complete overview of the methods available for design and evaluation in more detail. This overview of different design and evaluation methods will serve as a jump start to quickly formulate user experience evaluations that can be performed on the early demonstrator prototypes which will become available in the coming few months.

5.1 Design processes

There are different ways to conceive of and visualize a design and evaluation process. Firstly such a process can be viewed as linear, during which one gradually progresses and becomes more and more concrete and detailed about a concept or design. An example of a linear process is moving from policy/strategy towards ideas, concepts, designs, prototypes and pilot these during larger evaluations, after which a product or service is launched and deployed by the users. Linear process conceptualizations are good when progress can be made in sequential deliverables and decision moments. Such models are useful for managers of new product development projects to plan, monitor and control progress; however one should be fairly sure the project is quite clear in terms of the outcome and the path that needs to be followed to realize this. Furthermore the outcome and path towards it should carry little risk in terms of uncertainties. Within TA2 new technologies and interaction concepts are created and developed to support new kinds of experiences. Risks in terms of the number of uncertainties encountered during the project are therefore many and should be foreseen within the design and development as early as possible, meaning many moments at which specific ideas, concepts and features need to be evaluated and thoroughly reconsidered. A more non-linear and creative approach is therefore needed. Idea generation, idea selection, concept definition, opportunity identification and opportunity analysis can happen in parallel and more or less simultaneously.

A second approach is the cyclic approach in which a circular process is used to conceptualize product design and development. In a circular process one can start anywhere in the process (see figure 8).

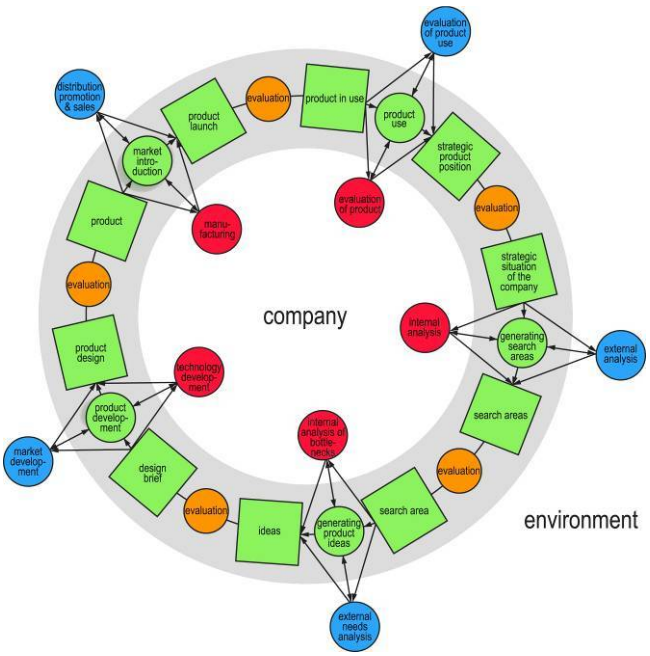

Figure 8: Circular design and development process (Source: Buijs and Valkenburg, 2005)

A third design and development process is the iterative process, which partially shares characteristics with the circular process in terms of gaining insight (through design methods or evaluations) that are used in further design and development but can lead to the decision to take a step back as well. Since we develop complete new products within TA2 and the iterative process starts at the utmost beginning of new product development and gradually works towards the end in different iterations and reconsiderations of design and implementation, this approach seems to fit the TA2 project best. In iterative design processes alternating phases of attempts to understand the (problematic) situation, to design solutions for that situation, and to evaluate these solutions are central (see figure 9).

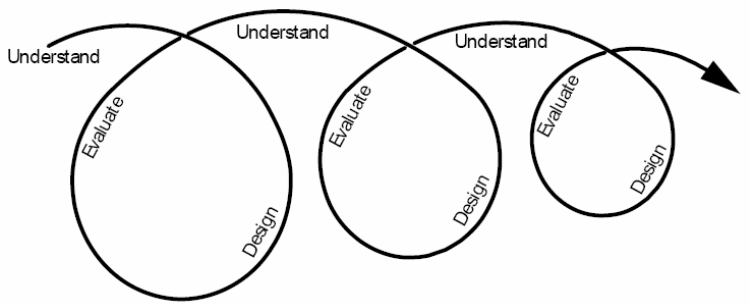

Figure 9: The iterative design process (Source: Faber and De Vos, (2008))

5.2 Methods to evaluate UX in iterative design

As we addressed in chapter 2 through 4 there is no validated framework for UX measures available from theory, only pieces of theory that fit parts of the framework. However from practise there is a wide range of methods and tools available to evaluate UX of ICT products and services on specific aspects in which a researcher is interested. These methods are often applied in iterative design processes. In this paragraph we will briefly address the most commonly used methods in iterative design and evaluations. Over the next few months we will elaborate on these methods in more detail by creating a complete overview of methods available that can be used in TA2 demonstrator evaluations and help to discuss in putting together the evaluations with the vision holders and technical integrators.

In methods for design and evaluation we can find 3 main dimensions on which methods can be placed and which influence the choices for specific methods. These are: trying to understand the user and his or her context (***understanding***)or looking for ***confirmation*** of ideas or ***understanding***; being interested in ***qualitative*** (often ***subjective***) aspects of a user's context, behaviours, feelings, thoughts, etc. related to design or being interested in ***quantitative*** aspects thereof; and being interested in '***snapshots'*** of specific moments (e.g. the usability right in the beginning of using a product or service) or being interested in a '***movie'*** perspective in which a user's context, behaviours, feelings and thoughts are often viewed as dynamic and changing. These changes are what you are interested in the latter case.

In the following table the methods are only plotted on the dimension of ***understanding*** versus ***confirmation*** (evaluation of concepts, ideas, etc) (see table 4). In the more elaborate overview of methods (currently in progress) the additional dimensions will be addressed as well.

Table 4: Overview of methods for understanding versus confirmation (evaluation)

Design stage	Purpose	Method	Contribution
Understand	Broad understanding of target group	Desk research	Explore and create an overview of what is already known, e.g. about a specific group of people or about a specific phenomenon.
	Understand end-users' needs and preferences	Interview or Focus group (explorative); Diaries or Probes (explorative)	Understand end-users' needs and preferences.
		Observation; Experience sampling (summative)	Understand end-users' practices and experiences. Insight in how people experience situations (summative purpose, as input for design).
	Understand end-users' needs, attitudes, beliefs and preferences	Survey; Conjoint analysis	Identifies and quantify needs, attitudes, beliefs and preferences of people in specific contexts, e.g. their daily life, work or usage context.
	Generate ideas and concepts for new services	Interview or Focus group (generative); Design workshop	Explore and identify needs. Explore and envision solutions and new services, often in the form of ideas or concepts.
Confirmation	Develop services and service attributes	Survey; Questionnaires; Conjoint analysis	Determines which service attributes are preferred by the target group and e.g. people's willing to pay for it.
	Evaluate service concept	Interview; Focus group	Identify the pros and cons of specific services or service elements, and envision alternatives and articulate recommendations for design
	Evaluate the usage and use experience of service prototypes	Observation; Diaries (evaluative)	Insight in how people experience a service, which helps to e.g. identify problems or shortcomings of the service.
		Logging	Insight in how people actually use a service, which helps to e.g. identify

			problems or shortcomings of the service.
		Experience sampling (evaluative)	Insight in how people experience using a service in situ, while they use it in realistic contexts (evaluative purpose).
		Lab study; Lab experiment	A (partly working) demonstrator or prototype is evaluated or tested in study or controlled experiment in the context of a laboratory.
		Field trial	End-users evaluate the usage and experience of using the service. During a field trial one can conduct Surveys; Logging; Interviews and Observation.

In practice, methods are often combined. Understanding in users and their context is created which often later is conformed by applying other methods. For example, one can start with interviewing users in order to explore their needs and preferences (understand), then generate and select ideas for new a product (design), then evaluate these ideas in a design workshop together with users (evaluation), and then one can improve and quantify one's understanding of users' needs and preferences via a survey (evaluate and design), create a prototype and organize a field trial in which people test this prototype (evaluate).

6 Further evaluation activities

The further evaluation activities planned for 2009 are the following:

- Theoretical refinement and new evaluation methods.
- Creating overview of existing UX methods for iterative design.
- Communication with vision holders and technical integrators of the different TA2 demonstrators to further define the desired evaluations and their planning, based on the theoretical refinement, new evaluation methods, overview of existing methods and desired or needed insights in the UX for the demonstrator in question.

TNO ICT will in cooperation with Interactive Institute perform the main part of the evaluations or will supervise them, though the resources and time available should be considered carefully. Some evaluation methods are less resource intensive and provide good results for specific evaluation interests. These will have priority over more resource intensive evaluation methods to ensure for each demonstrator research questions and evaluation interests are answered. Furthermore, in cooperation with the vision holders and demonstrator technical integrators we will look for methods that can be generically applied by the vision holders and technical integrators themselves when they indicate they have the necessary resources, interest and knowledge. A planning to further design the evaluations will be developed over the coming months during which the concepts and planning of the implementation of the demonstrators will become more concrete as well.

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