How to Choose and How to Watch – An On-Demand Perspective on Current TV Practices

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December 2009
SICS Technical Report T2010:03, ISSN 1100-3154

ABSTRACT

In Sweden, digital TV services have until very recently not been accessible to most people through the TV set. At the same time, TV channels offer more and more content on the web and the majority of the population has access to high-speed internet connections. A web survey aimed at investigating attitudes and behavior related to on-demand TV was distributed in December 2008 to 52 households in an experimental, open (operator neutral) access network in Sweden. Questions were posed on TV arrangements, habits and attitudes; social aspects of TV watching; watching film or TV on-demand; and watching film or TV using the computer. Complementary interviews were also performed with participants that were not part of the experimental environment. Results show that participants in the studies understood and felt a need for time-shift and on-demand TV services: time-shift needs for re-scheduling, catch-up and repeats were expressed as well as on-demand needs for movies and for accessing otherwise unavailable TV content. Support for on-demand TV could also be found in that subjects reported little need for viewing TV content according to a broadcast schedule, with the main exception of news, sports events and other live broadcasts.

Keywords

Television, interactive television, IPTV, on-demand, TV watching, user studies.

1. INTRODUCTION

The 21st century has witnessed an explosion in technological development within the TV area. In 2012, Europe will have closed down analogue TV, a major technological shift that has already taken place in several countries. TV producers and broadcasters are offering more and more of their content on an on-demand basis, over the internet or directly to the TV set through TV operators. Operators in their turn are exploring new TV offerings combining broadcast and on-demand TV with increasingly more powerful set-top boxes, allowing for personal video recording, time-shift, catch-up, pay-per-view and other services. And while computers and "media boxes" of various kinds become more and more powerful and user friendly, the functionality of the TV set itself also evolves, turning the computer into a TV set and the TV set into an internet browser.

Television is a medium in change, both from the viewers' perspective with personal video recorders and on-demand TV, and from the provider perspective with IP delivery allowing for interactivity. In Sweden, this development is still young: what most viewers have access to is "traditional" linear television.

We set out to investigate this traditional TV watching using an on-demand perspective. The objective was to find out what aspects of TV viewing that could be supported or enhanced by on-demand TV and what aspects might be inhibited or just perceived as less interesting. This would also help us to understand to what extent a transition from traditional TV to on-demand TV would imply a big difference for the viewers.

To study these issues we administered a web survey posing questions on TV habits and attitudes (what people watch on TV; to what extent they follow the broadcast schedule; how they choose what to watch etc); on social aspects of TV watching; and on attitudes towards on-demand TV. Since the access to on-demand TV, video clips and movies through the TV set is at present limited in Sweden, we also included a set of questions about watching TV using the computer as a medium. An additional goal with this approach was to explore if today's consumption of TV material could be used to probe future trends of TV watching.

The questionnaire was distributed in December 2008 to 52 Swedish households that had enlisted as test pilots in an experimental IPTV network in the city of Hudiksvall.

2. DIGITAL TV IN SWEDEN

In February 2008, the analogue terrestrial network for TV broadcast in Sweden was completely shut down. The effect on the viewers varied. Single-house owners in rural areas and other viewers who had previously received the TV signal using a simple antenna now had invest in one set-top-box per TV set, while many others continued to have analogue TV delivered to the home through cable (almost 50% of the households in 2009 [7]).

A growing number of viewers are also getting their TV delivered over IP, in Sweden usually referred to as digital TV, broadband TV or IPTV. This is a natural development for a country where 83% of the population has Internet access in their home [3], and where 87% of these connections have a bandwidth of 2Mbit/s or more [7].

Most Swedish TV networks are also offering more and more content over the web. The overall term for this has come to be "Play" services, from the Swedish public service broadcaster SVT who launched their service "SVT Play" in December 2006. Depending on the network, services may be free or pay-per view.

Web-based video on-demand services for movie rental have also been available over the Internet since 2001.[1]

However, contrary to the rapid technical developments, not very much has changed from the general viewer's point of view. Although "broadband TV" has been part of some Swedish TV operators' service offers for quite some time, it has until recently not taken on. PVRs were not introduced in Sweden until 2006; at the time of our study, 16% of Swedish households had one [8]. Electronic Program Guides (EPGs) are also quite new to the average Swede due to the fact that analogue TV via cable remains a common form of TV delivery, where no set-top-box is needed. And while video web services are abundant, most often it is still the viewer's problem to somehow transfer the web content from the computer to the TV set in the living room, a definite non-trivial task.

The situation is currently changing rapidly. During fall 2009 most the major TV operators have launched new digital TV services, including on-demand video rental services and direct access to the same "play" content that is offered on the web. However, this development had not yet taken place at the time of the study reported in this paper.

3. RELATED WORK

The technological developments in the TV area have a major effect on TV use. This has led to an increasing interest in exploring people's use of and interaction with TV. A number of field studies have been performed, some directed to the development and evaluation of new services and interfaces and other with a broader scope on exploring and understanding the new arena.

In a literature study, Van den Broeck, Pierson and Lievens investigate existing viewing practices and the effect of new TV and video possibilities on these practices [13]. Video on-demand services have an effect on the TV experience and viewing practices by introducing new degrees of freedom regarding time and content as well as place, with the advent of TV viewing on different screens. Two important elements of TV viewing are identified: 1) the degree of domestication that makes TV viewing such an integral part of people's daily lives; and 2) the importance of the TV experience as a whole. When developing new services these elements have to be taken into account.

The introduction of new services into existing practices is further investigated by Van den Broeck and Bauwens in a study of the discrepancy between promises and actual practices as lived by the audience [12]. From discussions in panels and focus groups, user views on making the switch from traditional to interactive, digital TV were compared to the image painted in the promotion of these new services by official parties and the media industry. In short, they conclude that the expectations created on radical changes in TV viewing practices were mostly not met. Services were perceived as "old news in new clothes" (e.g. PVRs as updated VCRs). Viewers were also reluctant to change their practices.

Simons [9] investigated TV viewing in a survey with 80 participants. Three main characteristics of traditional TV viewing were studied: TV as a medium that structures our lives; the feeling of belonging to an audience; and TV as a lean back medium. Simons found that although participants were interested in re-organizing the TV schedule to suit their needs, there was little interest in constructing the entire TV evening from scratch. Subjects all agreed that TV often is a topic for conversations. As for TV as a lean-back medium, people were reluctant to interact and play along (e.g. vote or answer quizzes) with TV shows.

A central theme for most studies of TV viewing is that TV is a social medium and that TV practices are deeply embedded in the ways that we live our daily lives. According to Barkhuus and Brown, TV may be considered the default evening entertainment in the home. The focus of their study was on the use of recording media [1]. Through in-depth interviews, behavior and attitudes of PVR users was compared to users downloading TV programs from the internet and to VCR users. Although these users differed a lot, there were also similarities, notably that TV watching was viewed as a social activity by all groups, although this was manifested in different ways.

The sociality of TV watching was also the focus of a study by Hess and Wulf [4]. Using a diary approach, they found that the TV in the living room seemed to be on while other things were going on in parallel; "Within households, people join and leave television reception dynamically".

Similar results were found by Bernhaupt et al. [2], observing that watching TV was experienced as "doing something together". Probing techniques were used in an ethnographic study of interaction technology use and adaptation in the home. They found TV to be strongly related to other activities in the, due to the central placement of the main TV set in the living room, the most important room for social interaction.

Taylor and Harper [10] studied routine TV habits with a focus on programme selection. Although they identified several programme selection methods, they found that TV viewing seems to be "curiously unplanned". The least demanding method was channel surfing, due to the naturalness of moving through channels. Their findings support the general understanding of TV as a lean-back medium in comparison to the more active lean-forward computer.

In an ethnographic study, Tsekleves et al. [11] studied 27 households in the London area focusing on the merge of different technologies for audio-visual consumption in the home. They also found TV to be a lean-back activity that is shared with others, mainly through the use of a centrally placed TV set. The results were used to design a device for controlling all audiovisual sources of the home and displaying them on the TV screen, including an electronic program guide as well as the library of photos on the home computers. When confronted with the experimental device, users had very differing opinions on what was useful and what was not, leading the authors to the conclusion that personalization of the device was needed.

As the sources for and amount of TV content offered continues to grow, the electronic program guide becomes an increasingly more important tool for the TV consumer. This is reflected in this section that to a large extent has focused on EPGs. A final example is Obrist et al. [6], who developed and tested a prototype EPG for mixed content deploying a user-centered approach. The prototype gave access to content from several sources: broadcast TV, local content on a PRV or other media server, an on-line content available over the internet. Social functionality such as ratings and recommendations were also included.

[1] Film2Home.se was launched in 2001, SFAnytime.com in 2002.

4. THE STUDY

4.1 Method

In December 2008, a web questionnaire was distributed to 52 households that were part of a test bed, described below. The questionnaire contained 27 questions, mostly multiple choice but also a few open questions. Background questions were asked on age, gender, household size and TV arrangements. The remaining questions were grouped into four categories: TV habits and attitudes; social aspects of TV watching; watching film or TV on-demand; and watching film or TV using the computer.

Questions and answers were given in Swedish.

4.2 Subjects

Subjects were recruited from users of an existing test bed administered by our project partners, Acreo[2]. In this testing environment a number of households are connected by optical fiber to an experimental, open (operator neutral) access network that allows for measuring traffic, testing of different technical equipment, and investigating viewer behavior. The open access IPTV platform *OpenChoice*[3] provides TV and TV based services. Connected households – test pilots – receive an OpenChoice set-top box with access to a number of TV channels and a set of example services. At the time of the study test pilots had access to around 45 TV channels and a few services such as an on-demand video service (free but with a very limited set of movies), a guitar course and an EPG.

In this study, 52 test pilots in the Hudiksvall area were prompted to fill in a web questionnaire, a procedure well known to them. Subjects were anonymous to us but not to the test bed administration. After two weeks and a few reminders 50 households had submitted their answers and the questionnaire was closed.

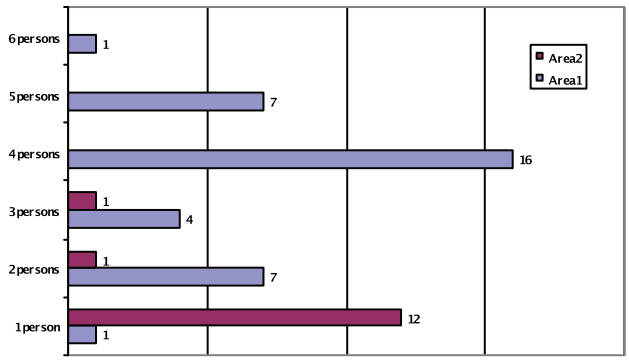

Figure 1. No. of households of different size in areas 1 and 2

Subjects lived in two different areas (36 subjects in area 1 and 14 in area 2). Area 1 consists of one-family houses and the households are typically larger than in area 2, where people live in smaller apartments (Figure 1).

Age was given as one of 9 categories (<18, 18-24 and then 10-year intervals up to >84). Most of the subjects (39 of 50) were in the ages between 25 and 54. In the analysis, age is grouped into the categories ≤ 34 (17), 35-44 (15) and ≥ 45 (18 subjects).

Overall, 37 men and 13 women answered the questionnaire (28 men in area 1 and 9 in area 2). The male dominance is reflected in that the majority of the contact persons in the test pilot households are men. It should however be noted that the results represent the view of male respondents to a larger extent than those of female respondents.

The most discriminating attribute was area, an attribute that indirectly splits the households into families and single-person households. In the further analysis, age and area will be used for discrimination.

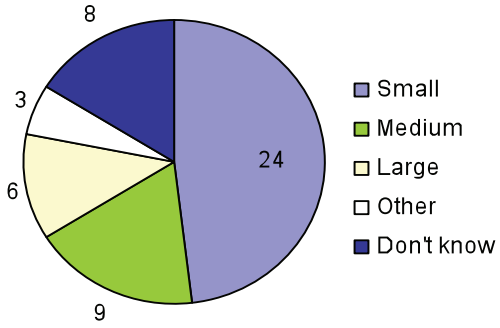

Figure 2. Type of TV offer

In area 1, the average number of TV-sets per household was 2.42 (N=36, SD=.91) and for area 2 this number was 1.15 (N=13, SD=.38), with an overall average of 2.08 (N=49, SD=.98). In addition to the experimental broadband connection, most households also had TV delivered in other ways e.g. by cable or satellite. When asked about the number of channels they were able to access (in terms of size of TV service offer), almost half of the subjects (24 of 50) selected the smallest option (Figure 2).

4.3 Results

4.3.1 TV habits and attitudes

TV watching habits over the day were consistent with statistics on typical TV watching in Sweden, with the exception that our subjects watched more TV in the morning: 20 of 49 subjects reported on watching TV between 6 and 10 am on weekdays, as compared to statistics reporting on 3% of the population watching 6-8 am and 6% watching from 8 am to noon, on an average day [5].

The most watched categories of TV programs were film and drama; entertainment; and news (Table 1). Series were very popular in the youngest group, while the 44+ age group dominated in watching culture and music.

Some small differences could also be detected when splitting the data on area. In area 1, dominated by families living in detached houses, kids' programs and programs about hobbies and leisure activities were more watched. As for area 2, people watched film and drama, science and different series to a greater extent than in area 1.

[2] http://www.acreo.se/

[3] http://www.openchoice.tv/index.php?page=in-english

Table 1. TV programs watched – split by age
(49 subjects; multiple answers allowed)

	<34 (17)	35-44 (15)	>44 (17)	Total (49)
News	***11***	***13***	***16***	***40***
Sport	12	12	12	**36**
Finances	6	6	5	**17**
Politics and documentaries	**9**	**11**	**13**	**33**
Kids programs	**8**	**8**	**4**	**20**
Entertainment	15	14	14	**43**
Hobbies and leisure activities	9	9	8	**26**
Science	12	9	12	**33**
Culture and music	***4***	***5***	***9***	***18***
Series	***16***	***8***	***7***	***31***
Film and drama	15	11	17	**43**

A central part of the questionnaire was designed to find out more about how people choose to watch what they watch (Figure 3). No large differences were found regarding area; however there were some interesting results with respect to age differences. Compared with the younger groups, the oldest group to a greater extent chose what to watch from program guides, stuck to their favorite shows and would also let someone else in the household do the choosing. In contrast, the main strategy for the youngest group was "channel surfing"; they also acted on recommendations from someone else to a greater extent than other groups.

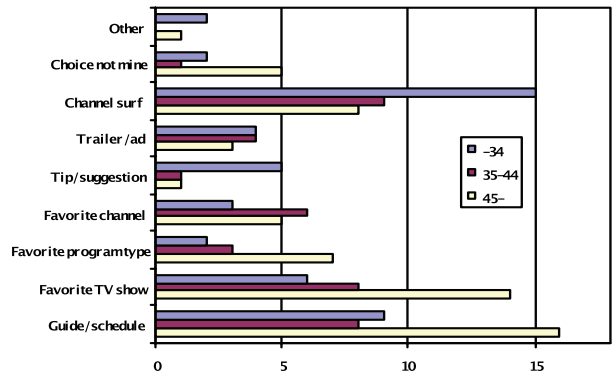

Figure 3. How to select what to watch split by age (49 subjects)

4.3.2 Social aspects of TV watching

The next group of questions investigated social aspects of TV watching. Questions were posed on watching together with others and about discussing TV shows with other people. The assumption was that TV is a social medium and our results (as well as results from other studies) support this. Figure 4 shows that our subjects did watch TV with others (a little less frequently in the youngest group), especially with other family members (36 of 50 subjects). All except 4 of the 50 respondents stated that they more or less frequently did discuss what they have seen on TV with others; 37 subjects also reported on watching the same shows as friends or colleagues (5 daily, 18 once or twice a week and 14 once or twice a month).

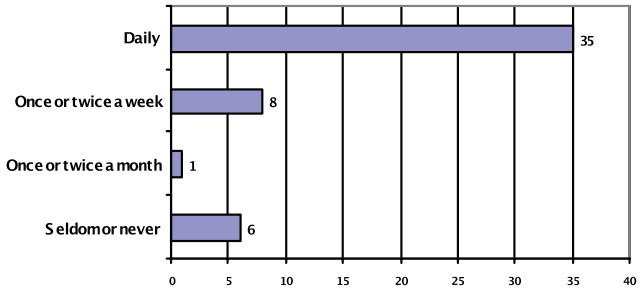

Figure 4. How often do you watch TV with someone else?

4.3.3 Watching film or TV on-demand

The third group of questions investigated in what way the participants in the study wanted to take control over their watching, i.e. the importance of with a linear setting (according to the broadcast schedule) versus an on-demand setting. Since the on-demand service offered in the test bed turned out to be very limited, it is not surprising that 45 of 50 subjects reported that they seldom or never used that service. Using the same set of choices as in other questions, news and sports were the dominant categories of TV programs deemed important to see in real time viewing (36 and 30 of 48 answers respectively). Table 2 lists all categories split by area. It could be noted that TV series is the third most important category;

Table 2: TV programs deemed important to watch according to schedule
(48 subjects of 50, percentages included for comparison)

	All		Area 1		Area 2	
	Freq. (48)	*% (96)*	Freq (34)	*% (94)*	Freq. (14)	*% (100)*
News	36	*72%*	28	*78%*	8	*57%*
Sport	30	*60%*	23	*64%*	7	*50%*
Finances	3	*6%*	3	*8%*	0	*0%*
Politics and documentaries	9	*18%*	7	*19%*	2	*14%*
Kids programs	11	*22%*	11	*31%*	0	*0%*
Entertainment	13	*26%*	7	*19%*	6	*43%*
Hobbies and leisure activities	6	*12%*	5	*14%*	1	*7%*
Science	6	*12%*	5	*14%*	1	*7%*
Culture and music	4	*8%*	1	*3%*	3	*21%*
Series	16	*32%*	10	*28%*	6	*43%*
Film and drama	15	*30%*	9	*25%*	6	*43%*
Other	1	*2%*	1	*3%*	0	*0%*

We also posed an open question on what on-demand services respondents would like to have access to if anything was possible. An on-demand movie rental service was the dominating request.

4.3.4 Watching movies or TV using the computer

Overall, approximately half of the subjects reported that someone in the household watched TV or movies on the computer, more in area1 than in area2 (Figure 5). No conclusions could be drawn about the age or gender of the person watching TV: the question covered all members of the household and the person answering the questionnaire might not be the one that is watching.

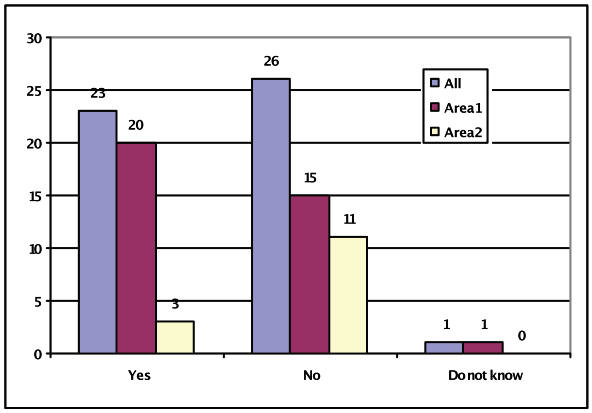

Figure 5: Does someone in the household watch TV or film on the computer?

The 23 subjects answering positively were also asked to indicate the preferred program categories for watching on the computer. Series were the number one choice (9 of 23 subjects), closely followed by film and drama (8) sports (7) and kid's shows (7). No larger differences between the areas were found except for kids shows that were unique for area 1.

The number of subjects in each age group was too small to allow for any stronger conclusions based on age. However, it could be pointed out that it seemed like the oldest age group, to a larger extent than other age groups, watched news on the computer (4 of 9 in the group 45- compared to 1 of 6 aged 35-44 and none under 35); and that the youngest age group, to a larger extent than other age groups, watched series on the computer (5 of 7 compared to 1 of 6 in the middle group and 3 of 9 in the group 45-).

Answers were complemented with an open question on what services on the computer that participants wanted to be able to access over the TV set. The answers closely mirrored services already known to the participants, with internet browsing and searching as the top request.

5. RESULTS IN PERSPECTIVE

It is not surprising that our survey respondents do not show a wide range of on-demand oriented behavior in their TV watching, since their options for on-demand TV were limited. However, there are several aspects in their regular, linear TV watching that are interesting from an on-demand TV perspective. We believe that these aspects could support TV watchers in the transition from linear, broadcast TV to an on-demand TV setting.

The results from the questionnaire study to some extent confirmed statistical information and other related findings, but also provided new insights. To supplement the rather coarse form of the questionnaire, four informal interviews were also performed. The interviews covered the same areas as the questionnaire and allowed us to gather comments and reasoning behind answers. The four interviewees were recruited through notes on billboards in Stockholm and had no connection with the experimental environment in Hudiksvall. Two men and two women aged between 36 and 61 were interviewed; two of them lived by themselves, one in a family with small children, and the fourth in a relationship. One interview was conducted at home and the remaining three in a conference room at the gym.

In the following, we will revisit some of the more interesting results and follow up with free-text answers and comments as well as input from the interviews.

5.1 TV arrangements, habits and attitudes

Taylor and Harper report on an average of 4.1 TV sets per household in a survey of 5000 people[10] . Bernhaupt et al. found 1-4 TV sets in the homes of their 16 subjects [2] and Simons [9] also report on most respondents having multiple TV sets. Although our results are consistent with these studies, we were still surprised at the number of TV sets in people's homes. Not only families but also single-person household frequently owned more than one TV set. A plausible explanation for this is that families want to be able to solve conflicts in what to watch. If there is more than one TV in the house, family members do not have to watch the same program all the time.

Another reason for having several TV sets, supported by the fact that single person households also had more than one TV, is that different TV locations are used for different types of watching. One of our interviewees, a single man, had three TV sets placed in different rooms. He described a typical weeknight as follows:

When one comes home then possibly the news are on, at dinner more or less. And then when dinner is over I will easily switch over to the TV room, because then at eight or at nine that show that I might want to see is on and then I want to be comfortable so it is the TV room couch. And then […] to the bedroom. OK, now that film is on […]

As reported by many other studies (e.g. [1], [10], [13]), the TV in the living room is used by our subjects for watching together with the family, or just having the TV on in the background [4]. In contrast, the TV set in a family members private (bed)room is used for relaxing before going to sleep or by family members that really want to watch something the others do not want to watch [9].

The number of TV sets in each household and the various types of TV watching provide a foundation for on-demand TV. The possibility to choose what to watch at what time could for example minimize program conflicts in the family by providing time shift.

5.2 Selecting what to see

Our survey results do not suggest that the participants use a conscious decision process or put a lot of effort into making informed choices about what to watch on TV. Respondents seemed to resort to the easiest ways to find something to watch, i.e. programs they watched regularly or programs they found through channel surfing. Similar behavior has been observed e.g. by Taylor and Harper [10]. This suggests that the linear program supply is an important tool for people when deciding what to watch, both because it is regular and familiar and because it flows by the TV watcher within easy reach. New selection habits will only slowly be introduced into the old way of watching, as suggested by Van den Broeck et al. ([12], [13]).

Even though the unplanned TV watching and people's faith in the linear flow of TV programs might not be the obvious foundation for on-demand TV, it still provides valuable information for future on-demand services. First, we can conclude that 100% on-demand is unlikely to be a good starting point. People seem to like the fact that TV programs come to them in a flow, and thus might prefer "semi"-on-demand services such as program packages, theme

nights etc. Second, the results show that the linear TV flow triggers on-demand behavior such as people being reminded of TV shows, creating a need for watching a program that they had missed completely or that will be broadcast on awkward time.

However, the ability to choose is not only positive. One of the interviewees pointed out that it could narrow your horizons significantly if it was possible to watch only programs that you were interested in beforehand. With linear TV, his TV watching got more diversified:

I think it may be e little dangerous also that you only pick that what interests you, that you may become a little isolated if you only pick that type of programs (interview with single man)

Another interviewee brought up the negative side of choosing what to watch. She considered the freedom from choice was a fundamental aspect of watching TV which should be relaxing.

The whole point disappears if you have to choose, you want to relax.

5.3 Broadcast vs. on-demand TV watching

In the survey, we contrasted on-demand with broadcast TV. In addition to filling in the multiple choice question reported in Table 2, an open question asked for subjects' general thoughts about what kind of content was important to watch according to a the broadcast schedule and for what content the schedule did not matter.

The main two categories from the multiple choice question, news and sports, were repeated in the open answers as the most common programs that should be watched according to the TV schedule. This is not surprising since this kind of content is strongly situated in time, but comments gave more detail. Several comments talked about sports and live broadcasts in general, suggesting that the main reason was to watch it when it happens, in real time. Comments also included pay-per-view demands, to get access to live events such as specific football games or concerts. Thirdly, another set of comments stressed the importance that news and sports were up-do-date, without mentioning real-time:

News should be broadcasted according to schedule regularly during the day, for other TV content this is not important

[For] news and sport I readily follow the schedule so that the information is fresh

We also found support for people using the program schedule to organize their day:

"*Sportspegeln"* [a daily Swedish sports program] *is important for me and should be broadcasted on a fixed time of day*

Kids shows, because it is good for them with routines for sleeping eating etc.

Comments also included what was NOT important to watch according to schedule. A mix of all kinds of programs were mentioned, even sports and news, summarized in the following laconic quote:

I can watch everything afterwards.

In another open question we asked for requested on-demand services. The most requested service by far was movies on-demand. Such a service was included in the testing environment; indeed, most of the services suggested by respondents mirrored the example services in the test bed or other well-known services e.g. on the computer.

Movies are different from other programs offered on TV in many ways. They carry an on-demand tradition of making a careful selection of what to see when going to the movie theatre or renting a video at the video store. As discussed by Barkhuus and Brown [1], the selection process when choosing what movie to see is more similar to choosing a book to read or a piece of music to listen to.

The free text comments and interviews proved most helpful in concluding that the broadcast selection of shows serves as a base line for TV watching, but that participants wanted to have more freedom in when to watch – i.e. time-shift functionality. Many comments mentioned recording shows and watching repeats. The most extreme example was one of the interviewees who talked about how nice it would be to be able to record the entire day as broadcast, and then rearrange it in a way suitable for his family.

5.4 Social aspects of TV watching

Previous research provides abundant evidence for the social role of TV watching (e.g. [1], [10] [11],[13]) and our results fully support these finding, both for families and single persons households. Our respondents did watch TV with family members and/or friends. Watching TV with others could be supported by on-demand TV since it would be possible to choose something that everyone would like to watch. This is certainly true for movies, as discussed above. In general, the social TV watching that takes place in the living room is of a different nature. As Taylor and Harper put it, the actual watching is more important that what is watched [10].

Our subjects also discussed what they had seen on TV and to some extent watched the same programs as friends and colleagues. At first sight, a totally time-independent on-demand service could inhibit this social behavior, leading to a situation where everyone watches their own content. However, the current situation is that most on-demand content is made available in some relation to a broadcast scheme. An underlying reason for this is the way that distribution and broadcast rights are defined. Programs are made available on an on-demand basis from the moment that they are broadcast, and only for a limited period of time. One interviewee related his on-demand needs to this scheme, suggesting that someone at work might ask "did you see this-or-that on TV yesterday", triggering him to look for a rebroadcast or on-demand access to the program in question.

Another and slower type of program flow is the consecutive nature of TV series. We did not look at series in particular in our studies but it is clear from table 1 that series is at the top of viewing in the youngest age group and also hold a third place in what is most important to watch according to schedule (table 2). From their study on recording behavior, Barkhuus and Brown also report on TV series being the topic of many discussions even when viewed exclusively on-demand by download from sources outside of the broadcasting system [1]. Simons' subjects found it easier to discuss national TV programs, while people's tendency to watch international series at their own rhythm made those discussions more difficult [9].

5.5 Watching movies and TV on the computer

The fact that the computer had been used to watch TV content in 45 of the 50 households suggests that our participants have taken a small step towards on-demand TV watching. Participants were also asked to freely describe what they felt was different when watching TV on the computer vs. on an ordinary TV screen. Their thoughts or attitudes could be described from three perspectives: viewing content at a time different from broadcast (time shift); free access anytime (video on-demand); and searching the TV material for fast access.

Time shift: Some participants reported that they used the computer to time-shift their TV watching. They watched programs that they had not been able to watch when they were broadcasted, or when they wanted to watch something once again. Another type of time shift was reported by parents who said their children watched the same kids' shows again and again on the computer. Time shift is an example of the interaction between on-demand behavior and linear TV: when people cannot watch a specific program at the time it is broadcast, the computer was used for simple, unplanned time shift.

I watch TV on the computer when I have missed a program (quote from free form comment in the questionnaire)

Video on-demand: Some participants pointed out the importance of being able to watch TV material based completely on their own time and content preferences. This user behavior could be categorized as a need for Video on-demand, being able to get access to desired material regardless of time and social context. It was, for example, mentioned that the computer was used more for TV material during holidays, and that it provided a broader access to TV material based on different preferences between different groups and ages. Interestingly, one interviewee was strongly against this freedom of choice based on a fear of becoming too biased. He considered channel surfing as an opportunity to widen his horizon.

... I will probably also miss out on quite a lot that maybe I should have seen, that is, maybe I should have seen that documentary […] because maybe it would have influenced me (interview, single man)

Search and fast access: Participants also described their use of the computer for accessing TV material in terms of quick access to information, especially in a single person situation and when already using the computer for some other purpose. The material in these cases consisted of more information about different news or getting information about sport events/results. The opportunity to get this kind of information by pressing a designated button on the remote is not yet available in Sweden.

5.6 Easy access and simpler devices

When discussing TV services, set-top-boxes and different solutions to connecting the TV to the internet, ease of use is always an issue. Most people seem to feel that connecting the different devices and adjusting installation parameters is a paramount task – and they are probably right.

We did not include any survey questions on ease of use but technical problems with the equipment filtered through in the open question. In the four interviews, all subjects requested easy handling. One interviewee described herself as a TV and technology user, interested only in what technology may be used for and not in technology per se. Another interviewee was very technically skilled but still hoped for a simpler future:

I hope everything will become easier to use, fewer devices, just one box that takes care of everything.

These findings are also strongly supported by literature, emphasizing the lean back nature of TV watching as opposed to e.g. Internet surfing on the computer [11].

6. CONCLUDING REMARKS

In summary, it is clear that even though on-demand TV access through the TV set still was practically non-existent at the time of our survey, on-demand viewer behavior is still developing around the computer and TV content available over the Internet.

Although the exact terms were not necessarily used, it was evident that our subjects understood and felt a need for time shift. Although PVRs are still rare in Swedish homes, time shifting by recording TV using a VCR is a well known procedure for any adult [13]. Viewers' needs for time shift observed in the survey and interviews covered re-scheduling of the broadcast schedule, catch-up and repeats.

As for on-demand services in general, subjects related to known services such as renting a movie; accessing live content that is broadcast but not available in any available channel, i.e. PPV; and accessing content that is only broadcasted in other countries, notably series.

Finally, the fact that only a few content categories (mostly news and sports) were deemed important to watch according to the TV schedule may serve as an important foundation for on-demand TV. How such services should be designed to be intuitive and easily navigated remains to be seen.

7. ONGOING AND FUTURE WORK

The survey reported in this paper took place at the end of 2008. In November 2009, we conducted interviews with 11 of the participants from the 2008 survey. The aim was mainly to go into more detail with how people choose what to watch and how watching TV in the traditional sense differs from watching TV mediated by the computer. Early results from the analysis suggest that TV and computer behavior differ to a much larger extent than can be explained by the different interaction modes. We have also found further support for the impact on linear television on on-demand behavior (time-shift, catch-up and repeats) and the importance of having a flow of TV content within easy reach.

In the survey study, an open question on TV related services in general was included. At the end of 2008 in Sweden, this was a difficult question to relate to. As discussed in section 2 digital TV in Sweden is rapidly changing and we would like to come back to this issue in further studies. An interesting part of such a study would also be to look further into all the other technical equipment that may be connected to the TV set: cameras, game consoles, cameras and camcorders, media storage units etc.

8. ACKNOWLEDGMENTS

This work was performed within the OnDemand IPTV project at Acreo and SICS, co-funded by project partners from the Swedish telecom industry and VINNOVA, the Swedish Governmental Agency for Innovation Systems.

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