Push for the Second Screen

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***Abstract*—Users' perception of the relation between the TV screen and a secondary screen (e.g. smartphone or tablet) is examined empirically in a pilot project through a low-fi prototype and interviews. Early observations indicate that the user value/acceptance of push-messages delivered to the second screen during the TV viewing depends on a number of interwoven factors such as TV-genre, rhythm and number of messages, semantic correlation and user's general media habits.**

***Index Terms*—Second Screen, Interactive TV, attention, push messages.**

I. Introduction

FOR many years, television has been "the killer" application in private homes when it comes to entertainment for the whole family. With the uprising of and increasing adoption of a diversity of mobile devices, entertainment is now becoming more distributed and diverse in the home. The concept of social TV where a mobile phone, tablet or laptop is used synchronized with watching television (referred to as the second screen) (see for example [1] and [2]) opens the possibility for bringing in interactivity and social perspectives into the traditional passive television entertainment situation.

The concept of the second screen has within the last years become an element in discussing the convergence of social media. Several studies show that the consumption of entertainment go across a large range of different platforms (gaming consoles, mobile phones, laptops, tablets, etc.) towards the interactive television such as Apple TV, and the Samsung Smart TV[1]. And there is a general trend that users increasingly use a second screen such as a mobile phone, laptop or tablet while watching traditional television. The second screen is used for connecting with friends, searching for information or other things–introducing interactivity into the television situation [3]. For a longer time users have integrated laptops, mobile music and video players (such as iPods) for a more flexible use of media in the home [4]. Furthermore, there are trends going in the direction of combining the content on the two screens changing the dialogue between the content provider and the user [5] and supplementing the traditional television situation. In the US, this integration is currently going further; applications and logins for shows offer the users a social element, on their tablet or mobile phone, in seeing who else are watching, to get information about the shows and actors, etc. (see for example in footnote[2]).

The direct connection between the content at the television screen and the second screen is somewhat still in its infantry. Many service providers experiment with different services and set-up to understand the possibilities and challenges in this. One example is shows such as "The Voice"–a worldwide entertainment program (singing competition). While the direct show is broadcasted, the shows' webpage offers information on the contenders, songs, tweets from watchers as well as from the show's host, etc. (see for example the webpage www.nbc.com/the-voice as an example). Another example on a contemporary second screen is the direct applications, which are made for the users to use while the television program is broadcasted. One of these examples is the Euro 2012 app for the European Championship in Football 2012[3]. This app (and others similar) offers additional information on statistics during the game, information on the teams and players, and scores and updates (being pushed) while the games take place.

The purpose of this paper is to analyse the needs, challenges and viewpoints from users receiving pushed information on the second screen synchronized to a broadcasted television programme. The paper examines pushed content as one of the elements in the diverse media picture of the future. Additionally, this paper looks at the pushed content to be a possibility for different genres of broadcast. As a basis for the examination, we worked on the following hypotheses:

- that the content on the TV-screen is perceived as being controlled by the content provider, while the content on the second screen rather is co-controlled by the user and the provider(s),
- that push messages on the second screen are perceived more intruding than the push from the TV-screen.

We did not reveal these research hypotheses to the test persons, but tried instead to identify the connections between test persons' reactions and the different variables: TV-genre, amount of semantic redundancy, number and rhythm of push messages and test person characteristics.

Due to the small number of test persons (five), this pilot project can only give very early indications that only can be used to identify possible positions in users' relation to and potential future use of second screens while watching TV, to identify new research questions, and to form basis for a larger experiment.

The paper is organised as follows: Section 2 includes the methodological set-up of the analysis work and section 3 describes the actual experimental set-up for the empirical part of the study. The early and preliminary results are presented in section 4. These include observations and identifications of new areas for future work. Conclusions and further work can be found in section 5.

[1] www.samsung.com/us/topic/our-smart-tvs

[2] http://mashable.com/2012/05/10/mashcon-leaders-in-digital-socialtv/).

[3] http://www.caughtoffside.com/2012/06/07/top-five-free-football-apps-you-must-download-for-the-euro-2012-finals/

The paper shall be seen as the first early observations of a larger study on the second screen and its possibilities and challenges.

II. METHOD

The paper is based on a qualitative laboratory test focusing on studying the conceptual understanding and perception of the test persons receiving content on the second screen while watching television. Methodologically, the test is comprised by two central elements: Laboratory settings, and low-fidelity prototyping.

The test was performed in laboratory settings allowing for the test to take place in fully observed, controlled and focused surroundings. The alternative in this situation would be to carry out the test at the test participants' home premises to place a realistic element into the test. However, the laboratory setting was chosen here as the first step to be able to control the settings and set-up to secure what was reflected on by the test persons.

Low-fidelity prototyping was used in the test to simulate pushed content for the second screen (see details in the next section). Much literature discusses the limitations and possibilities of different types of prototypes (see for example [6]). Generally, low-fidelity prototyping have a limited functionality, none or limited possibility for interaction, and with simple representatives of content or the system in focus. Also a facilitator is needed to explain what takes place since the test person cannot try out functionality etc. However, for this test, the low-fidelity prototypes of the screens had the purpose of providing a conceptual understanding of the idea of the synchronization of the second screen content. Interaction was not needed and furthermore, the risk of using high fidelity prototyping in the test would be that the test person would concentrate much more on the GUI than was intended here. It is generally known that low-fidelity prototyping can demonstrate concepts and screen layouts [6]. Additionally, Sefelin, Tscheligi and Giller [7] conclude in their research comparing the results of using different types of prototypes that low-fidelity prototyping lead to almost the same quantity and quality of results. It should, however, be mentioned that the same study also concludes that the users at all times prefer high fidelity prototypes. Building on [7], Brandt [8] demonstrates that low-fi prototypes exactly because of their lack of functionality, facilitates participants' definitions and reflections on requirements to a future system.

III. THE TEST

The test was built on a number of interviews organized around a test person watching a television clip while receiving low-fidelity content on a second screen. The following describes how the experiment was organized.

A. Set-up

The test was conducted in an office at the university equipped with a normal desk, chair etc. The test person sat at a chair in the middle, while two facilitators sat on both sides of the person. The interviewer sat besides the test person while a second facilitator (responsible for running the videos as well as "sending" the push messages) sat at the end of the table. On the table, the desktop computer screen represented the TV screen and on the table an iPod touch was used to represent any type of mobile device the test person would have. The set-up can be seen in Figure 1 below. The camera, which was taping the whole session, was placed at the desk lamp. The door was locked to prevent noise and distraction from outside.

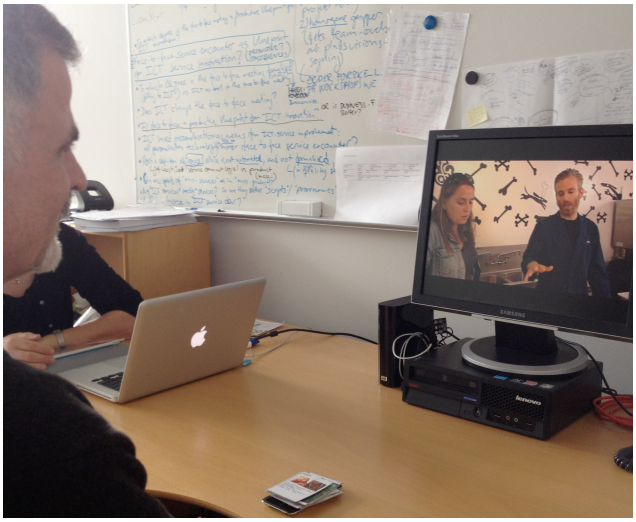

Figure 1 The set-up where the test person could watch the TV clips on the computer screen, the person in managing the clips and the flow of low-fi screens according to a pre-defined time plan, and the iPod with low-fi screens on the table in front of the test person.

B. The Test Persons

Two men and three women were involved in the test. The persons were chosen to represent variety more than representativeness. Table 1 gives an overview of the 5 persons, age and background. All the persons were chosen because of their familiarity with using a second screen (laptop, template or mobile phone) while watching TV. This was to secure that the test person would have an immediate chance to understand the concept of push content, as was the focus of the experiment.

TABLE 1
OVERVIEW OF THE TEST PERSONS, THEIR AGE AND PROFESSIONAL BACKGROUND

Person	Age	Background
Person R (male)	50 years	Professor
Person C (female)	36 years	Ph.D. student/Layer
Person K (male)	41 years	Self-employed IT company owner
Person L (female)	28 years	Nurse student
Person M (female)	19 years	Hair dresser student

Recruitment of these persons was done in a combination of snowball sampling [10] and random sampling [11]. The first persons asked were persons R and C, independent of each other. Following this, person C was asked to invite another person to the test. The criterion was that this person was a smart phone/tablet user and could associate some use to the situation watching television. That is how person K was identified. Persons L and M were both identified as persons known to the researchers to represent both different age groups as well as professional backgrounds.

C. *What Took Place*

Arriving at the set-up, each test person was asked to envision the set-up to be at home in front of the television. This was followed by a short interview about the person's television and media habits, as well as a briefing to what should take place afterwards. Three different television clips were then shown at the computer screen:

First was showed a 2.35 minutes clip from a news channel (DR Update–a Danish digitally national broadcasted news channel). This clip focused on the significant raise in the price for rental apartments in Denmark causing difficult situations for many. This clip was chosen as a news element that many people would find interesting and as a news element, which not would be out-dated.

Second was showed a 4.30 minutes clip from a popular life style program where a well-known cook travels to New York (Anne Mad in New York) and discovers new and different products and shops and provide examples of her own cooking afterwards. This clip was chosen as a representative of this genre focusing on where Anne (the cook) visits a spice vendor in New York – something, which is unknown in the same format in Denmark.

The final clip lasts 5.48 minutes and shows a summary of highlights of one half of a (Champions League) final from 2009. This clip was selected as a representative of a significant football match with world famous teams (Barcelona and Manchester United).

The three clips represented three different genres of broadcasting in terms of rhythm and information density, producing different possibilities for second screen push content. The three TV clips should represent a diversity of emotional versus analytical engaging TV-content, as well as speaking to a relative broad audience, increasing the likelihood that the test persons would be familiar with the genre. The push content was designed to allow an examination of the correlation between test person's reaction and the different configurations of the push information: text only (headlines, link or full text), text and picture, picture only, and diagrams.

During the clips, the test persons "received" push messages on the mobile phone representative (the iPod). The pushed content was in the format of printed drawings and text printed and glued on cardboard. Each text element or picture was adapted to the screen size of the iPod. Examples can be seen in Figure 2 below.

Figure 2 Examples of cardboards representing screens pushed to the user while watching the television clips. The first row are low-fi screens relating to the popular life style program, the two first screens in the second row relates to the news clip, and the two last screens in the second row relates to the sports clip.

As it can be seen from Figure 2, the screens were rather different in style, fonts used and the diversity of pictures and texts. This was done deliberately as a basis for the test person to reflect on the differences.

An example of the iPod with the paper screen can be found in Figure 3.

Figure 3 Example of the iPod and low-fi screen set-up. The example is taken from the sports clip.

During each television clip, the test person kept all low-fidelity screens "sent" to his device. This would provide the basis for further discussion on the availability of the content afterwards. It shall be noted that we purposely did not designate the push messages, except calling them "cardboard cards". Synchronized with the video signal, the cardboard cards were dropped on the table in front of the test person. Between each television clip and after, the test person was asked about the experience, the likes and dislikes of the pushed content and television experience and what other comments he/she would have to the experience. The experiments would typically take around 1 hour all included and were carried out over a period of a month. The tests were video filmed for documentation purposes.

IV. Early Observations

The reflections made by the test persons in the interviews as well as the actual reactions on the push messages point not unambiguously in one direction. This indicates that we instead can identify a complex relationship between the different parameters in the push-message experiment: the genre, the information type and -density of the TV content, the sematic relationship (amount of redundancy) between the TV content and the push messages, the number and rhythm of push messages, and the test persons' media habits. Some patterns can however be identified: If information provided via the TV-content is regarded as of relevance outside the TV-viewing context, the acceptance of the push-messages is higher than if the TV-content is consumed in an "ephemeral" mode, or if it requires full attention. If the viewer has previous knowledge on the area, the push messages are seen as a kind of dialogue/ supplement, if the viewer is a novice on the area but has some interest in more knowledge, the push messages are welcomed as explanation and as recordings/storage of facts from the TV flow. Generally, the test persons to a large degree rejected most of the push messages as too redundant or irrelevant. It is difficult to add extra information on top of a well produced, information packed TV-flow, particularly when a personal device (smart phone/second screen) is used.

Using a personal device for push requires that the push messages have personal and immediate relevancy. Below we present a more detailed analysis of the results.

The experiment also points at general questions about TV-watching, expectations and habits related to TV-watching, TV as medium in relation to interactive media, and the use of attention during TV-watching. The test persons' reflections about TV-viewing and use of interactive media represent very strong positions. Some test persons' describe TV-viewing as a less morally legitimate activity than their use of interactive media, e.g. the smartphone. In some cases the interactive second screen is constructed a moral legitimation of the "passive" TV-viewing. In other cases, it serves as a "back up" solution if the TV content fails to entertain. This indicates that interactivity related to the smartphone, table-PC or PC is seen as socially more acceptable than "passive" TV-watching.

When asked to report on their current use of smartphone when watching TV, test persons state that they either use it for an unrelated activity (gaming, SMS, normal telephone conversations), or get inspired by the TV content to browse the web. One single piece of information in the TV-content may function as inspiration for interaction with the second screen, either because the test person wants to verify the information, wants a deeper explanation, or because an element of the TV-content (e.g. a dress worn by a person on the screen) triggers an association, astonishment, or desire at the test person e.g. to search for a similar dress or check facts provided in the TV content. The second screen (smartphone, tablet or laptop) is thus a companion to TV used to make the TV-experience useful on a personal level. Through the active search for extra information the viewer "personalizes" his or her TV-experience. This behavior applies however not to the oldest test person instead prefers to devote the TV full attention. It is unclear whether the general use of second screen is related to age, to other demographics or is a result of the test person's media habits.

The test persons describe the attention they normally devote to TV-watching very differently: For some test persons TV-watching is a focused and planned activity they devote full attention. These test persons typically reject the idea of push-messages. Other test persons make distinctions between different types of TV-watching: some requiring full attention while others are less focused, e.g. using the TV as a radio. This is also reflected in their reactions on the experiment: In some cases the push-messages are accepted or even appreciated as a support for understanding the TV-content. Sometimes the push messages are tolerated, but not appreciated, as any other kind of disturbance; sometimes the push messages become the main narrative since more attention is spent on the second screen than on the first. A relationship seems to exist between the genre and the degree of redundancy, but again, the findings are ambiguous.

As the most dominant observation, the test person's habits related to TV usage seems to determine the overall reaction: Those test persons that generally prioritize to concentrate on the TV-screen, e.g. by avoiding social contact with family members when watching TV describe the push messages as disturbing. Conversely, those test persons that describe their concentration spent on TV as less intense, e.g. because the attention is spent on the smartphone while the TV runs in background, react less irritated. The push-message is in this group of primarily younger test persons quickly scanned and subsequently put to the side. In general test persons however spend longer time looking at the push messages than they estimate afterwards. The test persons spontaneously signified the push messages on the cardboard cards as "SMS messages". In terms of user experience, they thus expect the push messages to be displayed in the same way as SMS. They expect the messages to be listed as a thread, making a condensed chronological view possible. They also expect the push-information to available after the TV-show. Finally, that the test persons name the second screen push messages "SMS messages" indicates that in order to justify the disturbance the push content should posses the relevancy for the user as a personal SMS message. Push-messages on the smartphone /second screen are perceived as person-to-person communication, not as mass media communication. This has serious implications for the design of the editorial policy for the use of push messages.

If we look a bit closer on the reactions on the push-message experiment, they appear to be a result of the mix of the TV–content (genre & information density), the semantic relation between the push-messages and TV content, the number and rhythm of push-messages and the test persons' attitudes and habits of TV watching.

The genre- or more precisely the kind and density of information in the program–seems to be one of the main parameters. TV programs with a high amount of factual information, like the News clip produce one kind of reaction among the test persons, where TV programs with a low amount of hard facts, but with a higher degree of sensual elements (the cooking clip) produce other kind of reactions.

The test persons' previous knowledge plays a role for the reaction on the push-messages. In two cases test persons had accidentally specialist knowledge within the subject of the news clip, and in one case within the cooking-clip. In these cases, the push messages created a reflection/inner conversation among the test persons, and a critical reading of the content. These test persons called for more diverse information through the second screen, e.g. opinions or facts arguing against the discourse of the TV clip. Conversely, the (younger) test persons that had no knowledge of the subject matter used the push messages as the main information source, spending considerably attention on the second screen. In some cases the push-messages constituted the main narrative, with the sound from TV as supplement. In the cases where the TV-content requires a high degree of attention (e.g. the soccer clip), test persons are likely to completely ignore the push-messages or abandon the service. They describe the push messages as highly disturbing, claiming that the TV speaker already covers this kind of information.

Test persons' reflections reveal that both a deep knowledge as well as the lack of knowledge on the subject motivates to study the second screen information. The same ambiguity applies to test persons' reflections on the semantic relation between the information on the TV and in the push message. As part of the experiment some push messages content redundant information whereas others contained different kinds information with varying degrees of semantic similarity.

When asked about their associations related to the word "push", the older test persons described very negative feelings, whereas the younger pragmatically described "push" as a condition for media usage, namely the content providers' struggle for attention. One test person

provocatively described all content, also the news content, as a kind of advertising. In all cases the intention of the second screen was by the test persons interpreted as content providers' attempt to capture attention. Some of the test persons explicitly demanded the push-functionality to be disabled, where as other test persons suggest that they should either permit or actively request push messages before each program.

During the interviews, the test persons refined some of their reflections over the experiment into requirements for future systems. It was the low-fi cardboard-made "push messages" that enabled and encouraged this kind of reflections, since the array of possible solutions and variations over the idea of push messages on the second screen was kept open to the test persons. Often the test person would grab one of the cardboard cards in order to argue or explain an idea. In this sense, the experiment evoked elements of a participatory design methodology [9].

Based on the test persons' comments the following, partly overlapping purposes for second screen applications can be derived:

- Several test persons envision the second screen application as a collector/recorder of facts information during the TV-show (e.g. cooking recipes), creating a higher degree of comfort. Currently, users who want access to TV program-related content after viewing the TV show must type a URL and navigate to the desired content via a webpage. This is a cumbersome process. The idea was obviously triggered by the physical cardboard card carrying the push messages: After the TV clip they represented in short form the narrative of the TV-clip. It is thus a question how this idea translates to/performs at the interactive but still ephemeral second screen. An interesting observation should be added: The test persons envision the collected information linked specifically to the smart phone/second screen as physical object, meaning that the ephemeral information from the TV show is captured and made portable through the mobile device.

- Second Screen applications used for time shifting on the narrative/dramaturgical level of the TV-show. A number of test persons call for the possibility to get access and study hard facts presented or referred to in the program before as well as after they have been mentioned in the broadcast. This information can thus be studied in periods where the TV-show is less interesting. The second screen application functions as an overview of the narrative/dramaturgy of the TV-show (providing some user sovereignty) as well as it functions as depository for the related documents. As a variation over idea one, this idea arguably also emerges from the physicality of the cardboard cards.

- Second Screen applications as a tutor/companion/ guide to viewers that are novices within a specific field. A case could be a branch of sports unknown but fascinating to a viewer. This viewer would need some basic information e.g. about rules and challenges that would be trivial to most viewers. This idea emerged through test persons' reflections about possible uses for the second screen in relations to sports. During our tests it was clear at an early stage that push information during a soccer match is irrelevant if not disturbing, but the rules and logic of e.g. a game unfamiliar to the viewer could be transmitted via the second screen.

Discussion and Conclusion

We initiated the research to examine how the relationship between the TV-screen and the "second screen" is perceived in praxis.

The experiment showed that the test persons mostly perceive the second screen push messages as disturbing. In some cases, they find the push information useful, but generally they see the push information as irrelevant. The test persons expect the second screen (the mobile device) to be controlled by them, whereas the big TV screen is expected to be controlled by the broadcaster. Push messages received on the mobile device must be personally relevant and must be part of a dialogue with another human being. Push messages received from an institutional sender, like a broadcaster, must also prove to be relevant on a personal level in order to not be perceived as irrelevant or as "advertising". This rather unsurprising observation demonstrates the phenomenon of media ecology [12], which should be taken to consideration when designing second screen applications. Prospective users will judge new services based on their experiences with the existing media. Therefore, the test persons describe the push messages as SMS'es and therefore they expect the relevancy of the push message to be much higher than on the TV.

In cases where the test person had a very specific interest in the topic discussed on TV, the push messages added an extra narrative layer to the experience. In these cases there is a certain potential for using the second screen to add value to the TV-experience, e.g. by giving access to extra information or the opposite view. A major challenge for content providers is however to predict this need, respectively orchestrate the second screen narrative without cannibalizing the TV-experience: If the main narrative is well organized, audience attention will be directed towards the TV-screen. If the main TV narrative for a moment is perceived less interesting, audience members want to take control over their attention.

The test persons' reflections revealed by us unanticipated potential use of the handheld device during the TV-experience: It is being used to collect information from the TV content. A successful second screen solution should thus aim at fulfilling this need in an easier way that the existing workflow, which typically requires manual searches, based on the ephemeral information from the TV. A second screen solution should thus work as a kind of time-shifting device, not for the video content, but for the information in the TV stream, if the information, which is useful for the viewer outside the TV-viewing context, is captured, summarized/condensed and stored "physically" on the second screen to be made portable.

Based on the interviews, we made a general observation: Handheld devices may legitimize TV-watching morally. The active search for more information based on the TV content helps some of the younger test persons constructing the TV-viewing as a legitimate active experience. What by this

group of viewers is described as a morally problematic laziness related to the traditional "lean back" TV-watching is morally justified through interactivity on the second screen. It appears however crucial that a future second screen application gratifies this need to be active. It thus an imperative that the second screen not by designers and content providers is perceived as yet another platform for push of information.

The challenge is to push information that has a high level of serendipity, but which is not included in the main attention attracting stream (the TV-stream), which the viewer would not have found herself/himself, and which semantically fits into the TV-content in a way that balance each individual's need for redundancy versus serendipity in relation to specific TV-content. Since the second screen application demand attention from the main TV experience, the content must be perceived as vary valuable to the viewer. The biggest potential for second screen applications appears to capture otherwise ephemeral information in the TV narrative and make this specific information easily available later. It is thus the portability of information from TV-viewing that is personally useful for the viewer.

Methodologically, the test showed different challenges. Possibly, the attention spent on the second screen is higher in the experiment than it would be in real life, since the test situation and the novelty of the service stimulate test persons' interest in the push message content. The push-messages delivered in the first video clip (the news clip) received more attention than those delivered during the second video clip (the cooking clip). The reason could also be that the information density is higher in the news clip. The future design of the experiment must thus compensate for bias produced by the sequence in which the clips are played. Methodologically, the low number of test persons can also be criticized. It should thus be stressed that this research is in an early stage and that the purpose is to specify research questions for the further research. Based on our initial research we identify the following research questions:

- What is the relationship between TV genre and different uses of the second screen?
- What is the relationship between TV-viewing habits and different uses of the second screen?
- What is the relation between the ephemeral TV-viewing experience and search via interactive media?
- How is the relation between a person's interest in a topic and the acceptance of push messages?
- Why seems user-control to be much more important on the handheld small screen than on the big screen (the TV)? How are different modes of interaction/ expectations related to physical properties of the device: are they a product of history or materiality?

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