

# A user-centred mobile television consumption paradigm

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**Abstract :** This paper describes the design considerations for a mobile television service from a user-centred perspective. Results from previous research on interface design, traditional TV consumption, and focus groups on user expectations and needs in a mobile context are taken into account.

## 1. Introduction

This paper explains the design considerations for a demonstrator for a mobile TV service, which will be part of and accessed through mobile phone devices. More specifically, this demonstrator emulates the service of the Satellite Digital Multimedia Broadcast (SDMB) system. The cost-efficient country-wide distribution of the multimedia content will be achieved by integrating satellite broadcast capacities with existing terrestrial 3G and beyond 3G infrastructures [1]. The SDMB service assumes the use of mobile phones with extensive storage that allows the consumption of previously cached content at opportune times as well as the watching of live streams and receipt of alerts.

The interface design of this service must consider the following factors:

- how people use their mobile phones
- how and why they watch regular television and whether this holds in a mobile context
- the technical requirements of the different content types
- the technical restrictions of the mobile phones and the SDMB system
- users and their needs when in places where they obey different social norms

To address these questions concerning the overall quality of experience of a mobile TV service I have conducted focus groups [2] and conducted lab-based experiments on the acceptability of audio and video encoding bit rates [3]. This resulted in the interaction design of the mobile TV service demonstrator which represents the scope of this paper.

## 2. Traditional TV Consumption

Television consumption generally takes place at home. Watching television is a rather passive or “lean back” activity in which an audience passively consumes broadcast content. Remote controls facilitate hopping through parallel channels of sequential content - an opportunistic search for content to satisfy a viewer’s moods and mindsets. When in a group, however, the decision of what to watch can be a contentious one.

People watch television for social and psychological reasons. On the social side people value the time they spend with friends and/or family and enjoy the communal experience. Mood management is one of the major psychological drivers for watching television. People who are bored may choose excitatory or arousing content, while those who are stressed are likely to prefer relaxing content [4].

We can see higher commitment viewing with favourite shows, programs for which people plan ahead of time, and shows for which viewers have to pay for on a per-use basis. During high commitment viewing people change channels infrequently and are less accepting of outside interruptions. When viewing on a low commitment basis, on the other hand, people

make more channel changes and may allow other demands and activities within the home to distract them relegating TV viewing to a background activity.

For the context of this work I consider the following to be the defining characteristics of standard television: Instant on – once a person turns on the TV he/she continuously receives content of a sequential channel. Easy switch - the cost of switching to a different channel is low, especially with a remote control. Seamless switch - the switch to a parallel channel is more or less instantaneous. Graceful transitions - due to the way TV is programmed, the transitions from a program that has just ended to the next program are smooth in an attempt by broadcast companies to keep their viewers. No spatial overlap - channel navigation does not spatially overlap with the content. No functional overlap - TV sets are dedicated to their purpose and can be used simultaneously with many other appliances.

In a study on digital television, Eronen and Vuorimaa found that users who were interested in watching television were not interested in interacting with an EPG or interactive television. The authors emphasized that digital television should maintain the familiar living room TV experience [5].

### **3. Mobile Phones and Mobile TV**

Being mobile consists of spurts of activity that interwoven with periods of dead or unstructured time. The usage of mobile phones evolves around the three general user areas of home, work, and public [6]. People use them mainly is to stay in touch with friends and family and synchronize with them in and across space and time. The perceived main threats to this need are high cost, imperfect coverage, and short battery life [2].

How does the use of a mobile phone - the centre of communication representing activity and control - go together with the passive or “lean back” consumption of television content?

In terms of mobile consumption, people are worried about absorbing themselves in multimedia content, which requires their visual attention and progresses at its own pace. They fear increased risks of accidents or lapses (e.g. missing train stops) [2]. Many people are wary of the effect their mobile phone usage, i.e. talking aloud, has on others in public spaces. For these and other considerate users multimedia consumption requires the use of headphones, which might further immerse them. It is currently unclear if and how mood management of ordinary TV usage will translate to the mobile context.

Previous research has shown that peoples’ average [7] usage of mobile TV is less than ten minutes long. This has ramifications both on the type of content as well as the way that people will consume it. Longer programs will be more appealing to people that experience extensive dead times; for example, long commuters [2].

How does the small screen size affect the content and its consumption? In general fidelity is traded off for mobility and availability. Mobiles have modest screen sizes. Large visual stimuli result in orienting responses (involuntary attention) and increases in arousal [8]. We do not know how attention and arousal decreases when viewing on smaller screens or whether headphone usage will partly compensate for this. A less attentive audience engages in more channel changing [9]. Less absorbing mobile television could be associated with more channel-changing and less attention to embedded commercials. Smaller screens might also affect the different content types viewed on the handset.

With reduced screen sizes screen clutter could become an issue much earlier than at traditional TV resolutions where screen clutter has been shown to impede attention and comprehension [10]. Text clearly suffers from small screen size, as a small screen renders text nearly illegible. If text were sent through a separate channel and presented separately people could easily adjust the viewing distance to the handheld device.

On current mobile phones videos are usually accessed through galleries that include a thumbnail and a title describing the content. The typical question that arises after a clip has finished playing is: What next? Whereas traditional impromptu television choices are based on the content and the point of entry to the content, the consumption of downloaded or video on demand requires more user interaction and decision-making which is partly due to the payment model. The naming of items in an EPG exerts a strong influence on user choice. In the following section we will present an alternative to this approach.

#### 4. Proposed Design

In short, the proposed design is based on the assumption that mobile users have short windows of opportunity, engage in low commitment viewing with channel changes, and need to control the content easily while in public spaces where they have unsteady visual fields. These are all challenges to the idea that mobile TV viewing should be an effortless, enjoyable experience.

I believe that the cost of choosing the next clip in current mobile interfaces, in terms of cognitive overhead, is a major inhibitor to a flow experience [11] of multimedia content, which already suffers from small screen sizes.

An electronic program guide (EPG) can be a valuable instrument in content navigation [7] and could be a tab/channel in the proposed design; however, it is not a fast entry point to mobile TV service. In order to maximise the amount of time spent watching content during the relatively short idle periods, mobile TV should behave like ordinary TV. When turned on, it should start playing that content that was last played. It should continuously show content until it has run out of new content and then loop back again to the first program. The only exception to this should be if a lower battery threshold is reached beyond which the user's usual communication pattern in relation to the charging pattern cannot be guaranteed. In this case the application would halt with an appropriate message.

The support of program changes is twofold. If the user is not interested in a channel he can change to a different channel by selecting the channel's tab on the screen depicted on top in Figure 1. Programs are serially aligned in the channels. It is not clear yet how the television brands, i.e. channels like CNN and BBC, will carry over to mobile television but current research suggests that a channel-centric consumption will prevail for some time over genre or category-centric channels (e.g. the channel of all news programs) [7]. However, for practical reasons, i.e., the feasibility of emulating full channels in our studies, we will follow a category-centric approach.

In previous studies users voiced their desire for indexed programs that would allow them to skip to interesting parts or scenes [7]. This functionality is based on content items as originally conceived by [12], which make up part of a program. If the user is not interested in a content item but wants to continue watching the same program he can navigate to the next content item with the buttons ">>" and "<< ". A 'double-skip', meaning two fast successive button presses, will be interpreted as a skip of the program and the service will continue with the next program on the same channel. With channel changes and program skipping the user can navigate a two-dimensional content grid with little cognitive effort. This interface allows for more habit formation [13] in contrast to lists displaying video clips, which differ every day or possibly every time a user browses them.



**Figure 1: Demonstrator for mobile TV with channel tabs on top, play/pause, skip buttons, and audio control on the bottom**

If for any reason, e.g., to get on a bus, the user needs to halt his/her viewing, he/she could use the pause button (||) and pause the program at its current position. The label of the button then toggles to a play (>) symbol. For incoming calls the presentation of the content should be automatically paused and the user confronted with the question of whether to accept or reject the call.

## 5. Summary

I have presented a design for a mobile phone based television interface, which draws from previous research on television watching behaviour and its psychology, mobile phone usage, focus groups on mobile multimedia consumption expectations and needs, and lab experiments. I believe that this user-centred approach leads to a design of a mobile TV service that will leave operators with services that offer quality of experience and which users find enjoyable and for which they are willing to pay.

I suggest a mobile television interface that aims at porting many of the standard television characteristics to the mobile phone as long as peoples' communication needs are not compromised, especially in terms of battery life and in receiving and making calls. I believe that a television service that presents content immediately on start up, that allows users to change channels, that skips boring parts and that pauses the content if necessary is a good way to approach the challenges of watching audiovisual content while on the move.

The only drawback from this approach is that the people might get too immersed in the television program because the device does not stop playing.

## References

- [1] K.Narenthiran, M.Karaliopoulos, R.Tafazolli, B.G.Evans, P.Vincent, C.Selier, C.Nussli, N.Chuberre, M.Mazzella, A.Jacobs, L.Zaccheo, M.Dieudonne, F.Rible, K.Petit, A.Nazif, K.Aldinger, L.Roullet, A.Pouliakis, I.Andrikopoulos, I.Mertzanis. S-DMB System Architecture and the MODIS DEMO. IST Mobile and Wireless Comm. Summit 2003 .
- [2] H.Knoche, J.McCarthy. Mobile Users' Needs and Expectations of Future Multimedia Services. WWRF12. 2004.
- [3] J.McCarthy, D.Miras, H.Knoche. TN01.1.03\_UCL\_MAESTRO. 2004.
- [4] D.Zillman. Mood Management: Using Entertainment to Full Advantage, in: L.Donohew, H.E.Sypher, E.T.Higgins (Eds.), Communication, Social Cognition, and Affect, Erlbaum, Hillsdale, 1988, pp. 147-172.
- [5] L.Eronen, P.Vuorimaa. User preferences and designers' views on what would suit the user. Conference on Advanced Visual Interfaces. Proceedings of the Working Conference on Advanced Visual Interfaces . 2000.
- [6] J.Edelmann, J.Koivuniemi. Future development of mobile services and applications examined through the real options approach, *Teletronikk*, 2, (2004) 48-57.
- [7] C.Södergård. Mobile television - technology and user experiences Report on the Mobile-TV project. 2003. VTT Information Technology. ESPOO 2003.
- [8] B.H.Detenber, B.Reeves. A bio-informational theory of emotion: Motion and image size effects on viewers, *Journal of Communication*, 46(3), (1996) 66-84.
- [9] E.M.Perse. Implications of cognitive and affective involvement for channel changing, *Journal of Communication*, 48(3), (1998) 49-68.
- [10] M.Edwardson, K.Kent, M.McConnell. Television news information gain: Videotext versus a talking head, *Journal of Broadcasting & Electronic Media*, 29, (1985) 367-378.
- [11] M.Csikszentmihalyi. *Flow: The psychology of optimal experience*, HarperCollins, New York, 1990.
- [12] N.Negroponte. *Being Digital*, Vintage, New York, 1996.
- [13] J.Raskin. *The Humane Interface*, Addison-Wesley, 2000.