KATHOLIEKE UNIVERSITEIT LEUVEN

FACULTEIT SOCIALE WETENSCHAPPEN

SOCIABILITY HEURISTICS FOR INTERACTIVE TV

Supporting the Social Uses of Television

Promotor: Prof. Dr. D. De Grooff
Onderzoekseenheid:
Centrum voor Mediacultuur en Communicatietechnologie [CMC]

Proefschrift tot het verkrijgen
van de graad van
Doctor in de Sociale Wetenschappen
aangeboden door
David GEERTS

2009

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David Geerts

Sociability Heuristics for Interactive TV.
Supporting the Social Uses of Television.

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LIST OF ABBREVIATIONS

CMC: Computer Mediated Communication

CSCW: Computer Supported Cooperative Work

CW: Cognitive Walkthrough

DARe: Discovery and Analysis Resources

DVD: Digital Video Disc

EPG: Electronic Programme Guide

ESPRF: Extended Structured Problem Report Format

FOAF: Friend-Of-A-Friend

GOMS: Goals, Operators, Methods, Selection rules

HCI: Human-Computer Interaction

HE: Heuristic Evaluation

HEP: Heuristic Evaluation for Playability

HW: Heuristic Walkthrough

iTV: Interactive Television

MHP: Multimedia Home Platform

MMORPG: Massively Multiplayer Online Role-Playing Game

MOT: Metaphors of Human Thinking

PHE: Participatory Heuristic Evaluation

PVR: Personal Video Recorder

STB: Set-Top Box

UAF: User Action Framework

UCD: User-Centred Design

UEM: Usability Evaluation Method

UGC: User Generated Content

UIM: Usability Inspection Method

VCR: Video Cassette Recorder

VOD: Video On Demand

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1. Introduction

In recent years, many interactive systems for use on television as well as web applications with TV content have been successfully introduced. This so-called "interactive television" is no longer perceived as a failed experiment as it was in the late nineties (Jensen, 2008). Technological advances as well as the ubiquity of interactivity in everyday life using e.g. the Internet or mobile devices have lead to the acceptance of several forms of interactive TV by an ever larger portion of the public. As with many other consumer applications, the interface of interactive TV applications needs to be as simple as possible, to accommodate a wide range of users with different capabilities due to the widespread nature of television. User-centred design (UCD) is a well-established process to design such interfaces to be as usable as possible (Sharp, Rogers & Preece, 2007).

Evaluation is a critical part of this UCD process. It is best done as soon as possible – to uncover problems when it is still easy and cheap to fix them – and as often as possible, in an iterative manner (Sharp et al., 2007). Within Human-Computer Interaction (HCI), the multidisciplinary field that is concerned with studying how humans use interactive systems and how to design systems to improve this use, a wide range of methods exist to evaluate if a system is adapted to human needs. These methods are usually classified in three categories: user-based methods, model-based methods and expert-based methods (Sears, 2003). User testing is usually seen as the most effective method to uncover real problems with real users (Dumas & Redish, 1999). One of the challenges posed by user testing of interactive TV, however, is the fact that users expect a seamless TV experience, even more than with PC applications. When unstable systems are being tested (which is often the case in an early design phase), this fact can influence users' comments and actions related to usability (Boertjes, Schultz & Klok, 2008). So instead of user testing, heuristic evaluation is a good method to perform early in the development process in order to uncover problems as soon as possible and with a relative low-cost. Heuristic evaluation (part of the expert based methods) is low-cost and easy to perform (Nielsen, 1994), so it is very popular with practitioners. Such a heuristic evaluation is performed by one or more experts that use a number of general usability principles or heuristics to form an opinion on the user friendliness of an application (e.g. Nielsen,

1994; Scapin & Bastien, 1997). Most of these heuristics however are meant for computer based applications, and even though some of these guidelines could be transferred to interactive television, they are not always applicable due to the specific nature of television (e.g. being a lean-back medium). Thomas & Macredie (2002) have argued that, if there are no specific guidelines, designers for interactive television would be forced to apply existing HCI guidelines. Because of the essential difference between both media, they feared that these designers would create a mix of ad hoc, company specific standards that are mostly incompatible and inconsistent, based on HCI knowledge stemming from an obsolete economical, social and technological environment. They say that to design new guidelines, the general principles of HCI are best taken as a starting point, but adapted to the properties of interactive television and the characteristics of the traditional television viewer.

There are already some guidelines to design user friendly interfaces for interactive television (e.g. Daly-Jones & Carey, 2000; Lu, 2005; Chorianopoulos, 2008), but they usually focus on the usability of interactive television systems, and do not take the social nature of television into account, or only very limited. Another problem with some of these guidelines is that they are tailored to certain applications, e.g. Electronic Program Guides (EPG), which means they are not widely applicable to other interactive TV systems. What's more, in academic research groups as well as in companies' research laboratories, a new brand of interactive television applications is being developed: social television systems that allow remote viewers to interact with each other via their television set. In the beginning of this decade, systems such as AOL TV (Time Warner, 2000), 2BeON (Abreu, Almeida & Branco, 2001) and AmigoTV (Coppens, Trappeniers & Godon, 2004) were designed to allow people at different locations to talk or chat with each other while watching television. Since then, more and more interactive TV systems incorporating different forms of social interaction have sprung up: Social TV (Harboe, Massey, Metcalf, Wheatley & Romano, 2008), ConnecTV (Boertjes et al., 2008), CollaboraTV (Nathan, Harrison, Yarosh, Terveen, Stead & Amento, 2008), Ambulant Annotator (Cesar, Bulterman & Jansen, 2006), etc. When you also consider watching television programs on Internet, the list becomes even longer, with examples such as Joost, Babelgum, Yahoo! Zync, and more systems coming out regularly.

As discussed in the previous paragraph, existing guidelines for interactive television are usually related to usability: “The extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use" (ISO 9241-11). However, for applications being used in a social context such as the social television systems listed above, which will be described in more detail throughout this PhD, evaluating only usability is not enough. Even if these applications are evaluated to improve their usability, it does not mean that the social interactions they are supposed to enable are well supported.

Recently, the term ‘sociability’ (Preece, 2000) is being used to indicate these aspects that support and enhance social interaction with and through new technologies and applications. Conducting social interactions with new technologies is not new at all. Even before, but especially since the advent of the Internet, people have used new technologies to find ways to communicate, discuss and form networks with each other. Several research areas have arisen that focus on this phenomenon such as Computer Mediated Communication (CMC) and Computer Supported Cooperative Work (CSCW). However, specifically evaluating how well these social interactions are supported is only recently an area of research.

1.1 Purpose of this PhD research

The observations discussed in the previous paragraph, lead to the conclusion that there are currently no well established guidelines for evaluating the sociability of social interactive television systems, and that such guidelines are needed in order to design well-functioning applications that support social interaction. The first and most important purpose of this PhD is therefore to create a set of guidelines (or rather heuristics) that will help evaluators to assess how well these systems will support social interactions between viewers. The heuristics are however not only meant as an evaluation tool, but can also be used as guidance for designing certain features of social television systems, and as such function as a design tool as well.

Although the heuristics that we aim to produce for this PhD are targeted mainly at social interactive television systems, we think the application of (some of) these heuristics could be expanded to interactive television in general. We believe that the social practices surrounding television are so important, that interactive television can only be successful if these practices are taken into account (see also Lee & Lee,

1995). We therefore hope that our guidelines can be a step towards creating more successful interactive television programs and services.

1.2 Structure of this PhD

This PhD contains four main parts. In **Part I: Theory**, we summarize the existing literature surrounding the three central aspects of this PhD. First, we discuss the change from television to interactive television, describe how the social uses of traditional television have been studied and classified, and give an overview of current social television applications. Second, we survey the field of usability evaluation methods, with a focus on usability inspection methods. We pay specific attention to heuristic evaluation and describe several general as well as domain-specific heuristics. One of these domains is interactive television, where we present a number of existing (usability) guidelines. Third, the domain of sociability is analyzed and different concepts that relate to sociability are compared. Again, we consider sociability in different domains, and place an emphasis on how sociability has already been studied related to interactive television.

Part II: Methodology, explains how we created the sociability heuristics. We formulate the central research question, discuss how several general and domain-specific heuristics have been created in the past and introduce our approach to creating sociability heuristics for interactive television. We then describe in more detail the different steps we performed for detecting sociability issues with a competitive analysis of several social television applications, and how we created the sociability guidelines using a grounded theory approach.

In **Part III: Results**, we first present the outcome of the competitive analysis of the different applications, and how coding this data with NVIVO8 resulted in a number of sociability issues which in turn lead to the formulation of our sociability heuristics. We then present and discuss in detail the twelve sociability guidelines that are the main result of this PhD.

In **Part IV: Conclusion** we discuss how the sociability heuristics can be used for performing an evaluation as well as for designing social TV features, what the applicability is of the heuristics and what areas we can define for further research. We end this part and the PhD with a personal view on the success of interactive television.

PART I: THEORY

2. The social uses of (interactive) television

Interactive television is not an entirely new medium. It adds interactivity to a medium that has been around since the 1930s, and that has acquired a central place in the lives of millions of people. It is therefore necessary to have a look at the different roles that television plays for these people, and how interactive television does or does not have an impact on these roles. However, before we do that it is useful to first define what we mean when we talk about 'television' and 'interactive television', especially since recent technological advances have changed the way we can watch television. Rather than take on the daunting task of describing the history of (interactive) television, we aim to delineate in the following section the scope of these terms, so it is clear what the object of our study is, and how broadly applicable the heuristics we aim to produce are.

2.1 From television to interactive television

When television first entered people's homes, viewers could watch scheduled programs that were created by professional content producers and distributed by broadcasters over a telecommunications network (Magoun, 2007; Noll, 2004). This way of watching television is still considered as 'traditional' television. However, ever since the advent of the videocassette recorder (VCR), which allowed time shifting of watching recorded content, several changes have occurred (and continue to do so) that spark a discussion on the nature of television, and when we can still call something television (Magoun, 2007). Although watching recorded content with the use of a VCR on a television set is mostly considered as part of the classic view of television, watching the same content with a computer on the Internet often is not (Andreasen, 2001). Things get even more complicated when users are starting to create their own audiovisual content and distributing this to other viewers (often referred to as User-Generated Content or UGC (Hart, 2004)). In contrast to the move of television content to the Internet, a similar movement is taking place with Internet content that is being placed on and interacted with through the television set (Andreasen, 2001). In this section will discuss the several ways in which television as well as interactive television can be conceptualized.

2.1.1 The nature of television

The move from internet content to the television screen and vice versa indicates that a definition of what constitutes television should not be focused on the television set as only constituting factor. A television set can indeed be used for much more than watching television programs, e.g. surfing the World Wide Web, playing console games or even using it as furniture that holds picture frames or trophies. So the concept of television is more than the set itself, and includes at least the programs that are being watched. Similarly, we can ask ourselves if the television set is even a necessary element of the concept of television. If we watch television programs on the Internet, is that not television as well? One could argue that it would then be a different medium (Andreasen, 2001), but when someone hooks up the computer to watch the same television programs on a traditional television set, where does that leave this new medium? Andreasen (2001) uses the notion of the 'television consumption experience' as a focus of her examination of how families use television. In this view, although the television set itself is not essential, a shared experience in front of a larger screen, having some physical distance from this screen and a shared audio source is an integral element to create a social experience which is often not available with a personal computer. From the content side, when defining television viewing, the source of this content is less important than the (individual or social) experience of watching "broadcast and cablecast messages appearing on a television monitor" (Andreasen, 2001).

In contrast to defining 'traditional television', it is worth looking at the other end of the scale, which is Internet television. Noll (2004) defines Internet television in its simplest form as "conventional television[1] obtained over the Internet" and watched on a personal computer. If interpreted conservatively, this means watching broadcast television via the Internet on a PC. However, he acknowledges that there are several other ways of defining Internet TV, including "the use of the home TV set to view Internet sites". A more open definition offered by Noll (2004) is "the adoption of an Internet-like interface in accessing and watching television – a new form of video navigation over the Internet". Especially the last part of this definition shifts the focus from television to video, opening up a more wide interpretation of watching television.

[1] The notion of 'television' in this definition refers to television programs, not the television set

Figure 1 shows the different elements that have an impact on the development and conceptualization of Internet TV.

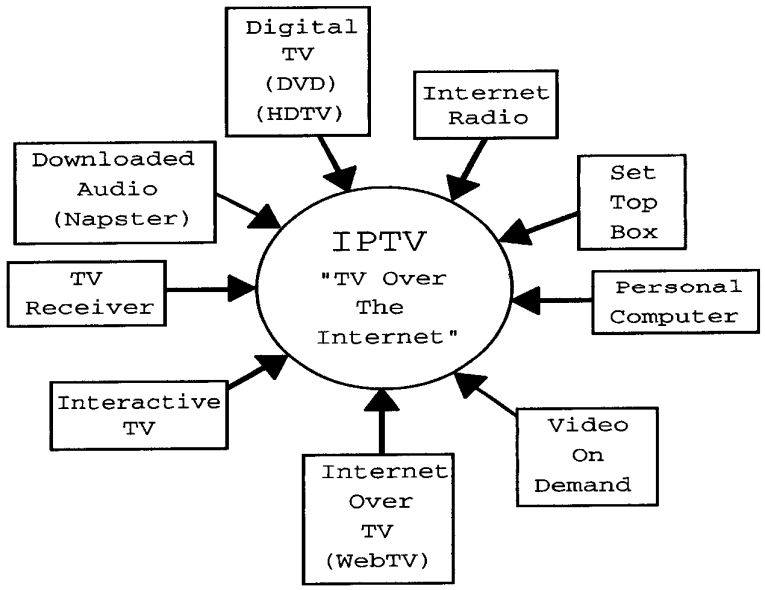

Figure 1: Internet TV (Noll, 2004)

Rather than trying to solve the dilemma if watching TV programs on the PC is television or not, for the purpose of this PhD we will use the presence of television programs as a constituting factor when talking about television, rather than the medium that is used to watch it on, and include in our definition of television watching programs on a standard television set as well as on a computer via the Internet. The distinction between the two platforms is however important, because of the difference in the social experience they both offer, so we will use this distinction later on in order to delimit the scope of our heuristics.

The next question that we are then faced with is: what constitutes a television program? It is clear that a television program refers to audiovisual content, but does only professionally created audiovisual content qualify, or is user-generated audiovisual content television as well? Einav (2004) lists five main categories of content providers in the context of Internet TV: (1) television broadcasters (major networks as well as local and cable TV channels), (2) large Hollywood film and TV producers, (3) independent web video creators and syndicators, (4) licensers of web video and (5) users that create user generated content. The content produced itself can be very varied, and includes (spread across the different provider categories): promotional trailers, short program excerpts, full length television programs and films,

third-party advertising, additional scenes to regular programs, home videos, etc. (Einav, 2004; Carey, 2004). The content types of the television programs can range from entertainment to news and sports, children's programming, information-based shows, education and training, corporate communications or pornography (Einav, 2004). An analysis of content types from YouTube, a popular web platform for distributing user generated content as well as professionally authored content, includes similar categories such as comedy, entertainment, music, sports, news & politics as well as categories specific for user generated content such as people & blogs or howto & DIY (Gill, Arlitt, Li & Mahanti, 2007). A full, multi-dimensional, classification of all different content types available on television was compiled by the European Broadcasting Union (EBU, 1995). Several dimensions are presented for classifying television programs conceptually[2], such as intention, content, format, target group, origination, language and participation. The main categories from the intention dimension are useful to distinguish television programs from other audiovisual content (such as teleconferencing). According to these categories, television programs are intended for entertainment, information, enrichment (educational or inspirational) or involvement (EBU, 1995).

In light of the previous discussion, we consider television as audiovisual content intended to entertain, inform, enrich or involve viewers, is or was distributed via a telecommunications channel and is being watched on a screen-based device. This very broad definition encompasses not only traditional television, but also new forms of television such as Internet television and mobile television, includes professionally produced as well as user-generated content and broadcast as well as recorded content. It does exclude using a television set for other purposes than watching audiovisual content, such as browsing web pages or video conferencing. It is interesting to note that our definition is consistent with a definition provided by John Fiske (1988): "[…] television consists of the programs that are transmitted, the meanings and pleasures that are produced from them, and, to a lesser extent, the way it is incorporated into the daily routine of its audiences" (Fiske, 1988, p.13). Even before the advent of watching television on the Internet, Fiske did not include the

[2] In the same document, television programs are also classified along more practical dimensions such as scheduling data or financial data, but this is not relevant for our discussion

television set itself as part of his definition. The last part of Fiske's definition, which refers to the social uses of television, will be discussed in section 2.2.

2.1.2 Interactive television

In this section, we will have a brief look at what constitutes interactive television, as this is the main object of our study. Jääskeläinen (2001) defines an interactive television program as "a program or a service in which the content itself or the presentation manner of the content or even the presentation order of the content can be affected by the viewer". Program is defined by Jääskeläinen as "any type of content or service, should it be an advertisement, a movie, a quiz show, teletext page, e-mail message or even any kind of sound". As the reader might notice, this definition is already broader than our previously discussed definition of television, as it includes more than audiovisual content. However, even if most definitions of interactive television include other content (text, audio only, etc.) we will focus on audiovisual content as a central element of (interactive) television as this aspect is closest to the traditional view of television, around which people construe their social activities.

If Jääskeläinen offers a broad definition of interactive television, most authors make distinctions between different forms of interactive television. Srivastava (2002) distinguishes Enhanced TV from Interactive Services. Enhanced TV according to Srivastava is interactive content related to a specific television program, e.g. playing along with game shows, voting for a favourite contestant or requesting extra information about a sports team that is currently playing on screen. Interactive Services are services not directly related to a specific television program, such as the weather report, an interactive television guide or sending and receiving e-mail.

Van Vliet & van Stelten (2001) make a more elaborate distinction between WebTV, Enhanced TV, Interactive TV and Personal TV. They describe WebTV as a service where the Internet is being used via a television set. Enhanced TV is the enrichment of programs with extra information. Interactive TV (here a subcategory and not the overarching category) is also the enrichment of television programs with extra information, but with the possibility for viewers to interact with this content. Personal TV is according to van Vliet & van Stelten the possibility for viewers to choose themselves which program to watch at what time.

To get an even better view of interactive television, it is useful to have a look at the different interactive program types that are available, based on Traudt (2002). *Interactive content* is content provided along with a television program, but without web access. *Interactive gaming* includes programs where viewers can actively participate in a program, such as playing along, voting for a participant, or playing online games. An *Electronic Programme Guide* (EPG) is service that offers viewers and overview of and information about the different channels and programs that are available through their digital television. *Internet tools* offer the possibility to chat, mail, send text messages or surf the World Wide Web. When watching web pages is restricted to a limited number of – often specifically created – content, this is called a 'walled garden'. *Personal Video Recorders* (PVRs) allow viewers to record television programs and watch them whenever they want. *T-commerce* is the equivalent of e-commerce on the Internet, and allows viewers to buy things via television. *Video on Demand* (VOD) consists of ordering television programs or movies and watch them immediately or at a chosen time, with the possibility of pausing the content. With *T-Government*, citizens can use their interactive television to interact with government, e.g. by requesting certain documents or by contacting their local representatives. Although quite complete at the time of writing, the above listed interactive program genres might be expanded with the further success and proliferation of interactive television.

One might have noticed that this list does not contain a category for social interactive television, which is the main focus of this PhD. Arguably, social interactive television is not a separate program genre, but the enhancement of different genres with social features that allow interaction between remote viewers at different locations or co-located viewers at the same location. However, before we will describe social interactive television, we will first sketch the social context of television and their implications for interactive television in order to provide a framework that supports the relevance of social interactive television systems and programs.

2.2 The social uses of television

The social nature of watching television has always been subject of discussion, especially in an age marked by growing use of computers and the Internet, and an

increase in the number of television sets in a lot of households (Lemish, 2007). Although people can certainly watch television alone, according to McQuail (1998) media use is as sociable or as solitary as a person wants it to be. But whereas certain media like books are typically solitary, television is typically very sociable. He cites different researchers that have studied the social uses of television and summarizes some aspects of the 'sociability' of mass media, e.g. maintaining peer-group relations, using media as a basis for conversations and promoting social contact, replacing missing role models by media personalities and structuring interaction within the family (McQuail, 1998).

One of the studies cited by McQuail that is particularly interesting is the ethnographic research by James Lull (1980) who classifies the social uses of television in a typology. Lull distinguishes structural and relational uses of television (see Figure 2). Structural aspects are concerned with the way television has an impact on the structure of people's lives. Relational aspects consider the influence television has on relationships between people.

Social Uses of Television

Structural

Environmental (background noise; companionship; entertainment)

Regulative (punctuation of time and activity; talk patterns)

Relational

Communication Facilitation (experience illustration; common ground; conversational entrance; anxiety reduction; agenda for talk; value clarification)

Affiliation/Avoidance (physical, verbal contact/neglect; family solidarity; family relaxant; conflict reduction; relationship maintenance)

Social Learning (decision-making; behavior modeling; problem solving; value transmission; legitimization; information dissemination; substitute schooling)

Competence/Dominance (role enactment; role reinforcement; substitute role portrayal; intellectual validation; authority exercise; gatekeeping; argument facilitation)

Figure 2: Social Uses of Television (Lull, 1980)

Lull divides the structural social uses of television into environmental and regulative aspects. With *environmental aspects,* he refers to the use of television as background noise. In a lot of families, the television set is turned on and used as a way to bring life into the house. The television can also be used as a companion during household chores, to make them seem less tedious. In a general way, Lull also sees the television as a source of entertainment for the family as an environmental aspect. The *regulative aspects* of television refer to the use of television to punctuate time and activities. As a lot of television shows are aired at the same time every day, it is easy to use this as an indicator of the time, or as an indication that dinner will be served. When family members talk to each other is also regulated by the scheduling of television programs. The same goes for external activities or communication outside of the family (e.g. phone calls to friends or relatives).

When we analyse these environmental and regulative aspects with relation to interactive television, there are some interesting difficulties. As interactive television demands some interaction from the user, it is not enough to merely put on the television and let it serve as background noise or companionship. Also, as video-on-demand might become more widespread, it is a lot more difficult to structure time and activities around certain programs. The news for example does not necessarily start at seven, but can be put on whenever the viewer(s) want.

Relational aspects according to Lull are divided into four categories. *Communication facilitation* means that television can trigger off conversation, or for a child be an entry point into a discussion because he can refer to something he has seen on television. Television in this sense can also fill holes into a conversation or make it possible to clarify personal norms and values. *Social affiliation or avoidance* means that television can promote but also prevent physical or verbal contact. Family members can cuddle together in front of the television, but the presence of the television can also be an excuse for not talking to each other. It can also strengthen the solidarity in a family or alleviate conflicts. *Social learning* refers to the possibilities offered by television to learn how to behave socially or solve problems, but also to spread information and knowledge about norms and values to others. Finally, *social competence or dominance* means that parents can use their authority to decide when children watch television, role patterns are confirmed or imitated or television characters can be verbally assaulted or corrected to demonstrate their own competence.

Regarding relational aspects, again it is already clear that there are services of interactive television that undermine some of these aspects as mentioned above. The Guardian reports that because of the increased choice of television channels on digital television, the shared experience of discussing a television show that was on the day before is becoming less common (Wells, 2004). If on-demand television gets widely spread, that might become an even bigger problem. On the other hand, interactive television offers a lot of possibilities to support or even enhance the relational social uses of television. Interactive game shows make it possible to play along more actively than is possible with normal television, even with other households across the country, making it easier to strengthen the relations within a family. On-demand programs can help parents in spreading knowledge about norms and values to their children. Child locks can be used to help parents keep control over the moments children watch television, or which television show can be watched.

Lull's typology of the social uses of television is not the only study that gives us more insight in this respect. Although Morley's study "Family Television" (1986), in which he conducts family interviews about their television habits, is limited in scope and focuses more on gender differences than on the social uses of television per se, some of the aspects are similar to the typology of Lull (1980). In most of the interviewed families, television is used as accompaniment to domestic activities (cf. environmental aspects), but almost exclusively by women. The remote control serves as the token of power for the father of the family (cf. social competence or dominance). The family members talk to friends and colleagues about television, especially women (cf. television as communication facilitation).

One might argue that these studies are quite old, and the conclusions can not be transferred to modern times given the recent technological developments. However, a more recent analysis of domestic media among Flemish, French, Italian and Swedish children and teenagers (Pasquier, Buzzi, d'Haenens, & Sjöberg, 1998) shows evidence that only a decade ago, television was still very much a social medium. Pasquier et al. have found that in the four countries studied, most of the families still eat the main meal and watch television together. Although a lot of children (depending on the country, one in four or one in two) have a television in their bedroom, watching television is still a family activity taking place in the living room, especially in France. They conclude that "co-viewing is still the dominant practice

everywhere" (Pasquier et al., 1998, p.510). When looking at television used as "communication facilitation", as in Lull's typology, the findings show that "television – and VCR – is the main medium which mediates between young people and their parents in all four countries", especially between mothers and daughters. A similar argument for the social role television still plays in the family context has been made as recently as 2007 (Lemish, 2007), indicating that the increased use of the Internet does not (yet) have a strong impact on the way that television is being used.

Lee & Lee (1995) have studied the social uses of television as well, but more specifically – and very relevant to our discussion – in order to look at the implications for interactive television. Again, there are numerous similarities with Lull's typology. Lee & Lee discovered four levels of viewing based on the physical proximity of the viewer to the television set and the mental (or physical) involvement with something other than television viewing (e.g. talking to someone, or performing household chores). In level 1, television is the only activity which demands all attention. In level 2, television is one of two activities, e.g. next to reading a book, and the attention of the viewer is divided. In level 3, television is a peripheral activity as accompaniment to another activity, but attention can be turned to the television set when appropriate. And in level 4, television serves as background noise, and the viewer is not necessarily in the same room. Especially the last two levels relate to the environmental aspects of television. Other aspects mentioned by Lee & Lee are the routinization of watching television (cf. regulative aspects), and the general observation that television is still (in 1995) very much a social activity. They also studied the motivations and gratifications for watching television, of which some seem contradictory to interactive television. They especially think that "the desire for undemanding relaxation, involvement in engrossing stories, and the enjoyment of a routinized experience all mitigate the possibilities of new patterns of involvement with television" (Lee & Lee, 1995, p.13). They also argue that television as "social grease", meaning the role of television to facilitate interpersonal communication, conflicts with the highly individualized programming possible with interactive television. On the other hand, television as a source for information, self-education and social learning hold some possibilities for interactive television. They conclude that "interactive television is likely to be successful to the extent that it takes into account existing behaviour patterns as well as motivations and gratifications already

being satisfied by this enormously successful medium" (Lee & Lee, 1995), which implies that including social features in interactive television, and ensuring that social interaction with these systems is adapted to the specific characteristics of watching television, is a useful path to ensure the success of interactive television.

Even though there is a general consensus among media researchers that television is a social medium, there are contrasting viewpoints as well. Brown & Hayes (2001) report that modern families seldom watch television as a family unit, but rather as adult pairs or child groups, and family watching is more related to habits and program preferences rather than families wanting to spend time together. They also point out the fact that selecting programs to watch can even be causes for dispute, rather than affiliation between family members. It is important to remember that television can serve several functions, and there can be huge differences between different kinds of families. Nevertheless, there are numerous accounts of the importance of the social uses of television which warrant a focus on this aspect.

Returning to the concept of interactive television, the last decade has seen a trend towards creating interactive TV applications supporting several ways for users to communicate or interact with remote viewers. In the next section we will describe in detail these systems, as they form the central subject of our PhD.

2.3 Social applications for interactive television

During the last couple of years, several social interactive television applications have been designed. Some of them were only described as a concept, others were turned into a prototype as a proof-of-concept and tested in a lab environment or (limited) in the field. Of the social interactive television systems that were designed to function on a set-top box (STB) in a home environment, none have yet been made available commercially. On the Internet, there are some websites or applications that offer video or television programs, along with some social features such as chat functionality. Although they only offer a subset of possible social features, they are the only social systems that are – at the time of writing – open to the larger public.

In this section, we will give an overview of the different social television systems that have been described and/or designed in the past. This overview will also offer insight into different possible social features of such systems, although this is by

no means a fully comprehensive list of functions. Future systems might include other social features as well. We will first discuss social interactive television systems intended for use on set-top boxes so it can be watched through a normal television set. Next, we will describe Internet based systems. Finally, some concepts that have been described in less detail, are not developed and only described as concept or are not commercially available will be discussed.

2.3.1 Social TV applications on STB

The following paragraphs give an overview of different social television systems intended for use on a normal television set, mostly using some kind of set-top box. As a traditional television set usually has a central place in a room, there is some distance between the screen and its viewers, and the audio is shared easily by different viewers, these systems offer a social experience by excellence. The social features described in the following sections therefore have an impact not only on the interaction between remote viewers, but also between co-located viewers, whether intentionally designed as such or not. For each system, we will shortly describe how it works, list the social functionalities and then describe the extent to which it has been tested in the lab or the field – to our knowledge. Each system is illustrated with a representative screenshot.

2.3.1.1 Communication Services on Interactive Television (CoSe)

During 2006 and 2007, Siemens (now Nokia Siemens Network) developed a social interactive television system called "**Communication Services on Interactive Television**" (**CoSe**)[3], designed by Coeno Gmbh. Users of CoSe can add friends to a 'buddy list', and see which channel and program each friend is watching. They can start a chat conversation with their friends, either one-on-one or a group conversation, by using a remote keyboard or their remote control to type the text. It is also possible to send a short text message, to which cannot be directly replied, or to invite other users to watch the same channel. When this invitation is accepted, the invited user will automatically switch to that channel. Users can also send a file, e.g. an image

[3] Details about the system have not been published, but as we have been involved in user testing of the system, we have acquired enough knowledge and the approval to describe the system.

from the media library on their STB, to other buddies. The key social features that are offered by CoSe are:

- Synchronous communication
- Text chat
- Presence information (buddy list, watched channel and program)
- Sending messages
- Sending invitations
- Sharing content

The CoSe system was developed as prototype on a set-top box on which user tests have been carried out, but there were no field trials or a commercial launch.

Figure 3 is a screenshot of the CoSe interface, showing the buddy list on the left, and an open chat window on the lower right. A new chat session is about to be opened, that can be added to the current conversation or as a new, separate chat session. In the upper right corner, the television program keeps playing.

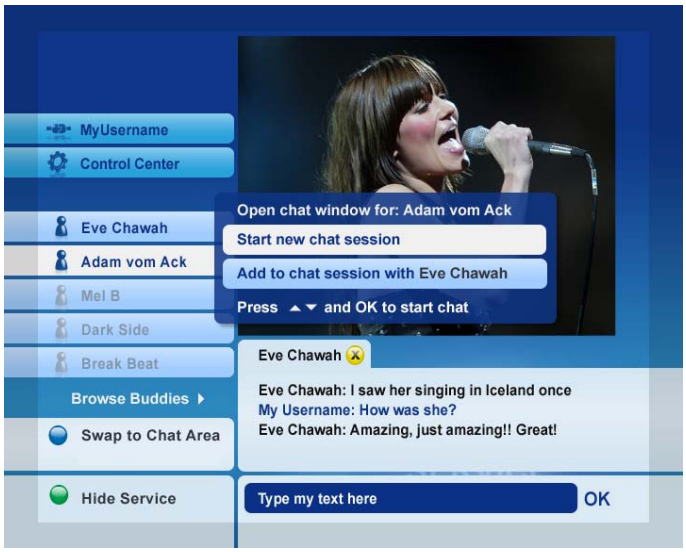

Figure 3: CoSe interface © Coeno

2.3.1.2 AmigoTV

One of the first full-blown social television applications, and also one of the most cited, is **AmigoTV** by Alcatel-Lucent (Coppens et al., 2004). With AmigoTV, users can use a table microphone to talk to their friends at other locations. A buddy

list shows a list of friends and the television programs they are watching. Avatars that are continually present on-screen show the online buddies, and can be changed to convey different emotions. Users can send cartoons to each other, some general, some with specific themes e.g. to celebrate a goal in a football match. The cartoon is briefly shown on screen, sometimes accompanied by sound. The key social features that are offered by AmigoTV are:

- Synchronous communication
- Voice chat
- Presence information (buddy list, watched program and channel)
- Sending cartoons

AmigoTV was developed as a working prototype on a mini pc, coupled with a television. It underwent several user tests with different interfaces, in a lab context (Geerts, 2006; Baillie, Frohlich & Schatz, 2007) as well as with small field trials (Coppens et al., 2004).

Figure 4 is the interface of AmigoTV, showing a cartoon that is being sent by one of the buddies. In the lower left and lower right corner are the avatars of two buddies. At the bottom of the screen is the menu, for accessing different features such as changing the look of the avatar or seeing the list of buddies.

Figure 4: AmigoTV interface

2.3.1.3 Windows Media Center

Not developed as a social television system, but combining several of its features, is **Microsoft Windows Media Center**. Windows Media Center is an edition of the Windows PC platform that is specifically designed to use and manage the

multimedia features of the system, often sold together with a computer that has built-in connections and features to connect to a television. When hooked up to the television set, the system can be controlled with a remote keyboard and a remote control. Apart from watching broadcast as well as recorded content, when connected to the Internet users can use Windows Messenger to chat with other users. These other users can be watching television as well, but this isn't necessarily the case. Other users can also be using their PC for other things, which makes this a more open system than other social interactive television systems, but also less directly related to watching television. The key social features of Windows Media Center are:

- Synchronous communication
- Text chat
- Presence information (buddy list)

Microsoft Windows Media Center is commercially available.

Figure 5 is the interface of Microsoft Windows Media Center, showing in the left lower corner the chat window, and in the right lower corner the buddy list. The main screen, now showing the menu, can be used to watch a television program.

Figure 5: Microsoft Media Center interface

2.3.1.4 Social TV

Motorola Labs, part of Motorola, created several versions of a system called **Social TV** (**STV**) (Harboe et al., in press), in order to explore different features of

social interactive television. A first version (STV1) only included voice communication, enabling users to talk to each other through their television set. A second version (STV2) did not allow voice communication. It did include a buddy list, showing the channels and programs the different buddies are watching, and which can be easily joined. Additionally, using an ambient device called “The Orb”, users could get some information about whether or not one ore more friends are watching television, even when the television was turned off. When the television was on, users could invite others to watch the same channel, and send emoticons and fixed text messages to each other. Integrated with the EPG are features that show the favourite programs of the user’s buddies, as well as a viewing history of certain buddies. The third and (as far as we know) final version (STV3) included the same features as STV2, extended with free-form text communication as well as voice communication. The key social features of STV3 are:

- Synchronous communication
- Voice and text chat
- Presence information (ambient device, buddy list, watched channel and program)
- Sending emoticons and messages
- Sending invitations
- Social EPG

The three different versions of Social TV have been tested during field trials lasting from 1 hour to several weeks (Harboe et al., in press). We have also tested an intermediate version of the system that contained presence information (buddy list and watched channel and program) as well as voice communication in a lab user test.

Figure 6 is the interface of STV2 showing the buddy list and the channels and programs the different buddies are watching. By pressing OK on the remote control, the user can easily switch to the program of the selected buddy.

Figure 6: Social TV2 interface

2.3.1.5 Ambulant Annotator

The "Centrum voor Wiskunde en Informatica" (CWI) in the Netherlands created the **Ambulant Annotator** (Cesar et al., 2006), a system that allows users to clip a program that is shown on television and share it with friends. The clips or screenshots that are made can be enriched by adding annotations on it before sending. A secondary screen, such as a smart-phone or tablet PC, is used for clipping, annotating and sending the content. The content can then be sent to friends that are listed in a buddy list, but without information about their current activities or if they are online or not, and can be received and watched on a mobile phone, via a PC (either by e-mail or on a blog) or on a normal television set. The key social features of the Ambulant Annotator are:

- Asynchronous communication
- Annotations
- Buddy list (without presence information)
- Sharing content

The Ambulant Annotator has been developed as a proof-of-concept prototype, and has been tested a couple of times in a lab context (Cesar et al., 2008; Seager & Knoche, 2007). No field trials have been executed yet.

Figure 7 is the Ambulant Annotator interface, showing a television on the left with a program that is running, and a secondary screen on the right with the interface for clipping, annotating and sharing content.

Figure 7: Ambulant Annotator interface

2.3.1.6 ConnecTV

ConnecTV (Boertjes et al., 2008) is a system created by the "Nederlandse organisatie voor Toegepast Natuurwetenschappelijk Onderzoek" (TNO). It includes a buddy list with information about what the user's buddies are watching, and several features such as inviting other buddies to watch the same channel, automatically following a buddy when he/she is changing channels, changing to the most popular channel or having a 'theme buddy' that automatically gives suggestions for specific genres of programs. There is however no communication possible with the current version of ConnecTV. Key social features are:

- Presence information (buddy list, watched channels and programs)
- Sending invitations
- Following a buddy
- Changing to the most popular channel

ConnecTV has been tested in a field trial that lasted for more than two months in about 38 households (Boertjes et al., 2008). This is the longest running known field trial of a social interactive television system to date.

Figure 8 is the interface of ConnecTV, showing the buddy list with an online buddy in green and the program he is watching (partly obscured), and three offline buddies in red. On top of the buddy list is a menu for switching to a buddy's channel, sending a recommendation or an invitation to watch along, or sending a request to follow the other buddy when changing channels.

Figure 8: ConnecTV interface

2.3.1.7 2BeOn

At the University of Aveiro, Portugal, a couple of researchers have developed **2BeOn** (Abreu & Almeida, 2002), an early social interactive television system. It contains a buddy list with information about the channels and programs a user's buddies are watching and the possibility to send a short message to them as well as e-mails. It is possible to initiate a longer conversation using text chat. A user can also send recommendations to his buddies. Additionally, a channel chat is possible with viewers that are not buddies, and thus not friends or family, of the user. The key social features of 2BeOn are:

- Synchronous and asynchronous interaction
- Text chat
- Presence information (buddy list, watched channel and program)
- Sending messages
- Sending recommendations

2BeOn was developed as a prototype and evaluated in the lab. As far as we know, no field trials have been conducted.

Figure 9 is the interface of 2BeOn. The screenshot on the left shows the television screen, with the menu in the upper right corner. The middle screenshot shows the buddy list with channel information. The screenshot on the right shows a

resized television program, the buddy list in the upper right corner, and an active text chat on the bottom of the screen.

Figure 9: 2BeOn interface

2.3.1.8 Unified EPG

Within the framework of the European project Citizen Media (Trogemann & Pelt, 2006), NDS France developed a **Unified EPG** (Alliez, 2008) with some social features. A user can choose to log in to the system with their personal account, so the system will be personalized for their use. He can then publish the program he is watching automatically on his blog, so his friends can use their PC to see what program he is watching. They can also choose to watch the program as well, either on their PC or on their television set. The Unified EPG is also coupled with a social network (as a test case, this is MySpace, but it can be any social network), so the user can rate a program which is posted on his profile when it has received a high score. Vice versa, the ratings of other people in his community can be viewed on his television so he can base his choice to watch certain content on what his friends recommended. Finally, the user can see how many members of his community are watching a certain television program. The key social features of the Unified EPG are:

- Shared ratings
- Presence information (watched program)
- Sending recommendations
- Social EPG

NDS' Unfied EPG is fully working on a set-top box, and has been user tested in a lab as well as with a short field trial in people's homes.

Figure 10 is the interface of the Unified EPG, showing the rating for the current show from Andrew, the user that is currently logged in. On the right, the ratings of the "Star Wars" community and the "The Simpsons" community are shown.

Figure 10: Unified EPG interface

2.3.1.9 Telebuddies

At the University of Hasselt, the Expertise Center for Digital Media (EDM) developed **Telebuddies** (Luyten, Thys, Huypens, & Coninx, 2006) which tries to exploit the similarities and social relations between television viewers to create a social experience for existing television shows. As proof-of-concept, they use a quiz show where the viewers at home can form a team, and answer the same questions as the participants in the television studio. Using the Friend-of-a-Friend protocol (FOAF), which includes personal information of a user as well as his social relations, shared characteristics such as family ties or shared interests are found to form the teams. Next to playing together in teams, users can also chat with each other. A second version was developed which included the use of secondary screens (such as a smart phone) to play along, even when not in front of a television set. The key social features of Telebuddies are:

- Synchronous communication
- Text chat
- Team-based play

Telebuddies was tested on MHP enabled set-top boxes in a lab environment, but no field trials have been conducted.

Figure 11 is the interface of Telebuddies, showing an active chat conversation in the left upper corner of the screen, the scores of the team players in the right lower corner and the television program in the right upper corner. At the bottom of the screen is the menu which can be controlled with the colour buttons of the remote control.

Figure 11: Telebuddies interface

2.3.2 Social TV applications on the Internet

The systems described in the previous section are all intended for use on a normal television set using a kind of set-top box. However, many social interactive television systems that can be used via the Internet, using a PC, are being introduced recently. The PC is an excellent medium for communication between remote viewers, but is a less sociable medium for co-located viewers as it is intended for solitary use, due to the smaller screen size and a 'two-foot experience' (in contrast to the 'ten-foot experience' of a television set). Although the focus of this PhD is mainly on social interactive television applications on a normal television set, we will also give an overview of Internet based systems as they incorporate several features also found in the previously described systems. It is therefore useful to look at the similarities as well as differences between the two sets of applications.

This section is not a comprehensive overview of Internet based social television system, even less than the previous section of set-top box based systems, as

new applications come out every month. Related applications such as SeeToo[4] or GSnap[5] offer various social features, but we made a selection of the most high-profile applications to give an overview of these kinds of systems.

2.3.2.1 CollaboraTV

At AT&T Labs, **CollaboraTV** (Nathan et al., 2008) is currently being developed. This social television system was designed to overcome the problem that with the abundance of digital television channels and time-shifting possibilities, viewers often have not watched the same television shows at the same time and hence cannot share their experiences anymore. CollaboraTV allows users to leave comments during the course of a television show. The comments are replayed later on when another user watches the same show, visualized using a text balloons attached to a set of avatars at the bottom of the screen. Although this is mainly intended for asynchronous communication, the text balloons are also shown to users that are watching the same show at the same time, and so synchronous communication is possible as well. Additionally, small gestures such as a thumbs-up or thumbs-down can also be used to express interest in certain parts of a television program. Users can also call up an interest profile, showing a graph that indicates which parts of the program contains the most comments and interactions, and is thus more interesting to watch. The system also contains a buddy list with information about the shows that are being watched by each buddy, as well as an EPG that contains social usage data. The key social features of CollaboraTV are:

- Asynchronous and synchronous communication
- Text comments
- Interest profiles
- Avatars
- Presence information (buddy list, watched program)
- Social EPG

[4] http://www.seetoo.com/

[5] http://www.gsnap.com/

CollaboraTV has been tested in a lab environment, as well as in a field test where 16 participants used the system for a period of four weeks (Amento et al., in press). For the field trial, the system was implemented in a web browser, and could be controlled with a remote control as well as with a mouse.

Figure 12 is the CollaboraTV interface, showing program information (A), a chat box (B), the interest profile (C), a progress bar (D) and the avatar representation of the virtual audience (E). All panels except the virtual audience fade away after a specific time of inactivity.

Figure 12: CollaboraTV interface

2.3.2.2 Lycos Cinema

In 2006, Lycos launched **Lycos Cinema**[6], a service available on the Internet that enables users to watch movies and television series online with their web browser. The movies and series are watched in a virtual cinema room, allowing up to ten people to watch the same movie synchronously. While watching, users can chat with each other. Users can also chat with each other in the so-called lobby, while they are browsing for movies or television programs to watch. Users can join a show that has been initiated by another user, or they can schedule a show and invite friends to watch it at a specified time. The user that initiated the screening, called the host, holds the virtual remote control with which he can start or stop the program. He can pass it on to other viewers if he likes, but if they abuse it or pause the show and become inactive, the host can reclaim the remote control. A previous version of Lycos Cinema also

[6] http://cinema.lycos.com/

included the possibility to make small clips of a show, and post that on a personal profile page, but this feature has been removed recently. The key social features of Lycos Cinema are:

- Synchronous communication
- Text chat
- Shared remote control
- Invite friends

Figure 13 is the interface of Lycos Cinema, showing an active movie screening. At the left lower corner, the chat window is visible, including the option to send emoticons. At the right lower corner, the users that are synchronously watching the same movie are shown. Just below the movie screen, a progress bar is visible with at the left the name of the user that holds the virtual remote control. The "i" icon at the right part of the screen offers more information about the current movie, and the calendar icon just below it links to a calendar with information about future screenings.

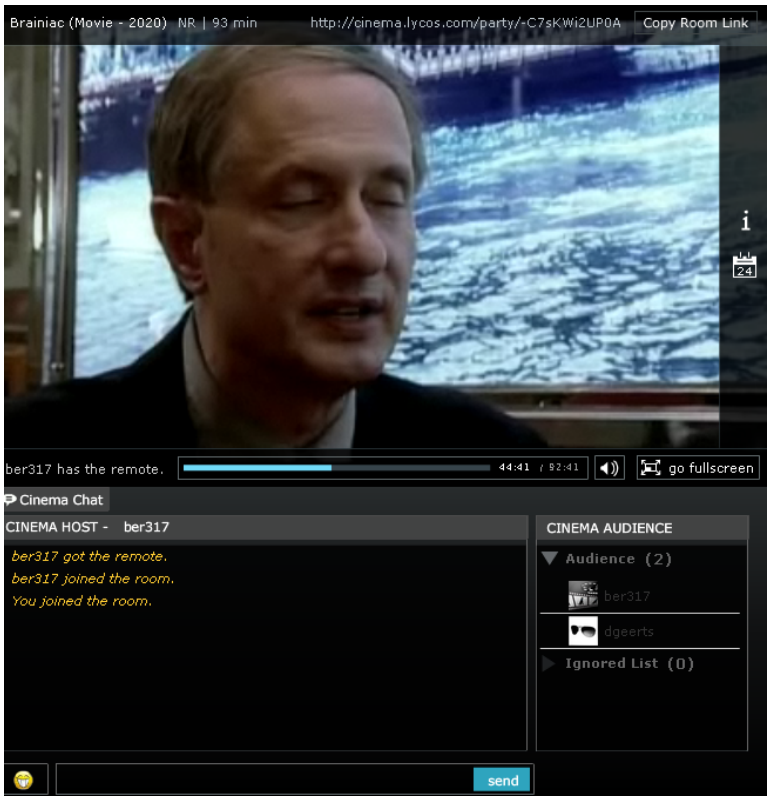

Figure 13: Lycos Cinema interface

2.3.2.3 Joost

Joost[7] was commercially launched in October 2007 by the creators of Skype, a famous and popular Internet telephony service. Before that, it was only available to beta-testers who had received an invitation from friends. In September 2008 Joost completely redesigned their interface including almost no social features except for commenting on clips, much like YouTube. Although no longer available, we will describe the previous incarnation of Joost, as it was an interesting mix of different social features.

Joost offered more than 200 channels via a peer-to-peer system, which were available to watch on-demand with a separate client that could be downloaded for free. While watching one of these channels, a room chat was available to chat with other viewers that were watching the same channel, but not necessarily the same show, as the programs were not synchronized. Within Joost, users could also sign in to their gmail or jabber account, giving them access to their friends on instant messaging who could see information about the show they are watching. Those friends did not have to be using Joost to chat with them. Users could also blog about what they are watching, through a widget which allowed them to sign in to their favourite blogging website. Finally, via a share-button, users could send an e-mail with a link to the show they were currently watching to their friends. A rating system was also available, that you could use to rate a show and then see the combined ratings of other users. Joost included an invitation widget to invite new friends to use Joost, but once invited, there was no buddy list to show who of the friends were online. The key social features of Joost were:

- Synchronous communication
- Text chat
- Inviting friends
- Blogging
- Sharing links
- Presence Information (watched channel and program)

[7] http://www.joost.com/

Figure 14 was the interface of Joost, showing the instant messaging widget in the upper left corner, the channel chat in the upper right corner, and the rating widget in the lower right corner. The lower left corner shows the button which gives access to the Widget Menu, which includes the links to the different social features. The widgets can be minimized with the button in the far upper right corner of the screen or by clicking anywhere on the screen. If wanted, a widget can stay on the screen by clicking on the pin icon of that widget.

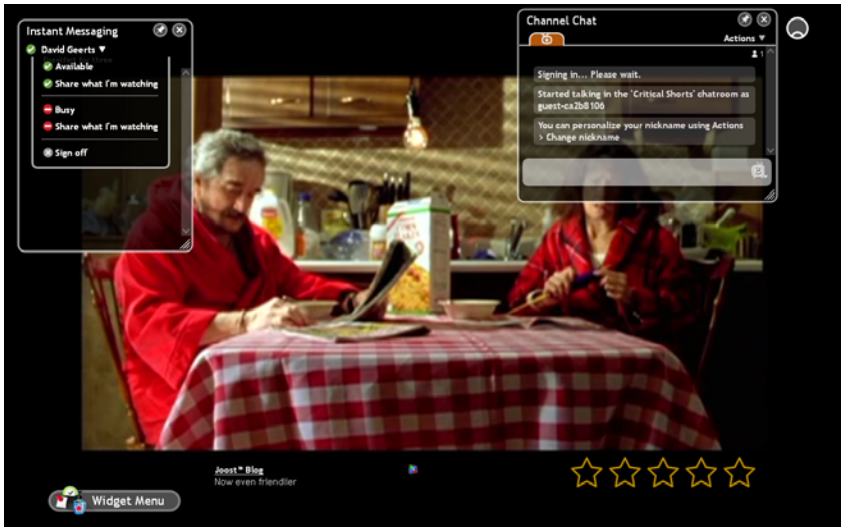

Figure 14: Joost interface

2.3.2.4 Babelgum

Babelgum[8] launched in 2007, and when Spike Lee joined the project to support a film festival that was held by Babelgum, it gained some popularity. With Babelgum, several channels can be watched with a downloadable client. There is no direct chat or interaction between its viewers, but there are some community features, including the possibility to comment on a video (not temporally linked to the program, although this was included in an earlier version of the application) or leave comments for a community that is created around specific programs or genres. Other social features include a sharing function, with which users can send a mail about a certain video to friends, post it to a social network such as Facebook or MySpace, embed a

[8] http://www.babelgum.com/

video on a blog or website or just copy a link to the video so users can share this anywhere they want to. The key social features of Babelgum are:

- Comment on a video or channel
- Send a mail with video link
- Post on social network site or blog

Figure 15 is the interface of Babelgum, showing a comment that is being added to a video. In a previous version, this was temporally linked to the video, in the current version it is attached to the video in general. At the top of the screen are the controls for scrolling between videos or within the video, as well as audio controls. Just below it is a list of the different shows of the chosen channel. At the right of the screen is a menu with access to different widgets, including some social features. At the bottom of the screen is the menu that gives access to the community features.

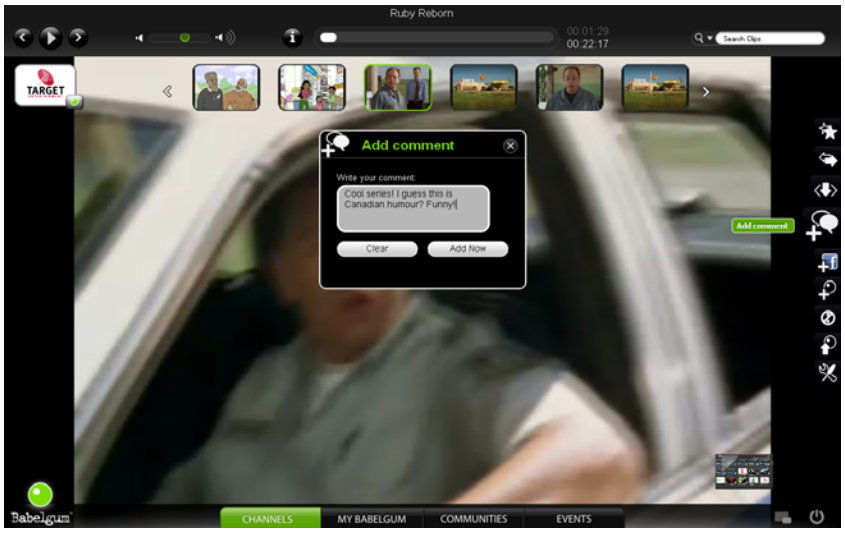

Figure 15: Babelgum interface

2.3.2.5 CBS Watch & Chat

In October 2008, CBS introduced the "Watch & Chat" feature in a so-called social room[9], which allows viewers to chat while watching an on-demand video, see a list of users watching the video at the same time, and showing small animations on-

[9] http://www.cbs.com/socialroom/

screen such as throwing a tomato at someone or something, or typing text directly on the screen. The key social features of CBS Watch & Chat are:

- Synchronous communication
- Text chat
- Sending animations

Figure 16 is the interface of CBS Watch & Chat, showing the television program in the central part of the screen, with just below it the avatars of the co-viewers and a textbox for typing comments. When moving the mouse over the program screen, some screen elements appear that make it possible to adjust the volume, or select animations to show overlaid on the screen.

Figure 16: CBS Watch & Chat interface

2.3.2.6 Zync

Yahoo! Zync[10] (Shamma, Bastea-Forte, Joubert, & Liu, 2008) is an add-on to Yahoo! Instant Messenger, allowing two users to send videos and synchronize them with each other, while chatting. Both users can control the video, pausing and restarting it as they please. Users can paste any link from a video website to start sharing that video. Although the technology of those websites (progressive download)

[10] http://timetags.research.yahoo.com/zync/

does not make it possible to synchronize the videos precisely, it is good enough to make sure people are watching the same parts of the video simultaneously. The key social features of Yahoo! Zync are:

- Synchronous Communication
- Text chat
- Sharing videos

Figure 17 is the interface for Yahoo! Zync, showing the video on the right side of the window, and the chat conversation on the left side.

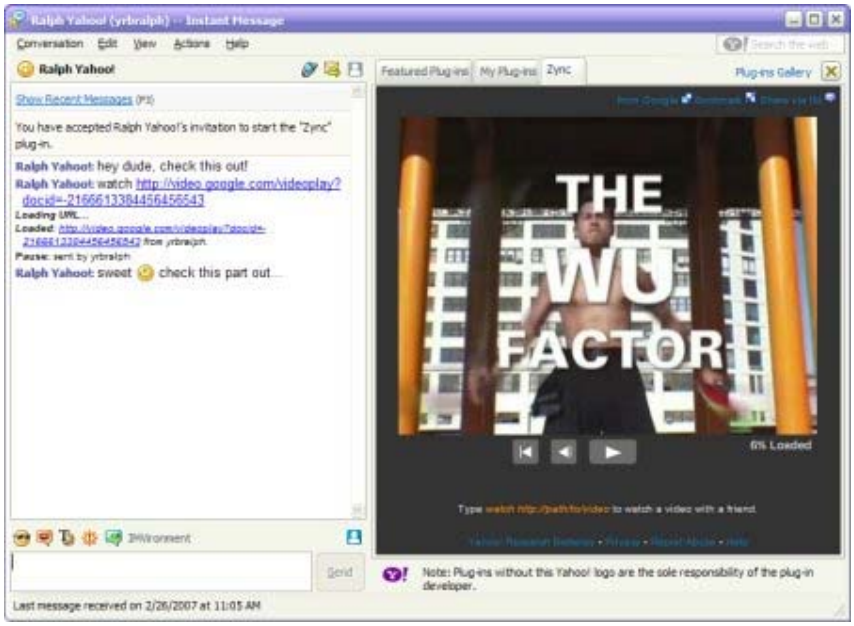

Figure 17: Yahoo! Zync interface

2.3.2.7 Messenger TV

Microsoft Messenger TV[11] is, similar to Yahoo! Zync, an add-on to an instant messaging client, in this case Microsoft Messenger. One user can start an activity with another user, inviting him to start watching a video from the MSN video website. The video is played synchronously while both users can chat with each other. The key social features of Microsoft Messenger TV are:

- Synchronous Communication

[11] http://messengertv.msn.com/

- Text chat
- Sharing videos

Figure 18 is the interface for Microsoft Messenger TV, showing the video on the right side of the window, and the chat conversation on the left side.

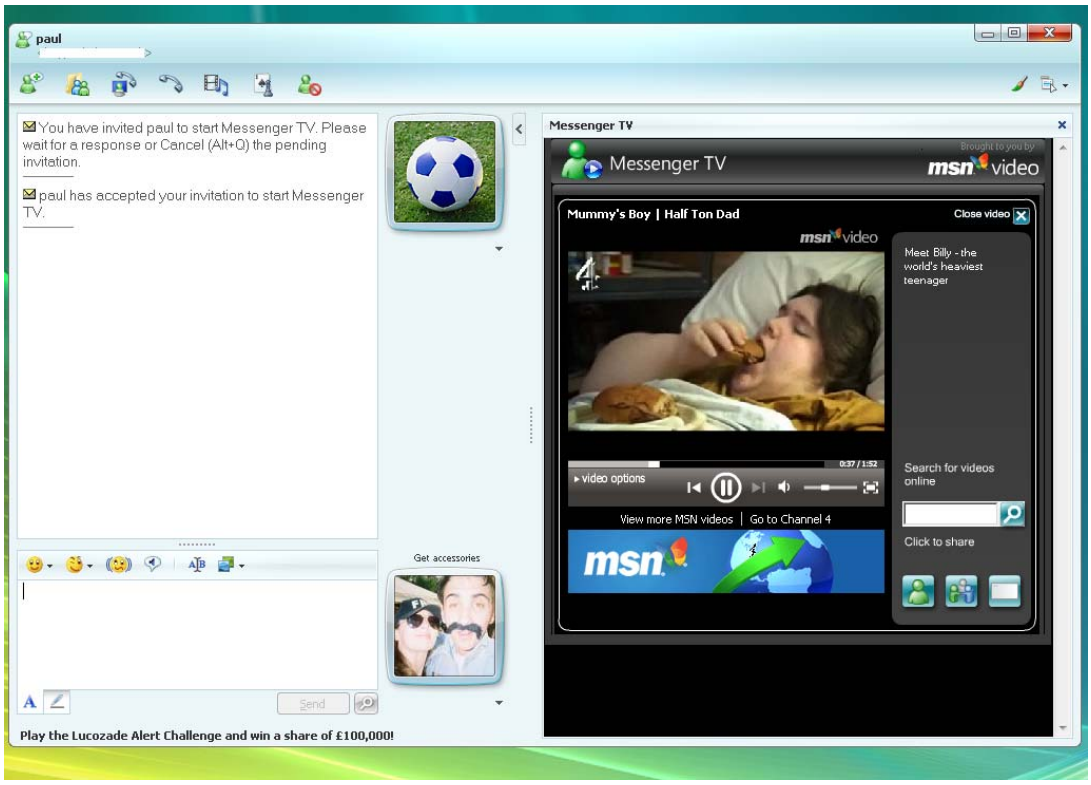

Figure 18: Microsoft Messenger TV interface

2.3.3 Other social television applications

In addition to the social applications for set-top boxes and the Internet that are described in the previous two paragraphs, there are several other social applications for television that have either been described in less detail, are not developed and only described as concept or are not commercially available, but which are still interesting to discuss as it gives an even better idea of the different ways that social television can be implemented or conceptualized. We will shortly describe them in this paragraph. Although there might be even more applications in development that we are not aware of, we think this overview gives a good perspective on the scope of current social television applications.

Regan & Todd (2004) described a system using Microsoft Messenger, called **Media Center Buddies**. It builds on, but significantly enhances the social features of Microsoft Media Center, as described above. Media Center Buddies allows multiple users to log-on at the same location, so it supports co-located watching on a television set, and combines each user's buddy list. The buddy list shows remote users when two or more users are together, so remote viewers are aware of this before sending private messages. Users can reply to incoming messages in different ways, e.g. by sending an automated reply or typing in a free-form text message, but they can also ignore the message to continue watching television. A similar system called **Reality Instant Messenger** has been described by Chuah (2003), also bearing resemblances to Yahoo! Zync and Microsoft Messenger TV (see above), but it does not seem to have been developed in a real system, or even a prototype.

At the Palo Alto Research Center (PARC), Ducheneaut, Moore, Oehlberg, Thornton and Nickell (2008) performed a few experiments by linking two rooms with an audio link, and having them watch a synchronized video stream. Based on observations of the participants as well as a conversational analysis, they describe several features that a **Social TV** system could have – such as a showing a preview of the upcoming show structure, automatically isolating private side conversations or a "Catch Me Up" button to bring new members of the audience up to speed – but as far as we know such a system was never developed.

Schatz & Egger (2008) have developed a prototype of a **mobile social television** system, porting some of the features that we described in the previous paragraphs to mobile devices. Users that are watching television on their mobile phones can use functions such as voice chat, text chat, joint zapping, presence information and sending invitations.

Ghittino, Iatrino, Modeo & Ricchiuti (2007) describe a concept for the set-top box called **Living@Room**, which includes features such as voice communication, a picture-in-picture video of the participants and a shared remote control. It is unclear if this system has been further developed.

Iatrino & Modeo (2007) are developing a social EPG called **EPG-Board**, created on Omegabox, a Linux based media center, with the following features: a "To-Watch Planner" which serves as a reminder as well as a shared EPG, a message

board related to TV programs which allows synchronous as well as asynchronous communication, program ratings that are linked to the planner and a content tagging application that can enrich the information available in the EPG.

Hess (2007) created a prototype called **Find-a-Friend**, allowing users that watch television to chat with people watching the same show and living nearby, thereby stimulating them to find new friends in their neighbourhood.

Aarreniemi-Jokipelto (2007) integrated text chat via instant messaging in a **t-learning** community, for supporting students to help each other while using their television for educational purposes.

Quico (2003) describes the success of chat features in interactive quiz programs and forums in enhanced television programs, broadcasted by the Portuguese interactive television provider **TV Cabo**.

Fokker, De Ridder, Westendorp & Pouwelse (2007) have created a peer-to-peer system called **Tribler** for downloading and sharing videos, including some social features such as friend lists and 'taste neighbours', mainly focusing on stimulating user cooperation to enhance the download process.

Similar to the Social EPG developed by NDS (see above), Baca & Holtzman (2008) developed **Television meets Facebook**, linking the social network site Facebook with a commercial set-top box, making it possible to publish information about which shows have been watched as well as ratings that were given on a Facebook account, so other users can see what a user's favourite shows are. Vice versa, information about the watching habits and ratings of a user's friends can be sent to his set-top box, that can record or schedule specific shows based on this information.

Lowet & Khmelinskaya (2008) developed a common **technical platform based on CE-HTML** for supporting third party service providers to create multi-user and other social applications for a browser based interactive television platform, including the possibility to integrate buddy lists, video communication, sending invitations or shared activities.

Similarly, Hesselman et al. (2008) created **interactive TV Together (iTVT)** to integrate community and interactivity services of third party providers that are not specifically created for iTV, into an interactive television application. By using

metadata, session management, identity management and a personal recommender system, they created a prototype as proof-of-concept that allows two friends to play along with an interactive live television quiz show, including a buddy list with presence information, and buy products related to the quiz after the program.

Park, Blythe, Monk & Grayson (2006) present several concepts, commonly described as "**sharable digital TV**", based on ethnographic observations. One concept involves using mobile phones as separate remote controls, as well as for having separate EPGs, so users will not disturb other viewers. Another concept they briefly describe is family voting, where each user can vote on the same issue using a separate remote control.

Launched in 2001, **AOLTV** (Time Warner, 2000) was the first (and so far only) commercially available social interactive television system, available only in the USA, which included a chat feature linked with the television program that a user was currently watching, as well as a buddy list. It was however not a success, getting bad review after bad review[12], and is currently not available anymore.

At Alcatel-Lucent, the team that created AmigoTV (see above) subsequently designed **Participation TV** (Vanden Bergh et al., 2007), enabling live participation of viewers in cross-media TV formats. Several concepts are described where viewers can take-up different roles (either as host or as participant), and audio as well as video communication is possible. These concepts include "Speakers Corner", "Community Quiz", "Charades" and "Karaoke TV".

Fink, Covell & Baluja (2006) describe a system that analyzes the audio coming from the television set, and based on this information presents information and applications on the user's computer. One of the social features they suggest, is the creation of ad-hoc communities linked to the current television content, within which users can chat (called "**ChaT.V.**"). These ad-hoc communities can be based on users watching the same content, but also experts in the subject matter of the current program. The chat stream can even be replayed afterwards by other users watching the same content, who can follow the conversation synchronized with the video

[12] Mainly because of the lengthy set-up system and lack of active users. The chat feature was usually applauded (Broom, 2001).

stream. Other features they suggest are personalized information layers that present information related to the current broadcast, real-time popularity ratings showing how many users in a certain community are watching a show, and video bookmarks that enable easy retrieval or sharing of certain programs.

Somewhat different than previously described systems are television systems that encourage users to create video programs themselves and show them on a privately or publicly available channel. Although they do not contain several of the social features described before, such as communication features or buddy lists, they do allow users to share user-generated content with each other, creating a stronger sense of community in small local communities. Examples of such systems are **LommelTV** (Van Der Meerssche, Van Rompaey, Vandenbempt & Van Brabandt, 2007) and **Buntes Fernsehen** (Miletich, 2008), both of which have gone or are still going through successful field trials.

2.4 Conclusion

The importance of the social uses of television, discussed in this chapter, as well as the rising success of interactive television, come together in the concept of social interactive television. The wealth of systems, prototypes and concepts that are described in the previous paragraphs shows that social interactive television is not a marginal phenomenon, and although there are currently no commercial set-top box applications available and Internet based systems only offer a limited set of social features, many companies and research laboratories are working on such systems. As the focus of this PhD is mainly on systems intended for use on a normal television set in the living room, Table 1 shows an overview of the different set-top box based systems and the main social features they support, based on the systems described in this chapter.

In the next chapter, we will discuss the importance of heuristics to support the design and evaluation of such systems. We will first look at guidelines and heuristics for ensuring the usability of interactive television, and then explore what the current state of research on designing and evaluating sociability is.

Table 1: Overview social features of STB based social iTV applications

	Synchronous interaction	Asynchronous interaction	Voice chat	Text chat	Sharing content	Presence information	Social EPG	Annotating content	Team-based play
CoSe	X			X	X	X			
AmigoTV	X		X			X			
Windows Media Center	X			X		X			
Social TV	X		X	X		X	X		
Ambulant Annotator		X			X			X	
ConnecTV						X			
2BeOn	X	X		X		X			
Unified EPG						X	X		
Telebuddies	X			X					X

3. Usability Inspection Methods and Heuristics

The sociability heuristics we set out to create within this PhD, are meant to be used for evaluating how well social television interfaces support social interaction. They are not an end in itself, but will serve as a tool and hopefully become part of a range of methods that are being used to design and especially evaluate social television systems. Within Human-Computer Interaction, several methods for evaluating usability already exist.

In this section, we will first introduce the concept of usability, as it is closely related to sociability, and the methods that are used to evaluate usability. We will specifically focus on inspection based methods and heuristic evaluation, as the latter method will prescribe the procedure how to use our sociability heuristics in evaluation. Finally, we will discuss some domain-specific guidelines and heuristics, with a special interest in guidelines for designing or evaluating interactive television.

3.1 Usability

The most widely cited definition of usability is described by the International Standardization Organisation (ISO) in the official ISO 9241-11 standard, called "Guidance on Usability":

> [Usability is] the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use.

In this definition, two important elements can be discerned. First, the definition places the focus on *specified* users, *specified* goals and a *specified* context of use. This means that usability is not absolute, but that it is relative to which users are using a specific product, what they use it for, and in which context they use it. Hence the famous catch-phrase of usability designers: "It depends" (Furniss, Blandford & Curzon, 2007). The second part of the definition lists the criteria that can be used to define if a product is usable: effectiveness, efficiency and satisfaction. Effectiveness is "the accuracy and completeness with which users can achieve their goals", efficiency refers to "the resources expended in relation to the accuracy and

completeness of goals achieved", and satisfaction is "the comfort and acceptability of the work system to its users and other people affected by its use"[13].

The ISO definition covers all aspects quite well, but is at the same time quite broad. Other authors have tried to capture different elements of usability. We do not intend to survey and summarize all definitions about usability, but want to single out two authors that have been very influential and/or whose definitions carry certain assumptions with them that influence how usability is perceived.

Nielsen (1993) for example lists five aspects of usability: (1) learnability (how easy is the system to learn); (2) efficiency (how quickly can users achieve their tasks); (3) memorability (how easy is the system to remember); (4) errors (control of errors, including prevention and recovery); and (5) satisfaction (how much users like the system) (Nielsen, 1993). Although this list of criteria does not include the context of use, specific users or specific tasks explicitly, it does imply an understanding of these aspects. Dumas & Redish (1999) define usability as follows:

> Usability means that the people who use the product can do so quickly and easily to accomplish their own tasks. This definition rests on four points: (1) usability means focusing on users; (2) people use products to be productive; (3) users are busy people trying to accomplish tasks; and (4) users decide when a product is easy to use.

Although similar aspects as in the ISO definition and Nielsen's definition return, such as effectiveness and efficiency, two interesting extra elements are added. The definition (or rather, the four points it rests on) puts the final decision on the usability of the product explicitly in the hands of the users. More importantly for our discussion, the definition is, even more than the two others, focused on productivity. When designing interactive television systems however, users are usually not trying to be productive, but rather trying to relax or enjoy themselves. To include this kind of aspects, as well as other less work-oriented qualities, recently the term user experience is being used.

[13] We chose to cite these phrases literally, and not paraphrase them, as the way they are defined in the standard is crucial in understanding the scope of these terms.

User experience, a term that is still widely debated and is understood in different ways by different researchers, can refer to broadly three categories of qualities (see Figure 19): (1) aspects that go beyond instrumental use of products, and focus e.g. on aesthetics of a product; (2) emotional and affective aspects, referring to how users anticipate on, react to or reflect on their use of a product; and (3) experiential aspects that look at the use of a product in a complex combination of previous and future experiences, that can change over time and are unique for each user (Hassenzahl & Tractinsky, 2006). Within user experience, some researchers refer to the experience of multiple people using products together with the term 'co-experience' (Battarbee, 2003a). As this is more related to the concept of sociability, we will look deeper into that aspect of user experience in the next chapter.

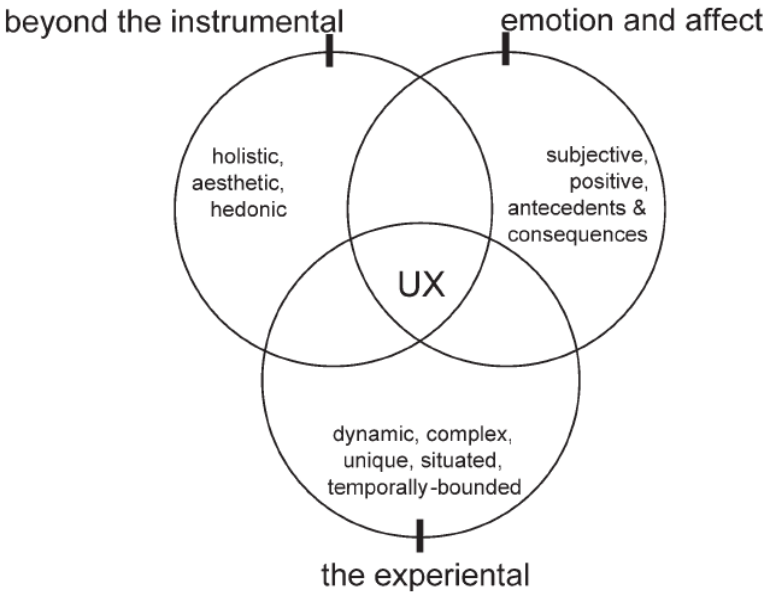

Figure 19: A unified view of user experience (Hassenzahl & Tractinsky, 2006)

The definitions we have just discussed do not explain how a usable product should be attained. The ISO definition implies that this cannot be done by just following a list of usability guidelines – although guidelines (and heuristics) can be part of a process that will lead to a usable design – because each product is made for different users, a different set of tasks and a different context of use. To reach a good understanding of the requirements for these specific users, specific tasks and a specific context of use, it is generally accepted that a user-centred design process is the most efficient and effective. Again, the International Standardization Organisation provides a standard for what they call 'human-centred design' (see Figure 20).

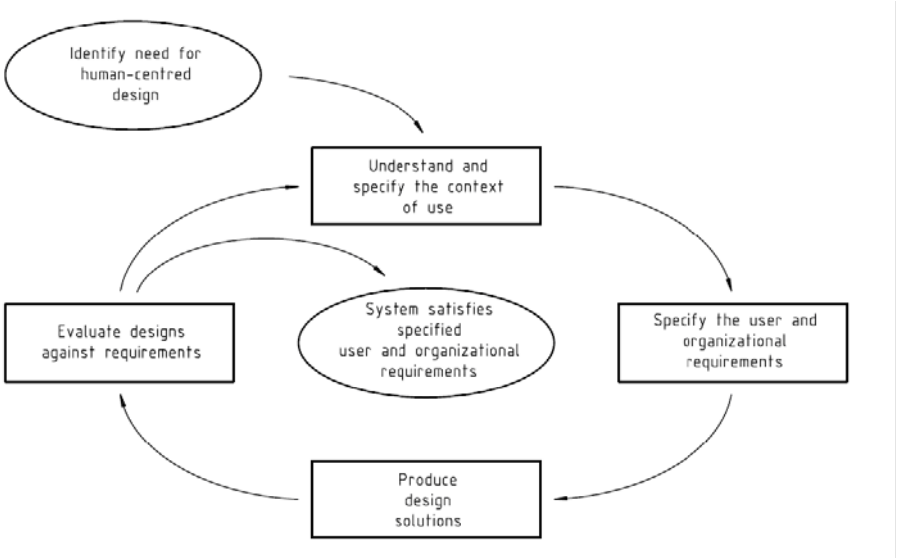

Figure 20: ISO-13407 Human-centred design processes for interactive systems

Four main activities are described in this process: (1) understanding and specifying the context of use; (2) specifying the user and organizational requirements; (3) producing design solutions; and (4) evaluating designs against requirements. Arguably, step 1 and 2 can be seen as part of an analysis phase, whereas step 3 is part of the design phase and step 4 part of the evaluation phase. These three phases (analysis, design and evaluation) can also be found in other definitions or descriptions of the user-centred design process. For example, Sharp, Rogers & Preece (2007) identify four basic steps: (1) identifying needs and establishing requirements; (2) developing alternative designs; (3) building interactive versions of the designs; and (4) evaluating designs. Step 1 in this process is part of the analysis phase, steps 2 and 3 can again be combined to be part of the design phase and step 4 is the evaluation phase. For an overview of other definitions and descriptions of the user-centred design process, see Mayhew and Mantei (1994). In each of these phases, several methods can be used, usually including in some way an interaction with users (e.g. card sorting, user and task analysis, prototype evaluation, etc.). As the focus of this PhD is creating an evaluation method, we will not discuss all these different methods, but we will go into more detail in the different methods used for evaluating interactive products.

Even though evaluation is often listed as ‘last’ phase in the user-centred design process, it is usually and preferably done as soon and as often as possible. It is a good and often applied practice to create low-fidelity prototypes on paper early on in the

design process, and evaluate these (Snyder, 2003). The results of these evaluations can be used to redesign the prototypes, and as such eliminate as many usability problems as possible. The different methods that can be used for evaluating will be discussed in the next section.

3.2 Usability evaluation methods (UEM)

Each usability evaluation method can be classified in one of three categories: methods based on user input, methods based on models of human behaviour or methods based on inspection by experts (Sears, 2003). We will shortly explain each of these categories, before discussing in depth the different inspection methods, as they are most relevant to our research.

3.2.1 Evaluation methods based on user input

Evaluation methods based on user input are mainly empirical, using observation, analysis and interpretation to evaluate the usability of a system or product. The two most used variations on observing users are controlled observations, usually called 'usability testing', and naturalistic observations, or 'field studies' (Dumas, 2003). As usability testing (sometime also called user testing if the focus is less on usability) and field studies are the most commonly used names, we will continue to use these terms.

Usability testing is one of the most used and most reliable methods to find usability problems. Dumas (2003) lists several characteristics a valid usability test should have: (1) the goal is to improve the usability of a product; (2) the participants are real users, (3) the participants perform real tasks; (4) observe and record what participants do and say; (5) analyse data, identify real problems and recommend changes to solve the problems; and (6) use the results to change the product. This not only sets usability testing apart from other UEMs, but also from technical tests (bug tests or acceptance tests) and psychological experiments, which require a more rigid set-up. Usability tests are usually carried out with a small sample of users, as the purpose is not statistical relevance but improving a product (Nielsen, 1993). However, summative usability tests that try to measure how usable a product is (in contrast to formative tests that are used to improve the usability of a product) do require a higher number of participants. Usability tests are often performed in a usability lab with a one-way mirror, but this is not a prerequisite as other environments can also allow the

researcher to observe and record participants' behaviour (Dumas & Redish, 1999; Sharp et al., 2007). Although usability testing is a reliable method to find usability problems, it is not the perfect method to find all problems in a system.

Rubin (1994, p.27) lists four limitations to usability testing: (1) a test is always an artificial situation; (2) results from usability testing do not necessarily prove a product will work; (3) participants are seldom completely representative for the target population; and (4) usability testing is not always the most appropriate method to find usability problems. Keeping these limitations in mind, it is best to combine usability testing with other evaluation methods.

Field studies are carried out in the natural environment of the users, for example the office where they perform their daily work or, in the context of interactive television, their own living room (Bernhaupt, Obrist & Tscheligi, 2007). A researcher can observe and record the behaviour of the user(s), but the user himself can also record his own behaviour, e.g. by keeping a diary. Usually, the researcher tries to interfere as little as possible, so the behaviour of the user is as natural as can be. Results are mainly qualitative, and consist of descriptions and anecdotes (Rubin, 1994; Dray & Siegel, 2003; Sharp et al., 2002). Similar to usability testing, field studies also have some limitations. Baber and Stanton (cited in Dumas, 2003) argue that it is hard to detect the cause of a certain problem when observing user behaviour, as the evaluator can not manipulate or interfere with what is going on. It is also possible that certain situations take long to occur, or do not occur at all, so important usability problems can be overlooked. Moreover, like with usability testing, participants can alter their behaviour when they know they are being observed. Finally, evaluators can see the problems they want to see, rather than real problems, compromising the validity of the results. A good preparation and execution of the field tests can however mitigate these limitations (Rose, Shneiderman & Plaisant, 1995), minimizing the risk of misinterpreting the results or overlooking certain usability problems. It does make clear that, even though field testing might seem like the most realistic method to capture usability problems, it is not perfect either, and should only be used in the appropriate circumstances. Field testing is usually more interesting in a later phase of development, when a product is more or less stable and allows longer interaction in the user's environment. When the product is still in

prototype phase, and still has bugs or functional limitations, usability testing is more appropriate.

In both usability testing and field studies, identification of usability problems is not based on theories or models, in contrast to the other categories, but on user behaviour. Nevertheless, good knowledge of the context of use, the target user group as well as the system and the tasks it should support is necessary for preparing the observations and interpreting the results. This way, false negatives[14] can be avoided. Usually, one assumes that the problems found with these methods are always real, because the users are (or should be) representative for the target group, and so there is no risk of getting false positives[15] (Cockton, Lavery & Woolrych, 2003). However, as each observation method – be it in a usability lab or even in the field – has an artificial aspect, results should be interpreted carefully, and false positives can not be excluded completely.

Another method based on user input, but not on user behaviour, is the use of questionnaires. There are two kinds of questionnaires: short questionnaires as part of another evaluation method (e.g. after performing a usability test) or self-contained questionnaires that are used to assess the usability of a system on its own. Examples of (standardized) short questionnaires are the After Scenario Questionnaire (ASQ) (Lewis, 1995), the System Usability Scale (SUS) (Brooke, 1996) and the Computer User Satisfaction Inventory (CUSI) (Kirakowski, 1987). Examples of longer, self-contained, questionnaires are the Questionnaire for User Interaction Satisfaction (QUIS) (Chin, Diehl & Norman, 1988) the Software Usability Measurement Inventory (SUMI) (Kirakowski, 1994) and the Measurement of Usability of Multi Media Software (MUMMS) (Sharp et al., 2002). An important limitation of questionnaires for measuring the usability of a system is that it relies on self-reporting of users. What a user says does not always match with what a user does, so questionnaires are more relevant for discovering subjective opinions of users, rather than for detecting specific usability problems with a system. The advantage of questionnaires is that they can be sent to a large number of users, in contrast to

[14] False negatives are problems that are present in the system, but that are not found during evaluation

[15] False positives are problems that are found during evaluation, but that are not present in the system

usability or field testing, where time and budget limitations often allow only a limited number of participants (Sharp et al., 2002).

3.2.2 Evaluation methods based on models

Evaluation methods based on models use a model of how humans use a system, in order to predict by calculation or simulation if there are usability problems or bottlenecks in this system (Kieras, 2003). Model-based methods are useful in the very early stages of design, when prototypes to evaluate are not yet available or only in a very preliminary form. Even at this stage they are quite limited, as they can only predict the order of certain actions, the time to execute tasks or the time to learn how to use a system. So the complementary use of user testing or inspection in a later stage is needed, to make sure other usability aspects such as legibility and comprehension of screen elements can be assessed as well. It is important to realize that model-based methods are not intended to discover all usability problems in a system, but to use existing and well-founded knowledge of human behaviour, stemming from cognitive psychology, in order to make faster and more reliable decisions in the design process, rather than relying on the intuition of designers (Kieras, 2003). As these evaluation methods are less relevant for this PhD, we will not further discuss them.

3.2.3 Evaluation methods based on inspection

With evaluation methods based on inspection, also called usability inspection methods (UIMs) or analytical evaluation methods, one or more experts analyse a system to identify usability problems. Unlike model-based evaluation, UIM is not explicitly based on underlying HCI theories. As we have seen, usability depends on specific users, specific tasks and a specific context of use, so experts using a UIM should be familiar with each of these aspects in order to reliably find the right problems. Performing a usability inspection consists of three phases (Cockton et al., 2003): (1) analyst preparation (the expert gets familiar with the chosen UIM, the system and the context of use); (2) candidate problem discovery (finding possible problems); (3) confirmation or elimination of candidate problems (removing false positives). Each UIM we will now discuss requires going through these three phases.

A further classification within usability inspection methods is between UIMs based on rules versus UIMs based on walkthroughs. UIMs based on rules check if a system conforms to a set of pre-defined rules. These rules can be (ordered from

abstract to specific) general HCI principles, heuristics, guidelines or style guides. Usually there is little attention to the interaction and dynamics within a system. This is more addressed by walkthroughs, with which experts analyse the use of a system step by step in a hypothetical interaction (Cockton et al., 2003). There are some other analytical evaluation methods that do not really fit in any of the two categories, such as 'concept-based analysis of surface and structural misfits' (CASSM), which uses the fit between user and system at the level of concepts and the relationships between them to evaluate a system (Blandford, Keith, Connell & Edwards, 2004) or 'claims analysis', in which experts analyse positive and negative claims about using an interface, based on user scenarios (Carroll & Rosson, 1992).

Heuristic evaluation is used to analyse a system based on a list of general rules of thumb called heuristics. The expert uses these rules of thumb to find usability problems during a free exploration of the system. It is also possible to use task oriented scenarios for analyzing the system with the heuristics, so there is more focus on the interaction (although still not as much as with walkthroughs, see later). The experience and good judgment of the expert is trusted upon to recognize specific problems that violate one or more of the heuristics (Cockton et al., 2003). As the purpose of this PhD is to create sociability heuristics, we will discuss heuristic evaluation in more detail in the next section.

Guidelines are more specific than the general rules of thumb used with heuristic evaluation. Some guidelines are very specific for certain systems (e.g. websites (Koyani & Allison, 2003)), a specific context of use (e.g. mobile use (Bertini, Gabrielli, & Kimani, 2006)) or specific target users (e.g. children (Markopoulos, Read, MacFarlane & Hoysniemi, 2008)), but there are also more broadly applicable guidelines that can be applied on different kinds of systems, contexts of use or target users (see e.g. Smith & Mosier, 1986). Performing an evaluation based on guidelines usually requires less expertise than with a heuristic evaluation, as guidelines are more specific and less ambiguous in nature (Cockton et al., 2003). Even more specific than guidelines are style guides, which define and document rules for one specific system or set of applications (e.g. Apple Computer Inc., 1993).

In contrast with rule-based inspection methods, walkthroughs focus more on interaction with the system. One of the most described walkthrough methods is cognitive walkthrough, a procedural inspection method where experts walk through a

system using a set of representative tasks, and answer four questions at each step in this process (Wharton, Rieman, Lewis & Polson, 1994): (1) will the user try to achieve the right effect?; (2) will the user notice that the correct action is available?; (3) will the user associate the correct action with the effect that the user is trying to achieve?; and (4) if the correct action is performed, will the user see that progress is being made toward solution of the task? These questions are based on principles from cognitive psychology, more specifically the CE+ learning theory. The four questions refer to the logic of the system, the visibility of control elements, the comprehensiveness of the control elements and feedback to the users. The method was designed to be primarily used for so-called "walk-up and use" systems that are used without any prior learning process.

An interesting combination of the two varieties of inspection based evaluation methods is a heuristic walkthrough (HW). This method couples heuristic evaluation with cognitive walkthrough, resulting in a more structured evaluation focusing on interaction with the system as well as established usability rules. Starting with the cognitive walkthrough will make the heuristic evaluation benefit from the task oriented approach, so the expert will keep this in mind when applying the rules. The advantages of both methods are kept, while minimizing their limitations (Sears, 1997; Cockton et al., 2003).

In the next section, we will describe and discuss heuristic evaluation in more detail, as this is a central evaluation method in this PhD.

3.3 Heuristic Evaluation

The term "heuristic" comes from the Greek "heuriskein" which means "to discover" (Merriam-Webster). Heuristic evaluations are thus meant to discover usability problems by using a set of general rules-of-thumb.

Heuristic evaluation for user interface design was introduced by Molich & Nielsen (1990), presenting a list of nine heuristics (see Table 2). They created the heuristics based on their teaching and consulting experience[16]. Nielsen presented the heuristics as part of a discount usability engineering process, which also includes user

[16] For more details about the creation process of these and other heuristics, see PART II: METHODOLOGY

and task observation, scenarios and simplified thinking aloud (Nielsen, 1993). The philosophy behind discount methods is that, although they might be less perfect than more elaborate and expensive methods, they reduce the intimidation barrier for using usability methods. So instead of going for the best possible results, with the risk of the methods not being used because of budgetary constraints or lack of experience, discount methods have more chance of actually being used and will yield good enough results. In the case of the usability heuristics, this means that instead of using daunting lists of hundreds of guidelines[17], only ten rules have to be applied to evaluate a system. Nielsen does grant that some expertise is required when applying the rules (Nielsen, 1994).

Table 2: Original Heuristics by Molich and Nielsen[18] (1990)

1. Simple and natural dialogue
2. Speak the user's language
3. Minimize the user's memory load
4. Be consistent
5. Provide feedback
6. Provide clearly marked exits
7. Provide shortcuts
8. Provide good error messages
9. Error prevention
10. Help and Documentation[19]

After the introduction of the original usability heuristics, several other sets of heuristics and general principles were introduced. In an attempt to enhance the

[17] Such as the 944 guidelines by Smith and Mosier (1986), a popular set of guidelines at the time

[18] The exact formulation of the original heuristics differs slightly in different publications

[19] This tenth heuristic was not in the original publication (Molich and Nielsen, 1990) but was added in 1991, according to Nielsen (1994)

explanatory power of usability heuristics, including his own heuristics, Nielsen revised his heuristics based on several lists of other guidelines and a factor analysis of 249 usability problems (Nielsen, 1994), resulting in a new list of usability heuristics (see Table 3). It is this list of heuristics that has since been promoted by the author, and which has been used by most practitioners to date[20].

Table 3: Revised heuristics by Nielsen (1994)

1. Visibility of the system status
2. Match between the system and the real world
3. User control and freedom
4. Consistency and standards
5. Error prevention
6. Recognition rather than recall
7. Flexibility and efficiency of use
8. Aesthetic and minimalist design
9. Helping users recognize, diagnose, and recover from errors

Muller & McClard (1995) claimed that the proposed heuristics by Nielsen are product-oriented, and not process-oriented. The latter refers to how a system fits the user and his or her work needs, rather than looking at the system in itself. Therefore, they added three additional heuristics (see Table 4). During a validation exercise, they found that the added heuristics found several unique problems, not found by the original heuristics. In their conclusion, they add (but do not validate) a fourth extra heuristic: "protect the user's privacy". In addition to adding a couple of new heuristics, they also propose to add users as expert reviewers when performing the heuristic evaluation, and call this participatory heuristic evaluation (PHE) (Muller, Matheson, Page & Gallup, 1998).

[20] As an indication, the ACM Digital Library (http://portal.acm.org/dl.cfm) alone lists 97 citations of Nielsen (1994)

Table 4: Extension to heuristics by Muller et al. (1995)

1. Respect the user and her/his skills
2. Pleasurable experience with the system
3. Support quality work

David Travis (2007) argues that heuristics should be used that are based on extensive research and international consensus, such as the dialogue principles from the ISO standard 9241-110: Ergonomics of human system interaction - Part 110: Dialogue principles (see Table 5). Beimel, Schindler & Wandke (1994) used a survey to find out if human factors experts understand and accept this standard. They found that the majority of the human factors experts accept the general approach of the standard, understand most of the guidelines, and see them as appropriate for promoting user-centred design practices in the design and evaluation of software. However, they did not test the validity or reliability of the standard, and report that the standard itself states that "it is not proven whether the proposed seven principles are independent factors and whether this set is complete".

Table 5: Dialogue principles from ISO 9241-110

1. Is the dialogue suitable for the user's task and skill level? (Suitability for the task)
2. Does the dialogue make it clear what the user should do next? (Self-descriptiveness)
3. Is the dialogue consistent? (Conformity with user expectations)
4. Does the dialogue support learning? (Suitability for learning)
5. Can the user control the pace and sequence of the interaction? (Controllability)
6. Is the dialogue forgiving? (Error tolerance)
7. Can the dialogue be customised to suit the user? (Suitability for individualisation)

Gerhardt-Powals (1996) stressed the importance of using guidelines that are rooted in the cognitive sciences. She formulated ten guidelines (cognitive engineering principles for enhancing human - computer performance, see Table 6) based on

cognitive science literature relevant to the domain of the interface she was studying: an antisubmarine warfare system. Because such systems are being used in a time-critical and high-information load environment, the principles reflect these characteristics and focus mostly on situational awareness and display design that supports fast and accurate decision making in a stressful situation.

Table 6: Cognitive engineering principles for enhancing human-computer performance (Gerhardt-Powals, 1996)

1. Automate unwanted workload
2. Reduce uncertainty
3. Fuse data
4. Present new information with meaningful aids to interpretation
5. Use names that are conceptually related to function
6. Group data in consistently, meaningful ways
7. Limit data driven tasks
8. Include in the displays only that information needed by the operator at a given time
9. Provide multiple coding of data
10. Practice judicious redundancy

Lai-Chong Law & Hvannberg (2004a) have taken the ten cognitive engineering principles by Gerhardt-Powals and compared their effectiveness with the ten usability principles by Jakob Nielsen (see Table 3). The reasons they give for choosing the principles by Gerhardt-Powals are: (1) that they are theoretically firmly grounded in cognitive engineering; (2) they have been empirically evaluated; (3) they are easy to learn and apply; and (4) because they consist of the same amount of principles, so it is easier to compare them with Nielsen's heuristics as they put the same cognitive load on its users. Their results show that the heuristics by Nielsen are more effective than the principles by Gerhardt-Powals. The reasons they cite for this conclusion are: (1) that Nielsen's heuristics are stated in plain language, and Gerhardt-Powals' principles in technical jargon; (2) Nielsen's heuristics were already

well-known to the participants whereas Gerhardt-Powals' principles were not; and (3) the principles by Gerhardt-Powals were created for evaluating military systems with many numerical representations, which does not fit the context of other systems as the one they used in their study. Even though the heuristics by Nielsen performed better than the principles by Gerhardt-Powals, Lai-Chong Law and Hvannberg note that the overall effectiveness of heuristic evaluation methods is still quite low. We will discuss this further in a following section.

Scapin & Bastien (1997) point at the fact that most guidelines or heuristics have not been properly validated. They propose a new set of criteria (see Table 7), based on several sets of guidelines, and performed different experiments to assess the reliability, effectiveness and relative effectiveness of the criteria. They conclude that their criteria are complete, distinct and applicable, performing better than the ISO principles when used by non-specialists. The guidelines by Scapin & Bastien are less well known in the Anglo-Saxon HCI community, and circulate more in the French-speaking HCI community[21].

Table 7: Ergonomic Criteria by Scapin & Bastien (1997)

1. Guidance
1.1. Prompting
1.2. Grouping and distinguishing items
1.2.1. Grouping and distinguishing items by location
1.2.2. Grouping and distinguishing items by format
1.3. Immediate feedback
1.4. Legibility
2. Workload
2.1. Brevity
2.1.1. Conciseness

[21] As an indication for this, more than half of the citations to Bastien & Scapin (1995), which is an article in English, in the ACM Digital Library are from French-speaking researchers

2.1.2. Minimal actions
2.2. Information density
3. Explicit control
3.1. Explicit user actions
3.2. User control
4. Adaptability
4.1. Flexibility
4.2. Users' experience
5. Error management
5.1. Error protection
5.2. Quality of error messages
5.3. Error correction
6. Consistency
7. Significance of codes
8. Compatibility

3.3.1 Performing a heuristic evaluation

Nielsen (1993) offers a detailed description of how to perform a heuristic evaluation. Consistent with the guidelines for using UIMs (see above), he suggests first getting acquainted with the context of use, by looking at a typical usage scenario, and giving a training session about the domain (Nielsen 1994). He even advocates using 'double experts' to perform the heuristic evaluation, as they are expert in usability as well as in the specific domain that is being examined, and shows that they find more problems in an interface. Nielsen (1994) also suggests that the evaluator might use category-specific heuristics (e.g. in the case of calendar applications, the domain-specific heuristics from Dykstra (1993)) in addition to more general heuristics. Several researchers highlight the important of support and training of the method as well when performing heuristic evaluation (Cockton et al., 2003; Lai-Chong Law &

Hvannberg, 2004a). In a case study, Nielsen (1994) uses a training session to not only explain the domain of use, but also the method itself.

Although heuristic evaluations can be performed by a single evaluator, Nielsen states that single evaluators only find 35% of usability problems, and thus multiple evaluators should be used to perform a heuristic evaluation. He recommends using about five evaluators, or at least three (Nielsen, 1993). Each evaluator should inspect the interface alone, by going through the interface several times (at least twice) and comparing all interface elements with a set of heuristics (see above). The resulting set of usability problems found, linked with the heuristic they are in conflict with, can then be aggregated with the results of the other evaluators. Nielsen suggests adding a debriefing session with the evaluators, possible observers during the evaluations and representatives of the design team, in order to provide design advice based on the problems found. Nielsen claims that the heuristics themselves already make it easy to suggest design changes, as they are formulated as guidelines. This is confirmed by more recent research as well (Blandford, Green, Furniss & Makri, 2008).

An important aspect in the reporting of usability problems, is assigning a severity rating (Dumas & Redish, 1999). Severity ratings allow usability experts to indicate which problems are critical and should be given priority to be fixed, and which are more trivial and can be fixed later. Artim (2003) provides the following description of severities, typically rated on a three-point scale:

- Severe usability problems are those that prevent the user from completing a task or result in catastrophic loss of data or time. Catastrophic loss of data implies either that the lost data cannot be reconstructed or that there is a very high cost to reconstruction. Catastrophic loss of time must be considered in light of the task duration.
- Moderate usability problems are those that significantly hinder task completion but for which the user can find a work-around.
- Minor usability problems are those that are irritating to the user but do not significantly hinder task completion.

Another important factor is the formulation of a usability problem. When different evaluators find the same problems, they are often described differently and then seen as two separate problems. While this might not seem a big problem, if this occurs often the efficiency (and cost-effectiveness) of the method is compromised, as

developers might put extra work in interpreting and correcting a problem. Hartson, Andre, Williges & van Rens (1999) developed the User Action Framework (UAF), based on Norman's stages of action model (Norman, 1988), that allows usability problems to be classified in a standard way (Sridharan, 2001).

3.3.2 Benefits and limitations of heuristic evaluation

There is a long and widespread debate going on in the HCI community about the effectiveness of UIMs, or even UEMs in general. During the nineties, several researchers conducted experiments to prove the effectiveness of different evaluation methods (Desurvire, 1994). At the end of the decade, Gray & Salzman (1998) wrote a broadly discussed article, arguing that these experiments, which were often cited by practitioners for choosing a specific method, contained many validity problems in set-up as well as in execution, compromising the resulting claims. They argue that many of the methods that are used by practitioners and that are thought of as reliable and effective are based on unreliable conclusions.

The article by Gray & Salzman (1998) not only spawned an ongoing discussion about UEMs, but also changed the way comparison studies between different methods for evaluating their strengths are conducted. Since then, more rigor in the scientific set-up of such studies is being applied. E.g. Hartson, Andre & Williges (2001) described a detailed process of how different aspects such as thoroughness, effectiveness or efficiency of UEMs can be assessed. On the other hand, there were also voices saying that UEMs are not scientific methods, and should therefore not be studied with controlled experiments, as they are very much dependent on the context of the company and a specific product design cycle. This context, is argued, strongly influences the suitability of certain evaluation methods (Wixon, 2003).

A lot of studies that compare or assess evaluation methods have focused on the absolute number of usability problem that can be found by different UEMs (Desurvire, 1994). The premise of studying which UEM finds most usability problems is that the best UEM is the one that finds most problems, and that different UEMs should at least find the same problems. Hartson et al. (2001) however argue that in order to study the effectiveness of evaluation methods, instead of the absolute measure of usability problems, thoroughness is a better measure. Thoroughness

compares the problems found with a certain method, e.g. heuristic evaluation, with actual problems from a standard set, e.g. as found with a more reliable method such as user testing. In the example of comparing heuristic evaluation with usability testing, heuristic evaluation is often found to be much less effective, finding less than half of the actual usability problems (Lai-Chong Law & Hvannberg, 2004a). The statement that user testing is the best way to find all usability problems is however challenged, as it suffers from user effects (Lai-Chong Law & Hvannberg, 2004b) as well as the evaluator effect (Hertzum & Jacobsen, 2001), and – depending on task formulation or test execution – can underreport usability problems as well. So when usability problems found with heuristic evaluation are classified as false positives if they are not found by usability testing, they might be real usability problems after all. Because of this inherent difficulty in correctly assessing the effectiveness of evaluation methods, and heuristic evaluation in particular, it might be better not to focus too much on the effectiveness as such, but make sure they are grounded well in a specific domain. As we have seen earlier, when using heuristics developed for a specific domain (such as the cognitive principles of Gerhardt-Powals for military systems (1996)), they will perform worse than general heuristics when used outside of that domain. Similarly, domain-specific heuristics will perform better than general heuristics when used within that domain (see e.g. Baker, Greenberg & Goodwin, 2002; Mankoff et al., 2003). We will discuss domain-specific heuristics in more detail in the next section.

One important conclusion that we can draw from several studies comparing different UEMs, as well as from critique on these studies (Gray & Salzman, 1998), is that UIMs such as heuristic evaluation are not meant to find all problems in an interface, as identified in empirical observations. In line with this conclusion, Blandford et al. (2008) take another approach to assessing evaluation methods and argue that each UEM is good at finding a certain kind of problems, so it is much more important to focus on the scope of each UEM. Evaluators can then decide which method to use in which situation for finding certain kinds of problems, or combine several methods so many different kind of usability problems can be detected. What's more, although UIMs might not find all problems identified in empirical observations, they do offer more guidance on the causes of certain problems and how to repair them

(Blandford et al., 2008). We will focus here on the scope of heuristic evaluation, as this is the central method in our PhD.

Based on a comparison of several UEMs (a combination of UIMs and model-based methods), Blandford et al. (2008) conclude that heuristic evaluation supports finding a wide range of general usability problems at relative low cost. Although this might be seen as a benefit, the drawback is that heuristic evaluation is not a specialized tool for finding specific problems with an interface. They include several other interesting observations about using HE, such as the fact that the wording of the heuristics (or the accompanying text) heavily influences the kind of problems that can be identified with the method. It must be noted that they used the heuristics by Jakob Nielsen (as described above), and that a different set of heuristics might yield different results. Also, HE stimulated evaluators to consider the causes and consequences of certain errors more explicitly than the other UEMs they used (such as Cognitive Walkthrough or GOMS), which can be seen as beneficial for recommending changes to improve the usability of the interface. Finally, they found that the use of HE caused the evaluators to find relevant usability errors that were not within scope of HE, but that could be attributed to the skills of the evaluator. Although this is not directly an asset of HE itself, it does show that the 'unconstrained approach' (Blandford et al., 2008) of the method has interesting and useful side-benefits. However, this last observation also has an important negative side-effect: as the skills of the evaluator play a role during evaluation, usability inspection methods are also susceptible to an evaluator effect (Hertzum, Jacobsen & Molich, 2002) which leads to little overlap between different usability problems when having several usability teams inspect the same interface (Molich & Dumas, 2008).

Finally, we want to point out that several researchers are looking for ways to improve inspection-based evaluation, arguing that instead of dismissing the use of discount usability methods, it is better to improve them (Cockton & Woolrych, 2002). Some researchers have introduced improvements on the inspection methods. The metaphors of human thinking (MOT) method (Frøkjær & Hornbæk, 2008) uses psychologically based metaphors such as 'Habit Formation is Like a Landscape Eroded by Water' for guiding an evaluation. The HE-Plus method (Chattratichart & Brodie, 2002; Chattratichart & Lindgaard, 2008) on the other hand, uses the heuristics by Nielsen but focuses the evaluator on specific problem areas such as navigation or

formatting & layout. Others have tried to improve the circumstances when performing an inspection based evaluation. Cockton et al. (2003) have created the DARe model, which explicitly includes external resources for guiding the discovery and analysis of problems during an expert evaluation, and Cockton, Woolrych & Hindmarch (2004) suggest using Extended Structured Problem Report Formats (ESPRFs) for reporting usability problems and analyzing analysts' rationales, both improving the effectiveness of discovering problems and improving analysts' performance. Cockton et al. (2003) conclude that it is better to improve the analysts themselves, rather than trying to improve the inspection methods, although a combination of both is of course even better.

Based on the previous three paragraphs on heuristic evaluation, the main benefits and limitations of heuristic evaluation are summarized in Table 8. As the limitations of the method show, a heuristic evaluation is not sufficient to find all problems in a user interface, and should therefore not be used as the only method to evaluate usability. Instead of dismissing heuristic evaluation as a method altogether (Cockton & Woolrych, 2002), it is good practice to combine heuristic evaluation with user testing, in order to first find the most evident problems before doing a more thorough evaluation with user testing (Sauro, 2004; Straub, 2004). A combination with other UIMs is also possible, such as the heuristic walkthrough that combines heuristic evaluation with cognitive walkthrough (Sears, 1997).

Table 8: Summary of main benefits and limitations of heuristic evaluation

Benefits	**Limitations**
Low-cost and low-barrier to use	Will not find all problems in a user interface
Can be used early in the development process	Expert needs to be familiar with the heuristics
Offers guidance how to repair problems	Does not find specific problems
Unconstrained approach for evaluation	Evaluator effect

3.3.3 General heuristics vs. domain specific heuristics

As already mentioned earlier, Nielsen (1994) claims that double experts perform better in finding usability problems in specific applications, and evaluators should use domain-specific heuristics in addition to more general heuristics when a double expert is not available. In this section we will review several domain-specific heuristics for different categories of applications, as the sociability heuristics for interactive television we are creating are also domain-specific. We will not detail the creation process of these heuristics here, as this is discussed in section 5.1.1.

Dykstra (1993) was one of the first to create domain-specific heuristics, aimed at evaluating calendar applications, in order to capture the knowledge of domain experts and improve the effectiveness of heuristic evaluation of calendar applications. The list (see Table 9) contains nine heuristics, each of which has a number of more detailed guidelines, e.g. “alternative formats for date and time entry are allowed”. Some heuristics have up to 19 guidelines, while others have only two. For each individual guideline, a rationale is provided that explains the problems users had during the tests that were used to create the heuristics. The heuristics and especially the guidelines are formulated in such a way that it acts as a checklist, which means that it is more suitable for a guidelines based evaluation than for a real heuristic evaluation, unless the heuristics are used on their own.

Table 9: Calendar-specific heuristic checklist (Dykstra, 1993)

1. Adding and deleting a calendar event should be straightforward
2. Working with todo lists should be straightforward
3. It should be easy to attach notes to the calendar
4. Rescheduling an event should be easy
5. Adding and deleting recurring events should not confuse users
6. Special events should be handled in a simple and straightforward manner
7. Movement between days and calendar views should be quick and easy
8. General calendar design should enhance usability
9. Dialogue should be as simple as possible

Similarly, Greenberg et al. (1999) indicated the lack of evaluation methods for groupware, and the difficulty in applying traditional evaluation techniques such as usability testing to groupware. They claimed that existing heuristics are excellent for single user systems, but that for evaluating groupware specific heuristics are needed. Based on the Locales Framework (Fitzpatrick, 1998), they formulated five heuristics (see Table 10). Each heuristic has a short formulation as well as longer one that includes some more details on how to interpret the heuristic, e.g. "allow individual views so one can view a locale or aggregate multiple locales as they relate to one's responsibilities, activities, and interests. A particular person should be able to view locales from his or her particular perspective and in a way that reflects their degree of focus and participation." (Greenberg et al., 1999)

Table 10: Groupware heuristics (Greenberg et al., 1999)

1. Provide centers (locales)
2. Provide awareness (mutuality) within locales
3. Allow individual views
4. Allow people to manage and stay aware of their evolving interactions
5. Provide a way to organize and relate locales to one another

In a later publication, Baker, Greenberg & Gutwin (2001) state that these groupware heuristics are still quite generic, and more specific heuristics are needed for certain groupware application genres. Based on the mechanics of collaboration (Gutwin & Greenberg, 2000), Baker et al. created a set of heuristics for shared visual workspaces (see Table 11).

Table 11: Groupware heuristics (Baker et al., 2001)

1. Provide the means for intentional and appropriate verbal communication
2. Provide the means for intentional and appropriate gestural communication
3. Provide consequential communication of an individual's embodiment
4. Provide consequential communication of shared artifacts (i.e. artifact feedthrough)
5. Provide Protection

6. Management of tightly and loosely-coupled collaboration
7. Allow people to coordinate their actions

Another area for which a number of specific sets of heuristics were created, is game design. Federoff (2002) states that of the three aspects of games that can be evaluated – game interface, game mechanics, and game play – only the game interface can be evaluated using general usability heuristics like Nielsen's. Based on observations and interviews at a game development company, as well as a compilation of already existing game heuristics, Federoff created a list of 40 heuristics[22], divided into the previously mentioned game aspects. As these heuristics were not validated, Desurvire, Caplan & Toth (2004) compiled a new list of heuristics, which they then validated by comparing the issues identified using the so-called Heuristic Evaluation for Playability (HEP) method with the issues identified by user studies. Similar to Federoff (2002), the heuristics were divided into subcategories addressing different aspects of a game: game play, game mechanics, game story and game usability. Game story is an aspect not mentioned by Federoff, while game usability is closely related to the game interface. Interesting to note is that the HEP yielded a number of similar issues as the user studies, but aspects such as boredom, challenge, pace level and terminology were not found using the heuristics. This indicates that also in these specific domains, combining heuristics with user testing is necessary, as heuristics are meant to detect all problems in an interface. Pinelle, Wong & Stach (2008) add an important argument to the discussion on heuristics for evaluating games. They advocate using a separate set of heuristics for evaluating game usability, next to heuristics that evaluate engagement, fun or challenge – sometimes also called playability (Desurvire et al., 2004). This is similar to our argument that usability heuristics for (social) interactive television alone are not sufficient, and sociability heuristics are needed to specifically address social interaction issues. Based on an analysis of game reviews in several games magazines,

[22] As the full list is quite long, and not directly relevant for our discussion, we refer the reader to Federoff (2002) for a description of the 40 heuristics

Pinelle et al. (2008) present a list of ten game heuristics, focused exclusively on game usability.

Other domains for which specific heuristics were created include mobile devices (Bertini et al., 2006; Korhonen & Koivisto, 2006), ambient displays (Mankoff et al., 2003) and large screen notification systems (Berry, 2003; Somervell, Chewar, McCrickard & Ndiwalana, 2003), but as these are not directly related to our research domain, we will not further discuss them. More relevant for our PhD is the domain of interactive television, which we will discuss separately in the next section.

3.4 Guidelines and heuristics for evaluating interactive television

The first guidelines for designing interactive television applications were mainly focused on the usability of specific types of applications, for example electronic program guides (EPGs) (see Table 12, Daly-Jones & Carey, 2000). At the same time, the interest in designing accessible interactive television services resulted in guidelines for iTV accessibility (Gill & Perera, 2003). Within some companies, style guides for designing usable interactive television applications were created, tailored to their specific platforms (e.g. BBC, 2005).

Table 12: Interactive TV And Electronic Programme Guides: Usability Guidelines (Daly-Jones & Carey, 2000)

1. Make it easy for users to access and leave the EPG
2. Ensure 'click-through' mechanisms are visible and predictable
3. Give users a clear return path after they use a 'click-through'
4. Provide programme listings in a range of formats
5. Make it easy for users to compare across channels
6. Provide a clear and simple means of accessing programme information
7. Offer information appropriate to the type of programme
8. Ensure EPG listings add value
9. Ensure important remote control functions are represented on the TV screen

10. Design for correspondence between the TV screen and the remote control
11. Support peoples' natural TV planning strategies

As the interactive television market matured, there was a move from guidelines for specific applications or platforms, to guidelines for interactive television in general. In 2004, the Finnish government commissioned a guide to promote easy-to-use digital TV content (Rinnetmäki, 2004), which includes guidelines such as “support laziness and learning” and “give everyone a chance to participate – or not to participate”.

Lu (2005) surveyed the field of interactive television as well as existing design guidelines and challenges to formulate her interaction design principles for interactive television (see Table 13). She divides them into four categories: interaction design, interaction model, interface, and navigation. One of these principles, in the category interaction model, is “convening an audience” and refers to the social aspects of interactive television as discussed in section 2.2. With this principle, Lu points at the participatory properties of interactive television, allowing viewers to convene by call-in voting or polls. She highlights the possibility of iTV to stimulate forming communities, because of its networked and participatory characteristics. For example, seeing the instant feedback of other viewers’ reactions, or rating other viewers’ creations, is extremely satisfying for viewers and creates and instant community around the program (Lu, 2005). She argues that certain program genres are more conducive to convening and audience, such as reality shows. The most important aspect of this principle, according to Lu, is that viewers feel more connected with other viewers, and as viewers get more creative – stimulated by having an audience – this creates more loyal communities around television programs.

Table 13: Interaction Design principles for Interactive Television (Lu, 2005)

Interaction design	Interactivity should be integrated into the program at its conception
Interaction model	Give users increased control over their viewing experiences
	Maximize agency

	Allow viewers to customize their viewing experiences
	Enhancements must be intimately tied to content
	Convening an audience
	Promote iTV
Interface	Simplicity
	Enhancements should not compete with the main content
	Interfaces should have a consistent theme
Navigation	Create an effective screen structure
	Orient the viewer
	Pay attention to existing standards
	Teach viewers how to interact
	Minimize clicking / distance from primary screen
	Always offer an exit option
	Reinforce engagement through immediate and consistent feedback
	Use appropriate cultural mental models and metaphors

Chorianopoulos (2008) took a similar approach as Lu when creating guidelines, and explored the field of communication science, more specifically television and audience research, to create user interface design principles. He divides his principles into two main categories: (1) principles that indicate which are the most suitable features for interactive TV applications and (2) principles that indicate how to design the iTV user experience supporting these features (see Table 14). The focus is mainly on usability, although Chorianopoulos does mention the social nature of television in one of his principles: “Consider social viewing and opportunities for social communication that might take place locally, or remotely”. He points at the possible pitfall of seeing interactive television with its one remote control as a solitary device, resulting in applications tailored for solitary use, and highlights the fact that

recommendations should take groups of viewers into account. He also indicates the opportunities for remote communication, playing along with a quiz in a team or forming communities around certain television programs (Chorianopoulos, 2008).

Table 14: User Interface Design Principles for Interactive Television Applications (Chorianopoulos, 2008)

Interactive TV features	Empower the viewer with features borrowed from a TV production studio
	Provide interactive entertainment elements, or on-demand information elements that match the main TV content
	Involve the user in lightweight content editing, such as annotations and virtual edits
	Release the content from the single and fixed broadcast source and augment it with out-of-band content delivery
Interactive TV experience	Enhance the core and familiar TV elements (characters, stories) with programmable behaviors (objects, actions)
	Instead of information seeking, support relaxed exploration
	Consider social viewing and opportunities for social communication that might take place locally, or remotely
	There are varying levels of attention to the main display device or to complementary ones.

3.5 Conclusion

Heuristic evaluation is a widely used technique, and although it has many flaws – which should be taken into account when using the method, e.g. by combining it with user testing or improving the problem finding process – it is still useful for finding many usability problems, often early in the design process. As domain-specific guidelines can help usability specialists to evaluate interfaces for specific types of applications, they can be a useful help for the domain of interactive television. Although both Lu's and Chorianopoulos' guidelines for interactive television incorporate social aspects of using interactive television, they do so only very limited

and there is no specific guidance on how to implement this kind of features, or how to evaluate how well they support the social functions they intend to enable. This is a gap we intend to fill with our heuristics. In the next chapter, we will have a detailed look at how sociability can be conceptualized, and how it has been used to analyse or evaluate social interaction in several contexts of use.

4. Sociability: supporting social interaction

It is no surprise to state that humans are social beings and love, friendship, family relations and respect by others are part of our basic hierarchy of needs (Maslow, 1943). As a consequence, as soon as new technologies enable people to get in contact with each other, this is usually quickly adopted: e-mail, instant messaging, SMS, social software on web2.0, are a few examples of this principle. However, just enabling social interactions is not enough. For example, as different failed experiments with video telephony have showed, practical and social barriers such as privacy can have an impact on the adoption of a social technology (O'Hara, Black & Lipson, 2006). This means that it is important to carefully consider which social features can be implemented in certain technologies and, even more importantly, how to implement these features so they will enable, support and sometimes even stimulate social interaction as good as possible.

Several terms exist to indicate this research focus on supporting social interaction in technology, e.g. co-experience (Battarbee, 2003a), socio-pleasure (Jordan, 2000), affordances for social interaction (Gaver, 1996), social affordances (Kreijns, 2004) or social translucence (Erickson & Kellogg, 2000). We will use the term sociability for these aspects, as this is a term that is being used ever more (e.g. Preece, 2000; Diederiks, van de Sluise & van de Ven, 2003; Hew, Gibbs & Wadley, 2004; Ducheneaut, Moore & Nickell, 2004), and is clearly related to the concept of usability. This chapter first deals with analysing the concept of sociability, and then looks at how it manifests itself in different application domains.

4.1 Sociability

When we look up the meaning of the word sociability in a dictionary, it is described as "the quality or state of being sociable; also: the act or an instance of being sociable" (Merriam-Webster). In order to get some more insight into the concept of sociability, we should therefore know what is understood by the word sociable. The same dictionary tells us that sociable is "1: inclined by nature to companionship with others of the same species: social; 2 a: inclined to seek or enjoy companionship b: marked by or *conducive to friendliness or pleasant social relations*" (our emphasis). For a more scientific approach to the concept of sociability, we can look at the famous sociologist Simmel (1949), who has written a seminal

paper about the concept of sociability, and defines it as “a feeling for […] the very fact that one is associated with others and that the solitariness of the individual is resolved into togetherness, a union with others”. He says that “sociability in its pure form has no ulterior end, no content, and no result outside itself, it is oriented completely about personalities”. This definition explains in more detail that sociability is just about relationships, being together and is completely focused on the act of being sociable, with no other motive than being together and enjoying the companion.

So sociable, not related to technology, implies companionship and pleasant social relations. When interpreted in the strict sense, it is simply a synonym for social, and a sociable person is someone who likes social relations. However, in a broader sense, sociable and sociability means being “conducive to pleasant social relations”. Transferred to the world of technology, sociability can thus be defined as the quality of a technology to be conducive to pleasant social relations, to support social relations and even stimulate them. This is however a very broad and general definition.

Some researchers have tried to capture more specific aspects of supporting social interaction in technologies. We will discuss these approaches in the next section, and look at concepts closely related to sociability such as socio-pleasure, co-experience and social translucence.

4.1.1 Concepts related to sociability

Jordan uses the "four pleasures" typology by Tiger (1992, cited in Jordan, 2000) to design pleasurable products[23]. The four pleasures as used in this typology are:

- Physio-pleasure
- Socio-pleasure
- Psycho-pleasure
- Ideo-pleasure

[23] Jordan refers to all kinds of products, including but not limited to technological products

Closely related to sociability is the concept of socio-pleasure, described by Jordan as "the enjoyment derived from relationships with others" (Jordan, 2000). This is similar to our previous discussion on the meaning of sociability.

More specifically, Jordan talks about facilitating social interaction in three ways: through (1) an object that brings people together (e.g. the social gathering at the coffee-maker at work) (2) a special object people can talk about (e.g. a design television set) or (3) an object that indicates that someone belongs to a specific social group (e.g. a Porsche for yuppies). All three aspects mentioned by Jordan are more related to the product as such, rather than specific properties or features of the product. So, although Jordan's typology of designing pleasurable products includes an important social aspect, it does not go into more details of how to design specific features of product to enable these kinds of social interactions. He does indicate that one of the challenges we face is how to link certain product properties with the different pleasures.

Battarbee (2003b) introduces the term co-experience, and defines it as "the user experience, which is created in social interaction". She points out that user experience is usually seen as an individual sense-making process, whereas in practice many user experiences are created collectively. According to Battarbee (2003a), co-experience is *social*, relying on communication, where the social situation creates incentives to respond to others. It is also *multi-modal*, augmenting the richness of face-to-face communication with several communication technologies. In the absence of face-to-face communication, these technologies can be a substitute, albeit with lesser richness. Co-experience is also *creative*, not in the sense of creating products or art, but rather the creation of meaningful experiences with others, much more than solitary use of products. Finally, co-experience is *fun*, and helps passing the timing, keeping in touch or strengthening social ties. The latter echoes the approach of Simmel (1949) to sociability, highlighting the feelings of togetherness. In addition to this definition, and its breakdown in different elements, Battarbee (2003b) describes the different dimensions of co-experience that can be understood. Co-experiences can be explorative or unplanned versus organised. They can be synchronous or asynchronous. Finally, co-experiences can be creative or requiring interpretation. These dimensions can help to classify the different ways that people collectively create experiences with products.

Both the concepts of co-experience as well as socio-pleasure serve more as a way to understand experiences with products and stimulate using methods that explore social aspects of new technologies in order to incorporate them into their design. However, both concepts give little guidance on the specific features that support social interaction. Erickson & Kellogg (2000) in contrast, use the concept of social translucence to implement specific social features in software. They are interested in designing systems that support communication and collaboration between large groups of people, and how these systems can support communication that is "deep, coherent, and productive" (Erickson & Kellogg, 2000). Claiming that social information guides a lot of our activities, they advocate making social information visible in such systems as well, labelling this 'social translucence'. They take the principles of social interaction in physical spaces, such as visibility, awareness and accountability, as a starting point for designing a system that supports long-running, productive conversations in small to medium-sized teams. One of the resulting features is a 'social proxy' that indicates which users are active in a conversation, when they have been active over time, how many conversations are going on, etc. Gaver (1996) takes a similar approach by talking about the affordances for social interaction that certain technologies do or do not offer, and gives the example of limited movement in media spaces which hinders social interactions.

4.2 Sociability in specific domains

Like with usability, sociability manifests itself differently based on the specific platform of the application, so a more specific definition of what sociability is will have to be defined for these specific platforms. Sociability is already being studied within domains as diverse as online communities (Preece, 2000), multiplayer games (Ducheneaut et al., 2004; Brown, 2005; Hew et al., 2004) and interactive television (Rasmussen, 2005). Although there is a lot of research on social interaction in groupware and other work-related applications that support social interactions (e.g. Greenberg et al., 1999), as well as in learning environments (Kreijns, 2004), we will limit ourselves to non work-related applications as this is more closely related to the domain of social interactive television. At the end of this chapter, we will look at how sociability is studied in the context of interactive television.

4.2.1 Online communities

Jenny Preece has been the first researcher to extensively study how to support and evaluate online social interactions. According to Preece & Maloney-Krichmar (2003), sociability "is concerned with developing software, policies and practices to support social interaction online". They argue that the concept of sociability, which they apply to online communities, is very new and, in contrary to usability, still has to be operationalized. They also say a framework for sociability is needed to support designers in creating social applications. De Souza & Preece (2004) have constructed such a framework, the online communities framework (OCF), to analyze and understand online communities, based on semiotic theory and semiotic engineering. The three basic elements relating to sociability in this framework are ‘people’, ‘purpose’ and ‘policies’.

With ‘purpose’, Preece (2000) stresses the importance of a clear purpose of the community that is well stated and linked with other aspects such as a good registration policy. ‘People’ are a key element in online communities, and there are several roles which each play an important part in the sociability of an online community, such as moderators and mediators, professional commentators, provocateurs, general participants and lurkers. Another aspect related to people in communities is the community size. As communities can be either too small or too big, reaching critical mass is important, albeit variable from community to community. Finally ‘policies’ are concerned with governing the behaviour of the online community. Topics related to policies are joining and leaving requirements, by-laws, codes of practice for communication, rules for moderation, issues of privacy and trust, and so on.

Based on this framework, Preece (2000) presents sociability guidelines for designing online communities, and derives several heuristics for evaluating not only the sociability, but also the usability of online communities. Some examples of design guidelines are: “give the community a clear, meaningful name”; “decide whether other experts are needed and they can contribute”; “support personal presence”; and “encourage empathy, trust and cooperation”. When translating these guidelines to more general principles, suitable for evaluating a system, this results in a number of heuristics for evaluating the sociability and usability of online communities (see Table 15).

Table 15: Usability and sociability heuristics for online communities (Preece, 2000)

Why should I join this community?
How do I join (or leave) this community?
What are the rules of this community?
How do I get started reading and sending messages?
Can I do what I want to do easily?
Is the community safe?
Can I express myself as I wish?
Why should I come back?

These heuristics are clearly tailored to evaluate the usability and sociability of online communities, and can not be used for evaluating other applications or platforms, such as interactive television applications. To see how sociability is different in other domains, we will first discuss the conceptualization of sociability in multiplayer games, before looking at the state of researching sociability in interactive television.

4.2.2 Multiplayer games

The popularity of online, networked games is growing continually. One particular genre of online games that is based heavily on interactions between its players is Massively Multiplayer Online Role Playing Games (MMORPG). Examples are Ultima Online, World of Warcraft or Guild Wars, each consisting of a large online world with thousands of users. Duchenaut et al. (2004) have used ethnographic observation and computerized data collection to study how sociability is supported in the MMORPG 'Star Wars Galaxies' (SWG). They use Oldenburg's concept of 'third places' to explain how certain locations (called 'cantinas' in SWG) do or do not support sociable conduct between the players of this game. Based on an evaluation, they formulate several design guidelines such as: "promote regularity", "urban planning", "partition the conversational space", and "encourage and reward gregariousness".

A similar study has been carried out by Brown (2005) in the game ‘There’. One notable observation is the use of speech bubbles where each word appears as it is typed. This allows users to speak with more natural turn taking than with other chat systems where one has to wait for a sentence to be sent. However, as speech bubbles overlay the screen, this puts a limit to the amount of participants that can comfortably partake in a conversation. Other aspects relating to sociability Brown (2005) recounts are the topics that are being discussed in ‘There’ and how players show their identity and status by their appearance. The author highlights the importance of shared activities to produce enjoyable social activities as this forces users to co-operate and collaborate.

Another study focusing on sociability in games, but on a different genre of online games, is an evaluation of the sociability of the Xbox Live Voice Channel, a system with which players can play games online through the Xbox game console, while talking to each other using a headset (Hew et al., 2004). By using user tests and focus group discussions, Hew et al. examined in how far this extra communication channel supports the social functions already present in online gaming. They looked at the most common themes in the user tests and discussions, to be able to analyze the aspects regarding sociability, resulting in three points of interest. They saw that attention must be paid to (1) controlling what is heard through the voice channel, (2) controlling what is sent over the voice channel and (3) the combination of two social spaces, namely the presence of multiple gamers in the same physical room versus multiple gamers in the same virtual room. Players were for example uncertain if their utterances were heard by the other players, because they didn't respond to them. Another problem was that a player talked to people in the same room, but this wasn't meant to be sent to the other players at other locations.

4.2.3 Interactive television

On a theoretical level, a number of scholars have tried to describe how sociability can be conceptualized in the context of interactive television. Rasmussen (2005) uses two concepts of John B. Thompson (1995, cited in Rasmussen, 2005) to describe the communicative aspects if iTV: discursive elaboration and concerted forms of responsive action. The first one refers to the conversations people have while watching television, while the latter means invoking coordinated responses from

distant viewers. We can find a similar but more expanded classification with Chorianopoulos (2007), who presents a taxonomy of TV sociability (see Figure 21) in which one dimension is between distance viewing versus co-located viewing, and another dimension between synchronous communication and asynchronous communication. In the same vein, Ducheneaut et al. (2008) describe the difference between direct sociability (talking while watching television) and indirect sociability (discussing about previously watched television shows). Rasmussen (2005) adds a semiotic view to this perspective, by describing the collective decoding of the TV narrative as 'interpretation-cum-interaction'. Interactive television then, she argues, not only incorporates this 'interpretation-cum-interaction' from traditional television, but also a form of 'interpretation-cum-interactivity', much like a PC. The first concept refers to the co-located communication of viewers when watching (interactive) television, while the latter indicates the interaction with the device, which is instigated individually, but has an impact on co-located as well as remote viewers. The convergence of both concepts offers a theoretical framework for understanding how people decode interactive television, in a social context.

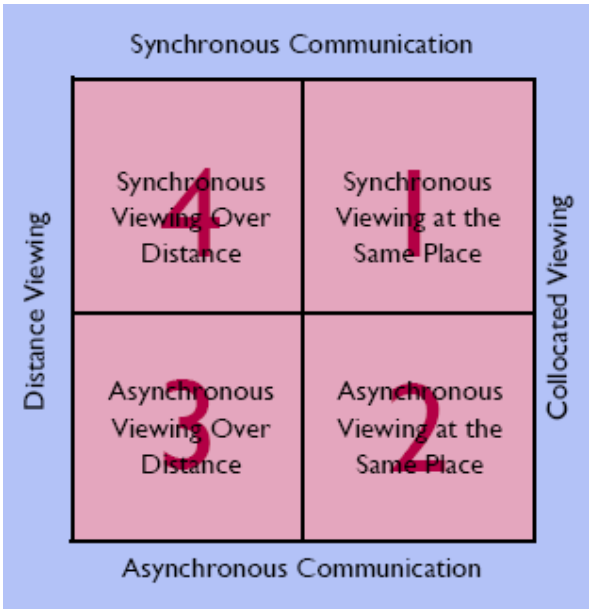

Figure 21: Taxonomy of TV sociability (Chorianopoulos, 2007)

Gross, Paul-Stueve, & Fetter (in press) take a different approach to defining sociability aspects that are relevant to interactive television. They use three concepts from the domain of Computer Supported Collaborative Work (CSCW) to discuss the implications for iTV: *group awareness* (explicitly showing information from other,

usually remote, users for orientation in the system), *communication* (allowing explicit conversations among, again usually remote, users), and *seamless integration* (integrating the different awareness and communication features requiring little attention from users). They go on to place these aspects on three dimensions: time, space and connection. The *time* dimension refers to the synchronicity of communication, similar to Chorianopoulos (2007). Gross et al. (in press) claim that social television systems should support both synchronous as well as asynchronous interaction. The *space* dimension can also be found in Chorianopoulos' taxonomy, but is here expanded and includes not only the – physical – co-located and remote spaces, but also a 'mixed setting', creating a virtual space where the interaction between viewers (individuals and/or groups) takes place. Finally, the *connection* dimension refers to the closeness of the relationship between two people regarding friendship, trust and privacy. Often, this sense of connectedness is seen as a central concept to computer-mediated sociability, and is often used as a measure to determine the level of sociability in an application (e.g. Boertjes et al., 2008; Weisz, in press). Gross et al. (in press) state that both close connections as well as more loose connections should be supported appropriately, and even new connections can be built with social television.

On a more practical level, a number of studies have been carried out in the past decade, studying the social aspects of interactive television. One of the first studies trying to capture the social aspects of interactive television has been performed by Arvola & Holmlid (2000). They studied the qualities-in-use needed for IT-applications that are meant to socialize, by doing a pilot study of a quiz game on interactive television. Four qualities-in-use of the game were detected, of which some are divided into subcategories: (1) ease of use, (2) enchantment[24] (on the surface level, the artefact level or the activity level), (3) entertainment (ego challenge or social challenge) and (4) togetherness (immediate togetherness or delayed togetherness). After this pilot study, Arvola (2003) analyzed an add-on to a racing broadcast and an on-demand news application.

[24] Enchantment was defined by Arvola & Holmlid (2000) as being related to excitement and engagement, but was not retained as quality-in-use by Arvola (2003). As enchantment is not directly related to the social use of interactive television, we will not further discuss this quality-in-use.

When the qualities-in-use of the first pilot study and the two new cases were compared, among others regarding their social use, the following three common characteristics were detected and presented as final qualities-in-use: (1) laidback interaction; (2) togetherness; and (3) entertainment. Laidback interaction refers to the "lean back" experience of television. Users of interactive television do not want to be too actively involved. Ease of use is closely related to this aspect. Togetherness is the feeling that viewers are actively engaged with other viewers in the room (immediate togetherness), or that they can talk about the program with friends later (delayed togetherness). This classification is directly related to the previously discussed concepts of direct and indirect sociability from Ducheneaut et al. (2008). Entertainment is also an important quality-in-use according to Arvola (2003), with two aspects: ego challenge is the joy of achieving or knowing something, social challenge is the joy of winning from another person.

Ducheneaut et al. (2008) wanted to get more insight into sociable television viewing over a distance, and set up two rooms with a television and an audio link between the two. Using observation and conversational analysis, they detected several aspects that influence social interactions locally as well as over a distance. The study pointed out that people are very apt at using gaps in television programs to steer their conversation, interactions between participants take place in the visual periphery, and side conversations are being used to establish a more personal collection with an individual nearby. In a classification of the content that was being discussed, they show that content related comments, context-related comments and phatic comments (short exclamations) do not disturb the flow of the television programs, whereas non-sequitur comments (not related to the television content) and to a lesser extent logistical comments (related to the interaction with the television set) can negatively effect a group's watching experience as it distracts from watching the program. Based on these and other observations, they formulate a number of guidelines for social television systems:

- Support the proper timing of social interaction during group television viewing
- Minimize disruptions in the television program's flow

- Isolate exchanges that are beneficial to the group from side conversations and non sequitur
- Allow viewers to move in and out of the audience smoothly
- Avoid drawing viewers' attention away from the television screen

Weisz (in press) conducted a laboratory study with an Internet based system allowing users to chat while watching online video, in order to find out how the social interactions between people are affected by different aspects of online video with chat. They used an experimental set-up to study if people chat at all while watching video, and if so, what topics they chat about, as social relationships often form when the content discussed is more off-topic. They used two psychological constructs to measure sociability: how much people like each other, and their feelings of closeness to one another. In the experiment, some users watched video with chat, while others watched video without chat, as a control group. Also, some people knew each other while others were complete strangers, so the effect of existing relationships could be calculated. When looking at the results related to the two measures for sociability used, they found that in general *groups with chat* liked each other more than *groups without chat*, and also felt closer to each other. Although friends liked each other more than strangers (not surprisingly), the same trend could be seen here: strangers with chat liked each other more than strangers without chat. As far as the topics were concerned, they saw that a variety of topics were discussed, on-topic as well as off-topic, thus encouraging socialization. They conclude that chatting alongside online video is promising to encourage sociability.

Schatz & Egger (2008) designed and evaluated a mobile social television system. Similar to Weisz (in press), they used two constructs to measure the influence of the different social features on the (social) user experience: social presence and joint TV experience. They explain that social presence is a good proxy for measuring how well a system creates a sociable atmosphere, as the 'salience' of other persons in the interaction have an effect on the 'salience' of their interpersonal relationships. Joint TV experience is, according to Schatz & Egger (2008) "the value added to an individual's TV viewing experience by the emotional, social, and intellectual exchanges with co-viewers as compared to solitary watching". They measured this aspect by asking participants in their study to rate the extent to which certain features

enriched or harmed their viewing experiences, and which value was added. As such, joint TV experience is quite a complex construct, and is not straightforward enough to fit with the previously discussed aspects of sociability in interactive television.

While there are many other studies that have evaluated social television systems (such as Boertjes et al., 2008; Harboe et al., 2008; Nathan et al., 2008), they do not attempt to classify or generalize sociability issues, and will not be further discussed here.

4.3 Conclusion

Studying how to design and evaluate social interaction in new technologies is a relatively new, but growing field of research. As we have seen in this chapter, each application domain has its own specificities, leading to different views on which aspects are important to sociability. The recent interest in social television systems, which have been described in detail in chapter 2, has also sparked interest in researching the sociability of interactive television.

Based on the discussion on sociability in interactive television in the previous section, as well as our review of literature on the social uses of television and usability inspection methods, we can define sociability for interactive television as follows:

> Sociability for interactive television is the extent to which an iTV application supports synchronous as well as asynchronous social interaction between co-located viewers and/or remote viewers, creating a sense of connectedness while watching audiovisual content intended to entertain, inform, enrich or involve viewers.

PART II: METHODOLOGY

5. Research question

In this part, we will first introduce our research question and the methodology we will use to answer this research question. Each step in our suggested methodology will be further explained, including details about its execution.

As argued above, supporting and stimulating social interaction offers a lot of benefits for social interactive television systems, and interactive television in general. Leaving this task to the common sense of designers is however dangerous. As extensive lab studies or field trials are expensive and time-consuming to execute, especially in an early-design phase, it is useful to have a low-cost design and evaluation method such as heuristic evaluation to ensure proper attention to sociability issues. As there are currently no such sociability heuristics for interactive television, the main research question we want to answer with this PhD is:

Which heuristics for supporting and stimulating social interaction can guide the design and evaluation of social interactive television systems?

The focus of this PhD research is the creation of the heuristics, using a methodology that will ensure these principles are well-founded and which will be explained in the next section. However, the validation of these heuristics is an important step that needs to be taken in order to assert that the heuristics do indeed help when designing and evaluating social interactive television, and designers and evaluators perform better with the heuristics than without them. This validation is not within the scope of this PhD, partly because there are no sufficiently developed and commercially available systems on the market that would easily lend them to be used for this purpose. We do however feel that in the future, the sociability heuristics that we have created will need to be validated in order to fully claim the benefits we hope they bring.

5.1 Methodology for creating heuristics

In order to answer our research question, we need a sound methodology for setting up new heuristic guidelines for designing and evaluating the sociability of social interactive television. In this section, we will first review how new heuristics

have been created in previous research, and then explain which approach we will take to create sociability heuristics for social interactive television.

Before discussing the methodology in detail, it is important to clarify our epistemological stance, as this influences not only the methods we choose to create the heuristics, but also the way in which the methods are used and the results are interpreted. Following Littlejohn & Foss (2007) and Renckstorf (1994), we take an interpretivist perspective (in contrast to a positivist perspective), which means that we assume that the world is heavily shaped by the subjects living in it and cannot be studied distinct from human beings. Within this perspective, we see users as actionable subjects that actively create meaning, have intentions and take decisions themselves, rather than being passive, reactive beings, and thus take an actional ontological position (Littlejohn & Foss, 2007; Renckstorf, 1994). As a consequence, we rely heavily on the interaction with users and their point-of-view to study the actual subject of our research, social television systems, which is an approach that is not unusual within human-computer interaction.

5.1.1 Related work

It is useful to first have a look at how the currently most used usability heuristics were created. When presenting their nine usability heuristics for the first time, Molich and Nielsen (1990) simply claim that "[this] checklist reflects our personal experience" (p.339) and in another publication Nielsen & Molich (1990) state that "[we] have developed this specific list of heuristics during several years of experience with teaching and consulting about usability engineering", suggesting that they did not use a specific methodology for arriving at these heuristics, even though the principles seem to be based on several experiments and usability tests of different software systems. They did test the practical applicability of the heuristics by performing four experiments with non usability experts[25] (Nielsen & Molich, 1990). Later on, Nielsen (1994) refined the heuristics by collecting seven sets of usability heuristics that were being used often at the time (including his own), and using them to explain 249 usability problems from 11 projects. For each of the in total 101

[25] Although the process of validating heuristics is important, it is out of the scope of this PhD, and we will therefore not further discuss the methodology for this validation process here.

usability heuristics, Nielsen assessed how well it explained each single usability problem. Each heuristic was then clustered based on a factor analysis, resulting in the formulation of nine new heuristics. Scapin & Bastien (1997) compiled their list of ergonomic criteria by synthesizing most usability guidelines available at the time as well as using available published experimental results and using a group decision process to establish the set of criteria.

More of interest to us is the creation of more specific sets of usability heuristics, which are created to evaluate a specific type of hardware or software products. One of the earliest attempts at this, and also one of the most extensively documented, is from Dykstra (1993), who created domain-specific heuristics for calendar applications in addition to the general usability heuristics. According to Dykstra, the value in these domain-specific heuristics lies in the fact that they capture the product-specific knowledge of so-called double experts, people that are specialized in usability as well as in the specific domain of the software that is being evaluated, and put it in the hands of non-double experts. He used competitive usability tests of existing products, in his case by testing with seven participants that used five commercially available calendar applications for Microsoft Windows, to detect usability problems with them. By basing heuristics on actual user difficulties with software in a specific domain, Dykstra claims that this will partially mitigate the tendency of heuristics to find more false positives. The heuristic checklist[26] was then created by "gradually pooling, pruning, and revising" (p.38) these individual usability problems until they could be formulated as general usability problems. This process took up five steps: (1) listing each usability problem for each program and each participant; (2) pooling the problems per program; (3) grouping similar problems together and giving them a title; (4) eliminating duplicate problems and merging into fewer categories; and (5) developing the final checklist. This process is explained in more detail by Dykstra in a domain-specific heuristic checklist development guide, meant for use by other usability professionals wanting to create a domain-specific heuristic checklist.

[26] It should be noted that Dykstra created a "heuristic checklist", which means that he not only presents general heuristics, but also more specific guidelines which can be used as checklist for each heuristic.

During the last ten years, for several types of applications new usability guidelines have been created, such as for groupware (Greenberg et al., 1999), ambient displays (Mankoff et al., 2003), large screen notification systems (Berry, 2003; Somervell et al., 2003) or games (Federoff, 2002; Desurvire, 2004; Korhonen & Koivisto, 2006; Pinelle et al., 2008). In the case of games, it is not only usability that is relevant and which needs specific heuristics to evaluate them, but also playability. This is similar to our case, where we are not directly interested in the usability of social interactive television systems (there are already several usability guidelines to assist this). We rather want to support and stimulate social interaction with these systems, and thus create sociability guidelines.

Mankoff et al. (2003) created heuristics for evaluating ambient displays by adapting the usability heuristics from Nielsen. They removed six non-applicable heuristics, changed the title and description of some other heuristics to be more applicable to ambient devices and added five new heuristics. A pilot survey with local ambient display designers was used to modify the heuristics. They then conducted a more extensive survey with four designers of ambient displays, two usability experts and one visual designer as input to refine the heuristics. Based on this survey, one heuristic was removed, a new heuristic was added, and the title and/or description of several other heuristics were slightly adapted, resulting in their final set.

Greenberg et al. (1999) created heuristics for evaluating groupware systems by starting from the 'locales framework', a theory explaining social activities and collaborative work. The guidelines from this framework were reformulated as heuristics. The locales framework itself is based on extensive experience of seeing real users work with a spatially-based CSCW system called wOrlds, as well as on Anselm Strauss' theory of action, also the result of extensive ethnographic work, and numerous other studies of CSCW systems (Fitzpatrick, 1998). Similarly, Baker et al. (2002) created a more specific set of groupware heuristics for shared visual workspaces, by restating the principles of a theory for the mechanics of collaboration, which in turn was based on an extensive analysis of the use of shared workspaces and related theory (Gutwin & Greenberg, 2000).

Berry (2003) created and validated heuristics for notification systems, but is quite vague about the creation process. He states that the major usability problems with these systems "were thought of collectively" and subsequently categorized into

eight usability heuristics, so it appears that they are not based on actual use of these systems, or at least not directly. It is interesting to note that in the validation of the heuristics, their set seemed to perform only slightly better than the general usability heuristics from Nielsen (1994). In contrast, Sommervell et al. (2003) more extensively describe a method for creating heuristics for large screen notification systems. They used scenario based design (Rosson, 2001), and more specifically claims analysis, to create their heuristics. They first generated claims, statements about the good and bad aspects of the different components of an interface, for five relevant systems and then analyzed the impact on user goals of each claim. Then, the claims were turned into heuristics. Although the method is more structured than that of Berry, again no users are directly involved for the creation of the heuristics.

In the context of games, several researchers have used different approaches in creating usability or playability heuristics for evaluating the various aspects of games. Federoff (2002) observed and interviewed five members of a game development team from one game company during a single business week to find out which implicit and explicit heuristics they used when designing games. The observations and interviews were coded to identify the heuristics they used, and were then compared to already existing guidelines for designing games. She then combined both lists to arrive at the final set of game heuristics, which are thus mostly based on expert opinions and previous guidelines. She then added two heuristics to this list because, according to Federoff (2002) “though they were not present in the literature and were not evident during the case study, they seem like issues that are relevant to all software including games” (p.42), and she removed two other heuristics because for one there was some incongruity between the literature and the case study, and for the other it would only apply to a specific game genre. The set by Federoff (2002) was not verified in any way, although she lists this as further research. Desurvire et al. (2004) do verify their list of playability heuristics, but are quite vague about the creation process. They state that the heuristics are based on the current literature (including Federoff, 2002) and reviewed by several playability experts and game designers, but do not provide further details. However, in a later publication, Desurvire, Jegers & Wiberg (2007) make a case for describing the creation process of heuristics in more detail and the importance of empirically informed design of new evaluation methods. Pinelle et al. (2008) do provide much more detail about the creation process of their usability

heuristics for video game design. They describe how they used three steps in this process: (1) identify real world usability problems that provide breadth and in-depth coverage of the game design space; (2) develop a set of categories that group similar usability problems; and (3) create heuristics that are the inverse of the problem categories and that describe how common usability problems can be avoided. Although this process is very similar to Dykstra's (1993), Pinelle et al. (2008) found it impractical to evaluate several games themselves, given the broad range of different kinds of games, and thus analysed and coded 108 PC based game reviews from six major game genres on a popular gaming website instead. They then developed twelve problem categories based on the problems that the reviewers mentioned in those reviews, and recoded all the reviews again to arrive at a total of 285 usability problems. The problem categories were consequently translated into principles that describe how to prevent these problems. As two categories were combined with two others, this resulted in a list of ten heuristics. Finally, they performed a small initial evaluation of their heuristics, showing that people using the heuristics found a wide range of real problems in PC based games.

Although there are no explicitly developed heuristics for evaluating the usability of interactive television, there do exist interaction or user interface design principles for interactive television (for a description of these principles, see section 3.4). Lu (2005) surveyed the field of interactive television as well as existing design guidelines and challenges to formulate her interaction design principles for interactive television. Chorianopoulos (2008) took a similar approach, and explored the field of communication science, more specifically television and audience research, to create user interface design principles. However, no user research has been used for the creation of these guidelines and the focus is mainly on usability, although Chorianopoulos does mention the social nature of television in one of his principles.

5.2 Used approach

Based on the previous discussion, it is clear that there is a variety of methods that have been used for creating new heuristics. A common aspect of most of these studies is that the heuristics created are based on actual use of these systems by representative users, directly or indirectly, or at least that they are refined by experienced domain experts who use their knowledge of the use of such systems to

assess the quality and applicability of the heuristics. Similarly, we think that it is very important to base heuristics, be it usability or sociability heuristics, on actual user behaviour so we will place heavy emphasis on this aspect.

Most studies cited above are either vague about the creation process, or – when using the direct experience of user studies – use a limited number of applications and/or users for observing actual user behaviour. One of the most documented and elaborate studies is that of Dykstra (1993), who uses just 7 users to test all five applications for listing the usability problems that will form the basis of his heuristics. In a domain like that of usability, with already a lot of established guidelines and methods to follow, this might serve those needs perfectly. But for our purpose of creating heuristics for the sociability of interactive television, a domain which we have seen is largely unexplored, we think that a more thorough and extensive procedure is needed to create these guidelines. We have therefore decided to put the focus of this PhD on an elaborate creation process, founded on the use of social interactive television systems by many users. We will explain this approach in more detail in the next section.

For analysing the results of the competitive sociability tests we will undertake with social interactive television systems, we will take a similar approach as both Dykstra (1993) and Pinelle et al. (2008), but again adapt it because of the unexplored nature of our subject. Because it is not evident to single out sociability problems, like it is with usability problems, we decided to use a Grounded Theory approach (Strauss & Corbin, 1998) that allows us to detect those elements of the interaction with the selected interfaces that are crucial in supporting and stimulating social interaction. In the next two chapters, we will explain how we performed the competitive analysis, and how we used a Grounded Theory approach to go from the raw data of our user tests to the final sociability heuristics in more detail.

Summarized, these are the steps in our approach for creating sociability heuristics for interactive television:

1. Perform competitive user tests with social iTV systems
2. Identify sociability issues with a grounded theory approach
3. Group identified sociability issues in categories
4. Formulate heuristics based on categories

6. Detecting sociability issues

As outlined above, the first steps in our methodology for creating sociability heuristics include detecting as many sociability issues[27] with social interactive television systems as possible. In this section we will first explain how we planned this competitive analysis, and then describe in detail the different user tests we undertook with several social interactive television applications.

6.1 Competitive analysis

A crucial aspect of a competitive analysis is selecting the right applications to be tested. We decided that our main focus would lie on applications targeted for use on a STB, which will be used with a normal television set, as these are expected to have a large impact on co-located social interaction as well as on remote social interaction due to the possibility of multiple viewers sitting at a larger distance from the screen. This excludes Internet based applications such as Joost or Lycos Cinema (see section 2.3.2), who are mainly used individually on a computer, although some Internet based applications can also be watched on television using a normal remote control.

As social interactive television systems are in full development, and not commercially available yet, we contacted several researchers working on these systems. We were able to get full access to a lot of social interactive television systems, but with some of them it was not possible to perform a user test, due to technical, legal or practical problems. This was the case for ConnecTV (TNO), CollaboraTV (AT&T), Unified EPG (NDS) and Telebuddies (UHasselt). Some of these systems were still used in our analysis, by using the reports of the field study that was carried out with it (see below). The social interactive television systems we did get full access to and that could be tested with users were AmigoTV (Alcatel-Lucent), Windows Messenger (Microsoft), CoSe (Siemens), Social TV (Motorola) and Ambulant Annotator (CWI). By using these specific systems, we were able to test a wide range of social features such as voice as well as text chat, synchronous as well

[27] We use the term ‘issues’ instead of ‘problems’, because we do not only want to see what sociability problems users encounter with the selected systems, but also these instances when sociability is good or even optimal when using them. Otherwise, we risk missing important aspects of sociability.

as asynchronous communication, recommendations, sharing content, annotations, emoticons, avatars or buddy lists. A description of the features included in the selected applications is given in the first chapter of this PhD, and can be found in Table 1 on page 41. The table shows that this selection of applications contains all main social features, except 'team-based play', which is a feature specific for social iTV games. Although not all possible social features are included, if only for the reason that new features can and will be created in the future, this range of applications thus offers us the best possible set of social interactive television systems there is currently available and serves as an excellent basis for creating the sociability heuristics.

We did not set up one user test with all applications for several reasons. For one, the selected systems contain many features and should be used during a long enough period to simulate realistic use, which means one test takes approximately two hours. While it is possible to combine two systems in one test (as we did with AmigoTV and Windows Messenger), using all five applications in one test would be too much of a burden on our test users. A second reason for using separate user tests is that not all applications were available at the same time, so practically we could not perform the tests simultaneously. As a beneficial result we had a large amount of unique users that have used the systems, not only because we recruited plenty of participants for each test (see next section), but because different users were recruited for each user test.

In the next section, we will explain how we set up and performed the user tests for each system. The results of the tests will be discussed in chapter 8.

6.2 Description of competitive user tests

The competitive user tests we performed as basis for creating our sociability heuristics were carried out from April 2006 to March 2008. Each user test was performed in two connected rooms, of which one was a usability lab with a one way mirror[28]. The applications were operated with a remote control and/or remote keyboard and used on a normal television set. All user tests followed the same pattern,

[28] Except in the case of the second iteration of the CoSe system, as there was no one-way mirror available

including an introduction to the system, the test itself, a (group) interview and a couple of questionnaires, but as all applications were different – e.g. in set of features or stage of development – the test set-up, questionnaires and interview questions used differed slightly from test to test (see documents in appendix). However, we made sure the basic element of the test that was of importance, i.e. the focus on social interaction with these systems, was ensured by recruiting multiple users and dividing them up in two groups for both remote locations.

In total 149 unique users, of which 66 were male (44%) and 83 female (56%), participated in these test. Ages ranged from 14 to 76 years old. The wide age range was an important element in the selection of the participants, as television is a medium being used by young and old, and interactive television applications are often targeted at a broad demographic. Including people with widely different ages, as well as varied experience in computer use (from very experienced to absolutely no experience), should guarantee that the heuristics can take into account different kinds of users. The following paragraphs provide the details of each test.

6.2.1 AmigoTV and Windows Messenger

In April 2006, we set up a controlled within-subjects lab experiment with AmigoTV (supporting voice chat) and Windows Messenger on Windows Media Center (supporting text chat). These two systems were chosen based on a combination of practical reasons as well as in function of our research questions. We had easy access to AmigoTV because of a collaboration with Alcatel-Lucent, who were willing to set up the system in our usability lab and provide technical support. Windows Messenger was chosen as it offered a different communication modality (text chat) than AmigoTV, thus making it possible to compare this specific feature, and was also easily accessible as it was commercially available and easy to set up. We created six test situations for each of which we recruited two groups of family members or friends. One group (one or more people) stayed in a usability lab where everything was recorded, and the other group stayed in a nearby meeting room with approximately the same user set-up but no recording facilities. In total 17 participants took part in the tests, with ages ranging from 17 to 61 years old, including 9 males and 8 females. The amount of computer and chat experience varied across the participants from almost none to very experienced.

Figure 22: User test with AmigoTV

We asked the test participants in advance to list their favourite television shows which they regularly discuss with friends or family. These shows were recorded the week before the test and used during the test as primary information or entertainment channel alongside which the communication with the other group could take place. Programs included football matches, drama series, reality TV, films or documentaries. All participants had already seen the programs before, which makes the tests comparable. The order in which the applications were tested was counter-balanced. This way, possible influences were neutralized. The participants were asked to watch the television program, and communicate with the other person or group like they would normally do with person(s) in the same room. They were not explicitly instructed to talk about the program or something else; this was left up to the participants. After the test, individual interviews were conducted with each participant.

Figure 23: User test with Windows Messenger

6.2.2 Social Television

In October 2006 we carried out nine usability tests with Motorola's Social TV system, then in full development. In total 48 participants (all residents of the USA) took part in these tests with 19 male and 29 female participants and ages from 25 to 65 years old. The smallest group contained three participants, the largest group nine. In each groups, all participants knew each other well, and were either friends or family of each other. During the test, each group was divided in two, so one group stayed in one room and could communicate through the system with the other group in a nearby room, a couple of meters away (not within hearing range).

After an explanation of the system, participants were instructed that they could find a television show to watch the next twenty minutes, and they could communicate with the other participants. Live broadcasting was used for this test, and even though some of the tests were carried out during the daytime, the American TV schedules provided a wide variety of television programs for the participants to find a suitable show. After the observational part of the test, users were given a short questionnaire to fill in, and a group interview was conducted.

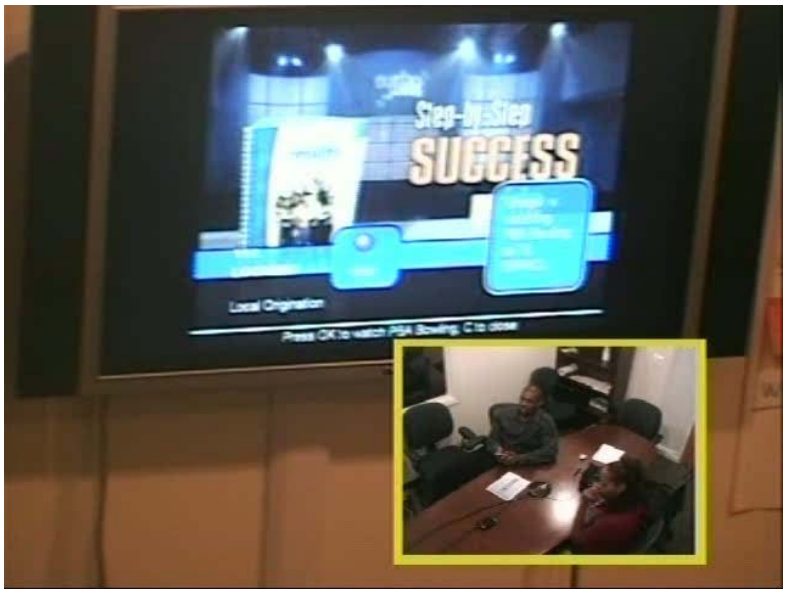

Figure 24: User test with Social TV

6.2.3 Communications Systems on Interactive Television

In the first half of 2007, we worked together with Siemens and Coeno Gmbh in an iterative design process for the interface of the CoSe application. As part of this process, we performed two user tests with the CoSe interface.

The first iteration of user testing took place in February 2007 and was mostly focused on detecting usability problems with the interface, although we also paid attention to social interaction issues. The main intention was however to eliminate as many usability problems with the interface as possible, so the second iteration could focus more on sociability. In this first iteration, 15 users took part during 10 test sessions. In half of the tests a single user participated, the other half were carried out by couples (not only partners, also brother-sister or parent-child relationships were represented). The age ranged from 16 to 76 years old. Eight participants were male, and seven participants were female. The tests were carried out in a usability lab with a one way mirror. The application was developed as Flash application on a PC, but as the PC was connected to the television set and operated with a remote control and a remote keyboard, the participants had the impression the application ran on a normal television set. Although the application included a chat module, the participants stayed together in the same room even when there were two of them and the remote chat activity was taken care of by a separate researcher. The users were asked to carry out several specific tasks, such as adding buddies to the buddy list. Although it is not

very suitable to carry out sociability tests this way, as social interaction requires a more free-form test mode, this is a suitable method for detecting usability problems. After the tasks were performed, interviews were being held with each participant. Couples were interviewed together.

Figure 25: User test with CoSe

The second iteration of user testing, performed in July 2007, put the focus more on sociability, although there was still room for usability issues to be detected. Since the first iteration, some new functions had been added to the application, and it was deployed on a STB and a normal television. The STB was connected with the local network, and communication was possible between two or more STBs in separate rooms. In total, 10 tests were performed with 33 participants. This time, the smallest group contained two participants and the largest group five participants, with ages ranging from 18 to 68 years old, including 17 male and 16 female participants. During the test, the groups of friends or relatives were divided in two: part of the participants stayed in one room and used the CoSe application to communicate with the other group in a separate room, about 200 metres away from the first room, so a sense of distance was present. Again, users were given a set of tasks to perform, but this time we gave the participants 15 minutes during the test to communicate freely with the other group. The last two tests of this iteration, each with a group of three participants, were not given any tasks and were instructed to use the system as they pleased during the whole hour of the test. Four recorded programs were provided for

the test, and the participants could switch between them like they are used to with their own television. After each test, a group interview was conducted with the participants.

6.2.4 Ambulant Annotator

In March 2008, we performed a user test with the Ambulant Annotator system to gain insight in how people annotate and share video clips from the couch. The system included clips from two documentaries and several film trailers that the participants could send and receive.

Twelve groups of users were recruited for the user test. A test session involved one single group, lasted for two hours, and was audio and video recorded. Each group consisted of two to five people that knew each other well, either as friends or as family members, and sometimes a mix of both. In total 36 participants took part in the test, with ages ranging from 14 to 72. As for gender, 13 participants were male and 23 participants were female. Occupations ranged from students and housewives to public servants and teachers. The test sessions took place in a simulated living room and consisted of four main parts: an explanation of the system, a co-located test situation, a remote test situation, and a group interview. After the second and third part, a couple of questionnaires were filled in by each participant individually. Each part of the test will be shortly explained below.

After greeting the participants, having them sign a consent form and giving a short briefing, the first part of the test was used for an extensive explanation of the system. This was done because the focus of the test was not on uncovering usability problems, but on how people would use the system and what their social experiences with using the system were. Therefore, any usability issues in the system in development could be lowered by offering the users a thorough tutorial.

During the second part of the test, all members of the group stayed in the same room, and were asked to browse through the available content, select those items they wanted to share with someone they knew, clip and annotate these clips if they wanted to, and finally send them to someone they had to specifically name (the latter was done to add some realism to the test, so users would really think about which content to send to which person). Figure 26 shows the users of one test during the co-located test situation. After this part of the test, which generally lasted between 20 minutes

and half an hour, a short questionnaire was filled in by each individual participant, to assess their first reactions to using the system.

Figure 26: User test with Ambulant Annotator

In the third part of the test, the group was split into two sub-groups. One sub-group (sometimes a single person) stayed in the simulated living room, whereas the other sub-group (or single person) was led to a separate room. For this part of the test, the participants in the living room were asked to edit and annotate clips to send to the participants in the other location. This way, the participants knew their edited clips were really received by someone. Also, the remote group could experience the different ways of receiving content (via PC, TV, SMS or a blog). Again, a short questionnaire was filled in by each single participant to collect their reactions on this part of the test, as well as a slightly longer questionnaire that covered the general use of the system and a final questionnaire about their daily media use.

Finally, the fourth part of the test consisted of a group interview lasting about twenty minutes, which covered several aspects. At the end of the test, users were rewarded with a gift coupon.

6.3 Conclusion

The user tests we carried out as described in this chapter, provided us with several hours of digital video files, (live) transcripts of each session, 149 questionnaires and 68 transcribed interviews. These raw data needed to be analysed systematically in order to distil the sociability issues from them, and then turn them into guidelines. In the next chapter, we will describe the methods we used for moving from this data to a set of sociability heuristics.

7. Creating sociability guidelines

In the previous chapter, we described the user tests we carried out as part of our competitive analysis, and that forms the main basis for creating our sociability heuristics. However, to broaden the scope of our analysis, we also analyzed user studies of several other social TV applications that are reported in papers or book chapters (e.g. Regan & Todd, 2004; Weisz et al., 2007), although the amount of data reported was less rich than from our own user tests.

Because we are aware that user tests in a usability lab are more artificial than a real-life situation, and could not capture all sociability issues, we decided to additionally include in our analysis reports of four field studies with social interactive television systems. The systems included in this extra analysis are CollaboraTV (AT&T), Social TV (Motorola), ConnecTV (TNO) and Zync (Yahoo!). These reports included much more information that was dependent on the (social and physical) context and environment of the participants in a real-life situation, and included Internet based systems as well. It should be noted however that even field studies are not free of problems when trying to detect sociability issues. Boertjes (2008) for example noted that due to some technical difficulties, e.g. a slower zapping speed, some of the answers on the questionnaires they received were negatively influenced. We took care in interpreting the reported results in light of such occurrences.

In the following paragraphs, we will describe the methods we used for analysing the data and creating the sociability heuristics.

7.1 Grounded Theory

As mentioned in 5.1, we use an interpretivist perspective on our data, which means we place an emphasis on participants' viewpoints and a context-based understanding of the results. A grounded theory approach is very suitable for studying data from this perspective, although it can also be used with a positivist perspective (Matavire & Brown, 2008) or even combines the strengths of both interpretivist as well as positivist approaches (Sarker, Lau & Sahay, 2000). As grounded theory can be applied in different ways, we will explain how we used this approach.

Grounded theory itself is not a methodology, but rather the result of using a grounded theory approach. A grounded theory is a theory that is heavily grounded in

social data, and is created by studying this data directly, rather than using a-priori theorizing and formulating hypotheses that have to be tested and either accepted or rejected. The grounded theory approach, in order to arrive at a grounded theory, rests on three basic principles: (1) emergence, (2) constant comparative analysis and (3) theoretical sampling (Glaser & Strauss, 1967). Emergence refers to the approach of letting data 'speak for itself' (Strauss & Corbin, 1998), not only during the analysis of the data, but also when formulating the theory. As a consequence, extensive literature reviews prior to the data collection and analysis is not required, and even discouraged, because this will influence the analysis of the data (Glaser & Strauss, 1967). Constant comparison means that every element of data is compared against other data in other contexts, in order to determine the accuracy of the data, establish limits of empirical generalization, specify concepts, verify theory and especially generate theory (Glaser & Strauss, 1967; Matavire & Brown, 2008). Finally, with theoretical sampling the selection of the sample being studied is made during the course of the analysis, based on what is expected to be most relevant for the emerging theory (Matavire & Brown, 2008; Salinger et al., 2008). The advantage of using a grounded theory approach over other qualitative research methodologies is that it is a way to systematically analyze data, leading to a comprehensive theory or framework that fits the data closely, and is scientifically valid (Strauss & Corbin, 1998). As our aim is to generate a framework (consisting of heuristic guidelines) for evaluating the sociability of interactive television, and we observed and interviewed several people using social television systems to obtain the data, a grounded theory approach is very suitable to generate such a framework from this data, in a systematic and valid way.

Before describing the methods we used within grounded theory, it is necessary to give a short overview of the different approaches that are commonly used. It is not our intention to describe the debate between the proponents of each approach in detail (as others have done this before, e.g. Matavire & Brown, 2008; Kelle, 2005), but to explain which approach we take as this has an impact on the methods used. Grounded theory was first introduced by Glaser & Strauss in 1967, but Strauss later made some changes to the basic principles, leading to a break-up between the two researchers and resulting in two different approaches: a 'Glaserian' approach and a 'Straussian' approach to grounded theory. The Straussian approach is characterised by using more directive questioning of the data (although still without a-priori theorising) and the use

of a paradigm model to guide the discovery of theory, in order to increase density and precision (Strauss & Corbin, 1998; Matavire & Brown, 2008). Although Glaser criticised this approach for being deductive (instead of inductive) and forcing categories (instead of letting them emerge), the Straussian approach still keeps an open mind when analysing data, but advocates using a theoretical perspective when trying to make sense of the different categories that emerge from the data. It is interesting to note that even in the original publication by Glaser & Strauss, they mention that a certain 'theoretical sensitivity' is needed, but it is not specified how it manifests itself (although Glaser later does create a list of 'theoretical codes' (Kelle, 2005) for this purpose). We take a Straussian approach to grounded theory, as we collected data in a more directive way (focused on sociability and social interaction with interactive television). However, as Matavire & Brown (2008) point out, the differences between both approaches are largely subtle, and Glaser's critique that a Straussian approach leads to the 'forcing' of categories is overdrawn (Kelle, 2005).

Taking a step back from this – ongoing – controversy, we will now describe the different methods in the Straussian approach to grounded theory, which we applied when analyzing our data. The first step in this process is *open coding*, in which the data is systematically analyzed and codes are created 'in vivo', describing occurrences of (relevant) events in the data. While coding, memos are written that already try to make sense of the data, and the concepts discovered are constantly compared with other occurrences in the data. The next step, which is specific for the Straussian approach, is *axial coding*. In this step, categories are related to sub-categories, describing their properties and dimensions. Some concepts detected during open coding can be retained as main categories, whereas other concepts will become sub-categories of these main categories. Finally, in *selective coding*, open coding is ceased and only those codes related to the 'core category', to which all other categories relate, are used to code the data. When doing selective coding, theory is being refined by reviewing the concepts, filling in or trimming certain categories and performing a high level comparative analysis of the data to validate the schema that has been developed (Strauss & Corbin, 1998; Matavire & Brown, 2008).

In the next section, we will explain in more detail how we used these grounded theory methods to analyze our raw data and arrive at a framework for

sociability of interactive television. The results of this analysis are described in section 8.2.

7.2 From raw data to a structured list of sociability issues

We imported all data from the user tests into the qualitative software package QSR NVIVO8, which is very suitable for performing an analysis based on grounded theory. We first started with the open coding of our own user tests, which resulted in 30 high level codes. Using axial coding, the 30 codes were enriched by writing down related concepts, resulting in ca. 55 concepts on post-its. The 55 concepts were then linked with each other, relating categories and sub-categories, and then clustered in 6 main groups and 22 subgroups. Because of some overlap between concepts, 46 low-level concepts were retained. With these new codes, we performed selective coding by recoding our user tests, and additionally coded the reports of other lab tests and field trials to validate our schema. As a result of this process, a few new codes were added, which we immediately clustered in existing categories, and some codes that were not used were removed. It is important to note that these codes itself did not represent single sociability issues, but were used solely as a way to detect and collect similar issues with social interaction in the different systems, and thus could combine a number of individual sociability issues.

Finally, the individual sociability issues that the codes referred to were compiled, resulting in an aggregated set of 70 separate sociability issues. As each of these issues was very specific, and they were not all formulated as guideline, we first had to cluster similar issues into the same category, in order to create a classification of more general sociability issues. We used the affinity diagramming technique for this classifying exercise, and asked another researcher to assist us, so we were forced to take a step back from the data we had been so closely involved with. This resulted in a smaller set of categories of sociability issues, which we subsequently reworded as heuristic guidelines and then checked if each single issue that was listed under this heuristic was covered by this formulation.

The many steps in (open, axial and selective) coding, extending and relating the categories, and recoding the data using the final schema, is consistent with the emphasis on constant comparison in grounded theory, and ensures a well-founded set of categories and a classification of sociability issues. The final step of moving from

codes to heuristics is specific to our research question in which the formulation of guidelines is an important part.

7.3 Conclusion

A grounded theory approach is an excellent methodology for detecting patterns in large sets of qualitative as well as quantitative data, which is exactly what we needed to do for detecting sociability issues based on our competitive analysis as well as the extra sources we used.

The next part of this PhD (Part III: Results) will provide more detail about the results of each step in our methodology, first by describing the results of each user test we performed and how these results were coded (Chapter 8), and then by listing the different sociability heuristics we created and explaining the rationale behind their formulation (Chapter 9).

PART III: RESULTS

8. Results of competitive analysis

In this chapter, we will first discuss the results of each series of user testing we performed, as these formed the basis of the analysis that leads to the creation of sociability heuristics. At the end of this chapter, we will discuss the results of the grounded theory approach we used to analyse these tests, as well as the codes and categories that were detected and from which the sociability heuristics were created.

8.1 Outcome of competitive user tests

As the set-up of the tests has already been described in section 6.2, in this section we will describe the main sociability issues that were discovered during these tests. Apart from the first user test, in which two systems are compared (see further), we will not draw general conclusions from each test, as the important aspects from each test are extracted by the coding procedure (see section 8.2). We will however further analyse and discuss the main results of the user tests when the sociability heuristics are being introduced.

The basis of this analysis in each case were (live) observations of users using the system, unstructured group interviews and questionnaires. Most comments draw directly from the group interviews, and are at times supported by either observations or questionnaires. As mentioned in the methodology section, we take an interpretivist approach, which means we stay close to the viewpoints of the users in our study.

8.1.1 AmigoTV and Windows Messenger

In the first test with social TV systems we set up, we included two different systems: AmigoTV and Windows Messenger on Windows Media Center. An important difference between the two systems is the way of communicating, text chat in Windows Messenger and voice chat in AmigoTV. These results reflect these differences, and because this is the only test using two systems, a comparison between the two is included here but not in the other user test descriptions. We will end with a discussion of some of the most central results of the test. As two systems were used during the test, we will first describe the sociability issues in each system separately before comparing the two systems.

8.1.1.1 AmigoTV

In AmigoTV, users had the option to send cartoons to others. Sending cartoons was especially considered fun in more boring parts of a television show or during breaks, but at other times it was usually seen as obnoxious. When someone sends a cartoon, all connected users get to see this cartoon. This was often seen as inappropriate by the receivers, who are paying attention to the program. The fact that most cartoons take up a lot of screen space, have a duration of a couple of seconds and make a sound, makes it even more obtrusive. So where it can be a sociability enhancing tool during breaks or boring parts, at other times, when users are paying attention, it can hinder sociability. One way to overcome this seeming contradiction is to give more control to the users, and give them the possibility to activate or de-activate cartoons, so they can decide whether they want to be disturbed or not. The sender could see which users will receive the cartoon and which users not. A possibility is also to have a small cartoon icon pop-up, that can be accepted or denied at will.

Using on-screen avatars, AmigoTV creates a sense of awareness with other users, which is an important aspect of sociability as discussed in section 4.2.3. The avatars were customizable, to convey different sets of emotions, but this option was seldom used. This could be due to the fact that it is not needed by most users, but the fact that the difference between the faces was not clearly visible and the user didn't receive any feedback when changing the avatar could also play a role.

Looking at the questionnaires, when asked how easy or difficult using AmigoTV (voice chat) was while watching television, twelve out of seventeen participants found it easy or very easy to talk with each other during the television program, whereas five people found it difficult. People who found it easy said that it was just like sitting next to each other, talking as you normally do, or speaking on the phone with each other. The direct contact was very much appreciated by most of the participants, and was qualified as being very natural. People who said it was difficult had trouble listening to two audio sources at the same time, especially because the sound was coming out of the same loudspeaker, which made it more difficult to understand. They also had difficulties in attuning the sounds of their voices to the sound of the loudspeaker. Depending on how loud they talked, some people complained that the sound of the television was too soft compared to the sound of the

speech, others complained that the sound of the speech was too soft. This is not a technical problem, however, but a problem relating to the use of different audio sources. When asked if they could still follow the television program, the results are slightly different. Eight out of seventeen participants found it easy or very easy to still follow the program, whereas four people said it was neither easy nor difficult. Five participants rated it as being difficult. The problem most people cited was that when someone is speaking, it was difficult to hear what was being said on screen. Some people said this was the same at home, when talking to someone next to you.

8.1.1.2 Windows Messenger

In Windows Messenger, several issues were detected that partly related to usability, but had a direct influence on sociability. As there were too many actions to remove the chat window (scroll to the right at least twice), and to bring it back up there were about three actions needed (more info → messenger → username), this was too much when the user wanted to keep paying attention to the television show. As a result, some users left the chat window open, even though it disturbed their viewing activity. Other users took the time to close the chat window and open it when there was an incoming message or when they wanted to chat themselves, but this resulted in slower reactions or less chat activity, thus lowering sociability. The chat window of Windows Messenger also takes up a lot of screen space, and the window is overlapping subtitles, which again hindered the viewing experience.

When text chatting, users are already familiar with using emoticons to convey their emotions. In Windows Messenger on Windows Media Center, the punctuation (e.g. ":)" to indicate a smiling face) was not converted to a smiley (☺), which most people found problematic. Again, the lack of this function diminished the sociability of the system as not all participants could interpret these punctuations correctly, and miss the emotions that other viewers wanted to convey.

In Windows Messenger, people could change their status to indicate whether or not they wanted to be disturbed or not. A couple of users used this functionality when watching a movie, and placed themselves on "don't disturb". Although the function worked well in not disturbing users when there were incoming messages, there was no indication at all that there were new messages, resulting in users missing complete conversations. This indicates the tension between not wanting to be

disturbed, so the viewers can continue paying attention to the program, and the desire to keep track of a conversation when wanted. For example, a subtle icon indicating that something new has been sent, preferably in the corner of the screen, will not disturb the user while still making it possible to keep an eye on chat activity.

Looking at the questionnaire results, when asked how easy or difficult using Windows Messenger was while watching television, nine out of seventeen participants found it easy or very easy, whereas eight out of seventeen participants found it difficult or very difficult. Most of the people who rated it to be easy or very easy said they were used to MSN, so they had no trouble using it on television. The reactions of the people rating it difficult or very difficult were more outspoken. Some people said it was hard to follow the program while typing and it was hard to type, watch, read and follow the program at the same time. Others commented on the fact that they were missing things happening on screen while typing, or that because of the delay while typing, it was difficult to know what a comment was referring to. When asked if they could still follow the television program, again the results are slightly different. Only six out of seventeen participants found it easy or very easy, three participants said is was neither easy nor difficult and eight participants rated it as being difficult or very difficult. People rating it easy said that it costs no more concentration to type than to speak, and that you can still hear what's being said when typing, only seeing what is happening on screen is more difficult. People rating it difficult or very difficult said that they could not do two things at the same time, or they were not used to typing. Dividing the attention between the chat activities (typing, reading or using the remote keyboard or remote control) seemed to be the cause of most problems.

8.1.1.3 Comparison

As mentioned previously, the main difference between the two systems was the use of either voice or text chat. If we compare the two systems, this is thus the main point of comparison.

Computer mediated communication (CMC) like instant messaging (text chat like in Windows Messenger) or voice communication (e.g. Skype, or the voice chat in AmigoTV) is used more and more in different contexts as a primary communication channel. In our user tests with both systems, the use of text or voice chat is not a

primary channel like in many communication systems, but rather a backchannel[29] while watching television. A backchannel is defined by the online encyclopaedia Wikipedia as "the practice of using networked computers to maintain a real-time online conversation alongside live spoken remarks". The use of a backchannel can however be interpreted more widely, and be used not only alongside live spoken remarks, but also along other primary information or entertainment sources like television. Like McCarthy & Boyd (2005), we distinguish the single, primary focus of attention, in our case the television program, from a secondary, or background, channel, in our case the communication tool (text chat or voice chat), which forms the digital backchannel.

McCarthy & Boyd (2005) found that lack of chat experience and capability of multi-tasking were some of the problems that users of simultaneous front- and backchannels at a conference encounter. They conclude that "continuous partial attention", a term used by one of their participants, is a potential obstacle to the success of backchanneling. Similar reactions as reported above are echoed in their study (e.g. "leaving now - can't take notes and do IRC", "Crap, I was reading this and missed everything he just said" or "wait, I was distracted, can you summarize his question for me?"). This is also reflected in our comparison between the two social TV systems (see Table 16). When the participants were asked to compare both systems, and express their preference, AmigoTV was mentioned by nine of the seventeen participants as most easy to use, Windows Messenger was mentioned by five people and three people said both systems were equally easy to use. The fact that they didn't have to divide their attention between different actions (reading, typing and watching) was the most cited reason for choosing AmigoTV. The participants preferring Windows Messenger said that they were used to chatting, or that it was easier to ignore the chat window than the audio communication.

[29] A backchannel in the context of interactive television can also be defined as the return channel that is used for sending information back to the service provider or broadcaster, but this is not the way we use the term here

Table 16: Comparison of voice chat and text chat (n=17)

	Voice chat	Text chat
Easy to use	12	9
Difficult to use	5	8
Easy to follow tv-show	8	6
Difficult to follow tv-show	5	8
Preference	9	5

Although in our user tests this problem with multi-tasking was present with both systems, there is a clear preference for using the voice chat function, which was described as being easier to do while watching television. Younger users clearly had less trouble with the text chat function while watching television. This can be attributed to the fact that they are more familiar with chat applications, as they indicated during the interview, but also that young people are more capable of multi-tasking (Rideaout, Roberts & Foehr, 2005). This could mean that text chat applications are useful for interactive television applications aimed at youngsters, but as television is being watched by elderly people a lot more, this could be a problem if broadcasters or service providers want to target a broad audience. Voice chat then seems the best option to use. The results of the test show that in both cases, distraction from the television program is more or less present when communicating. This loss of attention to the frontchannel should be minimized, as our users indicated this as their main problem.

8.1.2 Social Television

The Social Television (STV) application of Motorola had a lot of similar features to the AmigoTV system, for example the buddy list or voice communication, so some comments will also focus on these aspects. As other features were available as well, such as sending recommendations, some new elements came up during these tests. The results are presented mainly based on the group interviews with the participants in the test, which were compared with the live observations during the test itself.

Three groups of participants mentioned monitoring what the children are watching as a useful function of STV. Although the system is probably not designed for this, it does correspond with the social uses of television as described by James Lull (1980). In the category ‘competence/dominance’, he describes how parents act as gatekeepers to control what their children are watching. As television watching is spreading throughout the house, and children often watch television in their bedroom away from the control of their parents, this social function can be reinstalled with Social TV. One group of participants did mention that they do not want their children to know what they are watching themselves, which shows they want their authority as parents to remain intact.

For two of the participating groups, distance would play an important role when using STV, in two ways. On the one hand, they see the benefits of the system as a way to stay in contact with friends or relatives that live far away. On the other hand, the different time zones in which friends or relatives live could be a problem, because you could not watch the same broadcast at the same time and chat about it. A possible solution to this problem could lie in the exchange of recorded material (a topic also arising at another point in the discussion), which can be watched synchronously.

One group of participants mentioned the need to have private conversations with someone. This is a need that is also evident in normal social relationships, where by whispering or physically separating from a group a shared private space can be created, and is mentioned by Ducheneaut et al. (2008) when reporting their tests with a social TV setup. In a lot of computer mediated communication systems, such functions are present as well. In chat rooms for example, it is possible to send private messages or start a private communication with someone. At the time of testing, this function was not available in STV. For co-located users this would not be a problem, but for remote users it is.

One group explicitly mentions a usability problem they had with the notifications when recommending a program. They would like the notification screen to go away automatically. Now they had to close it manually. They also didn’t know if a notification they had just sent was actually received by the participants. Good feedback of the different actions performed by users of a system is a basic usability rule that is also valid for interactive television systems, but that also directly influences the sociability of the interaction.

The main part of the comments during the group interviews focused on technical issues, usually related to the use of sound in the system. This was also most obvious during the observations itself. Although technical problems are usually out-of-scope when detecting or reporting usability or sociability issues (or are reported under the heading of 'bugs'), the plethora of comments on this topic shows that an essential part of social interaction and communication is a well-functioning 'communication channel'. The most difficult part was distinguishing the sound of the television from the speech of the participants in the other room. All but one group explicitly mentioned the difficulty of hearing the other group in combination with the television. A mitigating factor was the fact that in the current setup of the system, the audio from both sources was not easy to control separately. If both sources could be independently regulated, the user would probably have more control over the different volumes resulting in a better balance between the two. However, as we noticed this problem with other social TV systems as well, e.g. with AmigoTV (see 8.1.1.1), we think other solutions are needed to better separate the sound. A combination with home theatre speakers would be ideal, where the audio from the television program would come out of the front speakers, and the speech of the other room(s) comes out of the rear speakers. This is also a natural way of communicating while watching television, where the communication with co-viewers happens on the couch next to each other, making it easier to listen to two sources of audio. Of course, if another technology would exist that makes it easier to distinguish television audio and speech (e.g. a simulated surround sound coming from the front speakers only), this would also be a suitable solution.

Another sound related issue, but less a technical problem, is the fact that the participants would like to have more control over the mute function. In the system that was tested, they could mute their own voices so the other group was not able to hear them. Four groups also would like to be able to mute the other group, at times when they do not want to be disturbed by the conversation of the other group, and want to focus on the television program. Of course, when implementing this function, the other group should be clearly notified that their speech is being muted, and that they cannot be heard by the remote group. In one group interview, the participants even talk about muting the sound of the television program, in order to comfortably

talk with the remote group. This could be useful e.g. during commercial breaks, or dull moments in a television show.

The fact that larger groups make it more difficult to communicate remotely and to recognize who is talking was mentioned by four participating groups as problematic. This indicates that there might be a limit to how many participants can use the system at the same time, and comfortably communicate with each other. In the AmigoTV and Windows Messenger tests, smaller groups were tested that included two (one-one), three (one-two) or four (two-two) participating users. In those tests, the users had no problem communicating comfortably, which indicates that the limit is higher than four participants, but at five or six it becomes more problematic.

Three groups of participants talked about losing concentration when trying to follow the television program, although they mention that this is also the case when being on the telephone while watching television. Part of this problem can be attributed to the concentration that went into distinguishing the two audio sources from each other (see higher).

During the test, the awareness features of STV were used intensively, and became part of the discussion in the co-located group, especially about the program the other users were watching. When discussing the awareness features of STV in the group interviews, five participating groups mentioned that they do not always want other people to know what they are watching. Even though a simple solution is to not log into the system, some groups also said that they would only like to have certain channels to not show up in the buddy list. One group explicitly mentioned they would like different statuses that indicate if they are online (and willing to talk), or not available. Three groups also mentioned they would like to choose who can see what they are watching, and block certain people from seeing what they are watching.

Although only mentioned by one participating group (but confirmed in e.g. Regan & Todd (2004)), an important sociability issue is the use of one buddy list when several people are watching television together (co-located). Apart from the fact that a buddy list can contain sensitive information that you do not always want to share with others, the group said that a buddy of another family member might start a conversation, which would not always be appreciated. A similar aspect that was mentioned by another group is the fact that the person that originally logged in leaves

the room, and is replaced by someone else. The remote participants would think they were still talking with the first person, and are not aware that someone else is listening, which can lead to all sorts of misunderstandings. These remarks show that the system should somehow indicate which participants are available at one location. This could be a limited solution that only shows group status versus individual status, or a more complex system that allows each participant to log in. The latter solution would however require users leaving the room to also log out, and new people entering to log in, which is probably too much of a burden for people to do. A related aspect mentioned by two groups is the fact that people could forget the system is on, and personal or confidential things are being said, that are being distributed to all participants at remote locations.

One group mentioned that when they would be online, they would feel obliged to talk. However, as the user test only took place for a limited time, it is unsure if this feeling would persist when using the system for a longer period. Also, before the test, users were asked not to be silent the whole time, which also created a feeling of pressure to talk. This could have influenced the group in making this comment.

Five groups of participants said that they would be interested to share videos, DVDs or even just pictures, with the system. This could be personal content they have recorded themselves, but also (legally obtained) pre-recorded material such as television series or movies. This would combine the recent interest in video-on-demand and user-generated content with a shared experience.

One group said the system could be useful if family members are watching television in different parts of the house, and they want to notify each other of something (e.g. that dinner's ready). With the growing amount of multiple television sets in the home, the use of STV as an in-house communication system could also be an interesting aspect.

In almost every group, the recommendation system was heavily used during the test, and also heavily discussed in the group interviews. Three groups explicitly mention that giving recommendations is something that they regularly do. Examples are given of immediate recommendations such as yelling through the house that something interesting is on TV or making a phone call to tell someone to start watching a program. Breaking news (such as when the storm Katrina hit the south of

the USA) is something that usually is a reason for stimulating others to go watch television. Some reservations are made however. Two groups mention that live recommendations are problematic when people are living in different time zones, although this is usually not the case for breaking news. Three groups also mention that when the TV is turned on, a list of recommendations should be shown. This means that the system then not only supports recommendations at the time of broadcast, but also recommendations that can be acted upon later (e.g. for recurring TV-shows, or on-demand content). Two groups indicated that they would not use the functionality of the system to send a recommendation, but just tell the other participants what they should watch. They did not see the need for a direct recommendation if they have a communication link with the other group anyway.

All groups were asked how they would feel about having a Picture-in-Picture view of the other participants[30]. Studies on remote communication (e.g. O'Hara et al., 2006) suggest that seeing the remote person or group enhances social interaction and correct interpretation of a conversation because non-verbal cues are present (e.g. seeing the mood of your communication partners). The reactions to this suggestion were mixed, indicating that further research into this issue would be necessary. Three groups said they had no problems with this, and some would even like to have this functionality. Four groups explicitly say they do not want such a function, mainly because of privacy issues (watching television is often done in the evening, when one is dressed more casually or already wearing night attire). In one group there was disagreement about this issue, with people defending both standpoints. One group was positive about this suggestion if it would be a controllable feature that could be turned on and off when wanted.

When the groups discussed the option of having a Picture-in-Picture of the television program of the remote participants, five participating groups were in favour of this option, especially when a recommendation was sent. This would allow them to

[30] Although we believe that users are not designers, and more specific techniques such as participatory design are better ways to let users collaborate with designers and come up with design ideas, we still want to present the discussed design solutions or suggested features, keeping their relative merit in mind, because we think that it can stimulate reflection on their usefulness.

quickly monitor if it is worth switching to the channel that was recommended by another group.

One group mentioned that they would like to have smileys to communicate their emotions, similar to what we saw earlier with Windows Messenger. Even though STV uses audio in stead of text to communicate, the possibility of sending smileys to convey emotions would be an unobtrusive way to enhance the communication between the remote participants. When watching television together in the same room, small non-verbal cues (such as posture, facial expressions, or chuckles) are important elements that enhance social interaction, and which were observed during the tests in the co-located group, but inhibited sociability with the remote group. Unobtrusive smileys could serve the same communication function.

Finally, one group indicated they would like to have a shared guide they could use together with remote participants to figure out what to watch. This suggestion could be an interesting addition to social TV systems in general, which extends the social TV concept to other services. Planning what to watch is often a social activity as well, and an EPG could be designed in such a way to support shared negotiation.

8.1.3 Communications Systems on Interactive Television

The third series of testing had the Communications Systems on Interactive Television (CoSe) system as a subject. Again a synchronous communication system, based on text chat, it also has some other features such as sharing photos.

When discussing the Communications Systems on Interactive Television (CoSe) system in general, most groups liked the concept of chatting with friends or family while watching television. One group mentioned that the genre of the television program would play a role and during a film or serial they would not chat, whereas something that can be followed in the corner of the eye would be more suitable for that. They would want to know the people they chat with, either as friends or family, but for a genre such as football, this would be less of a requirement. Several people mentioned chatting on their PC while watching TV, or sending SMS messages back and forth, but said this would be a better replacement, as with this system there is something to chat about available directly. One person even said she did not have the habit of chatting while watching TV, but would do it more with this system. The photo sharing part was received very well (although it was quite slow, see further),

and some people said they would even like to see it expanded to other content, such as music or (small) movie clips.

All groups mention specific design aspects they like or dislike, such as the size of the screen. In the CoSe application, the screen was resized to a smaller size, and the rest of the screen was used for showing the buddy list or the chat window. Most people mentioned this as a problem. This was also apparent during the tests, as most people switched the TV to full screen in order to have a better view of the program. One person also mentioned that certain screen elements interfered with the subtitles, while another commented that the football scores were obscured by the pop-ups. This shows that in a social television system, the TV experience should not be disturbed. Similarly, people complained about a slow remote keyboard, the slowness of the photo sharing function or the fact that when mistyping something, they had to delete all characters typed after the mistake they wanted to correct. These aspects, although mainly technical or usability issues, seriously hinder the fluency of the communication process and thus have a direct impact on sociability. Even more directly related to sociability, is the fact that they could not see if the other persons were typing something or not. This led to several people waiting for a comment that didn't come or people typing an answer when already another question was being asked.

When discussing the feature that other people can see you are watching television and which program you are watching, all groups mention they find it useful in some cases but would want to be able to turn it off if they wanted to, e.g. for specific programs they do not want others to know they are watching. Two persons do mention that they find it a useful feature to control their children (similar to the reactions during the tests with Motorola's Social TV, see 8.1.2). The useful aspects of this feature mentioned, are the fact that you can see if there are good programs on, to give tips to others, or to start talking about something others are watching. One group mentions some useful complementary features, such as a viewing history of other persons, a list of most popular programs or a shared TV guide with information from friends or family. These comments suggest that people are interested in social information for making decisions what to watch.

Automatic recommendations received mixed feelings. During the tests it was already obvious that some people tried it once, but then just used the chat function to

tell their friends to watch something. During the group interviews, some people said they would find it useful, but most people commented that they did not find it useful, and would just ask people directly. One person said he would be afraid that with a long buddy list, he would receive recommendations from a lot of people, which would become too much. He also said that he would like to block certain buddies, as he would not want to receive their recommendations, or even chat with them.

The function that allowed other people to see if they are watching in group or alone was heavily discussed. Most people said it was useful, as it might prevent them from sending 'strange' messages when thinking there was only one person, and it turns out that that person's parents or partner are sitting there. Someone mentioned that when gossiping, it is important to know more people are in the room. Someone else mentioned he would like to know the name of the people as well, so he would know who to address. The fact that it is a status that has to be changed when someone is entering or leaving the room is mentioned as a problem, as this is easily forgotten, or too much effort. This also collides with the lean-back nature of television, which requires not too many actions from the viewers.

8.1.4 Ambulant Annotator

The last social television system that was being tested as input for creating the sociability heuristics is the ambulant annotator. It is useful to remind that the ambulant annotator system is quite different from the other systems, in that it does not support direct communication, but rather sharing video clips and annotating them (which makes it possible to communicate as well). The discussion of the results will therefore differ from the previous sections, but has some notable comparable comments as well.

Many participants were excited about the idea that you can send something you see immediately to other people. One person that was very sceptical about the system during the initial briefing, admitted he changed his mind while using the system and found it fun because you do not only talk about a (part of a) program, but now could also send it to someone.

However, there was some tension between the lean-back nature of television, and the active participation required from the ambulant annotator system. Several participants reported they would not do it while watching TV, as they want to be lazy

when watching TV. One participant said he would take a screenshot while watching (again addressing the immediacy of sharing media content), but annotate and send it afterwards, so it does not disturb watching television. Several participants mentioned they would do it during watching, but only if the system was very easy and natural to use, so only very little attention should have to be paid to create, annotate and share a certain clip.

The fact that a separate screen was used for creating, annotating and sharing clips was considered beneficial for letting other viewers continue watching the program. This was also very evident during the tests, where some people continued watching the screen, while others were editing or fiddling with the secondary screens. Two participants referred to how changing the settings of video or DVD players disturbs the viewing experience, because a menu comes up on the screen, overlaying or even replacing the television program, even though the sound continues playing. However, the fact that the current system caused the program to pause regularly on the main, shared television screen when watching was considered more disturbing for the viewing experience, as well as confusing because it was not clear when something would happen on the separate screen, and when on the main television screen. A good selection of what aspects are handled personally in the private screen, and which ones happen on the central screen, is an important aspect of sociability.

Even more interesting is the fact that secondary screens not only enhance sociability by not disturbing others, but also by drawing attention to them and bringing people closer (because other users watch over the shoulder of the one holding the remote control) or even becoming an object of discussion itself.

When discussing sending clips to others, the participants did not always expect a reaction. The general feeling was that it greatly depends on the context and content being shared, and with whom it is being shared. Sometimes people would want to send something they find funny, and then they mostly do not expect a reaction. Some participants would expect something funny back. When they would send something to start a discussion, they would expect a reply. The expectations of receiving reactions were similar to that of their expectations when sending text messages or forwarding funny e-mails: some people would not expect anything back, whereas one older person always expected a reaction, and regretted that people do not respond to messages anymore. The reaction was sometimes expected in the same form or on the

same medium, but mostly people would expect a reaction by mail, by text message, by talking on the phone or even face-to-face, e.g. the day after. The latter two were preferred for longer talks or more personal contacts.

Several reasons for sending clips were mentioned by the participants. One reason can be classified as informative. Several participants said they would send something they knew would be interesting to someone, e.g. a news item or a nice goal in a football match. One participant said he would add a personal commentary to it. Related to this are practical reasons: one participant would send a recipe to his wife so she could cook it for him. Another participant said she would send information from home improvement programs to her friend because that person was building a house. Several participants related using the system to their work situation, so they could send clips to colleagues for several practical reasons, e.g. a teacher that would use it in class. Another reason mentioned by several participants was for sending things that other people (might have) missed, or could not see because they were on holiday. This could either be spontaneous (e.g. knowing that someone is abroad, and can not watch it) as well as on request (e.g. people asking in advance to record something). One participant mentioned still having a recorded program on video he always forgot to bring along, which he could send to that person using this system. Finally, several participants said they would use it for fun or to make someone smile. They would send a funny clip they see on TV, send something fun to someone that reminds them of that person, or send a clip for someone's birthday.

Several participants indicated they would find it problematic that multiple people could be watching the clip they have sent, especially if it was intended for a specific person. One person said it would not be good if she sent something to her friend, and her friend's husband would be watching it, while another person said he would not send it to a girlfriend if he would know her family would be sitting there as well. Some participants said they would send annotations or clips that are very personal via e-mail or text message rather than on TV, because you do not know who is watching.

The possibility of making annotations was positively perceived by most participants. Several people explicitly said they liked the personal aspect of making annotations. It allows you to give your own opinion, a commentary or a suggestion. One person said it was the same as talking to each other while watching, but then to

people at another location. Another participant would put a signature on the clip, so the recipient would be sure who the sender was, and that it was not spam. Some participants said they would write the reason for sending something, as sending the clip alone would be unclear.

When talking about the current functionality of the ambulant annotator, several participants would want extra functionality such as extra colours (now it was only a red font), funny images they could add to the clip or the possibility to type next to drawing. Some participants said they would want to add comments attached to the media, but not overlaid on the image. Several people said they would like to add an audio comment, especially when they would have to say a lot. Then it would be too elaborate to write it all down. Other reasons for using audio included giving a spoken introduction, laughing or singing along, creating voice-overs or telling the receivers where to pay attention.

In the next two sections, we will discuss the two most prominent themes that were observed and discussed about during these user tests, and which were analysed in more detail. First, we will look at user preferences for receiving clips. Second, the impact of television genres in social television will be discussed.

8.1.4.1 Preferences for receiving clips

We asked the participants that received (and watched) video clips during the test via mobile phone, e-mail, blog or television, which of these methods they would prefer in the future. The other participants were not asked this question, because they did not have the experience of receiving video clips, and would therefore not be able to relate to the specificities of each device for receiving and watching video content. Participants were asked to rank the devices from 1 to 4, where 1 is their most preferred device and 4 their least preferred device. In total, 15 participants answered this question, but 2 participants only gave one ranking for a single device (instead of a ranking for each device) so they were excluded from the results, leaving us with 13 participants. Figure 27 shows the distribution of the different rankings for each device.

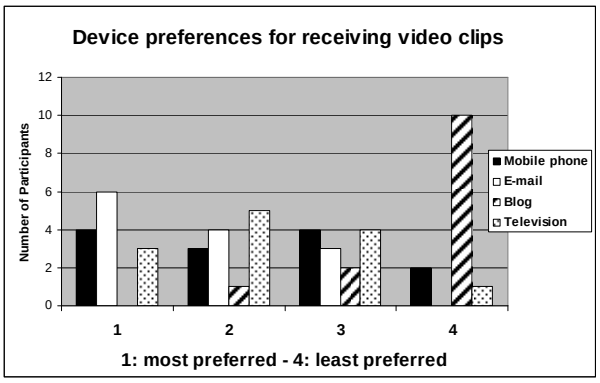

Figure 27: Device Preferences for Receiving Video Clips

Looking at the results, we can see that there are some trends, but not very outspoken. E-mail is mostly ranked first and television mostly ranked second, but differences are minimal and for mobile phone it is even more unclear, as it is ranked first, second and third by about the same amount of people. More outspoken is the last ranking for blog as a way to receive video clips. The reason for these mixed results can be found in the results of the qualitative analysis of the observations and group interviews. As the blog option was not discussed a lot during the group interviews, we will not include this in our following analysis.

During the group interviews after each test, the participants mentioned several factors that influence which device they prefer for receiving clips, which explains why the quantitative analysis showed mixed results. Clip length, content quality and immediacy were the three main factors that influenced the choice of device for receiving clips. Short clips that one would like to see immediately, without disturbing someone else, such as the weather forecast or breaking news, were preferred to be received by MMS on a mobile phone because you always have it with you. However, the size of the mobile phone screen was considered too small by most participants to watch something of higher quality (of content, not image quality), such as documentaries or movies. Some participants noted they would want to receive a notification on their phone, and then forward it to the device on which they would want to watch it later, such as their television or their PC. The size of the television screen, as well as the more relaxed and comfortable setting were mentioned by several participants as reasons to receive longer and higher quality content on TV.

Some participants would want to know if someone was watching TV at the moment before sending them a clip, which raises a fourth factor: privacy. Several

participants indicated they would find it problematic that multiple people could be watching the clip they have sent, especially if it was intended for a specific person. One person said it would not be good if she sent something to her friend, and her friend's husband would be watching it, while another person said he would not send it to a girlfriend if he knew her family would be sitting there as well. Some participants said they would send annotations or clips that are very personal via e-mail or text message rather than via TV, because they do not know who is watching. E-mail was considered by some participants as more private than TV, having almost the same immediacy as a mobile phone (these participants indicated having their e-mail always open) and having a bigger screen than a mobile phone, allowing higher quality content to be comfortably viewed.

Table 17: Summary of Device Preferences According to Video Properties

	Length	**Content quality**	**Immediacy**	**Privacy**
Mobile Phone	Short	Low	High	High
E-mail (PC)	Medium	Medium	Medium	High
TV	Long	High	Low	Low

In summary, we can categorize the three most mentioned devices for receiving videos according to the properties of the videos in Table 17. A mobile phone is usually preferred for short clips with low content quality that can be watched in private, and that have an urgent character (high immediacy). E-mail received on PC is preferred for medium length clips of medium content quality, which may or may not have an urgent character but can also be watched in private. Finally, television is a device on which people would want to receive long, high quality clips without an urgent character that can be watched in company.

8.1.4.2 Talking and sharing: the impact of different television genres

The 36 participants in our study answered several questions about television genres, so we could get a good picture of a) during which program genres people talk most or least, b) about which program genres they talk most or least and c) which genres they would like to share with someone. Participants were allowed to indicate multiple genres. We created a list of 18 program genres (plus an open category 'others'), based on the "EBU system of classification of RTV programmes"

(European Broadcasting Union, 1995), wherein programs are classified according to intention, format, content, target group, origination, language or participation. We chose the content classification, as this best reflected a variety in genres, including such formats as sitcoms, reality shows, the weather report, etc. but made a selection of the most popular genres according to TV program viewer ratings, otherwise the list would become too long. For each genre, we gave a couple of examples of popular television programs. The full list of genres we used is available in appendix 13.

In order to find patterns that would help us to understand the reason for preferring certain genres, we were especially interested to see if there were similarities between a) genres during which people talk while watching, b) genres people talk about (at work, at school, in the train, …) and c) the genres they would like to share videos of. A first glance already showed some interesting results. If we rank the most often chosen program genres, we see similar genres in the list of genres during which people talk least (Figure 28), about which people talk most (Figure 29) and people would like to share (Figure 30). In other words, people would like to share videos with each other of program genres that are discussed at work or at school, but those are genres during which people usually do not talk while watching. Those genres are film, news, news magazines and documentaries.

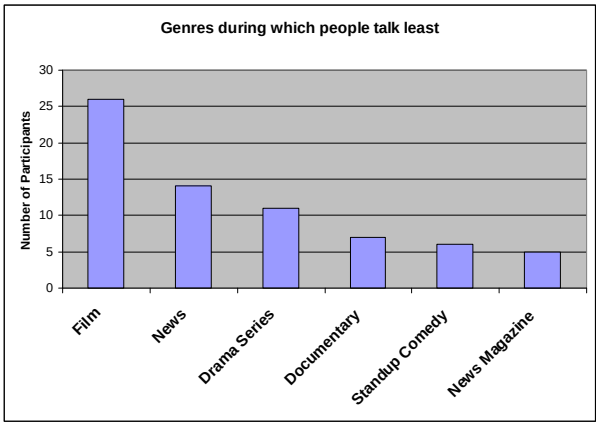

Figure 28: Genres during which people talk least

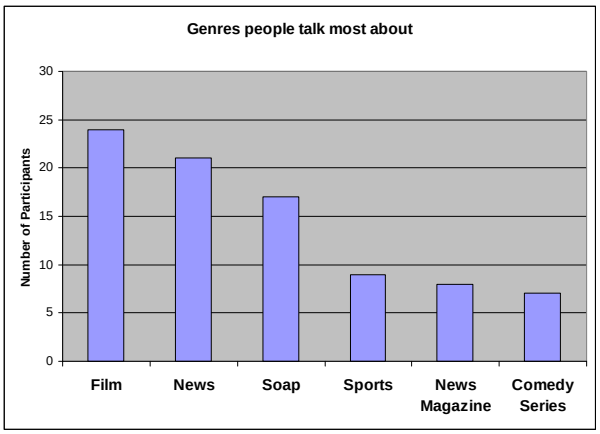

Figure 29: Genres people talk most about

Based on this first glance, we decided to look at correlations between items of the different lists, e.g. checking if it is usually the same persons that like to talk while watching and also want to share the video of a certain genre. However, we are not looking for predictive statements (which cannot be made on the current data alone) but rather detect which genres are the most 'sociable'.

When comparing the lists of genres our participants most talk about with the genres our participants would like to share, we see very strong positive correlations ($p<.01$) for the genres news, sport, soap opera, docusoap, reality show, talk show, comedy series and quizzes, as well as strong positive correlations ($p<.05$) for the genres film, animation film, stand-up comedy and music programs. Based on these correlations it is likely that most genres people talk about (12 out of 18) are also those genres people tend to share. On the other hand, for genres during which people talk most we find correlations with a preference for sharing for eight genres: debate programs, sport, soap, ($p<.01$), animation series, stand-up comedy, music programs or hobby programs ($p<.05$). Only sport and soap are genres that were scored by more than 25% of our participants, and thus are most relevant in our current discussion. In contrast, if we compare sharing certain genres with the list of genres during which people talk least, we find no significant correlations for any genre. Unsurprisingly, almost all genres that people have indicated as favourite genre positively correlate very strongly with genres they want to share, except for the weather report and talk shows. So if something is a favourite genre, people tend also like to send it.

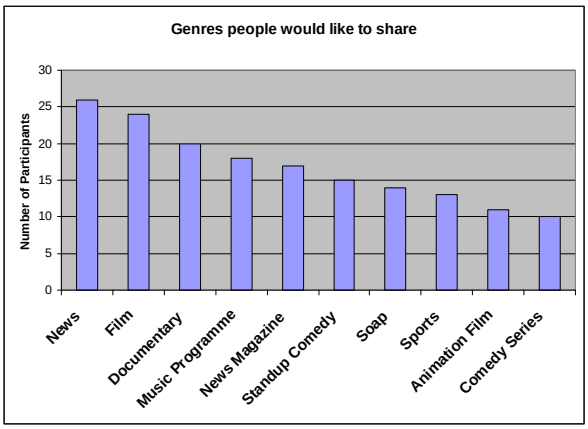

Figure 30: Genres people would like to share

Some genres show mixed results. News, for example, is indicated by almost as many people as a genre during which they prefer to talk (39%), as during which they prefer not to talk (50%). There is a very strong negative correlation between the two ($r=-0.67, p<.001$), so these are actually different people, in total 89% of our participants. Statistical analysis on gender or age differences showed no evidence that could explain the occurrence in both lists.

On the other hand, soap opera is a genre that people not only talk about afterwards, but also while watching ($r=.657, p<.01$). While this is also the case for sport, news magazines or docusoaps (the two questions positively correlate with $p<.01$), 47% of our participants talk during soaps as well as about soaps. For sport (the next runner-up), only 25% talk during sport and 30% about sport. Interestingly, sport and soaps are the genres that have strong positive correlations between talking during watching and sharing. Although these two genres are each known to be favoured by members of a specific gender (Brereton & O'Connor, 2007), we did not find significant gender differences in our data (maybe because gender was not well spread in our sample).

Finally, we can look at the list of genres during which people talk most (Figure 31), as an indication of which genres are especially suitable for a synchronous social iTV system. Although sport is mentioned by 11 participants (31%), we see that several other genres are even more popular to talk while watching, such as news (50%), soap operas (47%) and quiz shows (33%). Reality shows (28%) and talk shows (25%) also rank very high.

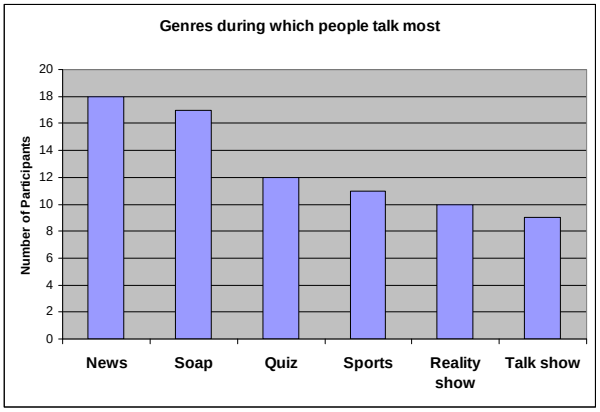

Figure 31: Genres during which people talk most

Although we did not explicitly ask for it in the interviews about device preferences, the genre of the clips our participants wanted to send or receive was often mentioned spontaneously. Documentaries and movies were often mentioned as 'higher quality content' which is preferably viewed on television, in contrast to the weather or breaking news, which people prefer to watch on their mobile phone. This confirms previous research that states that although the PC is becoming more and more an entertainment system, allowing online video watching (e.g. on YouTube) or even chatting while watching television (e.g. on Joost), the living room is still seen as the most comfortable viewing location, because of the big television screen and comfortable couch (Brereton & O'Connor, 2007). When compared with the results on genre preferences, documentaries and movies are genres during which one usually does not talk while watching, whereas one does talk during watching news and (to a lesser extent) the weather. Even though these similarities are anecdotal and not comparable in a systematic way, they do indicate that the two aspects of this paper, device and genre preferences, are linked to each other.

Next, we would like to look for reasons behind certain preferences, and especially the special cases we found in the data. Let us first look at the – at first sight – contradictory results about the news genre. Almost the same amount of people that would not talk during the news, would talk during the news. Although this could point at personal preferences, there are no other genres that show such contradictory results. Part of the answer might be found in a similar study about television attention styles (i.e. the length and frequency of looks at television) by Hawkins et al. (2005), which is closely linked to communicating while watching (Weisz et al., 2007). Hawkins et al. found that, contrary to what they expected, attention styles were not a steady

characteristic of an individual, but differed according to genre. Even specific gratifications or favourable attitudes for each genre accounted for little of the variation in attention style. This could indicate that communication patterns are also much more dependent on genre rather than on individual characteristics or genre gratifications and preferences. Thus, the variation in news should be sought elsewhere. An important element in attention style mentioned by Hawkins et al. is the relative importance of plot in the viewing experience. Dramas and movies ask for more continuous attention than commercials and news items. As Hawkins et al. point out, news magazines are an anomalous case, having a more narrative and plot-like structure, but with short items of less than 15 minutes. European news broadcasts might be more comparable to this structure, as the news in Europe is typically less fast-paced than in the US. This could partly explain the mixed results of the news genre in our questionnaire, because certain items in the news are longer and contain more plot than other parts of the news.

With the importance of a plot structure in mind, it is easier to see a pattern emerging in the genre preferences of our participants. All genres in the top six of those genres during which people do not talk while watching contain a plot-structure that calls for their full attention, e.g. film, drama or documentary. Reversely, the top six of genres during which people do talk have less plot-structure, such as quiz, sport or reality show (keeping in mind the ambiguous nature of news). Linking this again with the results on device preferences, we can argue that our category of ‘content quality’, referred to like this by our participants, is rather related to the plot structure of the content. So, genres with more plot structure are preferred to be watched on television, whereas genres with less plot structure can be watched on a mobile phone.

Another odd one out in our genre preferences is soap opera, during which people talk while watching, but also talk about afterwards. This is the same for sport (although for fewer participants). We can argue that plot structure is less important in soap operas as it focuses more on the situation at hand rather than the bigger plot (which explains why it is so easy to start watching a soap after missing a couple of episodes) as well as in sport. But although most genres in our study are either in the list of genres during which people talk most or in the list of genres people talk most about, soap opera and sport are in both lists. When looking for an explanation for this discrepancy, we have to dig deeper in the social roles certain genres play. According

to Lull (1980), citing others as well, soap opera is often used by viewers to learn how to deal with relational conflicts, and discuss this with friends and relatives. This explains why people use this in daily conversations, as evidenced by several researchers (see e.g. Fiske, 1988). A similar argument can be made for reality shows (Ducheneaut et al., 2008). Other genres however show other patterns. People often talk during quiz shows for example, because viewers like to show off their knowledge to each other (Lull, 1980), but do not often talk about quiz shows. Showing competence during a quiz show is usually done synchronously, so one can answer a question before a contestant, and not by bragging afterwards how many answers you knew.

To conclude our discussion, Figure 32 summarizes the relationship between the different aspects discussed in the paper. Although plot structure can account for most of the preferences in talking about and sharing videos, for some genres the relationship is more complex and related to some of the social uses of television.

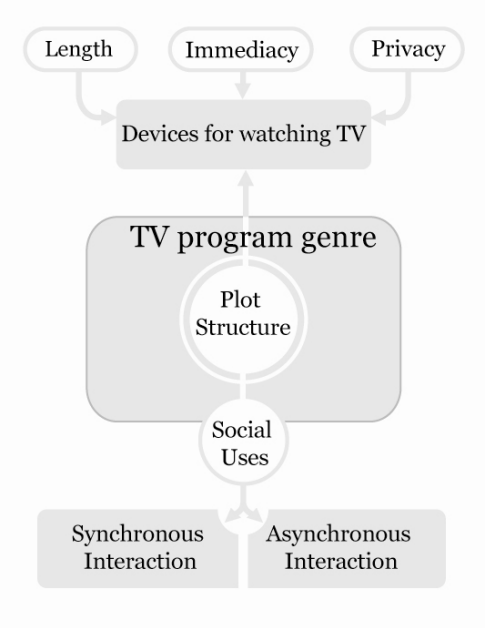

Figure 32:The role of television program genres

8.2 Analysis of competitive user tests

As described in chapter 7, we applied a Straussian grounded theory approach with open coding, axial coding and selective coding to detect and classify the

sociability issues we found in the user tests described in this chapter. Finally, we used affinity diagramming to cluster the sociability issues and translate them to sociability heuristics, suitable to design and evaluate (social) interactive television. In this section, we will present the results from each phase of this analysis.

The program used for this analysis was QSR NVIVO 8, a qualitative software package that allows several types of data (audio, video, text, word-files, pdf-files, etc.) to be coded in a systematic way. Several methods from grounded theory (e.g. open coding or writing memos) are well supported, making this a useful program for performing a grounded theory based analysis.

8.2.1 Open coding

During the open coding process, the notes from each user test, the results of the group interviews as well as the questionnaires were coded using a combination of the main categories of James Lull's social uses of television (Lull, 1980) as well as codes that emerged from the data itself ('in vivo' codes). Table 18 shows the results of this coding process, with a list of 30 codes which in total were mentioned 215 times. The column 'sources' refers to the number of sources in which the open code was used, the column 'references' points to the number of times the code was used for indicating a specific part related to that specific topic. More details about the parts that were coded by each of the codes can be found in the next section, where the axial coding process is described and examples of coded data can be found.

Table 18: Open codes from competitive analysis

Name	Sources	References
Affiliation-avoidance	6	18
Asynchronous	3	6
Attention	5	17
Awareness	6	23
Co-located	3	8
Communication facilitation	9	26
Competence-dominance	2	2
Don't disturb	7	11
Emoticons	2	2

Fun	1	1
Genre	1	3
Guests	1	1
Information	3	11
Lean-back	5	11
Notification	2	2
Opinion	3	4
Personal content	1	1
Private conversation	4	4
Profile	1	1
Receiving content	1	1
Recommendation	3	7
Referring	1	2
Regulative aspects	1	1
Shared content	7	21
Status	5	11
Synchronized watching	2	2
Talking	1	2
TV experience	3	9
Video of remote viewers	1	1
Volume control	2	6

It is important to mention here that as the familiarity with the data increased, so did the accuracy of the detection and labelling of the codes. This means that some codes were only created at the end of the analysis process, and therefore occur only once or twice in this list. It is therefore necessary that the coding process does not end here, or else the results would not be very accurate. Consistent with the emphasis on constant comparison in grounded theory, not only was data that was analyzed later compared with earlier data, but the whole data set was recoded so codes that emerged at a later stage could be used to analyse the first data again. However, we first performed axial coding in order to create subcategories for each code, and link the different categories and subcategories together.

8.2.2 Axial coding

In the axial coding phase, we wrote a memo for each code that was mentioned four times or more in the open coding phase. Codes that were mentioned less than four times were not discarded, but were related to the other codes as we noted all related concepts or different wordings for the same concept, which were present in the data (e.g. by using the open codes that were less frequently mentioned). There are two exceptions: the codes “communication facilitation” and “lean-back” were not described separately in a memo. The former is so all encompassing that almost every reference would have to be cited, and other categories discuss more subtle aspects of this concept. The latter was less widely cited, but was so closely related to “don’t disturb”, that it was described in more detail in that memo.

In the following sections, we will describe and discuss the memos that were written, including all issues that were coded with that term and the concepts related to this code. As the memos described are also “work in progress” during the coding process, the discussions are a first step in analysing the results, and do not represent the final discussion for each of the topics. A more thorough discussion can be found in chapter 9, where the sociability heuristics themselves will be discussed.

8.2.2.1 Affiliation-avoidance

When accepting or declining invitations, users explicitly show affiliation or avoidance. Also muting the sound of others or changing status both are forms of avoidance. However, in the social uses of normal television, avoidance is more implicit, and the television offers a way of watching the same content but not having to talk to one another which, according to James Lull (1980), reduces conflicts in families. When taking direct actions like declining invitations, muting sound or changing status, avoidance is more explicit and can look as a rejection. Nevertheless, the need for information about such actions is important. Affiliation is better supported with accepting invitations, as users will get a positive feeling when someone accepts it: families living apart might get a feeling of togetherness, even if they just watch the same program without talking or chatting. Affiliation and avoidance, although related, are actually two separate concepts, and should be treated separately. Both concepts return in awareness (affiliation) and don't disturb (avoidance).

The following issues were coded with the term affiliation/avoidance:

- Log-on as offline and decide yourself when they can say something
- Laugh at someone from the other side (in sports match)
- It's more fun to watch TV together when you're in the same city, so you can meet up
- Would like reactions if video has been sent
- Recording something for someone else
- Send something funny to make someone smile, or for their birthday
- Stay in contact with friends or relatives
- Mute other group
- Feel obliged to talk when online
- Video of remote viewers might violate privacy, would have to be possible to turn off
- Smileys to give non-verbal cues

The following concepts were noted as being related to affiliation/avoidance:

- Control
- Fun
- Contact
- Mute
- Smileys

8.2.2.2 Asynchronous

Different timezones, but also recorded content, are a barrier for watching content together and talking about it. A complete social system should therefore include a way to share content asynchronously, including asynchronous comments and recommendations. Viewers should always be aware of the asynchronicity of their actions.

The following issues were coded with the term asynchronous

- When sharing video content, the length of the clip, the quality of the content and the immediacy of the content determines the choice of medium for watching it
  - Cell phone: short, highly immediate clips of low quality
  - E-mail: medium quality, medium length clips, medium immediacy
  - TV: high quality, high length, low immediacy
- When receiving videos, people want to choose on which platform they want to watch it
- Different timezones could be a barrier for watching together
- Live (immediate) recommendations are difficult in different timezones
- List of recommendations for later

The following concepts were noted as being related to asynchronous:

- Shared content
- Platform
- Timezone
- Recommendations

8.2.2.3 Attention

Related to both the television experience as well as sociability, attention is an important element. As social TV systems are being designed to interact with other people, usually while watching TV, this interaction needs to be as fluent as possible, so that attention to the system is minimal. Especially the genre of a program influences how much attention is needed to the television screen. As discussed in 8.1.4.2, the more plot-oriented a genre is (like movies or drama), the more attention someone needs to pay to the television screen in order to keep following the program. Users will not want to be disturbed while watching this kind of content, or only minimally. Related to remote sociability, text chatting is more distracting than audio, but both are in some way taking attention away from the audiovisual content on screen (see 8.1.1.3). More related to co-located sociability, separate screens can make sure that co-located viewers are not distracted while one or more persons are active.

The following issues were coded with the term attention:

- Watching television and chatting at the same time is not easy, especially with subtitling (closed captioning), although this is less so for younger people
- Doing something while watching (making clips, annotating, but also chatting) should be very easy and natural to do
- A separate screen is helpful for not disturbing other people that are watching co-located
- Too many actions to open or close chat window disturb the viewing experience
- The user should be able to set the status to don't disturb at certain times, so distraction from the screen can be minimized - (note: as this is related to the plot-structure of certain genres, this might be done automatically)
- Audio is less distracting, although it then interferes with what is being said on screen

The following concepts were noted as being related to attention:

- Don't disturb
- Status
- Audio
- Text
- Separate screen

- Usability
- Genres

8.2.2.4 Awareness

Awareness is the key feature that enables other viewers to see who is currently watching the same or another program. This is an excellent way of providing communication facilitation, as other people know that they can talk to their friends or family about the current program. Awareness should also provide information about synchronicity of watching. If a programs is watched in delay by some user, this should be indicated somewhere. Awareness is not very useful for co-located watching (but the related 'status', especially group status, is).

The following issues were coded with the term awareness:

- People would like to turn awareness off sometimes
- Would like to see the names of other people at the remote location
- Relevant when other people are in the room, for privacy reasons: people would choose what to say or what to send (or what not)
- Being aware if they are watching TV or not
- Would not send or say something if not sure who is watching
- Being aware that they can or cannot be heard
- Selective awareness in two ways
  - Only certain people can see what they are watching
  - Only certain channels will turn up in watch list
- Changes in situation that are not shown online (e.g. person leaves room and is replaced by someone else)
- Video of participants invades privacy, but if controllable feature (see point 1) could be useful
- Awareness of acceptance of invitation

The following concepts were noted as being related to awareness:

- Information
- Feedback
- Change in situation
- Privacy
- Accepting invitations
- Turn off
- Names
- Channels
- Watching or not
- Selectivity

8.2.2.5 Co-located

The co-located situation brings upon many issues such as being in group and receiving content (either text or audio communication, or shared videos) meant for someone specific that might contain sensitive information, or disturbing co-viewers with specific activity.

The following issues were coded with the term co-located:

- Seeing group status is useful, so you're not sending something sensitive
- Even better: to see the names of who is there
- When doing several activities, a separate screen is beneficial for not disturbing other viewers
- When sharing videos, important to know who will be (allowed to) watching it, or otherwise send it to a more private medium than TV
- Having a shared buddylist for the whole family

The following concepts were noted as being related to co-located:

- Status
- Group status
- Awareness
- Video sharing
- Separate screen

8.2.2.6 Don't disturb

Being on don't disturb might seem very similar as in other communication applications (such as messenger) but is especially relevant in a TV context, as you get easily distracted when things are happening so you can't follow the TV show anymore, and TV is a lean-back medium with which viewers want to relax. Viewers could be put on don't disturb in several ways, such as automatically (e.g. based on the kind of content (films), or when minimizing a program) or manually by the viewers themselves. When in don't disturb mode, there should be some small unobtrusive indication when something is happening. Otherwise, they won't notice that someone is trying to chat. They should then be able to ignore it (without any disturbance, so it should go away automatically) or act on it when they feel like it.

The following issues were coded with the term don’t disturb:

- During certain genres (e.g. film), people do not want to be disturbed, so they should be able to indicate this
- Make sure themselves when they want to be talked to

- Mute the sound of other group, so they can focus on the TV-show
- Don't disturb status should act as buffer, but still indicate if there is an activity (such as incoming chat) - users can then act on it if they want to or not
- Being in 'busy' or 'don't disturb' should minimize interaction as much as possible, leaving only a small indication when anything is happening

The following concepts were noted as being related to don’t disturb:

- Lean back
- TV experience
- Avoidance
- Mute
- Status
- Busy
- Control

8.2.2.7 Information

There are several types of information that people would want to see. One is related to a common usability issue: getting feedback from certain actions. Others are more related to the social nature of television: seeing who is watching what, not only currently but also historically, or getting a preview of what is being recommended. Important here is the selective nature of information sharing: people want to control who can see what.

The following issues were coded with the term information:

- A history of what someone has been watching or what their favourite programs are
- Feedback about actions: did participants receive an invitation?
- Sometimes people don't want certain information to be seen, or control who can see this information
- Seeing a preview of the recommended channel

The following concepts were noted as being related to information:

- Social profile
- Notification
- Feedback
- Selective

8.2.2.8 Opinion

Similar to Lull's competence/dominance as well as communication facilitation, this concept shows that people want to express their opinion. This can be facilitated with either free-form or predetermined messages, but in the latter case users might feel restricted too much in giving their opinion. Also, audio can have an extra benefit of creating extra possibilities. If text is used, a variety of means should allow the user to put more personality in their messages, e.g. with smileys.

The following issues were coded with the term opinion:

- People like to give their own opinion, commentary or suggestion
- People want to give some explanation when sending clips
- Sometimes audio is preferred over text, e.g. for longer texts, or for laughing or singing

The following concepts were noted as being related to opinion:

- Audio
- Text
- Commentary
- Recommendation

8.2.2.9 Private conversation

Two related issues are treated here: people want to say something to one person in private - and if you're talking remotely, and you don't know who's at the other end, you might say something embarrassing to someone else. So there should be some way to send or say something privately to one person, and at least be able to see if there are multiple persons at the other end. The first aspect will be difficult with speech, or even text, and only feasible if there is a separate device available.

The following issues were coded with the term private conversation:

- Be able to send private message to a specific person, without others seeing it
- Be able to have a private conversation with someone

The following concepts were noted as being related to private conversation:

- Co-located
- Privacy
- Group

8.2.2.10 Recommendation

Recommending content is something that people already do a lot, and a social TV system should also support this. Interestingly, people prefer a personal recommendation via a direct communication link (text or voice), rather than automated recommendations. Very important when recommending is that it should not only be live, about a current TV program, but should also recommend future programming. This, in combination with a shared TV guide, will offer a more sociable experience. When a recommendation is received, enough information should be provided so the recipient can decide whether and how to act on it.

The following issues were coded with the term recommendation:

- People like to have a TV guide, preferably shared with other viewers
- Recommendations should not only be made live, but also asynchronous (cf. different time zones)
- Some people don't like automatic recommendations, but prefer to do this personally via a direct communication link (if available)
- People like information about the recommendation they have received (not only info in text form, but e.g. also a preview)

The following concepts were noted as being related to recommendation:

- TV guide
- Asynchronous
- Information

8.2.2.11 Shared content

Social TV is not only about communication, but also about shared content. People want to share content and express their opinions about them. People want to refer to specific moments, and a delay when typing can make this problematic. So people should be able to control when something appears on screen (possible with asynchronous content, less so with synchronous content). A TV guide can also be a shared object that can be helpful when deciding what to watch. Audio comments are easier (directly referring to something, but also less cumbersome and with more attention for screen) than text comments. People should also know when they are watching TV together, and when they are watching unsynchronized.

The following issues were coded with the term shared content:

- A TV guide would be useful
- Would be nice to send movies or mp3's to each other
- Want to express personal opinion about shared content
- Written text is ok, but audio comments are more direct and less cumbersome
- Exchange video to watch synchronously, personal as well as pre-recorded content
- See picture or video of recommended program before switching
- Refer to specific moments
- Get feedback when an invitation to watch TV together has been accepted.

The following concepts were noted as being related to shared content:

- Preview
- Information
- Synchronous watching
- Sending videos
- Guide
- Text
- Audio

8.2.2.12 Status

Having the right status is clearly important. The two most important ones are busy/don't disturb when watching television and not willing to talk, and group status, indicating that multiple people are watching. Conflicts can arise with the lean back nature of television, and changing the status, so this should be kept as lightweight as possible. Other conflicts can arise with the dynamic social nature of the viewers: people can leave the room, guests can join in, buddy lists might be different, ... The most optimal solution would be one where each family member joining or leaving would log in, so all information of who is where is always available, but this might be too much work so in the end people wouldn't bother anymore. So a simple solution, still giving just enough information, should be enough. A combined buddy list might be the most difficult option.

The following issues were coded with the term status:

- Forget to change status
- Different statuses needed: online, willing to talk, not available, ...
- One combined buddy list of the different people watching together
- Change in persons: someone leaves the room and is replaced
- Indication of group status: general, or every single member

- Busy status should minimize activity, but indicate unobtrusively when something is happening

The following concepts were noted as being related to status:

- Don't disturb
- Co-located
- Busy
- Group
- Change
- Lean back

8.2.2.13 Television experience

The screen space for showing the program should not be compromised too much: if it's resized to a smaller size, people complain that it's too small; if too many items are laid on top of the program, people complain as well.

The following issues were coded with the term television experience:

- People complain that the screen size is too small when resized
- The screen should not be too cluttered with interface elements

The following concepts were noted as being related to television experience:

- Attention
- lean-back
- Screen-size
- Screen clutter

8.2.2.14 Volume control

Having separate audio sources for television and the viewers is important for being able to better understand what's being said, and to keep the attention on the TV program. Ideally, the two audio sources should also be separately controlled (volume, muting, maybe even where the sound is coming from). Even better, an indication of who is talking is welcome. This might be easier in text chat systems than in audio systems.

The following issues were coded with the term volume control:

- It's difficult to listen to two audio sources at the same time, as they are coming from the same speaker
- Larger groups make it more difficult to recognize who is talking

The following concepts were noted as being related to volume control:

- Audio
- Co-located
- Attention

8.2.2.15 Result of Axial Coding exercise

As a result of this step in the axial coding exercise, 55 single concepts were identified. In order to define the main categories as well as the subcategories, we used affinity diagramming to relate them to each other. Affinity diagramming is an inductive technique for building a structure from individual notes based on user research, to reveal a hierarchy of high-level concepts and patterns (Beyer & Holtzblatt, 1998). Affinity diagramming is carried out by writing individual concepts on small notes and then structuring the notes bottom-up by placing related notes next to each other, instead of using pre-defined categories. As such, affinities are being built without preconceptions about the data. Only when all notes are collected together, a category name is given that represents the whole group of notes. First-level categories can be grouped again, which results in a second-level category. As a result, all data are connected in a high-level hierarchy revealing the structure behind the data in a coherent way. (Beyer & Holtzblatt, 1998)

The affinity diagramming process with the concepts defined in the axial coding phase resulted in six main categories, 22 subcategories and 46 low-level concepts. Although this adds up to more than 55 concepts, there was some overlap in these categories and some concepts were duplicated as they fitted in multiple categories. Table 19 shows the resulting main categories, subcategories and lowest-level concepts.

Table 19: Categories, subcategories and codes from axial coding competitive analysis

Main category	Subcategory	Concept
Affiliation	Communicating	Audio
		Private conversation
		Text
	Contact	Inviting new friends

		Remote video
	Fun	Smileys
	Shared viewing	Choosing programs
		group size
		Shared content
		Shared remote
Asynchronous communication	Remote	
	Timezone	
Recommending	Annotations	Commentary
		Opinion
	Information	TV guide
	Recommendations	Preview
		Sending invitations
	Video sharing	Personal content
TV experience	Attention	Avoidance
		Busy
		Don't disturb
		Genres
		Mute audio
		Turn off
	Co-located	Mute audio
		Privacy
		Separate screen
	Lean-back	Accepting invitations and notifications
		Change status
	TV screen	Platform
		Screen clutter
		Screen size
Usability	Control	
	Feedback	
	Information	

	Notification	
Visibility	Awareness	Change status
		Situation changes
	Information	Channels
		Names
		Social profile
		viewing habits
	Presence	Avatars
		Buddy list
		Group
		Group status
		Guests
		Status
		Watching or not
	Privacy	Control
		Selective
		Turn off

The categories, subcategories and concepts thus created are of course not validated yet at this stage. Although all concepts directly draw from the data analysed, and even use the terms used by the participants, a comparison with the data is needed to check the prevalence of the different codes in the data. This was done by selective coding, using the hierarchy defined by axial coding. All codes in this hierarchy can be used to code the data again, so also the main categories and subcategories were used during coding.

8.2.3 Selective coding

In the selective coding phase, not only all data from the user tests were recoded using the codes created by axial coding, but we also included the published results of field tests with CollaboraTV (AT&T), Social TV (Motorola), ConnecTV (TNO) and Zync (Yahoo!) (see chapter 7 for more information), as well as reported lab studies with several other systems. This way, our codes were not only validated by comparing it with our own collected data from user testing, but also by comparing it

to data collected by other researchers during lab and field testing. As our data was collected using lab studies, the inclusion of field reports during this phase ensured that the concepts were validated against more real-life situations.

At this point, the coding exercise was not used anymore to create new codes, but rather to extract those statements from the data that directly referred to sociability issues that occurred in the user tests as well as the field tests. This means that during the selective coding, a large number of statements were collected and similar statements were combined to describe individual sociability issues. As a result, 70 sociability issues were identified (see Table 20), which we already formulated as guidelines in order to facilitate the creation of heuristics.

Table 20: List of individual sociability issues identified with the competitive analysis

1. Social TV should make it easy to connect with (close) friends and family (not so much with strangers)
2. Users want to mute the sound of the television program
3. The system should be able to handle large groups or a large number of people/groups
4. Users want free-form communication (whether audio or video, and if possible both!)
5. Provide a shared TV-guide with information about buddies' watching behaviour or recommendations
6. Users like to have an overview of their friends' most popular shows
7. Users should be able to exchange phatic utterances/light interactions in a quick and easy way, as this is non-disruptive
8. Video communication is not advisable for privacy reasons. If providing video communication, make sure it can be turned off
9. Supporting audio is a benefit, and is advisable
10. The sound of the TV should be easily distinguishable from the speech of the participants
11. The activation and de-activation of the audio link should be very easy and quick to

do (on-off or always on, instead of push-to-talk or shout-to-talk)
12. The microphone should be unobtrusive and non-cumbersome (on the table, rather than headset)
13. It should be possible to temporarily switch off the audio-link, for privacy reasons
14. When the audio-link is active, that should be clearly visible (for privacy reasons)
15. Enable private side-conversations between co-located and/or remote viewers
16. Make it possible to send an automated reply
17. Indicate when a reply is being typed
18. A social TV system should allow both remote and co-located activity, and not break any of the two
19. Provide a way to invite friends and family to use the system
20. Make sure text chat or comments do not take up too much space, so it is not too distracting
21. Make it possible to create and send emoticons very quickly and easily so it is not interruptive
22. Indicate when other buddies were watching frequently in the past, so viewers can see when it is favorable to watch together
23. Make it easy to see which friends are watching what, and then switch to that channel so they can watch together
24. A social TV system should support synchronous use as well as asynchronous use (e.g. by exchanging recorded material, leaving notes in real time and to be consulted afterwards, or by sending recommendations not only directly but they are saved and also come up when starting up the system)
25. Make it possible to invite others to watch the same channel
26. Make it possible to exchange recorded content and watch it synchronously and/or asynchronously (supports different timezones)
27. When more than two users are watching pre-recorded content, a shared remote should be used - a master/slave model is preferred, but the 'slave' role should be

able to take over the 'master' role - the master is the one that initiated the viewing
28. Let users decide who can view their comments/annotations, and if they will be anonymous or can be identified (just friends vs. strangers)
29. Users should be able to add a spoken or written commentary to recorded content they are sending to others - but should be able to be separated (e.g. attached comments instead of overlays and overlays or audio track that can be removed when playing)
30. Make a shared program guide available (for choosing programs together or for seeing what others recommend or are watching)
31. Exploit social knowledge for recommending content to watch (e.g. by providing a popular shows by buddies list, or by giving specific recommendations based on buddies' behaviour)
32. Recommendations should not only be sent directly, but they should be saved so they can be consulted later, or they come up when turning on the system
33. Give the user an option to reply to a recommendation - either by accepting, or when rejecting to optionally give a reason why (choice between pre-defined messages and free-form communication)
34. Show information about the channel and program other buddies are watching
35. Provide information about the recommendation that is sent: which program and channel, maybe even a PiP of the program
36. Do not enforce sending recommendations automatically, also provide other means of giving recommendations (e.g. by text chat or voice chat)
37. When a recommendation/invitation is accepted, give feedback to the sender how the receiver has reacted (accepted or not)
38. When receiving clips, users should be able to transfer it to another device (cell phone, computer, television) e.g. by forwarding it
39. Users should be able to add their own personal content to the system, and share, recommend or edit this
40. The system should not disrupt the television show, either automatically or by

actions of another user (e.g. do not pause automatically, do not impose a big overlay on screen, use secondary screen for some activities, ...)
41. Frequent system functions should be very easy and quick to do ("low-activity"), so attention to these functions is minimized, and attention can be paid to the television program
42. Screen elements should be small and in the visual periphery, so they do not distract from the television content, and not overlay subtitles or closed captioning - transparency could be of help
43. When a user is in the status 'busy' or 'don't disturb', this should not only be visible to others by their status indication, but incoming messages should be less intrusive or even blocked
44. When incoming messages are blocked, there should be a small non disruptive indication that there is chat or other activity - without forcing the user to act on it, or disturbing the viewer
45. A user should have control over audio or text chat activity, and determine to mute/block their own chat and/or mute/block the other chat (any muting should be made visible)
46. Users should be able to put themselves in a status 'non-disturb' - if this could be done automatically (e.g. by detecting the TV-genre), then it does not disturb the lean-back functionality of television
47. Social TV systems should take into account TV-genres that are most suitable: genres with high plot-structure are not suitable for synchronous systems (film, drama, documentaries, news magazine), genres with low plot-structure are (news, soap operas, sports, quiz shows, reality TV, talk shows) - genres that are being talked about a lot are suitable for asynchronous systems (film, news, documentary, music program, soap opera, ...)
48. The chosen social TV platform should also take into account TV-genres: mobile phones for short clips with low plot-structure that can be private, PC for different sized clips with medium plot-structure that can be private, television for longer clips with medium to high plot-structure that are not private

49. The social TV system should be an optional feature, that can be turned on or off when wanted
50. The social TV-system should take into account that multiple people can be watching television, e.g. by indicating a group status, or by notifying a user that a message might contain private information and can be watched by other people as well, or by giving the option to send it to a more private device (mobile phone or pc)
51. The buddylist should be adapted to the social situation in the living room: when multiple people use the system, the (shared) buddy-list should not contain sensitive information, or strangers to some family members
52. Social TV-systems should support the lean-back nature of television (e.g. by using low-activity methods for frequent actions, using auto-reply messages with one-click, or pop-up messages that automatically disappear after a few seconds)
53. The TV-program should not be resized too small, or not at all
54. Basic settings for social TV systems should follow the guidelines as closely as possible, but notifications, information sent and received, etc. should be controllable settings
55. The system should provide feedback on all actions so users see (1) if their action was successful and (2) when sending something if the receivers have acted upon it
56. The user should always be notified of incoming actions, but in a non-obtrusive way - when in don't disturb, this should be even more non-obtrusive
57. A social TV-system should show which users are currently watching television (this can be when the TV is on, but could also be conveyed with other means (ambient devices) when the TV is not on)
58. The system should provide information about which channel and which program a user is watching
59. Do not provide too many statuses, as it is easily forgotten to change this. An automatic system for changing status would be even better.
60. When a status is changed (especially to group status), this should be notified to

users that are having an active conversation, so they know that people have entered the room and are listening in
61. When people enter a channel or leave a channel, this should be notified, but in an unobtrusive way so it is not irritating
62. When starting to watch a program that has already started, people should be able to call up a short visual or textual synopsis to catch up
63. When having multiple people in the same room, provide an easy way of indicating who is talking (e.g. by using a code for each buddy, or a selection of the buddy before chatting)
64. Keep a history of what a buddy has been watching, available for other buddies (but make this controllable!)
65. when using an avatar visualization, do not offer too much customization. Male - female is already sufficient.
66. Allow users to choose which buddies can be on their buddy lists
67. Provide an option for some buddies to see a different status than other buddies (e.g. friends and family see your buddy as online, but colleagues not)
68. Provide a buddy list, including status information and information about what buddies are watching
69. Provide a group status, indicating that multiple people at one location are watching TV. Make sure this can not be confused with a group chat with people from different locations.
70. Certain channels or programs should be blocked from appearing in the 'now watching' list, for privacy reasons

8.2.4 From individual sociability issues to sociability heuristics

The final step in the creation process of the sociability issues was to group the individual issues that relate to the same basic concept together. Rather than using the existing categories we identified in the axial coding phase, we chose to cluster the individual sociability issues and label the new categories again with the help of a

second researcher for two main reasons. First, we already mentioned that the categories that were the result of the axial coding phase were not validated yet at that point and the selective coding phase was used for detecting the sociability issues present in the data. This final step therefore served partly as validation of the previously defined categories. Secondly, the purpose of this final step was to create clusters of sociability issues that could be turned into guidelines, which is a different purpose than in the first steps, where detection of sociability issues was aimed for. Additionally, we could take a step back from the data, and not risk using categories or codes that were already self-evident to us, but not to an outsider not familiar with the data. The result was a list of 12 main categories (see Table 21) referring to the clustered sociability issues. In the next chapter, where we will discuss the heuristics in detail, the individual sociability issues from Table 20 are linked to the clustered sociability categories from Table 21, so the relationship between the two becomes clear.

Table 21: Clustered sociability categories

1.	Communication modalities
2.	Presence and awareness
3.	Synchronous versus asynchronous use
4.	Remote versus co-located interaction
5.	Information about viewing behaviour
6.	User control
7.	Personal and group privacy
8.	Distraction
9.	Notifications
10.	Program genres
11.	Sharing content
12.	Sharing activities

8.3 Conclusion

The wealth of data from the competitive user tests as well as the extra sources from other user tests and field studies with social television systems, was boiled down to the 12 main categories listed in Table 21 that describe the different sociability issues that were detected. These categories reflect the most important issues related to sociability that our participants encountered when using the social television systems under development. Some categories are specific for the domain of interactive television, such as “program genres” or “information about viewing behaviour”, while other categories reflect issues that are also present in the Computer Supported Cooperative Work (CSCW) research area, such as “presence and awareness” or “synchronous versus asynchronous use”. However, even the concepts that are related to CSCW have specific consequences in the context of interactive television. For example, privacy is a general concern in groupware, but as television is often watched by multiple co-located people, the issue of group privacy becomes an important aspect. Similarly, several concepts related to usability were identified in the data and resulted in separate categories such as “user control” or “notifications”, but as their impact on sociability was very prominent during the tests, they were included in the list sociability issues.

As these categories are still quite broad, the final step in the creation process of the sociability heuristics was to formulate them in a prescriptive way, so they could serve as guidelines during an evaluation. The formulation was carefully chosen to make sure it reflected each sociability issue that was listed for each specific category. The resulting sociability guidelines are described in detail in the next chapter (Chapter 9), structured according to the sociability categories from Table 21.

9. Sociability heuristics for interactive television

In this chapter, we introduce the sociability heuristics that form the core of this PhD. The chapter is organized as follows: for each heuristic, we will first discuss the background that explains the research the heuristic is derived from, based on the sociability categories identified during the competitive analysis. We then present the heuristic, along with a short explanation that should help the evaluator to use the heuristic during a sociability evaluation. Finally, we will present a couple of specific guidelines as instances of that heuristic, so the evaluator has some examples of how this heuristic manifests itself in different systems. However, these specific guidelines are just examples, and should not limit the evaluator in assessing the system to be evaluated.

9.1 Communication modalities

One of the basic functions of most social television systems is supporting communication between remote television viewers. The first issue that arises when implementing communication tools is whether to enable text chat or voice chat, or maybe even both. This issue is currently actively debated (see e.g. Geerts, 2006; Schatz & Egger, 2008; Weisz et al., 2007; Tullio & Harboe, 2008), and is still not concluded. However, our user tests indicate that offering both modalities is the preferred option for users. This allows them to choose the communication modality that best fits the situation and their own experiences. Older users are less adept at chatting and multitasking, and prefer voice chat, whereas younger users prefer text chat (see our discussion in section 8.1.1.3). Certain circumstances are more beneficial for text chat (e.g. when the children are sleeping), others more for voice chat (e.g. when moving around the room) (Tullio & Harboe, 2008). However, if only one option can be chosen, due to technical or budgetary reasons, one has to carefully select the right modality, based on the intended user population and context of use.

Whatever communication modality is chosen, users clearly like a wide range of communication options. Several research studies (e.g. Harboe et al., in press) have shown that when restricting communication channels, e.g. by only offering pre-fabricated messages, users are unhappy about it, and try to find other ways of communicating (by taking the phone). This means that users need full communication possibilities. This does not mean that other ways of communicating should be

abandoned. Lightweight messaging such as emoticons, small generic messages or gestures that convey interest in a certain show all enrich the way users can communicate with each other through the system. Social television systems that focus more on sharing content should also consider implementing communication features.

Finally, when implementing text or audio chat, the communication should be optimally supported. Indicating who is talking, giving feedback when a reply is being typed or offering a simple way to control the audio, all ensure that communication between users goes smoothly.

Heuristic #1: Offer different channels and levels for communicating freely

Enable voice chat as well as text chat if possible, otherwise use voice chat for a broad user audience including people with little chat experience or text chat for a specific audience including people with chat experience. Allow communication on different levels, from low-activity quick responses such as emoticons, gestures or automatic replies, to free-form communication. Make sure the communication process is optimally supported so it can go smoothly.

Examples of specific guidelines:

- Enable free-form communication using voice chat or text chat, and if possible both
- When having multiple people in the same room, provide an easy way of indicating who is talking
- The sound of the TV should be easily distinguishable from the speech of the participants
- Give the user several ways to send or reply to a recommendation, from pre-defined messages to free-form communication
- Make it possible to send lightweight messages such as emoticons, pre-defined messages or gestures
- Indicate when a reply is being typed

- The activation and de-activation of an audio link should be very easy and quick to do
- Users should be able to add a spoken or written commentary to recorded content they are sending to others

9.2 Presence and awareness

In computer-mediated communication, indicating presence is an important feature that supports awareness and enhances sociability (Dourish & Belotti, 1992). Providing more information than just presence provides even more awareness for the users. In a social television system, awareness features can enable other viewers to see who is currently watching television, what channel they are watching and even what program. There can be several levels of presence indication, from a simple 'someone is watching television' to the names of the people that are watching television to a list of buddies that each have a status and indicate the channel and program names they are watching. This is an excellent way of indicating to other people that they can talk to their friends or family, whether or not about the current program. Even though there might be some privacy issues (see heuristic #7), several of our user studies have shown that users value this information and usually do not have a problem of showing this information of themselves.

One element of indicating presence, is using a status to convey availability, as found in several instant messaging clients. Taking into account other heuristics that emphasize the minimization of distraction or the support of group privacy, different statuses can be used to convey that a user does not want to be disturbed (e.g. because he is watching a movie) or that he is watching television together with several family members. Having a good presence and awareness system helps to show these availabilities. Such a system could not only be active while the television set is turned on, but also use more ambient ways of conveying presence (Harboe et al., in press).

A complicating factor that distinguishes social television presence systems from other systems is the social and recreational nature of television. It might not be appropriate for colleagues to be on the buddy list, or to see the programs a user is watching. A group watching television might be dynamic, with people entering and leaving the room, ending up with different people that started watching. In any case,

the way the buddy list is implemented should be carefully considered against the other heuristics as well.

Heuristic #2: Use awareness tools for communicating availability

Provide a means for indicating presence, and giving information about the current behaviour of other users. There can be several levels of presence and awareness indication, from a simple 'someone is watching television' to a list of buddies that each have a status and indicate the channel and program names they are watching. These tools should indicate if a user is available to chat or otherwise interact, or if there are special circumstances (such as watching in group) other users should take into account.

Examples of specific guidelines:

- Provide a buddy list, including status information and information about what buddies are watching
- Users should be able to put themselves in a status 'non-disturb'
- Provide an option for some buddies to see a different status than other buddies (e.g. friends and family see your buddy as online, but colleagues not)
- Show if and/or which users are currently watching television

9.3 Synchronous versus asynchronous use

Similar to other communication tools, social interactive television can support synchronous communication as well as asynchronous communication. This distinction is similar to the traditional social uses of television, where people can either talk or interact while watching television, or talk about television afterwards or even before watching television. In the context of interactive television, this has also been called direct and indirect sociability (Ducheneaut et al., 2008) or immediate and delayed togetherness (Arvola, 2003).

Accordingly, social television systems can support synchronous use as well as asynchronous use. For example, a user can send a recommendation to watch a specific

show to a friend. When the show is currently playing, and that friend is currently watching television, he can immediately tune to the recommended channel to start watching the show and use the communication features of the system to talk together. However, for several reasons, that friend might not be watching television at the moment. He might just not be at home at the moment, or not watching television, but he might also live in a different time zone on another continent. For these and other reasons, the recommendation should be saved somehow, so that the next time the user starts watching television, the user can see that a show as recommended and choose to start watching on demand, or the next time the show is aired. Apart from this specific example, plenty of other features can be thought of that can be implemented synchronously and asynchronously, or that are specific to one of the two modalities, e.g. chatting concurrently versus leaving comments.

Heuristic #3: Allow both synchronous and asynchronous use
Provide different functionalities for interacting and communicating synchronously as well as asynchronously, so users do not always have to be using the system at the same time, but can also benefit from it when they are using it at different times.

Examples of specific guidelines:

- Enable users to communicate in real time but also allow them to leave notes that can be consulted afterwards
- Make it possible to exchange recorded content that can be watched simultaneously with other users, or at another time
- Make sure recommendations not only can be sent directly, but they are also saved so they can be consulted later, or they show up when turning on the system

9.4 Remote versus co-located interaction

Using the "place/time matrix" as often used in Computer Supported Collaborative Work (Dix, Finlay, Abowd & Beale, 1998), we can not only classify the use of social television systems as synchronous versus asynchronous (see heuristic #3), but also as same place versus remote place. Even though television can be a

solitary activity, the dominant model for watching television has been and mostly still is a social activity, meaning that multiple people are watching television in the same location. This would classify traditional television in the same place/same time square of the matrix. With the advent of social interactive television, however, communicating and interacting around television can also happen at the same time, but in different places, or even at a different time at different places. When multiple people are interacting and watching television in the same room, this is called co-located interaction. When different people are interacting and watching television in different rooms, this is called remote interaction (see also Chorianopoulos, 2008).

Although the previous classification seems rather straightforward, it gets more complicated when there are multiple people in the same room ànd different people at other locations. This means a social interactive television system can fall in two squares simultaneously, and should cater for both co-located and remote audiences. One example from this is the use of side-conversations where two people silently talk to each other to say something private and/or in order to not disturb the other viewers (Ducheneaut et al., 2008). This can be either co-located, where a voice enabled system might allow users to temporarily mute their own sound to talk freely, or remote, where a text chat system might provide a separate chat window for talking to someone outside of a group conversation.

A social interactive television system should also be careful not to break any of the two, because this might result in a good experience for the remote users, but not for the relationship between the co-located viewers. An example for this is the use of system menus or certain features that overlay much of the screen. Even though the user that has initiated the action might not find this a problem, his co-viewers could have been following a television program and be annoyed by his actions. This is a careful balance that should be considered for each function.

Heuristic #4: Support remote as well as co-located interaction

As social interactive television systems can be used with multiple users at the same location (co-located) simultaneous with different users at other locations (remote), it should make sure its functions are appropriate for both situations, and not disturb the interactions between co-located or remote viewers.

Examples of specific guidelines:

- Enable private side-conversations between co-located and/or remote viewers
- The system should be able to handle large groups or a large number of people/groups
- The system should not disrupt other co-located viewers e.g. by imposing a big overlay on screen, should not take up too much space or should use a secondary screen for some activities

9.5 Information about viewing behaviour

Heuristic #2 discusses presence and awareness, including showing information about a user's current activities, such as what channel or what program he is watching. This can be taken a step further, by using the information of current and (especially) past information in specific functionalities. Information about a specific program can for instance include functionality to switch to that channel directly or, more extensively, a shared television guide can contain information about which television programs are most favoured by a user's buddies and even record popular shows from buddies automatically to a user's personal video recorder. Similarly, a system can provide recommendations based on other buddies' watching behaviour. A history of other viewers' behaviour can also give a good indication of favourable viewing times, to make sure there are friends or family members available for talking or interacting.

Although information from viewing behaviour can be exploited in several ways, the user should still feel in control (see heuristic #6) and also maintain his privacy (see heuristic #7). Users have no problem in disclosing most of their viewing behaviour if this will benefit their friends or family, but when used for commercial reasons, they are less inclined to offer this information.

Heuristic #5: Exploit viewing behaviour for informing and engaging other viewers

Use information from a user's viewing behaviour not only for showing currently viewed programs, but also for creating functions that aid communication, social interaction or recommendations for other users.

Examples of specific guidelines:

- Indicate when other buddies were watching frequently in the past, so viewers can see when it is favourable to watch together
- Show information about the channel and program other buddies are watching
- Provide a shared TV-guide with information about buddies' watching behaviour or recommendations
- Exploit social knowledge for recommending content to watch based on buddies' viewing behaviour
- Provide an overview of the most popular shows of a user's friends

9.6 User control

User control and freedom is one of the ten usability heuristics, created by Nielsen & Molich (1990). Although it is defined by Nielsen as "support undo and redo", giving users and emergency exit when they have made a mistake, it is often more widely interpreted as giving the user control over their actions and system settings (which is actually covered by the heuristic "flexibility and efficiency of use"). Although we do not intend to repeat basic usability heuristics with our sociability heuristics for interactive television, we feel this is such an important heuristic with severe implications for the sociability of such systems, that we think it needs inclusion here.

In several user tests we performed ourselves, as well as those reported in literature, users expressed concerns about certain features for several reasons (privacy, personal preference, experience, …) and indicated they would like to control different

aspects of the systems they used during these tests. This ranged from deciding what information they would like to convey to whom, controlling voice or text chat activity (by blocking certain people or muting audio, locally or remote), how to send and receive notifications, etc. In order to support this, users should on the one hand be able to change system settings to suit their own (or their families') preferences and on the other hand be able to have different options for specific functions (mute or not, accept or not, turn off certain features, etc.). The possibility of tailoring actions and changing settings should however not break the lean-back nature of television (see Chorianopoulos, 2008) and not disrupt or distract from the television program (see heuristic #8).

Heuristic #6: Give the user appropriate control over actions and system settings
Users should have sufficient control over their actions and system settings, so they can adapt the system in general or specific features to their needs or to the current situation.

Examples of specific guidelines:

- If providing video communication, make sure it can be turned off
- Settings for notifications, status indications, how to send and receive information, etc. should be controllable
- Allow users to mute the sound of the television program, separately from the sound of the voice chat
- The system should be an optional feature, that can be turned on or off when wanted
- A user should have control over audio activity, and determine to mute their own audio and/or mute the remote audio
- Let users decide who can view their comments or annotations, and if they will be anonymous or can be identified

9.7 Personal and group privacy

The social nature of watching television has several consequences, one being that users not only want to protect their own personal privacy, but also privacy related to the group situation. Regarding personal privacy, not everyone is keen on sharing information about all television programs they are watching. This has been confirmed in several use studies as an important concern, where users indicate they do not want friends or family to know they are watching e.g. porn or, in contrast, a female oriented program. Interestingly, one study pointed out that women would have less problems in disclosing this kind of information (even if it concerns porn) than men (Regan & Todd, 2004). Another privacy related issue has to do with video communication. Although this hasn't been implemented in any of the systems that have been analysed for creating these guidelines, it was mentioned by some participants as a useful feature. However, most users indicated they would feel it intrudes their private space, or they are not dressed appropriately when watching television. If a system would have a video communication feature, users should be able to activate or deactivate it for privacy reasons.

On the other hand, group privacy relates to the co-located situation in some instances. In a field study of a social television system (Harboe et al., 2008) as well as in a lab study (Regan & Todd, 2004), one remote user on one end said something that a co-located user on the other end wasn't supposed to hear. This could lead to all sorts of awkward situations, which should rather be avoided. A social television system should therefore use functions such as a group status, inform the user in different ways of an open audio channel or other people that are present, or allowing users to send messages to a different, more private device.

Heuristic #7: Guarantee both personal privacy and group privacy

Make sure the system enables users to ensure their own personal privacy, by choosing what (not) to disclose, as well as group privacy, by taking into account the presence of multiple viewers in a co-located viewing situation.

Examples of specific guidelines:

- Video communication is not advisable as main feature

- It should be possible to temporarily switch of the audio-link
- When an audio-link is active, that should be clearly visible
- Certain channels or programs should be blocked from appearing in the 'now watching' list
- Provide a group status, indicating that multiple people at one location are watching TV
- Give users an option to send content to a more private device (mobile phone or pc)

9.8 Distraction

The main purpose of television remains entertaining or informing viewers with television programs. When new features are added that enable communication or interaction via television, these features should not interfere too much with the content that is being shown. This means that interaction with the system needs to be as easy and fluent as possible, so that attention to the system is minimal, and viewers can pay sufficient attention to the program itself. Especially the genre of a program influences how much attention is needed to the television screen (see also heuristic #10). The more plot-oriented a genre is (like movies or drama), the more attention someone needs to pay to the television screen in order to keep following the program (see our discussion in section 8.1.4.2). Users will not want to be disturbed while watching this kind of content, or only minimally. Both text chat and voice chat is taking some attention away from the audiovisual content on screen. Although this usually does not stand in the way of enjoying the experience (Weisz et al., 2007), the system should be designed so that this distraction is as minimal as possible. Making screen elements not too large, putting them in the visual periphery (taking care not to overlay subtitles or closed captioning), enabling quick access to frequent functions and allowing automatic replies or short lightweight messages to be sent, all helps in minimizing distraction.

A helpful tool for users to decide themselves if they want to be more engaged in interaction or not, is the status don't disturb. Viewers could be put on don't disturb in several ways, such as automatically (e.g. based on the kind of content (films), or when minimizing a program) or manually by the viewers themselves. When in don't

disturb mode, there should be some small unobtrusive indication when something is happening, otherwise, they will not notice that someone is trying to chat. However, this notification should be unobtrusive and users should be able to ignore it (without any disturbance, so it should go away automatically) or act on it when they feel like it.

A co-located viewing situation brings up another issue: when one user is interacting with the system, and several menus or other messages appear on screen, maybe even overlaying parts of the content, this can disturb other viewers. Separate screens (e.g. on a mobile device) can make sure that co-located viewers are not distracted while one or more persons are active.

Heuristic #8: Minimize distraction from the television program

Design system features so there is not too much distraction from watching the television program. Specific tools can help users control if they want to be distracted or not. Distraction of other co-located viewers should also be taken into account and minimized.

Examples of specific guidelines:

- Users should be able to put themselves in a status 'non-disturb', even better is to do this automatically (e.g. by detecting the TV-genre)
- When a user is in the status 'busy' or 'don't disturb', incoming events should be less intrusive or even blocked
- Do not provide too many statuses, as it is easily forgotten to change this. An automatic system for changing status would be even better.
- Users should be able to exchange light interactions in a quick and easy way
- Screen elements should be small and in the visual periphery, and not overlay subtitles or closed captioning
- Make sure text chat or comments do not take up too much space
- Frequent system functions should be very easy and quick to do

- Pop-up messages should automatically disappear after a few seconds when not acted upon
- Make it possible to send an automated reply
- The TV-program should not be resized too small, or not at all
- The activation and de-activation of an audio link should be very easy and quick to do

9.9 Notifications

When using social interactive television systems, users interact with each other in different ways. This can be explicit communication, having a text chat or voice chat, but it can also be less direct and involve a recommendation that is being sent, or even implicit interactions of users that change the television channel or ignore a sent recommendation. As with traditional usability, where feedback is needed about how the system responds to user actions, a sociable system should also provide feedback about actions or responses of other users. When a user sends a recommendation to a friend, he would like to know if that friend has accepted the recommendation or not. A notification from the system when a user starts watching a certain channel or leaves a certain channel helps in the communication process, so users know if they have common ground to talk about.

Of course, when giving the user a notification, this should not interfere with heuristic #8 that states that distraction from the television program should be minimized, otherwise users can get irritated about these (Boertjes et al., 2008). It is also advisable to make this a controllable feature, so that some users can disable them if wanted, or choose which ones they would like to receive and which ones not. In addition, the number of notifications and the way they are sent can be dependable on the status a user is in (don’t disturb) or the program genre he is watching.

Heuristic #9: Notify the user of incoming events and situation changes

When users are requested to respond to an action of another user, notify them visibly or audibly of these incoming events. When there are changes in another user's situation, e.g. when switching channels or when going from watching alone to watching in group, users that are actively interacting with this other user should also be notified of this change in situation.

Examples of specific guidelines:

- When a status is changed (especially to group status), this should be notified to users that are having an active conversation, so they know that people have entered the room and are listening in
- When incoming messages are blocked, there should be a small non disruptive indication that there is chat or other activity
- When a recommendation/invitation is accepted, give feedback to the sender if and how the receiver has reacted (accepted or not)
- When someone enters a channel or leave a channel, this should be notified, especially to users that are actively interacting or communicating with this person

9.10 Program genres

As a social television system will usually be used at the same time as watching a television program, its features should be in some way adapted to the content that is being shown. This is less straightforward than it might sound, as this content is very heterogeneous. Television programs (and by extension any video content) are classified into different genres, that each induce specific audience reactions or user experiences. Television program genres range from movies, drama and soap opera to reality TV, news and sports. One differentiator between these genres, that has an impact on social television systems, is the plot-structure. The more plot structure a genre has, the more attention a user has to pay to it to follow the program. This means that genres with high plot-structure are less suitable for social interactive television systems that support synchronous interaction and communication, as chatting demands some attention from a user as well and interferes with following the plot.

News, soap, quiz and sport are those genres during which people talk a lot while watching. For designing features for synchronous social iTV systems, these genres are most suitable. For asynchronous systems (such as for video sharing or leaving notes on top of a video stream), film and news are two genres people talk a lot about and which they would also like to share, while documentaries and music programs also score high. This means that the focus of asynchronous TV systems should be on these genres when designing features for these systems (see 8.1.4.2).

Different program genres also have different social uses. According to Lull (1980), soap opera is often used by viewers to learn how to deal with relational conflicts, and discuss this with friends and relatives. This explains why people use this in daily conversations, as evidenced by several researchers (see e.g. Fiske, 1988). A similar argument can be made for reality shows (Ducheneaut et al., 2008). These genres are therefore not only suitable for synchronous communication, because they have low plot-structure, but also for asynchronous systems, because people like to discuss about it. Other genres however show other patterns. People often talk during quiz shows for example, because viewers like to show off their knowledge to each other (Lull, 1980), but do not often talk about quiz shows. Showing competence during a quiz show is usually done synchronously, so one can answer a question before a contestant, and not by bragging afterwards how many answers you knew. So this genre is mostly suitable for synchronous communication.

Genres also play a role in the platform that viewers use to watch their television content. As users nowadays have several options to watch video content (computer, mobile phone, television, …), they can also choose what content they want to watch on which device. Documentaries and movies are preferably viewed on television, in contrast to the weather or breaking news, which people prefer to watch on their mobile phone. This confirms previous research that states that although the PC is becoming more and more an entertainment system, allowing online video watching (e.g. on YouTube) or even chatting while watching television (e.g. on CBS Watch & Chat), the living room is still seen as the most comfortable viewing location, because of the big television screen and comfortable couch (Brereton & O'Connor, 2007). Not only plot structure, but also the length of the content play a role in choosing a platform to watch this content. In addition, the urgent character of the content (e.g. breaking news) and the social situation (group privacy) also has an

impact on this decision. A mobile phone is usually preferred for short clips with low plot structure that can be watched in private, and that have an urgent character (high immediacy). E-mail received on PC is preferred for medium length clips with medium plot structure, which may or may not have an urgent character but can also be watched in private. Finally, television is a device on which people would want to receive long clips with high plot structure but without an urgent character that can be watched in company (see 8.1.4.1).

Heuristic #10: Adapt to appropriate television program genres

Take into account the properties of television genres, and offer features or settings that are appropriate for these genres. The plot structure and social uses of certain television genres are the important qualifying factors for this. The system should be tailored to television genres that are more suited for the synchronicity of the interaction or for specific platforms.

Examples of specific guidelines:

- Tailor synchronous systems for genres with low plot-structure such as news, soap operas, sports, quiz shows, reality TV or talk shows, and less so for genres such as film, drama, documentaries or news magazines that have high plot-structure
- Tailor asynchronous systems for genres that are being talked about a lot such as film, news, documentary, music programs or soap opera
- Tailor social TV on mobile phones for short clips with low plot-structure that can be private
- Tailor social TV on PC for different sized clips with medium to high plot-structure that can be private
- Tailor social TV on television for longer clips with medium to high plot-structure that are usually not private

9.11 Sharing content

Currently, user-generated content (UGC) is created and shared in large amounts. Although a lot of it is publicly available on sites such as Flickr or YouTube, even more UGC is hidden because it is only shared privately, and often not online but by exchanging videos or dvds, or just showing visitors vacation snapshots. It is therefore no surprise that in many user tests, people expressed a wish to be able to share content, either created themselves or broadcasted content that they have recorded. Legal issues aside, there are many benefits to social interaction that warrant social television systems to enable the sharing of content.

Sharing content alone is not sufficient however, users should be given additional options to edit the content, e.g. to cut out an interesting part and only share that. Moreover, sharing content should also be integrated with other features of the system, such as communicating by adding spoken or written comments to the content. As users often have access to different devices to watch content next to television, such as a computer or a mobile device, they should be able to send and receive content on these devices as well, and easily transfer it from one device to another device.

Heuristic #11: Let users share content flexibly

Make sure users can send content to and from different devices to share this with other users. They should be able to edit the content as they wish, and add some form of commentary to it. As much as possible, integrate sharing content with other features of the social television system.

Examples of specific guidelines:

- Make it possible to exchange recorded content
- Allow users to add a spoken or written commentary to recorded content they are sending to others
- Users should be able to add their own personal content to the system, and share, recommend or edit this
- Make sure users can send content to others on different devices

- When receiving clips, users should be able to transfer it to another device (cell phone, computer, television) e.g. by forwarding it

9.12 Sharing activities

Social TV is not only about communication, but also about sharing activities. Examples are watching the same television program at the same time, choosing which programs to watch, recommending a favourite television show, pointing out a funny scene, etc. A social television system should make it easy to start and maintain these activities by offering features that encourage them, such as easy to accept (or decline) invitations to watch together, a shared remote control to pause or fast forward content or a shared program guide that allows several people to choose a television program to watch.

Of course, just offering these features is not sufficient. They should take into account the specific nature of television, some of which are already covered by other heuristics, such as the minimization of distraction or the combination of remote and co-located interaction. There are however also specific aspects of sharing activities. For example, when watching content together, people often want to refer to something that is happening on screen and a delay when typing can make this problematic. A system that enables an accurate way of supporting this will enhance the sociability of communicating about television content. Another heuristic that also has impact on sharing activities is providing awareness, e.g. by letting users know when they are watching TV together, and when they are watching unsynchronized. This helps people to manage this shared activity better.

Heuristic #12: Encourage shared activities

Allow users to easily start and maintain shared activities around the television content, such as communicating, watching together, choosing programs or controlling the content. Make sure sufficient information is provided so efficient communication and interaction is enabled.

Examples of specific guidelines:

- Provide a way to invite other users, e.g. friends and family, to use the system
- Make it possible to invite others to watch the same channel
- When more than two users are watching pre-recorded content, a shared remote should be used - a master/slave model is preferred, but the 'slave' role should be able to take over the 'master' role - the master is the one that initiated the viewing
- When starting to watch a program that has already started, people should be able to call up a short visual or textual synopsis to catch up so they have common ground to talk about
- Make it easy for users to switch to a channel that another buddy is watching, so they can watch together
- Make a shared program guide available, e.g. for choosing programs together
- Provide enough information about a recommendation that is sent, such as a program summary or a picture in picture video, so the receiving user can make an informed decision to act on the recommendation or not.

9.13 Conclusion

The 12 heuristics presented in this chapter are the final result of our PhD, in which the central research question was: “which heuristics for supporting and stimulating social interaction can guide the design and evaluation of social interactive television systems?” Although it could be argued that some of the heuristics echo earlier heuristics and best practices, from CSCW as well as from other usability heuristics, we think it is important to present them as we did for several reasons: (1) the heuristics should form a coherent set, so they can be used on their own to evaluate Social TV sociability; (2) there’s a difference in “best practices” and heuristics, as best practices are not formulated as guidelines that can be used to evaluate interactive systems, and are often not applied systematically during design; and (3) the specific context of TV (the home) as well as the characteristics of watching TV (Lee & Lee,

1995; Chorianopoulos, 2008) warrant in our opinion a specialized set of heuristics addressing sociability issues for this domain.

It is advisable to use the heuristics with the accompanying text (see the previous sections), especially when the evaluator is still somewhat unfamiliar with the domain of social interactive television. The examples of specific guidelines for each heuristic, described in the previous sections, can be used to get an idea of the scope and applicability of the heuristics, but one should take care not to limit oneself to these examples, as the heuristics should also be applicable to new systems and features. When more experienced with the domain, or when having used the heuristics already a couple of times, an evaluator can use the list of heuristics as such. In Table 22, the complete list of 12 sociability heuristics is presented.

Table 22: Sociability Heuristics for Interactive Television

1. Offer different channels and levels for communicating freely
2. Use awareness tools for communicating availability
3. Allow both synchronous and asynchronous use
4. Support remote as well as co-located interaction
5. Exploit viewing behaviour for informing and engaging other viewers
6. Give the user appropriate control over actions and system settings
7. Guarantee both personal privacy and group privacy
8. Minimize distraction from the television program
9. Notify the user of incoming events and situation changes
10. Adapt to appropriate television program genres
11. Let users share content flexibly
12. Encourage shared activities

In the next chapter, we will draw some general conclusions from our PhD research and discuss how to use the heuristics, what the applicability of the heuristics is, as well as some further research that needs to be done.

PART IV: CONCLUSION

10. From interactive television to social television

The intention of this PhD was to create and present a set of sociability heuristics for interactive television. In this final chapter, we will first have a critical look at whether or not these sociability heuristics can support the social uses of television, as was intended. We will also discuss the methodology we used to create the heuristics, and what the advantages and disadvantages are. Moreover, we would like to discuss the implications of these heuristics in several ways: how can the heuristics be used in design and/or evaluation and how broadly applicable are the heuristics for interactive television? We will also address further research that needs to be done in order to validate the guidelines, and we will end this chapter with a personal view on the importance of these guidelines for the success of interactive television.

10.1 Supporting the social uses of television

We started this PhD with the observation that current interactive television systems are not well adapted to the social uses of television, and sociability heuristics are needed to create social television systems that support these social uses. Indeed, with the rise of on-demand television viewing, hundreds of digital channels, individualized viewing and personal recommendations, social practices are not well-supported in current interactive television services. It is therefore useful to return to the social uses of television, to see if the sociability heuristics derived from the use of social interactive television systems do match them. As the framework by James Lull was an important starting point, we will start by comparing his framework with our heuristics.

Within the relational uses of television, communication facilitation refers to the use of television programs as common ground, a way to start or enter a conversation, or to clarify values. Heuristic #1 (“Offer different channels and levels for communicating freely “) explicitly suggests to create enough opportunities to interact, so starting or maintaining conversations is made easy. Heuristic #2 (“Use awareness tools for communicating availability”) makes it possible to detect who is available for communicating, while heuristics #3 (“Allow both synchronous and asynchronous use”) and #4 (“Support remote as well as co-located interaction”) intend to support communication in several interactive television scenarios where

apart from synchronized co-located viewing, like with traditional television, communicating with asynchronous and/or remote viewing is being supported as well.

Affiliation/avoidance is, according to Lull, the possibility of television to strengthen the bonds in a family or bring family members closer, while on the other hand it can also facilitate avoidance strategies between family members, and as such alleviate family conflicts. Heuristic #12 (“Encourage shared activities”) most obviously brings family members, friends or other users of social television systems closer by encouraging them to engage in shared activities. Similarly, heuristic #11 (“Let users share content flexibly “) promotes interaction between users by allowing them to share content. More related to avoidance is heuristic #7 (“Guarantee both personal privacy and group privacy”), which ensures that users can decide which parts of their activities they want to disclose or not, and conflicts arising from inappropriate communication are avoided by taking into account group privacy as well.

Social learning, using television programs as source for making decisions or model ones own behaviour, is a social use of television that might be more difficult to relate to our sociability heuristics, as they do not deal with the content of television programs itself. However, heuristic #5 (“Exploit viewing behaviour for informing and engaging other viewers”) does imply that viewers can base certain choices, e.g. for watching a specific television program, on the behaviour of other viewers. Also, heuristic #11 (“Let users share content flexibly”) allows people to send content to each other to transmit certain values (“you should see this”), another aspect of social learning.

Competence/dominance is another social use that is less (directly) evident in our heuristics, referring to parents exercising authority, intellectual validation or confirming role patterns. During our tests, several parents mentioned that they would use a social television system as a kind of control device, to see what their children are watching, which is part of heuristic #5 (“Exploit viewing behaviour for informing and engaging other viewers”). Also, when shared activities are enabled (cf. heuristic #12 “Encourage shared activities”), a form of competition or intellectual validation becomes possible, especially when involving games or quiz shows.

Some of the heuristics not yet mentioned can be related to the structural uses of television. Heuristics #8 (“Minimize distraction from the television program”) and

#10 (“Adapt to appropriate television program genres”) both ensure that the environmental function of television, serving as a source of entertainment, is still guaranteed, even when using social interactive television systems. These heuristics are also in line with the observation of Lee & Lee (1995) that viewers like to relax and become highly involved in engrossing stories. Regulative uses of television can be supported by heuristic #5 (“Exploit viewing behaviour for informing and engaging other viewers”) and heuristic #2 (“Use awareness tools for communicating availability”) which both can inform viewers about when is the best time to start a conversation.

Two heuristics that we have not yet related to any of the social uses mentioned by Lull, are heuristic #6 (“Give the user appropriate control over actions and system settings”) and heuristic #9 (“Notify the user of incoming events and situation changes”). Both heuristics are more related to the traditional usability heuristics of Jakob Nielsen. Rather than removing them from the list as they are not related to the social uses of television, we want to include them as during our user tests it became apparent that they are very important for facilitating sociable interactions.

As a conclusion to this section, we can state that the heuristics can for the most part be related to the social uses as documented by Lull. Although this indicates that the sociability heuristics presented here do support the social uses of television, two important remarks must be made. First of all, although the typology of James Lull is based on prolonged ethnographic research as well as relevant research by other researchers, it is more than two decades old and thus not necessarily representative for the current social uses of television. However, in Chapter 1 we have seen that some of these social uses are also reported in more recent literature, and as there is not a more recent typology of social uses of television available, the classification by James Lull is the most useful to compare our heuristics to. Secondly, as interactive television offers more as well as different possibilities for using television, this can also result in new social uses which we cannot compare with the traditional social uses of television. We believe that the method we used to create the heuristics allowed us to stay close to the effective use of these systems, and have also captured some of these new ways of using interactive television. Nevertheless, validating the sociability heuristics is an important step which we will discuss further in this final chapter.

10.2 Creating domain-specific sociability heuristics

In this section, we will have a critical look at the methodology we used to arrive at our sociability heuristics. As indicated in Part II Methodology, we used a similar methodology as Dykstra (1993) and Pinelle et al. (2008) to create our heuristics. As a reminder, this means that competitive user tests with relevant systems are being used as a basis for identifying sociability issues, which are then grouped into categories and turned into heuristics.

The selection of the right systems to include in a competitive analysis is crucial to the credibility of the resulting heuristics. An important challenge to our research was therefore the availability of social interactive television systems. As our research started, only a limited amount of systems had been developed or were accessible to study. Fortunately, as our research progressed, the research field for these systems expanded, and a more diverse set of systems became available which included various features such as voice chat, text chat, emoticons, buddy lists, sending recommendations, sharing content, annotating clips, etc. However, we could not include a quiz-based social interactive television system like Telebuddies (Luyten et al., 2006) and it is plausible that future systems include features that would involve other relevant social aspects. It is thus possible that our sociability heuristics are not well adapted to some of these new systems. Nevertheless, as the heuristics are formulated in a general way (suited for heuristic evaluation), we hope they are flexible enough to be used for the analysis of (future) systems with other features as well.

Another challenge in our analysis was the largely unexplored nature of the concept of sociability, especially in the domain of interactive television. In contrast to Dykstra (1993) or Pinelle et al. (2008), who could draw upon well-established general usability principles to detect domain-specific usability problems, we had to keep a broad focus in the first user tests we performed as we could not anticipate the kind of sociability problems our participants would encounter. As the user tests we performed on the different systems did not take place in the same period, we could however improve our analytical lens in subsequent user tests which made them more focused. As an example, it became clear quite early on that trying to find usability issues at the same time as sociability issues is not possible, as usability problems stand in the way of a sociable experience. The analysis itself, using a grounded theory approach, also

provided enough opportunities to get more familiar with the sociability issues by revisiting the data several times and comparing the results from the different user tests.

Finally, an important limitation to our own studies is that they were all lab-based, and although we tried to recreate some resemblance to a real-life situation (e.g. by performing the tests in a simulated living room with family and friends), this means that we could not detect sociability problems that would manifest themselves in a natural user environment. For this reason, we included public reports of field tests in our analysis, to make sure the heuristics also reflect real-life use. However, as none of the systems studied have been commercially launched yet, and the field studies we analysed are also limited in time, it is hard to imagine what the results would be if they were based on a prolonged and voluntary use of these systems. Even though most heuristics that are created are not based on prolonged real-life use, such a strategy could improve the explanatory strength of the resulting heuristics significantly. Nevertheless, we think that – although based on an analysis of lab and field studies only – this is an opportunity to make our sociability heuristics available before any of these systems are commercially available and have an impact on the systems that are in development, rather than after they have been launched.

10.3 Using the heuristics in evaluation and design

As we have seen in chapter 3, heuristic evaluation is a widely used low-cost technique to evaluate interactive systems, which was one of the reasons why we chose to create a set of heuristics to evaluate the social aspects of interactive television. Before discussing how the heuristics can be used in evaluation, we would like to point out that the heuristics are also a useful instrument when designing interactive TV applications. Indeed, the heuristics can be a form of inspiration which the designers can use to assess the different features that could be possible when starting to design from scratch. For example, the first heuristic “Offer different channels for communicating freely” not only serves as a way to evaluate if a certain system has different channels for communicating freely, but can in an early design phase also direct a designer to implement several communication features at different levels. However, as the heuristics are formulated in a general way, which is important for guaranteeing a wide applicability during evaluation, it does not offer a list of design

choices or features that can be chosen from, which is the case with for example design patterns (Tidwell, 2005).

When using the sociability heuristics, it is important to keep two things in mind. Firstly, these heuristics are targeted at evaluating the sociability of interactive television applications, and although some of the heuristics are closely related to usability, they can not be used to evaluate the usability of these applications as well. This means that it is important to combine these sociability heuristics with usability heuristics (or guidelines) such as the ones from Chorianopoulos (2008) when evaluating an interactive television application. One should also not forget about the accessibility of interactive television applications (Gill & Perera, 2003), as this is an important element of a user-focused system that is targeted at a wide range of people.

Secondly, heuristics are not suitable for finding all problems in an interface, but rather for detecting the problems that are apparent from previous research, sometimes called ‘low-hanging fruit’ (Sauro, 2004) or ‘cleaning for the housekeeper’ (Straub, 2004). It is therefore important to combine a heuristic sociability evaluation with user testing for finding all problems. Like with usability evaluation as well, it is important to first perform a heuristic sociability evaluation and fixing the problems found, before performing user testing. Otherwise, one risks to find the same problems already defined by the heuristic evaluation, and not reach the deeper problems that can only be detected by observing real users use the system.

10.4 Applying the heuristics to interactive television

The section above illustrates how the heuristics can be used as an evaluation instrument or a design tool, and how a heuristic sociability evaluation should be combined with usability heuristics as well as with user testing. In this section, we want to discuss the applicability of the heuristics on certain application categories.

As discussed in chapter 2, interactive television can include several kinds of applications and can be accessed either via a set-top box and watched on a normal television set or via the Internet and watched on a PC. The question remains in how far the sociability heuristics presented here can be applied to all these categories of applications.

The interactive TV applications that have served as a basis for creating the heuristics are all applications whose main function was to foster social interaction in

some way. Some of these systems had a limited range of social features and others a very wide range of those features, but the core functionality remained the same. It is thus clear that the main applicability of the heuristics lays with social television systems. However, we think that the heuristics can also be used to improve other interactive television applications as well, or to enhance certain functions with social features, because the platform as well as the social context is the same as for social iTV applications. For example, an EPG can include social features, taking into account the heuristic "Exploit viewing behaviour for informing and engaging other viewers" and show social information in the EPG next to program information. Enhanced television applications that show information about a documentary could include an awareness feature that shows which friends are also reading the same information, and include a means of sending short clips to friends. However, when designing or evaluating 'traditional' interactive television applications based on sociability, not all of the heuristics are applicable.

When taking into account social TV applications on the Internet, as discussed in section 2.3.2, it is more complicated. The platform as well as the viewing experience and social context of Internet based systems are often substantially different from set-top box based systems, making it unsure in which degree certain heuristics are applicable or not. As Internet based systems were not included in the analysis, we can not claim that the heuristics are in any case applicable to these systems as well. However, certain heuristics can be assumed to be as relevant for these systems as for set-top box based systems, for example the heuristic "adapt to appropriate television genres". Other heuristics, such as "support remote as well as co-located sociability" lose part of their meaning as watching television programs on a PC is more often a solitary experience than with a normal television set. Although we think that some heuristics have an impact on Internet based systems, we think this is one of the areas where further research is needed. We will discuss this and other aspects that need further research in the following section.

10.5 Further research

Although our sociability heuristics are thoroughly grounded in actual use of several systems – in user tests as well as in field tests – and we can assume that this leads to a well-founded set of heuristics, it has not been tested or validated if the

heuristics actually work. We believe, based on our reading of Hartson et al. (2001), that in order to test these heuristics, a long-term field study should first be conducted with a well-working social television system, including a wide range of features, to detect the sociability problems that actual users have with this system in a real use situation. At the same time, the system should be evaluated by a number of evaluators – with one group using the sociability heuristics and the other group not. The problems found by the evaluators can then be compared with the problems found during the field tests. Although it is not necessary for the heuristics to uncover all problems found in the field – as we have already discussed that this is not possible – if the evaluators using the sociability heuristics uncover more real problems than the evaluators using no heuristics, we can conclude that the heuristics work at uncovering the sociability issues in an interactive television application. However, at this time and to our knowledge, there is no publicly available (so the evaluators can access it), well-functioning (so no technical problems hinder the users) social television system available that has a wide range of features (so the applicability of all heuristics can be evaluated). So although we would have liked to carry out such a validation process as part of this PhD, it is currently not possible to do this in a scientifically valid way.

As already indicated in the previous section, another research issue that could be tackled in the future, is in how far the heuristics are also applicable for Internet based social television applications. As this is an area that has shown a lot of activity in the past years, it is certainly a task that is worth pursuing in further research. One could take the same approach as discussed in the previous paragraph, and validate the heuristics using a field-study of Internet based systems, which are more easily accessible. However, this would probably lead to the elimination or reformulation of several of the heuristics. A better approach might be to start from scratch and do a competitive analysis of several Internet based social television systems in order to create a new set of sociability guidelines. These guidelines can consequently be compared to the sociability guidelines presented here, to see what the similarities are. One of the benefits of taking this approach is that not only existing heuristics can be confirmed or refuted, but also new sociability heuristics could come up during this analysis.

10.6 Social interactive television: the secret to success?

We'd like to conclude with a highly personal, subjective and tendentious view on the role of our sociability heuristics in the future of interactive television. While we do not claim to hold the key to the future of interactive television, we are however strongly convinced that paying attention to the social aspects of television can be a successful strategy for creating interactive TV applications that are widely used and highly appreciated by viewers. As shown throughout this PhD, a wide range of social television systems is being developed and we think that these systems, if well-designed and taking into account the sociability heuristics we presented, can be very successful.

The term "Social TV[31]" is however a pleonasm: television is social already, and has always been social. Although we acknowledge that television is and can be used solitary as well, interactive TV should not break this important social function of television. So we would like to take things even further, and suggest that all interactive TV applications should take these sociability heuristics into account and include social features in their design. Most current interactive television applications are targeted at single users: banking applications, e-mail, ordering clothes, looking up information, etc. Instead of putting energy in porting Internet applications to interactive television, a medium not well-suited for offering the same functionalities as a PC, we should capitalize on the strengths of that medium. As one of the strengths lies in the social uses it has supported since its conception, we hope that the sociability heuristics we presented in this PhD will help in building successful interactive television applications.

[31] The term Social TV instead of "Social iTV" is more commonly used in the USA as 'interactive television' has a bad connotation there.

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APPENDIX

APPENDIX 1: Consent Form User tests AmigoTV, Windows Messenger, CoSe and Ambulant Annotator

Afspraken nota

Gebruikerstest voor een nieuwe toepassing op interactieve televisie

1. Doel van de test

Het Centrum voor Usability Onderzoek (CUO) van de K.U. Leuven onderzoekt de een nieuwe toepassing op interactieve televisie.

U helpt ons in dit onderzoek door deel te nemen aan een gebruikerstest. Zo kunnen we deze toepassing verbeteren.

2. Verloop van de test

De test vindt plaats in het Mediacentrum van de K.U.Leuven. Ik zal u vragen een toepassing op interactieve televisie te gebruiken en een aantal vragen te beantwoorden. Het is de toepassing die wordt getest, niet u! U hoeft zich dus geen zorgen te maken dat u iets verkeerds zou doen.

De test wordt gevolgd door een onderzoeker. Alles zal worden opgenomen op video zodat we achteraf alles rustig kunnen bekijken. Deze videobeelden worden enkel voor onderzoeksdoeleinden gebruikt, en helpen ons om de toepassing te verbeteren.

3. Toelating gebruik videobeelden en antwoorden op vragen

Door dit document te ondertekenen geeft u toelating aan het Centrum voor Usability Onderzoek om de videobeelden, inclusief uw uitspraken en uw antwoorden op vragen, te gebruiken voor het onderzoeken en verbeteren van deze interactieve televisie toepassing, en de resultaten hiervan samen te vatten in wetenschappelijke publicaties. **Uw persoonlijke gegevens worden in geen geval prijs gegeven!**

4. Rechten van de testpersoon

De test neemt niet meer dan 2 uur in beslag. In principe is er geen pauze voorzien, maar moest u toch een korte onderbreking wensen, dan kan u dit steeds aan de onderzoeker vragen. Als u andere vragen heeft, dan kan u ook hiervoor steeds de onderzoeker aanspreken.

U hebt het recht om op elk moment de test te onderbreken als u dit wenst.

5. Vergoeding

Als dank voor de deelname aan de test ontvangt u een Fnac-bon ter waarde van 30 Euro. Deze vergoeding dekt zowel uw verplaatsingskosten, uw deelname aan de test als het gebruik van de resultaten verkregen uit de test.

Namens de K.U.Leuven
(naam en handtekening)

Gelezen en goedgekeurd
(naam, datum en handtekening)

Opgemaakt in tweevoud

APPENDIX 2: Consent Form User test TogetherTV

Purpose of Research	The research that we are currently conducting has to do with evaluating the concept of social television viewing. You will be using a prototype that gives you the ability to hear and talk with your friends or family, who are in a different room, while you watch a TV program together. By participating you will be helping Motorola evaluate new concepts in order to make products that better suit your lifestyle.
Procedures	If you agree to participate in this test, you will be asked to do the following: • Use the prototype to talk with your friends while you watch the show. • Fill in a questionnaire about your experiences with the prototype • Participate in an interview at the end of the test • Grant researchers permission to audiotape and videotape your interactions while watching the selected program. • Grant researchers permission to use your answers to the questions in the questionnaire • Grant researchers permission to record the interview.
Risks and Benefits	Upon completion of the test, you will receive $75 in American Express gift cheques, in appreciation for your participation in this research. There are no risks in participating in this study.
Confidentiality	The information that we collect in the study will be handled confidentially. Your information will be assigned a code number or pseudonym. Any presentation of the data and findings will use only numbers or pseudonyms, not real names. In turn, we ask you not to disclose any specifics of the prototype you will be using. You can, however, talk in general terms about the prototype and the test.

Voluntary Participation	Your participation in the test is completely voluntary. You have the right to withdraw from the test at any time. If you decide that you want to withdraw from the test, please tell the researchers. If you choose to withdraw, you will not receive compensation for your time. If the researchers choose to end the research early for any reason, you will still receive the $75 in gift checks in appreciation of your time and effort.
Video Release	
Yes___ No ___	I give consent for video from my session to be studied by the research team for use in the research project.
Yes___ No___	I give consent for video and stills from my session to be used in publications and presentations about this research project.
Audio Release	
Yes___ No ___	I give consent for audio from my session to be studied by the research team for use in the research project.
Yes___ No ___	I give consent for audio from my session to be used in publications and presentations about this research project.
Questionnaire and Interview	
Yes___ No ___	I give consent for the answers to questions on the questionnaire and the group interview to be studied by the research team for use in the research project.
Yes___ No ___	I give consent for the answers to questions on the questionnaire and the group interview to be used in presentations about this research project.

Questions	If you have any questions about the research, please feel free to contact any of the researchers listed below. David Geerts [+32-486-63-32-61] david.geerts@soc.kuleuven.be Crysta Metcalf [847-321-0049] crysta.metcalf@motorola.com Gunnar Harboe [847-576-1207] gunnar.harboe@motorola.com Guy Romano [847-576-0597] guy@motorola.com
	If you have any concerns about or objections to the research, you may report them to: Larry Marturano [847-576-5170] larry.marturano@motorola.com
Agreement	I have read and understand the 3 pages of information on the purpose of the test, the procedures that will be followed, the use and confidentiality of the data, the risk and benefits, and freedom to withdraw from the test. I agree to participate in the user test described above.
Signature	Sign:_____ Date:_____

APPENDIX 3: Briefing User Test AmigoTV and Windows Messenger

Briefing 1 (AmigoTV – WMC)

We gaan vandaag twee programma's testen waarmee je kan communiceren via televisie. Met AmigoTV kan je met elkaar praten en cartoons naar elkaar sturen, met Windows Media Center kan je chatten. (Weet je wat dit is? Zo niet, dan leg ik dit straks nog wel uit.) Bij beiden gebeurt dit tijdens het kijken naar een tv-programma. De test zal dan ook in twee delen gebeuren: eerst AmigoTV, vervolgens Windows Media Center. Na elke deel zal ik jullie enkele vragen stellen over jullie ervaringen.

We testen niet hoe goed jullie met de programma's kunnen omgaan, maar we testen de programma's zelf. Jullie kunnen dus niets verkeerd doen. Als er iets niet goed moest gaan, dan is dat een probleem met het programma, niet met jullie!! Ik heb de programma's niet zelf gemaakt, dus je kan heel eerlijk zeggen wat je ervan vond.

Voor de test splitsen we jullie op in twee groepen. De ene groep blijft hier in het testlab, de andere groep mag straks naar de vergaderzaal gaan. Via walkietalkie zal ik in contact blijven met de groep in de vergaderzaal. (aanduiden wie naar vergaderzaal moet)

We starten de test met AmigoTV. Ik zal je eerst wat uitleg geven over hoe het werkt. Straks doe ik hetzelfde voor Windows Media Center.

Je bent automatisch ingelogd. De groep uit het Usability Lab is 'DAVID'. De groep uit de vergaderzaal is 'TIM'. Via de 'MENU'-toets kan je het menu oproepen, waarin je met de pijltjestoetsen kan bewegen en met de OK-toets kan selecteren. Hier kan je via 'CARTOONS' een cartoon versturen naar de andere groep (voorbeeld tonen). Via 'MY FACES' kan je een emotie kiezen. Met de menu-optie 'BUDDIES' kan je zien naar welk programma de andere groep aan het kijken is. Met de OK-toets roep je de opties op: JOIN, INVITE, ZAP

TO of BACK. De andere menukeuzes heb je niet nodig. Met de toets Program + en – kan je van kanaal veranderen. Heb hierbij geduld, want dit gaat trager dan bij een normale televisie. Met de toets VOLUME + en – kan je het geluid van het programma zelf regelen (niet de stem van de anderen). Blijf de toets niet indrukken, maar doe dit keer per keer. Wacht even tot je hoort of het beter is voor je de toets opnieuw indrukt.

Je opdracht is nu om een halfuurtje tv te kijken naar het programma ……. Beide groepen starten met een ander programma. De groep uit het Usability Lab dient de andere groep uit te nodigen om naar hetzelfde programma te kijken. Probeer met de andere groep te praten over het programma, zoals je dit normaal gezien ook doet als je in dezelfde kamer bent. Als je een kwartier niet zegt heb ik niet veel aan de test, dus probeer regelmatig iets te zeggen, maar je hoeft niet te overdrijven als het te geforceerd is.

Ik ga nu naar de vergaderzaal met de andere groep om hen op gang te zetten, en kom dadelijk terug naar het lab om het programma te starten. Zodra het programma is gestart kan de test beginnen. (vergaderzaal: walkietalkie uitleggen)

De volgende test gebeurt met Windows Media Center. Met de afstandsbediening roep je met de toets MORE INFO een venster op waarin je Messenger kan selecteren. Je kan dan TIM selecteren, en hier een bericht naar sturen. Een bericht typ je in met het toetsenbord. Met ENTER of OK verstuur je het bericht. Met de pijltjestoetsen op de afstandsbediening of het toetsenbord kan je naar het minnetje gaan om het chatvenster te minimaliseren. Met de MORE INFO toets kan je dit venster opnieuw oproepen.

Ik ga nu naar de vergaderzaal om de andere groep uitleg te geven. Ik zal daarna via de intercom het startsignaal geven, waarna je op PLAY moet duwen. Ik zeg 3 – 2 – 1- START. Op START duw je op play, en kan de test starten. Ook nu weer vraag ik je op een normale manier met de andere groep over het programma te praten. Ditmaal is het onmiddellijk hetzelfde programma.

Uitleg vergaderzaal: via Messenger kan je praten met de andere groep, in het andere venster kijk je naar hetzelfde programma. Ik zal via de walkietalkie het startsignaal geven, waarna je op PLAY moet duwen. Ik zeg 3 – 2 – 1- START. Op START duw je op play, en kan de test starten. Ook nu weer vraag ik je op een normale manier met de andere groep over het programma te praten. Ditmaal is het onmiddellijk hetzelfde programma.

Briefing 2 (WMC – AmigoTV)

We gaan vandaag twee programma's testen waarmee je kan communiceren via televisie. Met AmigoTV kan je met elkaar praten en cartoons naar elkaar sturen, met Windows Media Center kan je chatten. (Weet je wat dit is? Zo niet, dan leg ik dit straks nog wel uit.) Bij beiden gebeurt dit tijdens het kijken naar een tv-programma. De test zal dan ook in twee delen gebeuren: eerst AmigoTV, vervolgens Windows Media Center. Na elke deel zal ik jullie enkele vragen stellen over jullie ervaringen.

We testen niet hoe goed jullie met de programma's kunnen omgaan, maar we testen de programma's zelf. Jullie kunnen dus niets verkeerd doen. Als er iets niet goed moest gaan, dan is dat een probleem met het programma, niet met jullie!! Ik heb de programma's niet zelf gemaakt, dus je kan heel eerlijk zeggen wat je ervan vond.

Voor de test splitsen we jullie op in twee groepen. De ene groep blijft hier in het testlab, de andere groep mag straks naar de vergaderzaal gaan. Via walkietalkie zal ik in contact blijven met de groep in de vergaderzaal. (aanduiden wie naar vergaderzaal moet)

We starten de test met Windows Media Center. Ik zal je eerst wat uitleg geven over hoe het werkt. Straks doe ik hetzelfde voor AmigoTV.

De groep uit het Usability Lab is 'DAVID'. De groep uit de vergaderzaal is 'TIM'. Met de afstandsbediening roep je met de toets MORE INFO een venster op waarin je Messenger kan selecteren. Je kan dan TIM selecteren, en hier een bericht naar sturen. Een bericht typ

je in met het toetsenbord. Met ENTER of OK verstuur je het bericht. Met de pijltjestoetsen op de afstandsbediening of het toetsenbord kan je naar het minnetje gaan om het chatvenster te minimaliseren. Met de MORE INFO toets kan je dit venster opnieuw oproepen.

Je opdracht is nu om een halfuurtje tv te kijken naar het programma ……. De andere groep kijkt naar hetzelfde programma. Probeer met de andere groep te praten over het programma, zoals je dit normaal gezien ook doet als je in dezelfde kamer bent. Als je een kwartier niets zegt heb ik niet veel aan de test, dus probeer regelmatig iets te zeggen, maar je hoeft niet te overdrijven als het te geforceerd is.

Ik ga nu naar de vergaderzaal om de andere groep uitleg te geven. Ik zal daarna via de intercom het startsignaal geven, waarna je op PLAY moet duwen. Ik zeg 3 – 2 – 1- START. Op START duw je op play, en kan de test starten.

Uitleg vergaderzaal: via Messenger kan je praten met de andere groep, in het andere venster kijk je naar hetzelfde programma. Ik zal via de walkietalkie het startsignaal geven, waarna je op PLAY moet duwen. Ik zeg 3 – 2 – 1- START. Op START duw je op play, en kan de test starten. Ook nu weer vraag ik je op een normale manier met de andere groep over het programma te praten. Ditmaal is het onmiddellijk hetzelfde programma.

Je bent automatisch ingelogd. De groep uit het Usability Lab is ‘DAVID’. De groep uit de vergaderzaal is ‘TIM’. Via de ‘MENU’-toets kan je het menu oproepen, waarin je met de pijltjestoetsen kan bewegen en met de OK-toets kan selecteren. Hier kan je via ‘CARTOONS’ een cartoon versturen naar de andere groep (voorbeeld tonen). Via ‘MY FACES’ kan je een emotie kiezen. Met de menu-optie ‘BUDDIES’ kan je zien naar welk programma de andere groep aan het kijken is. Met de OK-toets roep je de opties op: JOIN, INVITE, ZAP TO of BACK. De andere menukeuzes heb je niet nodig. Met de toets Program + en – kan je van kanaal veranderen. Heb hierbij geduld, want dit gaat trager dan bij een normale televisie. Met de toets VOLUME + en – kan je het geluid van het programma zelf regelen (niet de stem van

de anderen). Blijf de toets niet indrukken, maar doe dit keer per keer. Wacht even tot je hoort of het beter is voor je de toets opnieuw indrukt.

Je opdracht is nu om een halfuurtje tv te kijken naar het programma ……. Beide groepen starten met een ander programma. De groep uit het Usability Lab dient de andere groep uit te nodigen om naar hetzelfde programma te kijken. Ook nu weer vraag ik je op een normale manier met de andere groep over het programma te praten.

Ik ga nu naar de vergaderzaal met de andere groep om hen op gang te zetten, en kom dadelijk terug naar het lab om het programma te starten. Zodra het programma is gestart kan de test beginnen. (vergaderzaal: walkietalkie uitleggen)

APPENDIX 4: Questionnaire User Test AmigoTV and Windows Messenger

Vragenlijst

Testnr.

Testgebruiker nr.

Ik ga nu enkele vragen stellen. Er zijn geen juiste of foute antwoorden, het is uw mening die telt! Ik heb de programma's niet gemaakt, dus antwoord gerust zo eerlijk mogelijk.

Ik ga eerst enkele vragen stellen over AmigoTV

1. Vond je het makkelijk of moeilijk om te praten met elkaar tijdens het tv-programma?

Zeer makkelijk	Makkelijk	Noch makkelijk noch moeilijk	Moeilijk	Zeer moeilijk

Waarom?

2. Vond je het makkelijk of moeilijk om te horen wie aan het praten was?

Zeer makkelijk	Makkelijk	Noch makkelijk noch moeilijk	Moeilijk	Zeer moeilijk

3. Hoe belangrijk is het voor jou om te horen wie aan het praten was?

Zeer belangrijk	Belangrijk	Noch belangrijk noch onbelangrijk	Onbelangrijk	Zeer onbelangrijk

4. Vond je het leuk of vervelend om cartoons te kunnen versturen? Waarom?

Zeer leuk	Leuk	Noch leuk noch vervelend	Vervelend	Zeer vervelend

5. Vond je het zinvol of zinloos om een ander gezicht te kunnen instellen?

Zeer zinvol	Zinvol	Noch zinvol noch zinloos	Zinloos	Zeer zinloos

6. Vond je het zinvol of zinloos om te zien naar welk programma de andere groep aan het kijken was?

Zeer zinvol	Zinvol	Noch zinvol noch zinloos	Zinloos	Zeer zinloos

7. Vond je het makkelijk of moeilijk om de andere groep uit te nodigen om hetzelfde programma te bekijken?

Zeer makkelijk	Makkelijk	Noch makkelijk noch moeilijk	Moeilijk	Zeer moeilijk

8. Vind je de plaats die het menu inneemt veel of weinig?

Zeer veel	Veel	Noch veel noch weinig	Weinig	Zeer weinig

9. Vond je het makkelijk of moeilijk om verder te ‘kijken’ (niet luisteren) naar het tv-programma?

Zeer makkelijk	Makkelijk	Noch makkelijk noch moeilijk	Moeilijk	Zeer moeilijk

10. Vond je het makkelijk of moeilijk om verder te ‘luisteren’ (niet kijken) naar het tv-programma?

Zeer makkelijk	Makkelijk	Noch makkelijk noch moeilijk	Moeilijk	Zeer moeilijk

11. Vond je het makkelijk of moeilijk om het tv-programma te volgen?

Zeer makkelijk	Makkelijk	Noch makkelijk noch moeilijk	Moeilijk	Zeer moeilijk

22. Hoe vond je het contact met de andere groep tijdens het kijken naar het tv-programma?

Zeer goed	Goed	Noch goed noch slecht	Slecht	Zeer slecht

23. Hoe goed vond je het onderlinge contact?

Zeer goed	Goed	Noch goed noch slecht	Slecht	Zeer slecht

12. Welke functies of mogelijkheden miste je nog of zou je nuttig vinden om te communiceren met elkaar?

Nu ga ik enkele vragen stellen over Windows Media Center

(uitgevoerd op PC / op TV)

11. Vond je het makkelijk of moeilijk om te chatten met de andere groep tijdens het tv-programma? Waarom?

Zeer makkelijk	Makkelijk	Noch makkelijk noch moeilijk	Moeilijk	Zeer moeilijk

12. Vond je het makkelijk of moeilijk om te weten wie er aan het chatten was?

Zeer makkelijk	Makkelijk	Noch makkelijk noch moeilijk	Moeilijk	Zeer moeilijk

13. Hoe belangrijk is het voor jou om te weten wie er aan het chatten was?

Zeer belangrijk	Belangrijk	Noch belangrijk noch onbelangrijk	Onbelangrijk	Zeer onbelangrijk

14. Vond je het makkelijk of moeilijk om te beslissen wie van jullie het toetsenbord bediende?

Zeer makkelijk	Makkelijk	Noch makkelijk noch moeilijk	Moeilijk	Zeer moeilijk

15. Vond je het handig of onhandig om het toetsenbord door te geven?

Zeer handig	Handig	Noch handig noch onhandig	Onhandig	Zeer onhandig

16. Vind je de plaats die het chat-venster inneemt veel of weinig?

Zeer veel	Veel	Noch veel noch weinig	Weinig	Zeer weinig

17. Vond je het makkelijk of moeilijk om verder te ‘kijken’ (niet luisteren) naar het tv-programma?

Zeer makkelijk	Makkelijk	Noch makkelijk noch moeilijk	Moeilijk	Zeer moeilijk

18. Vond je het makkelijk of moeilijk om verder te ‘luisteren’ (niet kijken) naar het tv-programma?

Zeer makkelijk	Makkelijk	Noch makkelijk noch moeilijk	Moeilijk	Zeer moeilijk

10. Vond je het makkelijk of moeilijk om het tv-programma te volgen?

Zeer makkelijk	Makkelijk	Noch makkelijk noch moeilijk	Moeilijk	Zeer moeilijk

22. Hoe vond je het contact met de andere groep tijdens het kijken naar het tv-programma?

Zeer goed	Goed	Noch goed noch slecht	Slecht	Zeer slecht

23. Hoe goed vond je het onderlinge contact?

Zeer goed	Goed	Noch goed noch slecht	Slecht	Zeer slecht

12. Welke functies of mogelijkheden miste je nog of zou je nuttig vinden om te communiceren met elkaar?

Nu ga ik enkele algemene vragen stellen over beide programma's

19. Vond je het leuk of vervelend om over hetzelfde tv-programma te praten? Waarom?

Zeer leuk	Leuk	Noch leuk noch vervelend	Vervelend	Zeer vervelend

20. Welke van de twee programma's vond je het handigst, AmigoTV of WMC? Waarom?

AmigoTV	Even handig	Windows Media Center

20. Welke van de twee programma's vond je het leukst, AmigoTV of WMC? Waarom?

AmigoTV	Even leuk	Windows Media Center

21. Denk je dat je onderling meer of minder praatte over het tv-programma dan je thuis doet?

Veel meer	Meer	Noch meer noch minder	Minder	Veel minder

Ten slotte ga ik nog enkele vragen stellen in verband met persoonlijke gegevens

(Geslacht: M / V)

24. Wat is uw geboortejaar?

25. Wat is uw hoogst behaald diploma?

26. Wat is uw beroep?

27. Hoe dikwijls kijkt u televisie?

Elke dag	Eén of meerdere keren per week	Eén of meerdere keren per maand

Hoe vaak kijkt u samen met anderen televisie? Met wie?

Altijd	Regelmatig	Af en toe	Zelden	Nooit

Hoe vaak praat u tijdens het programma met anderen? Bij welke programma's veel, bij welke weinig, bij welke niet?

Altijd	Regelmatig	Af en toe	Zelden	Nooit

Hoe vaak praat u achteraf over tv-programma's? Met wie? Over welke programma's?

Altijd	Regelmatig	Af en toe	Zelden	Nooit

28. Hoe vaak maakt u gebruik van Teletekst?

Elke dag	Eén of	Eén of	Eén of	Nooit

	meerdere keren per week	meerdere keren per maand	meerdere keren per jaar	

29. Hoe makkelijk vindt u het gebruik van Teletekst?

Zeer makkelijk	Makkelijk	Noch makkelijk noch moeilijk	Moeilijk	Zeer moeilijk

30. Hoe dikwijls maakt u gebruik van een computer?

Elke dag	Eén of meerdere keren per week	Eén of meerdere keren per maand	Eén of meerdere keren per jaar	Nooit

31. Hoe lang maakt u al gebruik van een computer? Druk dit uit in maanden of jaren.

32. Welke van de volgende toepassingen gebruikt u op een computer?

	Regelmatig	Af en toe	nooit	Ken ik niet
Eenvoudige tekstverwerking (Word)				
Tekenprogramma's of grafische programma's (bv. Photoshop)				
Het maken van bv. brochures of clubbladen, m.a.w. desktop publishing (vb. Publisher of uitgebreide functies in Word)				
Database beheer, databasemanage-ment, (bv. Dbase, Access, Exell)				
Computerspelletjes op PC				
Programmeren				
Instellingen aanpassen				
Surfen op Internet				
Chatten op Internet				
E-mails nakijken op Internet				

32. Hoe makkelijk vindt u het gebruik van een computer?

Zeer makkelijk	Makkelijk	Noch makkelijk noch moeilijk	Moeilijk	Zeer moeilijk

3.5. Hoe ervaren vindt u zichzelf met het gebruiken van een computer?

Zeer onervaren	Onervaren	Noch ervaren noch onervaren	Ervaren	Zeer ervaren

33. Hoe dikwijls maakt u gebruik van de afspeelfunctie van een videorecorder/dvd-speler/dvd-recorder?

Elke dag	Eén of meerdere keren per week	Eén of meerdere keren per maand	Eén of meerdere keren per jaar	Nooit

35. Hoe makkelijk vindt u het gebruik van de afspeelfunctie van een videorecorder/dvd-speler/dvd-recorder?

Zeer makkelijk	Makkelijk	Noch makkelijk noch moeilijk	Moeilijk	Zeer moeilijk

36. Hoe dikwijls maakt u gebruik van de opnamefunctie van een videorecorder/dvd-recorder?

Elke dag	Eén of meerdere keren per week	Eén of meerdere keren per maand	Eén of meerdere keren per jaar	Nooit

38. Hoe makkelijk vindt u het gebruik de opnamefunctie van een videorecorder/dvd-recorder?

Zeer makkelijk	Makkelijk	Noch makkelijk noch moeilijk	Moeilijk	Zeer moeilijk

APPENDIX 5: Briefing User Test Social TV

Briefing test TogetherTV

(check timing: ok to extend to an hour and a half, or not?)

Today, we will test an application that allows you to communicate via a normal television. This application is called TogetherTV. With TogetherTV, you can talk to your friends or relatives while watching television, and see which channel they are watching, while they are at their own home.

The test will consist of three parts: first I will ask you to watch a television show together. The second part of the test consists of a questionnaire that each participant has to fill in separately. Finally, I will conduct a group interview, asking you some questions about your experience.

We are not testing how well you can work with the application, but we test the application itself. So you can not do anything wrong. If anything would go wrong, the program is to blame and not you. As I am not the designer of the program, feel free to be honest when giving your opinion.

We will split you up in two groups for the test. One group will stay here; the other group can go to a separate room in a few minutes. [clearly say who is group 1, and who is group 2]

I will first explain briefly how TogetherTV works. [Use guide and remote control to show how the system works]

I'd like you to watch a television show for about half an hour. Pretend you're at home, and both groups are watching television. You'd like to watch the same television program, so spend the first minutes deciding on which television show you'd like to watch together. You can talk with the other group while watching television on a subject you want,

like you would at home when watching television with people in the same room. Try not to be silent for the whole test, but don’t force it either. Keep it as natural as possible.

I will now go to the meeting room to set-up the second group, and will give you a cue as soon as the test will start.

Is everything clear?

APPENDIX 6: Group Interview User Test Social TV

Questions/issues for group interview

User test TogetherTV

SECTION I: Experience with TogetherTV

1. **What did you find most appealing, interesting or fun about your experience with the application?**

2. **What did you find most problematic, difficult or annoying about your experience with the application?**

3. **What do you think of being able to see what the other group was watching?**

4. **What do you think of sending a recommendation to the other group?**

5. **What do you think of being able to see who is online or not?**

6. **Which functionality or options did you miss or would you find useful to communicate with each other?**

SECTION II: Watching television together (if there's still time left)

7. **With whom do you watch television together? Can you tell me about the last time you watched television together with someone?**

8. **Do you talk more or less with family than with friends while watching television? Can you give me an example?**

9. **Are there times someone is talking and you don't want to? Or you want to talk, but the other person not? Can you tell me about the last time this happened?**

10. **During which programs do you talk a lot, which programs less, which programs not at all? Can you give me an example of a program during which you recently talked a lot?**

11. **Where and with whom do you talk about television, away from the television? When and where was the last time you talked about television?**

APPENDIX 7: Questionnaire User Test Social TV

Questionnaire TogetherTV

Test no.: Participant no.:

Please fill in this questionnaire. There are no right or wrong answers, only your opinion counts. As I have not designed the application myself, you can be completely honest about your opinion.

SECTION I: Questions about your experience with TogetherTV

12. Did you find it easy or difficult to talk to the other group during the television show?

Very easy	Easy	Neither easy nor difficult	Difficult	Very difficult

13. Did you find it easy or difficult to hear who (from the other group) was talking?

Very easy	Easy	Neither easy nor difficult	Difficult	Very difficult

14. How important is it for you to hear who was talking?

Very important	Important	Neither important nor unimportant	Unimportant	Very unimportant

15. Did you find it easy or difficult to keep following the television show?

Very easy	Easy	Neither easy nor difficult	Difficult	Very difficult

16. Did you find it easy or difficult to watch (not listen to) the television show?

Very easy	Easy	Neither easy nor difficult	Difficult	Very difficult

17. Did you find it easy or difficult to listen to (not watch) the television show?

Very easy	Easy	Neither easy nor difficult	Difficult	Very difficult

18. How do you rate the connection you had with the persons in the same room, compared to watching television at home with other people?

Very good	Good	Neither good, nor bad	Bad	Very bad

19. How do you rate the connection that you had with the other group, compared to watching television at home with other people?

Very good	Good	Neither good, nor bad	Bad	Very bad

20. Did you find it fun or annoying to talk with your friends/relatives in the other room while watching television?

Very fun	Fun	Neither fun, nor annoying	Annoying	Very annoying

21. With the people in the same room, did you talk more or less while watching television than you do at home?

A lot more	More	Neither more nor less	Less	A lot less

22. Did you find it useful or useless to see what television program the other group was watching?

Very useful	Useful	Neither useful nor useless	Useless	Very useless

23. Did you find it useful or useless to send a recommendation to the other group?

Very useful	Useful	Neither useful nor useless	Useless	Very useless

SECTION II: Questions about your media use

24. How often do you watch television?

Daily	Once or more per week	Once or more per month

25. How often do you watch television together with other people?

Always	Regularly	Sometimes	Rarely	Never

26. How often do you talk with other people while watching television?

Always	Regularly	Sometimes	Rarely	Never

27. How often do you talk about television shows after they were on (e.g. at work, with friends, in the pub, …)

Always	Regularly	Sometimes	Rarely	Never

28. How often do you use on-screen program guides?

Daily	Once or more a week	Once or more a month	Once or more a year	Never

29. How easy or difficult do you find using on-screen program guides?

Very easy	Easy	Neither easy nor difficult	Difficult	Very difficult

30. How often do you use a computer?

Daily	Once or more a week	Once or more a month	Once or more a year	Never

31. How long have you been using a computer (in number of months or years)?

32. What do you mainly use your computer for? Multiple answers are allowed.

☐ Visiting websites ☐ Reading and sending e-mail

☐ Instant messaging ☐ Word processing

☐ Gaming ☐ Webdesign

☐ Graphic design ☐ Programming

☐ Other, please specify:

33. How easy or difficult do you find using a computer?

Very easy	Easy	Neither easy nor difficult	Difficult	Very difficult

34. How often do *you* play a videocassette or dvd (not on a computer)?

Daily	Once or more a week	Once or more a month	Once or more a year	Never

35. How easy or difficult do you find playing a videocassette or dvd? (if applicable)

Very easy	Easy	Neither easy nor difficult	Difficult	Very difficult

36. How often do *you* record television content (shows, movies, …) on a videocassette, dvd or hard disk recorder (e.g. Tivo)?

Daily	Once or more a week	Once or more a month	Once or more a year	Never

37. How easy or difficult do you find recording television content on videocassette, dvd or hard disk? (if applicable)

Very easy	Easy	Neither easy nor difficult	Difficult	Very difficult

SECTION III: Questions about yourself

38. What is your gender?

☐ Male ☐ Female

39. What is your date of birth (MM/DD/YYYY)?

40. What is your highest education level?

41. What is your profession?

Thank you for answering these questions!

Please return the filled in questionnaire to David Geerts.

The group interview will begin as soon as everyone has finished the questionnaire.

APPENDIX 8: Briefing User Test CoSe

Briefing
Gebruikerstest CoSe

Je bent hier in het kader van een onderzoeksproject om de gebruiksvriendelijkheid van een communicatietoepassing voor interactieve televisie te testen. Ik zal je zo dadelijk enkele opdrachten geven om uit te voeren met de toepassing. **Lees de opdracht luidop voor** wanneer je aan de taak begint. Probeer de opdracht volledig uit te voeren zoals ze staat omschreven. Wanneer een opdracht is afgerond, dan mag je zelf naar de volgende opdracht gaan.

Denk eraan, **het is de toepassing op interactieve televisie die wordt getest**, niet jij. Je kunt dus niets fout doen.

De toepassing waar je mee gaat werken is een **prototype**. Dat wil zeggen dat nog niet alles werkt. Het zou dus kunnen dat je een functie gebruikt die niets doet. Moest dit zo zijn, dan zal ik laten weten dat dit het geval is.

Je kan zowel het **toetsenbord** als de **afstandsbediening** gebruiken, je kan zelf kiezen wat je wanneer gebruikt, en wie dit bedient.

Ik zou je willen vragen om tijdens het gebruik van de toepassing, **luidop te zeggen wat je denkt**, bijvoorbeeld over wat je makkelijk of moeilijk vindt, wat je leuk of vervelend vindt, wat je goed of niet goed vindt, of er iets ontbreekt, …

Heb je hierover al vragen? Als je later nog vragen hebt, dan kan je die mij natuurlijk altijd stellen. Ook wanneer je even een pauze wil of naar het toilet moet.

Dan ga ik nu naar de ruimte hiernaast en geef ik een seintje wanneer je aan de eerste taak mag beginnen. Als alle opdrachten gedaan zijn, kom ik terug om een aantal vragen te stellen en samen een paar extra opdrachten te doorlopen.

Opdrachten gebruikerstesten CoSe

Demo1 en Demo2 hoofdgebruikers. Demo3, Demo4 en Demo5 inloggen en op away (afwezig), don't disturb (Bezet) en In Groep zetten (statussen testen) Paswoord: siemens2200

Extra taken:

Informatie vooraf: de groep in kamer 1 logt in als "Demo1", de groep in kamer 2 als "Demo2" → veranderen in eigen naam (schermnaam) + bij toevoegen van buddy veranderen naar naam uit andere groep

1. **Login**

Je bent aan het kijken naar tv. Je wil tijdens het kijken graag chatten met je vrienden/familie. Je hebt net een nieuwe toepassing gekregen waarmee dit mogelijk is. Je vrienden/familieleden van jou in de andere kamer hebben deze toepassing ook.

Start de toepassing op met de groene knop, en meld je aan als Demo1 met paswoord siemens2200. Zorg ervoor dat je de volgende keer het paswoord niet meer moet ingeven.

2. **Naam van je eigen buddy wijzigen**

Verander de naam Demo1 waarmee je aangemeld bent in je eigen naam (als je met meerdere bent, kies dan één naam)

3. **Add buddies**

Je wil met je vrienden/familie die in een andere kamer zitten kunnen praten. Zorg ervoor dat je hen straks met deze toepassing kan contacteren. (Je moet nu nog geen gesprek starten met hen). Je weet dat hun gebruikersnaam "Demo2" is, maar je wil wel (één van) hun echte namen zien.

4. **Presence information van anderen**

Zoek uit naar welk TV programma je vrienden/familie aan het kijken zijn, zodat je weet of je naar hetzelfde aan het kijken bent.

5. **Eigen presence information**

Zorg ervoor dat je vrienden/familieleden ook weten naar welk programma je zelf aan het kijken bent.

6. **Kleur**

Wijzig de kleur van de achtergrond in geel.

7. **Samen TV kijken**

Je wil met je vrienden/familie praten over één van de beschikbare tv-programma's (kanaal 51 met Lost, kanaal 52 met De Pfaffs en kanaal 53 met voetbal) waar je het liefste naar zou kijken. Zap naar dit kanaal, en zorg ervoor dat ze ook naar hetzelfde programma kijken.

8. **Chat**

Start een conversatie met je vrienden/familie. Kijk vervolgens een kwartiertje naar het gekozen programma. Ondertussen mag je met je vrienden/familie hierover chatten.

9. **Reacting on pop-up in full-screen**

Bekijk het tv-programma op volledig scherm. Als je een berichtje krijgt van één van je vrienden of familieleden, negeer dan dit bericht. Als je een tweede keer een bericht krijgt van één van je vrienden of familieleden, reageer dan wel door te praten over het tv-programma.

10. **Add buddies (2)**

Voeg ook Demo3, Demo4 en Demo5 toe aan je contacten.

11. **Status icons**

Je wil graag ook met iemand anders praten over het tv-programma dat je aan het kijken bent. Wie is er nog beschikbaar om mee te praten?

12. **Change status**

Je wil even kijken naar een spannende serie, en je wil niet gestoord worden. Zorg ervoor dat je vrienden en familieleden je niet kunnen storen.

13. **Group status**

Naast je zit iemand mee TV te kijken. Zorg ervoor dat je vrienden en familieleden weten dat je met twee (of meer) tv aan het kijken bent.

14. **Send message**

Je wil snel iets zeggen tegen je vrienden/familieleden, maar zonder een conversatie te starten. Stuur een kort berichtje naar hen.

15. **Media browsing**

Je hebt een aantal foto's van je vakantie op je tv staan. Bekijk je foto's. Sorteer de foto's op datum, zodat de recentste eerst staan, en kies er dan samen één uit die je groter bekijkt. Verwijder een foto die je niet mooi vindt.

16. **Sending media**

Je wil graag foto's delen met je vrienden/familieleden. Kies samen één foto uit en stuur deze naar je vrienden/familieleden.

17. Receiving Mediacentrum

Als je een foto ontvangt, weiger deze dan de eerste keer. Als je een tweede foto ontvangt, accepteer deze dan.

18. Buddies verwijderen

Je wil niet meer met “heatdrie” chatten of dat hij je status kan zien. Verwijder “heatdrie” uit je contacten.

19. Taal

Wijzig de taal van de toepassing in Engels.

20. Logout

Je wil verder tv kijken, maar niet meer praten. Je wil ook niet dat je vrienden of familieleden nog kunnen zien dat je tv aan het kijken bent. Zet de toepassing af, maar blijf wel verder tv kijken.

APPENDIX 9: Questionnaire User Test CoSe

VRAGENLIJST USABILITY TEST CoSe

Testnr.

Testgebruiker nr.

Gelieve de volgende vragen te beantwoorden door een kruisje te zetten onder uw antwoord.

Er zijn geen juiste of foute antwoorden, het is uw mening die telt!

DEEL I: BEOORDELING OPDRACHTEN

Hoe makkelijk of moeilijk vond je het gebruik van de toepassing?

Heel makkelijk	Makkelijk	Noch makkelijk, noch moeilijk	Moeilijk	Heel moeilijk

Vond je het makkelijk of moeilijk om te chatten met de andere groep tijdens het tv-programma?

Zeer makkelijk	Makkelijk	Noch makkelijk noch moeilijk	Moeilijk	Zeer moeilijk

Vond je het makkelijk of moeilijk om te weten wie er aan het chatten was?

Zeer makkelijk	Makkelijk	Noch makkelijk noch moeilijk	Moeilijk	Zeer moeilijk

Hoe belangrijk is het voor jou om te weten wie er aan het chatten was?

Zeer belangrijk	Belangrijk	Noch belangrijk noch onbelangrijk	Onbelangrijk	Zeer onbelangrijk

Vond je het makkelijk of moeilijk om te beslissen wie van jullie het toetsenbord bediende?

Zeer makkelijk	Makkelijk	Noch makkelijk noch moeilijk	Moeilijk	Zeer moeilijk

Vond je het handig of onhandig om het toetsenbord door te geven?

Zeer handig	Handig	Noch handig noch onhandig	Onhandig	Zeer onhandig

Vond je het zinvol of zinloos om te zien naar welk programma de andere groep aan het kijken was?

Zeer zinvol	Zinvol	Noch zinvol noch zinloos	Zinloos	Zeer zinloos

Vind je de plaats die de toepassing inneemt veel of weinig?

Zeer veel	Veel	Noch veel noch weinig	Weinig	Zeer weinig

Vond je het makkelijk of moeilijk om verder te ‘kijken’ (niet luisteren) naar het tv-programma?

Zeer makkelijk	Makkelijk	Noch makkelijk noch moeilijk	Moeilijk	Zeer moeilijk

Vond je het makkelijk of moeilijk om verder te ‘luisteren’ (niet kijken) naar het tv-programma?

Zeer makkelijk	Makkelijk	Noch makkelijk noch moeilijk	Moeilijk	Zeer moeilijk

Vond je het makkelijk of moeilijk om het tv-programma te volgen?

Zeer makkelijk	Makkelijk	Noch makkelijk noch moeilijk	Moeilijk	Zeer moeilijk

Vond je het leuk of vervelend om over hetzelfde tv-programma te praten?

Zeer leuk	Leuk	Noch leuk noch vervelend	Vervelend	Zeer vervelend

Hoe vond je het contact met de andere groep tijdens het kijken naar het tv-programma?

Zeer goed	Goed	Noch goed noch slecht	Slecht	Zeer slecht

Hoe vond je het onderlinge contact (met de mensen in dezelfde kamer)?

Zeer goed	Goed	Noch goed noch slecht	Slecht	Zeer slecht

DEEL II: Mediagebruik

Hoe vaak kijk je televisie?

Dagelijks	Eén of meerdere keren per week	Een of meerdere keren per maand

Hoe vaak kijk je televisie met anderen?

Altijd	Regelmatig	Soms	Zelden	Nooit

Hoe vaak praat je met anderen terwijl je naar tv aan het kijken bent?

Altijd	Regelmatig	Soms	Zelden	Nooit

Hoe vaak praat je over tv-programma's wanneer je geen tv aan het kijken bent (bv. op het werk, met vrienden, op café, …)?

Altijd	Regelmatig	Soms	Zelden	Nooit

Hoe vaak gebruik je teletekst?

Dagelijks	Eén of meerdere keren per week	Eén of meerdere keren per maand	Eén of meerdere keren per jaar	Nooit

Hoe makkelijk of moeilijk vind je het gebruik van teletekst?

Zeer makkelijk	Makkelijk	Niet makkelijk noch moeilijk	Moeilijk	Zeer moeilijk

Gebruik je Digitale Televisie? (Telenet Digital TV, Belgacom TV, …)

Ja	Nee

Hoe vaak gebruik je de interactieve functies van Digitale Televisie (bv. de programmagids bekijken, films huren, informatie opzoeken, …)?

Dagelijks	Eén of meerdere keren per week	Eén of meerdere keren per maand	Eén of meerdere keren per jaar	Nooit

Hoe makkelijk of moeilijk vind je het gebruik van de interactieve functies van Digitale Televisie?

Zeer makkelijk	Makkelijk	Niet makkelijk noch moeilijk	Moeilijk	Zeer moeilijk

Hoe vaak gebruik je een computer?

Dagelijks	Eén of meerdere keren per week	Eén of meerdere keren per maand	Eén of meerdere keren per jaar	Nooit

Hoe lang gebruik je al een computer? (in aantal maanden of jaren)

Waar gebruik je een computer meestal voor? Je kan meerdere antwoorden aankruisen.

☐ Websites bezoeken

☐ E-mail lezen en versturen

☐ Instant messaging

☐ Kantoortoepassingen (Word, Excel, Powerpoint)

☐ Gamen

☐ Websites maken

☐ Grafisch ontwerp (bv. foto's bewerken)

☐ Programmeren

☐ Andere, gelieve te specificeren:

Hoe makkelijk of moeilijk vind je het gebruik van een computer?

Zeer makkelijk	Makkelijk	Niet makkelijk noch moeilijk	Moeilijk	Zeer moeilijk

Hoe vaak speel je een videocassette of dvd af (niet op computer)?

Dagelijks	Eén of meerdere keren per week	Eén of meerdere keren per maand	Eén of meerdere keren per jaar	Nooit

Hoe makkelijk of moeilijk vind je het afspelen van videocassettes of dvd?

Zeer makkelijk	Makkelijk	Niet makkelijk noch moeilijk	Moeilijk	Zeer moeilijk

Hoe vaak neem je zelf tv-programma's op, op videocassette, dvd of een hard-disk recorder?

Dagelijks	Eén of meerdere keren per week	Eén of meerdere keren per maand	Eén of meerdere keren per jaar	Nooit

Hoe makkelijk of moeilijk vind je het opnemen van tv-programma's op videocassette, dvd of een hard-disk recorder?

Zeer makkelijk	Makkelijk	Niet makkelijk noch moeilijk	Moeilijk	Zeer moeilijk

Hoe vaak gebruik je instant messaging programma's (Windows/MSN Messenger, ICQ, Yahoo Messenger, …)?

Dagelijks	Eén of meerdere keren per week	Eén of meerdere keren per maand	Eén of meerdere keren per jaar	Nooit

Hoe makkelijk of moeilijk vind je het instant messaging programma's (Windows/MSN Messenger, ICQ, Yahoo Messenger, …)?

Zeer makkelijk	Makkelijk	Niet makkelijk noch moeilijk	Moeilijk	Zeer moeilijk

DEEL III: Persoonlijke vragen

1. **Wat is je geslacht?**

☐ Man ☐ Vrouw

2. **Wat is je geboortedatum (DD/MM/JJ)?**

3. **Wat is het hoogste diploma dat je hebt behaald?**

4. **Wat is je beroep?**

5. **Ben je kleurenblind? Zo ja, welke vorm?**

APPENDIX 10: Group Interview User Test CoSe

Groep interview

1. **Wat vond je het aantrekkelijkst, handigst of leuk aan de toepassing? Waarom?**

2. **Wat vond je het meest problematisch, moeilijkst of vervelend aan de toepassing? Waarom?**

3. **Wat vind je ervan dat je kan zien wie tv aan het kijken is en wie niet?**

4. **Wat vind je ervan dat de andere groep wist naar welk programma je aan het kijken was?**

5. **Zou je graag een automatische aanbeveling voor een programma kunnen sturen naar iemand (ipv te vragen)?**

6. **Zou je deze toepassing willen gebruiken bij je thuis?**

7. **Chat je nu soms tijdens het tv-kijken (op pc)? Waarover?**

8. **Zou je meer over tv praten als je deze toepassing gebruikt?**

9. **Vind je het handig dat je kan aanduiden dat je in groep aan het kijken bent?**

10. **Zijn er andere functies die je graag zou gebruiken tijdens het communiceren met anderen?**

APPENDIX 11: Briefing User Test Ambulant Annotator

Briefing
Gebruikerstest CWI

Je bent hier in het kader van een onderzoeksproject om enkele interactieve televisie toepassingen te testen. De test bestaat uit twee delen: het **eerste deel** vindt hier plaats met de hele groep samen, voor het **tweede deel** splitsen we de groep in twee. Voor we met elk deel starten zal ik precies uitleggen wat er verwacht wordt, en hoe de toepassing werkt. **Na elk deel** zal ik jullie vragen een korte vragenlijst in te vullen. **Na het tweede deel** komen we allemaal terug samen in deze ruimte voor een groepsinterview en een algemene vragenlijst.

We testen niet hoe goed jullie met de programma's kunnen omgaan, maar we testen de programma's zelf. **Jullie kunnen dus niets verkeerd doen.** Als er iets niet goed moest gaan, dan is dat een probleem met het programma, niet met jullie!! Ik heb de programma's niet zelf gemaakt, dus je kan heel eerlijk zeggen wat je ervan vond.

De toepassing waar je mee gaat werken is een **prototype**. Dat wil zeggen dat nog niet alles werkt. Het zou dus kunnen dat je een functie gebruikt die niets doet. Als de toepassing vastloopt of niet meer reageert, dan stoppen we even met de test om de toepassing opnieuw op te starten.

Heb je hierover al vragen? Als je later nog vragen hebt, dan kan je die mij natuurlijk altijd stellen. Ook wanneer je even een pauze wil of naar het toilet moet.

Dan ga we nu met het eerste deel beginnen.

Deel 1

Je zit thuis met z'n allen naar televisie te kijken. Je hebt op je hard disk recorder (soort videorecorder) enkele trailers en natuurdocumentaires staan, waar vrienden of familie van jullie misschien ook wel interesse in hebben.

Bekijk de verschillende filmpjes, en stuur een aanbeveling voor die filmpjes door waarvan je denkt dat je vrienden/familieleden dit graag zouden zien. Als je wil kan je hier aantekeningen op maken voor je het doorstuurt.

Probeer **zeker de volgende functies** uit:

- Volledig programma of scène aanbevelen
- Stukje knippen en dit aanbevelen
- Aantekening maken op video en dit aanbevelen

Opgelet: er zijn twee bedieningstoestellen. De clips die je met elk toestel aanmaakt komen terecht **op dezelfde harde schijf** van de tv. Wat je met het ene toestel aanmaakt kan je dus ook met het andere toestel bekijken! **Nieuw aangemaakte clips** krijgen de naam **"New Tag"** mee.

Bepaal **naar welke vrienden/familieleden** je graag een aanbeveling voor een programma wil sturen. Zeg elke keer luidop **wat je naar wie stuurt**.

Belangrijk om weten:

- Als je naar "**Ishan**" stuurt krijgt één van je vrienden/familieleden de aanbeveling toe op gsm.
- Als je naar "**Willemijn**" stuurt krijgt één van hen de aanbeveling toe per e-mail.
- Als je naar "**Group 1**" stuurt krijgen ze allen de aanbeveling toe op hun tv.

Deel 2

We gaan jullie nu opsplitsen in twee groepen. De ene groep blijft in de zitkamer, de andere groep gaat naar een ander lokaal. Nu kunnen jullie aanbevelingen naar elkaar sturen.

De groep in de zitkamer stuurt aanbevelingen naar de andere groep, die enkel de aanbevelingen kan ontvangen.

Groep 2 (zitkamer): verstuur aanbeveling achtereenvolgens naar Ishan, Willemijn en ‘Group 1’.

Groep 1 (computerlokaal): bekijk de aanbeveling die verstuurd werd op gsm, e-mail, blog en (als laatste!) op televisie.

Ter herinnering:

Als je naar “**Ishan**” stuurt krijgt één van je vrienden/familieleden de aanbeveling toe op gsm.

Als je naar “**Willemijn**” stuurt krijgt één van hen de aanbeveling toe per e-mail.

Als je naar “**Group 1**” stuurt krijgen ze allen de aanbeveling toe op hun tv/op een blog.

APPENDIX 12: Group Interview User Test Ambulant Annotator

Groep interview – groep n° ..

11. **Wat vind je ervan dat je tijdens het tv-kijken clips kan doorsturen naar anderen?**

12. **Stoort dit het tv-kijken? Zo ja, vind je dit vervelend?**

13. **Wat vind je van het bedieningstoestel? Vind je het handig dat dit apart is van het tv-toestel?**

14. **Wat zou je naar vrienden sturen, en wat naar familie? Of is dit hetzelfde?**

15. **Heb je graag reactie als je iets stuurt, of niet? Verkies je een onmiddellijke reactie, of mag dit ook op een later moment? Zou je nog extra aantekeningen maken bovenop de aantekeningen die er reeds zijn?**

16. **Op welke manier zou je het liefste de aanbevolen clips ontvangen: op tv, op gsm, per e-mail, op een blog? Wat verwacht je dat je bij elk kan doen? Hoe wordt je hier graag van verwittigd? Welke manieren vind je storend? In welke situaties?**

17. **Waarom zou je clips doorsturen? Banden aanhalen? Als cadeau? Om te communiceren? Om iets aan te tonen?Is dit afhankelijk van het soort tv-programma/genre?**

18. **Stuur je de aanbeveling het liefst naar iemand persoonlijk, of liefst naar iedereen die samen tv aan het kijken is?**

19. **Vind je het leuk of vervelend dat je aantekening kan maken op de clips?**

20. **Welk soort tv-programma's/genres zou je het liefste doorsturen? Welke niet?**

21. **Op welke manier wil je graag clips maken? Knippen met één punt of met twee punten (begin en start)?**

22. **Wat zou je graag extra willen doen met deze toepassing?**

APPENDIX 13: Questionnaire User Test Ambulant Annotator

VRAGENLIJST GEBRUIKERSTEST CWI

Testnr. **Testgebruiker nr.**

Gelieve de volgende vragen te beantwoorden door een kruisje te zetten onder uw antwoord.

Er zijn geen juiste of foute antwoorden, het is uw mening die telt!

BEOORDELING OPDRACHTEN DEEL 1

1. Hoe makkelijk of moeilijk vond je het gebruik van de toepassing?

Heel makkelijk	Makkelijk	Noch makkelijk, noch moeilijk	Moeilijk	Heel moeilijk

2. Hoe leuk of vervelend vond je het gebruik van de toepassing?

Heel leuk	Leuk	Noch leuk, noch vervelend	Vervelend	Heel vervelend

3. Vond je het goed of slecht dat je aantekeningen kan maken op de videoclips?

Zeer goed	Goed	Noch goed noch slecht	Slecht	Zeer slecht

4. Vond je het goed of slecht om een *apart scherm* te hebben om te bekijken wat je doet (in plaats van een afstandsbediening en het tv-scherm)?

Zeer goed	Goed	Noch goed noch slecht	Slecht	Zeer slecht

5. Welk toestel heb je *bediend* tijdens dit deel van de test?

Geen	Samsung	Nokia	Allebei

6. Als je zelf beide aparte toestellen bediende: welke manier van bedienen vond je het handigst?

Context Menu (Nokia)	Tekens (Samsung)

7. Vond je het makkelijk of moeilijk om te beslissen wie van jullie het aparte toestel bediende?

Zeer makkelijk	Makkelijk	Noch makkelijk noch moeilijk	Moeilijk	Zeer moeilijk

8. Vind je het goed of slecht dat je de poster kan veranderen?

Zeer goed	Goed	Noch goed, noch slecht	Slecht	Zeer slecht

9. Vond je het makkelijk of moeilijk om het tv-programma te volgen?

Zeer makkelijk	Makkelijk	Noch makkelijk noch moeilijk	Moeilijk	Zeer moeilijk

10. Hoe vond je het onderlinge contact (met de mensen in dezelfde kamer)?

Zeer goed	Goed	Noch goed noch slecht	Slecht	Zeer slecht

BEOORDELING OPDRACHTEN DEEL 2

Testnr.
Testgebruiker nr.

Groep 1 (CL) / Groep 2 (UL)

11. Hoe makkelijk of moeilijk vond je het gebruik van de toepassing?

Heel makkelijk	Makkelijk	Noch makkelijk, noch moeilijk	Moeilijk	Heel moeilijk

12. Hoe leuk of vervelend vond je het gebruik van de toepassing?

Heel leuk	Leuk	Noch leuk, noch vervelend	Vervelend	Heel vervelend

13. Welke manier van *ontvangen* verkies je? Zet een nummer bij elke vorm, waarbij je een 1 geeft aan de manier die je het meest verkiest, en een 4 aan de manier die je het minst verkiest. (enkel invullen indien je in het computerlokaal)

…… GSM
…… E-mail
…… Blog
…… Televisie

14. Welke manier van *verzenden* verkies je? Zet een nummer bij elke vorm, waarbij je een 1 geeft aan de manier die je het meest verkiest, en een 4 aan de manier die je het minst verkiest. (enkel invullen indien je in de living zat)

…… GSM
…… E-mail
…… Blog
…… Televisie

15. Hoe vond je het onderlinge contact met de mensen in dezelfde kamer? (enkel invullen indien je met meer dan 1 persoon in de kamer was)

Zeer goed	Goed	Noch goed noch slecht	Slecht	Zeer slecht

16. Welk toestel heb je *bediend* tijdens dit deel van de test?

Geen	Samsung	Nokia	Allebei

17. Als je zelf beide aparte toestellen bediende (deel 1 en deel 2 samen): welke manier van bedienen vond je het handigst?

Context Menu (Nokia)	Tekens (Samsung)

ALGEMENE BEOORDELING OPDRACHTEN

Testnr.
Testgebruiker nr.

18. Zou je deze toepassing zelf gebruiken?

Zeker wel	Waarschijnlijk wel	Misschien	Waarschijnlijk niet	Zeker niet

19. Met wie zou je het liefste video's uitwisselen?
(Zet een nummer bij elk antwoord, waarbij je een 1 geeft wat je het meest verkiest, en een 7 aan wat je het minst verkiest.)

….. Directe familie (broer, zus, vader, moeder, kind, partner, …)
….. Overige familie (nonkels, tantes, grootouders, kleinkinderen, …)
….. Vrienden
….. Kennissen
….. Collega's / mede-studenten
….. Zakenrelaties
….. Vreemden

20. Van welk programma genre zou je clips doorsturen?

☐ Nieuws (bv. zeven uur journaal, laatavond journaal, …)
☐ Nieuwsmagazine (bv. Terzake, Telefacts, …)
☐ Weerbericht
☐ Documentaire (bv. Virus, Vranckx, Histories, …)
☐ Debatprogramma (bv. Phara, De Zevende Dag, …)
☐ Sportprogramma (voetbalmatch, Sportweekend, tennismatch, ...)
☐ Dramareeks (bv. Inspector Morse, …)
☐ Soap (bv. Thuis, Familie, Sara, …)
☐ Docusoap (Het Leven Zoals het is, …)
☐ Reality show (bv. Big Brother, Expeditie Robinson, Peking Express, …)
☐ Film
☐ Tekenfilmserie (bv. The Simpsons, …)
☐ Standup Comedy (bv. Comedy Casino)
☐ Talkshow (bv. De Laatste Show)
☐ Comedy reeks (bv. The Office, Little Britain, De Kampioenen, …)
☐ Quiz programma (bv. De Grote Volksquiz, De Pappenheimers, Blokken, …)
☐ Muziekprogramma (bv. videoclips, optredens, klassiek ballet, …)
☐ Hobbyprogramma (bv. Piet's Pan, Groene Vingers, …)
☐ Andere: ……

21. Met wie zou je het liefste video's met persoonlijke aantekeningen uitwisselen?
(Zet een nummer bij elk antwoord, waarbij je een 1 geeft wat je het meest verkiest, en een 7 aan wat je het minst verkiest.)

….. Directe familie (broer, zus, vader, moeder, kind, partner, …)
….. Overige familie (nonkels, tantes, grootouders, kleinkinderen, …)
….. Vrienden
….. Kennissen
….. Collega's / mede-studenten
….. Zakenrelaties
….. Vreemden

22. Bij welk programma genre zou je persoonlijke aantekeningen maken voor je het doorstuurt?

☐ Nieuws (bv. zeven uur journaal, laatavond journaal, …)
☐ Nieuwsmagazine (bv. Terzake, Telefacts, …)
☐ Weerbericht
☐ Documentaire (bv. Virus, Vranckx, Histories, …)
☐ Debatprogramma (bv. Phara, De Zevende Dag, …)
☐ Sportprogramma (voetbalmatch, Sportweekend, tennismatch, ...)
☐ Dramareeks (bv. Inspector Morse, …)
☐ Soap (bv. Thuis, Familie, Sara, …)
☐ Docusoap (Het Leven Zoals het is, …)
☐ Reality show (bv. Big Brother, Expeditie Robinson, Peking Express, …)
☐ Film
☐ Tekenfilmserie (bv. The Simpsons, …)
☐ Standup Comedy (bv. Comedy Casino)
☐ Talkshow (bv. De Laatste Show)
☐ Comedy reeks (bv. The Office, Little Britain, De Kampioenen, …)
☐ Quiz programma (bv. De Grote Volksquiz, De Pappenheimers, Blokken, …)
☐ Muziekprogramma (bv. videoclips, optredens, klassiek ballet, …)
☐ Hobbyprogramma (bv. Piet's Pan, Groene Vingers, …)
☐ Andere: ……

23. Zou je graag audio toevoegen aan de clips (als intro of als commentaar)?

Ja	Nee	Geen mening

Vragen in verband met mediagebruik

Testnr.

Testgebruiker nr.

1. Hoe vaak kijk je televisie?

Dagelijks	Eén of meerdere keren per week	Eén of meerdere keren per maand	Eén of meerdere keren per jaar	Bijna nooit

2. Wat zijn je favoriete programma genres? (meerdere antwoorden zijn mogelijk)

☐ Nieuws (bv. zeven uur journaal, laatavond journaal, …)
☐ Nieuwsmagazine (bv. Terzake, Telefacts, …)
☐ Weerbericht
☐ Documentaire (bv. Virus, Vranckx, Histories, …)
☐ Debatprogramma (bv. Phara, De Zevende Dag, …)
☐ Sportprogramma (voetbalmatch, Sportweekend, tennismatch, ...)
☐ Dramareeks (bv. Inspector Morse, …)
☐ Soap (bv. Thuis, Familie, Sara, …)
☐ Docusoap (Het Leven Zoals het is, …)
☐ Reality show (bv. Big Brother, Expeditie Robinson, Peking Express, …)
☐ Film
☐ Tekenfilmserie (bv. The Simpsons, …)
☐ Standup Comedy (bv. Comedy Casino)
☐ Talkshow (bv. De Laatste Show)
☐ Comedy reeks (bv. The Office, Little Britain, De Kampioenen, …)
☐ Quiz programma (bv. De Grote Volksquiz, De Pappenheimers, Blokken, …)
☐ Muziekprogramma (bv. videoclips, optredens, klassiek ballet, …)
☐ Hobbyprogramma (bv. Piet's Pan, Groene Vingers, …)
☐ Andere: ……

3. Als je televisie kijkt, hoe vaak kijk je dan samen met anderen?

Altijd	Regelmatig	Soms	Zelden	Nooit

4. Als je televisie kijkt, hoe vaak praat je met anderen tijdens het kijken?

Altijd	Regelmatig	Soms	Zelden	Nooit

5. Tijdens welke genres praat je het vaakst? (meerdere antwoorden zijn mogelijk)

☐ Nieuws (bv. zeven uur journaal, laatavond journaal, …)
☐ Nieuwsmagazine (bv. Terzake, Telefacts, …)
☐ Weerbericht
☐ Documentaire (bv. Virus, Vranckx, Histories, …)
☐ Debatprogramma (bv. Phara, De Zevende Dag, …)
☐ Sportprogramma (voetbalmatch, Sportweekend, tennismatch, ...)
☐ Dramareeks (bv. Inspector Morse, …)
☐ Soap (bv. Thuis, Familie, Sara, …)
☐ Docusoap (Het Leven Zoals het is, …)
☐ Reality show (bv. Big Brother, Expeditie Robinson, Peking Express, …)
☐ Film
☐ Tekenfilmserie (bv. The Simpsons, …)
☐ Standup Comedy (bv. Comedy Casino)
☐ Talkshow (bv. De Laatste Show)
☐ Comedy reeks (bv. The Office, Little Britain, De Kampioenen, …)
☐ Quiz programma (bv. De Grote Volksquiz, De Pappenheimers, Blokken, …)
☐ Muziekprogramma (bv. videoclips, optredens, klassiek ballet, …)
☐ Hobbyprogramma (bv. Piet's Pan, Groene Vingers, …)
☐ Andere: ……

6. Tijdens welke genres praat je het minst? (meerdere antwoorden zijn mogelijk)

☐ Nieuws (bv. zeven uur journaal, laatavond journaal, …)
☐ Nieuwsmagazine (bv. Terzake, Telefacts, …)
☐ Weerbericht
☐ Documentaire (bv. Virus, Vranckx, Histories, …)
☐ Debatprogramma (bv. Phara, De Zevende Dag, …)
☐ Sportprogramma (voetbalmatch, Sportweekend, tennismatch, ...)
☐ Dramareeks (bv. Inspector Morse, …)
☐ Soap (bv. Thuis, Familie, Sara, …)
☐ Docusoap (Het Leven Zoals het is, …)
☐ Reality show (bv. Big Brother, Expeditie Robinson, Peking Express, …)
☐ Film
☐ Tekenfilmserie (bv. The Simpsons, …)
☐ Standup Comedy (bv. Comedy Casino)
☐ Talkshow (bv. De Laatste Show)
☐ Comedy reeks (bv. The Office, Little Britain, De Kampioenen, …)
☐ Quiz programma (bv. De Grote Volksquiz, De Pappenheimers, Blokken, …)
☐ Muziekprogramma (bv. videoclips, optredens, klassiek ballet, …)
☐ Hobbyprogramma (bv. Piet's Pan, Groene Vingers, …)
☐ Andere: ……

7. Hoe vaak praat je over tv-programma's wanneer je geen tv aan het kijken bent (bv. op het werk, met vrienden, op café, …)?

Altijd	Regelmatig	Soms	Zelden	Nooit

8. Over welke genres praat je het vaakst? (meerdere antwoorden zijn mogelijk)

☐ Nieuws (bv. zeven uur journaal, laatavond journaal, …)
☐ Nieuwsmagazine (bv. Terzake, Telefacts, …)
☐ Weerbericht
☐ Documentaire (bv. Virus, Vranckx, Histories, …)
☐ Debatprogramma (bv. Phara, De Zevende Dag, …)
☐ Sportprogramma (voetbalmatch, Sportweekend, tennismatch, ...)
☐ Dramareeks (bv. Inspector Morse, …)
☐ Soap (bv. Thuis, Familie, Sara, …)
☐ Docusoap (Het Leven Zoals het is, …)
☐ Reality show (bv. Big Brother, Expeditie Robinson, Peking Express, …)
☐ Film
☐ Tekenfilmserie (bv. The Simpsons, …)
☐ Standup Comedy (bv. Comedy Casino)
☐ Talkshow (bv. De Laatste Show)
☐ Comedy reeks (bv. The Office, Little Britain, De Kampioenen, …)
☐ Quiz programma (bv. De Grote Volksquiz, De Pappenheimers, Blokken, …)
☐ Muziekprogramma (bv. videoclips, optredens, klassiek ballet, …)
☐ Hobbyprogramma (bv. Piet's Pan, Groene Vingers, …)
☐ Andere: ……

9. Over welke genres praat je het minst? (meerdere antwoorden zijn mogelijk)

☐ Nieuws (bv. zeven uur journaal, laatavond journaal, …)
☐ Nieuwsmagazine (bv. Terzake, Telefacts, …)
☐ Weerbericht
☐ Documentaire (bv. Virus, Vranckx, Histories, …)
☐ Debatprogramma (bv. Phara, De Zevende Dag, …)
☐ Sportprogramma (voetbalmatch, Sportweekend, tennismatch, ...)
☐ Dramareeks (bv. Inspector Morse, …)
☐ Soap (bv. Thuis, Familie, Sara, …)
☐ Docusoap (Het Leven Zoals het is, …)
☐ Reality show (bv. Big Brother, Expeditie Robinson, Peking Express, …)
☐ Film
☐ Tekenfilmserie (bv. The Simpsons, …)
☐ Standup Comedy (bv. Comedy Casino)
☐ Talkshow (bv. De Laatste Show)
☐ Comedy reeks (bv. The Office, Little Britain, De Kampioenen, …)
☐ Quiz programma (bv. De Grote Volksquiz, De Pappenheimers, Blokken, …)
☐ Muziekprogramma (bv. videoclips, optredens, klassiek ballet, …)
☐ Hobbyprogramma (bv. Piet's Pan, Groene Vingers, …)
☐ Andere: ……

10. Gebruik je Teletekst?

Ja	Nee

Indien ja, ga naar de volgende vraag, indien neen ga naar vraag 12

11. Indien ja, hoe vaak gebruik je teletekst?

Dagelijks	Eén of meerdere keren per week	Eén of meerdere keren per maand	Eén of meerdere keren per jaar	Nooit

12. Gebruik je Digitale Televisie? (Telenet Digital TV, Belgacom TV, …)

Ja	Nee

Indien ja, ga naar de volgende vraag, indien neen ga naar vraag 14

13. Hoe vaak gebruik je één of meerdere interactieve functies van Digitale Televisie (bv. met de rode knop stemmen, de programmagids bekijken, films huren, informatie opzoeken, …)?

Dagelijks	Eén of meerdere keren per week	Eén of meerdere keren per maand	Eén of meerdere keren per jaar	Nooit

14. Gebruik je een computer?

Ja	Nee

Indien ja, ga naar de volgende vraag, indien neen ga naar vraag 19

15. Hoe vaak gebruik je een computer?

Dagelijks	Eén of meerdere keren per week	Eén of meerdere keren per maand	Eén of meerdere keren per jaar	Bijna nooit

16. Hoe lang gebruik je al een computer? (in aantal maanden of jaren)

17. Waarvoor gebruik je een computer meestal? Je kan meerdere antwoorden aankruisen.

☐ Informatie zoeken op websites

☐ E-mail lezen en versturen

☐ Instant messaging (msn, icq, skype, …)

☐ Kantoortoepassingen (Word, Excel, …)

☐ Gamen

☐ Websites maken

☐ Grafisch ontwerp
(bv. foto's bewerken)

☐ Programmeren

☐ Aankopen doen op internet

☐ Downloaden (bv. van film of muziek)

☐ Uploaden (bv. van foto's of video's)

☐ Telefoneren via internet (Skype, Voip, …)

☐ Sociaal netwerken (vb. MySpace, Netlog, bloggen, Facebook, ...)

☐ Video's en films bekijken op Internet (YouTube, MySpace, CurrentTV, Joost, ...)

☐ Andere, gelieve te specificeren:

18. Hoe makkelijk of moeilijk vind je het gebruik van een computer?

Zeer makkelijk	Makkelijk	Niet makkelijk noch moeilijk	Moeilijk	Zeer moeilijk

19. Hoe vaak speel je een videocassette of dvd af (op televisie of op computer)?

Dagelijks	Eén of meerdere keren per week	Eén of meerdere keren per maand	Eén of meerdere keren per jaar	Nooit

20. Hoe vaak neem je zelf tv-programma's op, op videocassette, dvd of een hard-disk recorder?

Dagelijks	Eén of meerdere keren per week	Eén of meerdere keren per maand	Eén of meerdere keren per jaar	Nooit

21. Hoe vaak leen je videocassettes, dvd's of videobestanden op pc uit aan vrienden of familie?

Dagelijks	Eén of meerdere keren per week	Eén of meerdere keren per maand	Eén of meerdere keren per jaar	Nooit

22. Hoe vaak leen je videocassettes, dvd's of videobestanden op pc van vrienden of familie?

Dagelijks	Eén of meerdere keren per week	Eén of meerdere keren per maand	Eén of meerdere keren per jaar	Nooit

23. Hoe vaak bekijk je video's op Internet (vb. YouTube, CurrentTV, Joost, …)?

Dagelijks	Eén of meerdere keren per week	Eén of meerdere keren per maand	Eén of meerdere keren per jaar	Nooit

24. Hoe vaak stuur je video's die je op Internet hebt gevonden door naar anderen (via e-mail, msn, …)?

Dagelijks	Eén of meerdere keren per week	Eén of meerdere keren per maand	Eén of meerdere keren per jaar	Nooit

25. Gebruik je Instant Messaging? (MSN, AOL, ICQ, Skype, …)

Ja	Nee

Indien ja, ga naar de volgende vraag, indien neen ga naar de Persoonlijke Vragen

26. Hoe vaak gebruik je instant messaging programma's?

Dagelijks	Eén of meerdere keren per week	Eén of meerdere keren per maand	Eén of meerdere keren per jaar	Bijna nooit

Persoonlijke vragen

6. Wat is je geslacht?

☐ Man ☐ Vrouw

7. Wat is je geboortedatum (DD/MM/JJ)?

8. Wat is het hoogste diploma dat je hebt behaald?

9. Wat is je beroep?

Sociability Heuristieken voor Interactieve TV. Het ondersteunen van de sociale gebruiken van televisie.

Samenvatting

Sinds haar introductie in gezinnen wereldwijd, is televisie steeds een sociaal medium gebleven. Hoewel het hoofddoel van televisie het vermaken en informeren van haar kijkers is, kijken mensen vaak televisie samen met naaste familieleden of goede vrienden, praten ze over wat er gebeurt tijdens het kijken van televisie, of organiseren ze sociale activiteiten rond televisieprogramma's. Maar televisieprogramma's maken ook het voorwerp uit van sociale interacties weg van het televisiescherm, wanneer favoriete programma's worden besproken in de koffiekamer op het werk of wanneer programma's worden aanbevolen aan goede vrienden. Nu televisie digitaal en interactief is geworden, leidt dit tot nieuwe mogelijkheden om televisieprogramma's te verrijken en nieuwe diensten te creëren. Helaas houden de huidige interactieve televisieprogramma's en diensten vaak geen rekening met de sociale aard van traditionele televisie, en zijn ze als gevolg hiervan vaak niet aangepast aan de manier waarop mensen effectief gebruik maken van en kijken naar (interactieve) televisie. Hoewel er usability heuristieken bestaan om interactieve televisie eenvoudiger te maken in het gebruik, bestonden er tot nog toe geen sociability heuristieken die ervoor kunnen zorgen dat interactieve televisieprogramma's en diensten de sociale gebruiken van televisie ondersteunen, een leemte die deze doctoraatsthesis tracht op te vullen.

Om sociability heuristieken te creëren werden vijf interactieve televisie systemen getest in een labomgeving met in totaal 149 gebruikers. De geteste systemen zijn AmigoTV, Windows Media Center, Social TV, Communication Systems on Interactive TV (CoSe) en Ambulant Annotator. De resultaten van deze gebruikerstesten werden geanalyseerd met een grounded theory benadering, en werden aangevuld met rapporten van andere lab- en veldtesten met gelijkaardige systemen. Dit resulteerde in een lijst van twaalf sociability heuristieken die zowel het ontwerpen als het evalueren van sociale televisie systemen kan aansturen.

De lijst met twaalf sociability heuristieken die in deze doctoraatsthesis wordt gepresenteerd, bevat belangrijke aspecten om rekening mee te houden bij het ontwerpen van sociale interactieve televisie systemen, zoals het aanbieden van verschillende opties om te communiceren, het garanderen van zowel persoonlijke als groepsprivacy, of het aanpassen van de programma's en diensten aan specifieke televisiegenres. Hoewel de heuristieken specifiek gericht zijn op sociale interactieve televisie, kunnen ze ook worden gebruikt om traditionele interactieve televisie diensten zoals elektronische programmagidsen (EPG) socialer te maken. Hierdoor zullen deze sociability heuristieken kunnen leiden tot interactieve televisieprogramma's en diensten die de sociale gebruiken van (interactieve) televisie ondersteunen.

Sociability Heuristics for Interactive TV. Supporting the Social Uses of Television.

Summary

Television has been a social medium since its introduction in households all over the world. Although television's main aim is entertaining and informing its viewers, people often watch television together with close relatives or good friends, talk about what's going on while watching television or even structure their social activities around a television show. But television programs are also part of social interactions away from the television set, when discussing favourite television programs around the water cooler at work or recommending shows to watch to good friends. As television becomes digital and interactive, new possibilities for enhancing television programs and creating new services arise. However, current interactive television programs and services often ignore the social nature of traditional television and as a result are not adapted to the way people actually use and watch (interactive) television. Although usability heuristics exist to make interactive television easier to use, there were no sociability heuristics which could ensure that interactive television programs and services support the social uses of television, a gap this PhD intends to fill.

In order to create sociability heuristics, five social interactive television systems were tested in a lab environment with in total 149 users. The systems that were tested are AmigoTV, Windows Media Center, Social TV, Communication Systems on Interactive TV (CoSe) and Ambulant Annotator. The results of these user tests were analysed using a grounded theory approach, and were complemented with reports from other lab and field studies of similar systems. This resulted in a list of twelve sociability heuristics that can guide the design as well as the evaluation of social television systems.

The list of sociability heuristics presented in this PhD includes important aspects to take into account when designing social interactive television systems, such as offering different options for communicating, guaranteeing personal as well as group privacy, or adapting the programs and services to specific television genres. Although the heuristics are aimed at social interactive television in particular, they can also be used to make traditional interactive television services such as Electronic Programme Guides (EPG) more social. Therefore, these sociability heuristics can lead to interactive television programs and services that support to the social uses of (interactive) television.

Heuristiques de sociabilité pour la télé interactive. Soutenir les emplois sociaux de la télévision.

Synthèse

Depuis son introduction dans les ménages du monde entier, la télévision a toujours été un média social. Bien que la télévision veuille avant tout amuser et informer son public, les téléspectateurs regardent souvent la télé ensemble avec des parents proches ou de bons amis, ils parlent de ce qu'ils voient ou ils organisent des activités sociales autour de programmes de télévision. Mais ces programmes font aussi l'objet d'interactions sociales loin de l'écran, quand on discute les programmes favoris à la cantine ou quand on recommande des programmes à de bons amis. La télévision numérique et interactive offre de nouvelles possibilités pour enrichir les programmes télévisés et peut créer de nouveaux services. Malheureusement, les programmes et les services interactifs actuels ne tiennent pas compte de la nature sociale de la télé traditionnelle, et ne sont donc souvent pas adaptés à la manière dont les téléspectateurs utilisent et regardent effectivement la télévision (interactive). Bien qu'il y ait des heuristiques de l'utilisabilité pour rendre la télévision interactive plus facile à utiliser, il n'y avait pas encore d'heuristiques de sociabilité qui puissent veiller à ce que les programmes et les services de la télévision interactive soutiennent les emplois sociaux de la télévision, une lacune que cette thèse de doctorat veut combler.

Pour créer des heuristiques de sociabilité, cinq systèmes de télévision interactive ont été testés dans un environnement de laboratoire avec 149 utilisateurs. Les systèmes testés sont : AmigoTV, Windows Media Center, Social TV, Communication Systems on Interactive TV (CoSe) et Ambulant Annotator. Les résultats de ces tests ont été analysés au moyen d'une approche basée sur la "grounded theory" et ont été complétés avec des rapports d'autres tests, en laboratoire ou sur le terrain, avec des systèmes similaires. Le résultat de ces enquêtes est une liste de douze heuristiques de sociabilité, qui peut diriger aussi bien l'élaboration que l'évaluation des systèmes de télévision sociale.

La liste des heuristiques de sociabilité présentées dans cette thèse de doctorat contient des aspects importants à considérer en élaborant des systèmes de télévision sociale et interactive, comme la présentation de différentes possibilités de communication, la protection de la vie privée tant personnelle que de groupe, ou en adaptant les programmes et les services à des genres télévisuels spécifiques. Bien que ces heuristiques soient orientées spécifiquement sur la télévision interactive et sociale, elles peuvent être utilisées aussi pour rendre plus sociaux des services interactifs traditionnels comme les grilles des programmes électroniques (EPG). De cette façon ces heuristiques de sociabilité pourront mener à des programmes et des services de télévision interactive qui contribuent à un emploi social de la télévision interactive.

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