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Interactive TV: Interaction and Control in Second-screen TV Consumption

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ABSTRACT
The integration of television and mobile technologies are becoming a reality in today's home media environments. In order to facilitate the development of future cross-platform broadcast TV services, this study investigated prompting and control strategies for a secondary device in front of the TV. Four workshops provided about 1000 statements from TV consumers trying out working prototypes and engaging in discussions following a semi-structured interview approach. We explored if test participants liked to interact with TV content through a secondary device and which kinds of interaction types they preferred with which content. Overall, we found a clear preference for keeping interactive contents and prompting on the secondary device and broadcast TV content on the primary screen. The workshops generated numerous ideas concerning possible personalization of such service.

Categories and Subject Descriptors
H.5.2 Information Interfaces and Presentation (e.g., HCI) – User Interfaces, *Evaluation/Methodology*

General Terms
Experimentation, Human Factors, Measurement

Keywords
Second screen, iTV, Qualitative Study, Interaction, Prompting, Cross media.

INTRODUCTION
Television-related technologies have evolved vastly lately. TV is changing its form, with the consumer moving from passive reception of one way broadcasts to being a part of an interactive media experience. The TV audience is starting to get used to having a much larger degree of control over the TV content. Simultaneously, smart phones and tablets are making their way into the home. As a result more TV viewers engage in media multitasking activities such as browsing the web while watching TV: in Denmark, 59% report browsing the web on a smartphone of tablet while watching TV, and 45% of those focus on their Internet activity when doing so [8]. Today broadcasters are striving to support this evolution and provide cross-platform solutions to deliver content to their audience [2][13]. Communication between content providers and the end viewers increasingly becomes two-way instead of one way.

From a research perspective, it is therefore interesting to investigate how to successfully combine television and mobile technologies in a cross media, or second screen environment. By "second screen" or "secondary device" we refer to any device (smart phones, tablets, laptops) that allows TV consumers to interact with TV content displayed on a 'primary' screen (typically a home television set). It is fundamental to find out what types of interaction the TV consumers would like to engage in through a second screen application and how this should be designed.

The user study reported in this paper explored at a conceptual level how people would envision interacting with a second screen device while consuming broadcast TV. This paper focuses on how to engage viewers in interacting with live TV content in second screen setups. Furthermore, the question of whether the broadcast content should be separate from the interactive is investigated. These issues are studied through four workshops involving small groups of participants trying out prototypes specially developed to illustrate and challenge typical second screen scenarios.

As a brief outline of the paper, the next section presents related work conducted in the field of second screen setups; this is followed by an elaboration of the methods used to conduct the study; the study setup and data analysis method are presented before the results are reported and discussed. Finally, the conclusion summarizes the main findings and opens for future work.

RELATED WORK
Second screens have been on the agenda of interactive TV researchers since the mid-1990s, focusing on various aspects of the integration of the two devices, from content control to T-learning [4].

In order to investigate if viewers actually want to have the opportunity to interact while watching a TV show, and if this provides added value to the TV experience an experiment with 11 households was conducted in [1]. In this study the households were provided with a second screen prototype with which they were to interact while watching various TV shows for a period of three weeks. The qualitative data collected put forward twelve main topics of discussion, including general comments, liked features and issues. The enhancement of TV experience was found to be due to two factors: (1) the possibility of accessing extra relevant information immediately and after the show; (2) the broadening of the experience to outside the TV room and to an extended social circle. Synchronization and relevance of content, variety in

information sources, filtering of user generated content, and personalization of information were found necessary to ensure the success of such service.

In [3], four major usages of the secondary screen in an interactive digital television environment are investigated: control, enrichment, sharing, and transfer of television content. The latter, also referred to as presentation continuity, has been covered in a recent work investigating four specific methods for transferring video content from a mobile phone to a TV set in a ubiquitous home media environment [5]. The remaining three concepts of controlling, enriching and sharing content will be discussed in the present study.

METHOD

Goals

This study focuses on the second screen set-up, while watching TV in a domestic environment. In particular, we are interested in how to encourage viewers to use the second screen to interact with live TV content, or in other words what are their preferences in terms of prompting strategies? Furthermore, should the broadcast content be integrated with or separated from the interactive content and if so, how?

Methodology

The workshop approach was chosen as it allows presenting complex concepts with relatively simple prototypes. Furthermore a workshop allows gathering a group of test participants in a controlled environment, in which they may try out prototypes under the researchers' control. A workshop can be shaped in a variety of ways thus taking different directions depending on the variables included: duration, number of participants, content, and can include various techniques: interviews, card sorting, discussions or other initiatives relevant for the specific workshop. In our case, a semi-structured interview approach is selected in order to consider any idea brought up by test participants while still covering a set of predefined topics. In order to ensure the reliability and validity of our approach, we employed the 5-step verification process recommended by Morse in [10]: Methodological coherence; sample appropriateness; concurrent data collection and analysis; theoretical thinking; and theory development.

Participants

For qualitative studies of this kind, the recommended number of participants is 5-8, see e.g. [12]. However, to ensure sufficient coverage and validity of the results we repeated the workshop four times with different participants and carefully examined any lack of coherence between the four runs. In total 23 participants were included in the four workshops.

The age span needs to be large, due to the big differences in TV habits, interests, technical proficiency etc. that people have across generations. For the two first sessions we recruited males and females between 35 and 60 years old. University students in their early twenties participated in the last two sessions and were profiled as early adopters. All 23 participants received two cinema tickets as a thank you gift.

Content

The process of choosing the content for the workshop encompassed a total of 11 iterations and included brainstorming, discussions, selection, eliminations and testing of potential content combinations.

The final set of selected TV shows and typical interaction to be experienced by participants through prototypes is:

1. *Who Wants to be a Millionaire* (quiz show) – Answer questions simultaneously with live participants
2. *So Ein Ding* (consumer show) – Participate in a poll about a product reviewed
3. *Aftenshowet* (talk show) – Submit comments related to the program
4. *TV Avisen* (news show) – Retrieve more info about the news items presented in the show

WORKSHOP

The workshop consisted of three main parts:

Part one: The participants tried out four scenarios using different prototypes in order to obtain a clear understanding of the second screen concept.

Part two: The participants tried out two specific prototypes designed to investigate prompting strategies.

Part three: The participants discussed content / control separation by trying out a last prototype.

Setup

The workshop was conducted four times, each with two hours duration. The location was in a laboratory at Aalborg University which contained a conference table with room for six participants. Two facilitators ran the workshops and one media researcher represented the Danish Broadcasting Corporation (DR) during the two first workshops. The equipment in the room consisted of a 55" TV screen mounted to the wall at the end of the table and a number of iOS devices held by the participants (iPads, iPods, iPhones). The TV was connected to a desktop PC giving access to the prototypes on a web server.

The prototypes were developed and implemented as full-screen interactive web-apps. The TV content were pre-recorded clips of the TV shows mentioned in the previous section, and the web-apps content was synchronised with the one shown on TV. Figure 1 illustrates the prototype for the discussion regarding prompting strategies, and Figure 2 the prototype used to discuss content/control separation.

Data Capture and Analysis

Data collection was done with a voice recorder placed on the conference table and two webcams. The data collected comprise about eight hours of audio and video recordings – the latter mainly used for backup.

The first step of the analysis was "Meaning Condensation", i.e. only the essence of the answers and opinions is extracted and written in short precise phrases [7]. An external person carried out this task to insure against

Figure 2. Prototype illustrating prompting strategies: Via a ticker on the primary screen (top) or a popup message on the second screen (bottom).

Figure 1. Prototype illustrating separation of content and control: The live program plays on the TV (top), while the second screen displays either the interactive functions alone (bottom left), or with the video stream (bottom right).

experimenter bias. The condensed data contained approximately 1000 statements.

The second step consisted in coding the statements in order to decompose the data and rearrange it into categories that facilitate comparison between findings in the same category or between categories [9]. The categorization thematized the participants' viewpoints which uncovered essential issues. A coding scheme comprising six categories was developed and implemented for the study.

RESULTS

Statements about long lasting battery time, big screen size, fast system response and general ease of use were coherent with previous findings concerning second screens [1], mobile TV [6], and general usability principles [11]. Results specific to prompting strategies and content/control separation are presented in the next sections.

Prompting: Discreet On the Primary Screen

At first, most participants agreed that prompting should not happen on the primary screen. One said: "*It is annoying to look at prompting on the primary TV screen, and an advantage of being prompted on the secondary is that users have the control and can choose for themselves if they want to look at prompting or not*". However, participants also wondered how one would be made aware of the opportunity to interact with a TV show. E.g. "*I would prefer that the prompting occurred on the primary screen as I don't want to sit with my secondary device all the time waiting for this to happen*". As a result of the discussions, a very discreet prompting, e.g. an icon in the corner of the primary TV screen was suggested. This discussion puts forward an ambiguity inherent to the second screen paradigm: How to involve viewers in a secondary activity that takes away their attention from the primary screen while keeping their focus on the broadcast program?

Connected to this issue, one participant commented: "*I did not look up at the TV at any time, while interacting and watching the TV show on the secondary device.*"

The facilitator then asked if the second screen setup rendered the primary screen superfluous, and there was wide agreement on that this was not the case. This ambiguity is clearly due to the fact that TV consists of both audio and video – and in many cases the audio is quite sufficient for viewers to continue following a TV show even when engaged in other activities, e.g. on the second screen. This is expected to be especially true with low engagement TV shows such as entertainment or sport, which are particularly suited for second screen services.

Content and Control Should Be Separated

Discussions about having the TV show running on the secondary device generated much debate. However, a very clear conclusion emerged; participants agreed that the TV content belongs on the primary screen and interactive

content and controls on the secondary device. Furthermore having both content and control on the secondary device may render the primary screen irrelevant: "*When having the content along with the controls on the secondary screen the primary screen becomes unnecessary"*. In other words, this corresponds to just watching mobile TV.

Nevertheless, many of the participants stated that watching TV shows on the secondary device should be an option as it could be convenient under certain circumstances. Scenarios where this was mentioned to be relevant include when leaving the room where the primary screen resides without missing out on the TV experience or when the primary screen is occupied by other viewers watching a conflicting program: *"I would prefer to watch content on the primary screen, but would also like to have the opportunity to watch it on the secondary screen for situations where there is no primary screen available"*. The participants wanted to be able to control if the show should be running on the secondary device, in sync with the content broadcast on the TV screen.

CONCLUSIONS

We have presented a qualitative study of second screen use for TV. We designed and implemented a number of illustrative prototypes and presented those to two user groups in four workshops. Specifically, we addressed prompting strategies and the separation of TV content and interactive content. The conclusions from the study raise a number of design questions regarding the optimal division between primary and second screens.

Specifically, the outcome of the discussion clearly shows that prompting for interaction with live TV content should be very discreetly advertised on the primary screen to redirect viewers' attention to the secondary screen. It is anticipated that the practice of displaying a small icon or slightly animating the TV name's logo would be an efficient yet non-intrusive prompting strategy. Furthermore, the study participants demonstrated little interest in mixing live TV content and interactive functionalities on the same screen, neither the primary nor the secondary. For both age groups, the TV receiver is dedicated to content playback, while value adding interactive services belong to the second screen.

We believe designers of future second screen services linked to live TV content should consider these guidelines carefully in order to integrate the interactive content smoothly into the TV experience. Interactivity would thus become part of the show's flow, increasing not only the entertaining value for audiences, but also their involvement with the show and perhaps their loyalty to the show.

In general, the workshop approach proved to be well-suited as a data-gathering method and provided more in-depth information than e.g. a questionnaire survey, and consumed fewer resources than a corresponding longitudinal field trial. Conducting such study seems the logical next step to the work presented in this paper, providing invaluable insight in an ecologically valid test environment. Another interesting issue to further investigate would be to look closer into exploiting the "audio-only TV viewing" in a second screen context.

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