iTV MODEL

An HCI Based Model for the Planning, Development and Evaluation of iTV Applications

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Abstract: This document describes a Model for the Planning, Development and Evaluation of iTV Viewer/User Interfaces. Explained are the motivations for the development of the Model and what is new about it. Also mentioned, are the models, methodologies, theories, guidelines, heuristics, design patterns, processes, "steps" and "tips" that were combined in order to achieve the presented Model. Some conclusions are presented and also future lines of research are point out.

1 INTRODUCTION

There is no doubt that iTV, which can be defined as a TV system that allows the viewer to interact with an application that is simultaneously delivered, via a digital network, in addition with the traditional TV signal (Perera, 2002) will replace the traditional TV viewing habits. Being a recent research area, there is a long way to go and new types of personalized applications (Bennet, 2004; Port, 2004; Chorianopoulos, 2003; Damásio, 2004; Eronen, 2003; Gill, 2003; Quico, 2003; Quico, 2004) and services need to be created and tested. This task will be easier with the use of an appropriate model. However, there is no specific, complete and detailed model. Instead, some scattered UI principles,

guidelines, heuristics, design patterns, processes, "steps" and "tips" are usually followed. Some of them new and specific for the development of iTV applications derived from practical experience. Others, not so new, resulted from an adaptation of the 'desktop computing paradigm'. However, the 'desktop computing paradigm' is not appropriate for iTV. In fact, the desktop metaphor is suitable to completely different user feelings, aspirations, states of reflexive cognition, activities and devices. Thus, the phases involved in the planning, development and evaluation of iTV applications need to be researched, especially, in terms of design principles, design guidelines, prototyping techniques and evaluation methods. The model we present addresses specific and detailed aspects, serving as a guiding

tool to those who are involved in iTV research, design and production.

2 MODEL

The model proposed model relies on the following assumptions:

1) iTV is examined from the perspective of the HCI discipline;

2) An iTV project is the result of a traditional TV program augmented with an interactive application;

3) The persons who interact with the iTV are being referred to as Viewers/Users (V/U);

4) This model is to be used as a framework for designing and evaluating iTV projects and is not a specification of standards or a strict set of rules. The overall framework allows designers some flexibility.

Due to space constraints, only the phases which are specific for iTV applications are described, leaving out phases that may be considered common to the design of other interactive application.

2.1 Planning Stage

At the planning stage, the specific iTV phases are:

1) *Choose and classify the television program* considering that certain genres are more "compelling for interactivity than others" (Lamont, 2003a);

2) *Characterize the Viewer* in terms of demographic profile (age, sex, socio-economic status); viewing patterns (e.g., social viewing, routines) and technology experience, which includes computer, set-top box and enhanced television experience. This information will help to make decisions on the following phase and on the development stage;

3) *Identify the reasons why people watch the chosen television program*. In order to help identify these reasons, one may give a look at the uses and gratification theory (Livaditi, 2003) which defends that consumers use media, in order to satisfy certain needs, namely: surveillance, personal identity, integration and social interaction, and diversion (Livaditi, 2003).

2.2 Development Stage

A User-Centered Design approach should be followed (Chorianopoulos, 2004; Perera, 2002; Nielsen, 1994a; Lamont, 2003b). This implies two things: First, that the design should incorporate "users concerns and advocacy" from the beginning

(Lamont, 2003b) and implies design for usability which is an approach that puts the user, instead of the system, at the center of the process when developing software.

The development stage, may be divided into 3 main processes, namely: conceptual model, prototyping, and formative - usability and affective - evaluation framework.

2.2.1 Conceptual Model

A conceptual model is a critical part of the design process since it defines the system image, that is to say, how the software will look like and act:

1) One must start by *identifying the interactive content*. A survey conducted by Livaditi (2003) has shown that ritualized needs (needs of entertainment, companionship and escape) "remain the driving force behind TV usage". Thus, in designing interactive applications we must consider that:

- Entertainment and communication applications (which cover ritualized needs) will be adopted easier by the mass audience;

- informational and transactional applications (which cover instrumental and cognitive needs) should be designed in order to offer entertainment and/or communication elements as well;

The quality of interactive products consists of three elements: utility (usefulness), ease of use (usability), and enjoyment (affective quality) (Chorianopoulos, 2006). Thus, the Interface will have to be designed in accordance. It will also have to be the less intrusive possible in order not to interfere or conflict with the TV viewer experience (Lamont, 2003a).

2) *Choosing the layout* - main choices rely on overlay or embedded design. On the overlay design, the video always displays in full-screen mode so that the interactive content is placed over top of the screen. On the embedded design, the video area is reduced so that content is placed around it (Lamont, 2003a). There is no ideal solution and, before choosing the layout, it is important to carefully consider each one advantages and disadvantages. For example, an overlay design advantage is the size of the TV window which is the same as regular TV. A disadvantage is that the content on top of the TV window may be distracting and condition legibility.

3) *Describe the system semantics* - for each design element on the system, some details must be described, namely, the element name, description, properties, actions, appearance, limitations, related elements and examples of use.

Important to note that all interaction design decisions, to be taken during this section, should be based in specific iTV V/U interface principles and guidelines. Principles and guidelines concerning

text, graphics, background, interactivity and technical options. The detailed description of principles and guidelines may be found at (Prata, 2005).

2.2.2 Prototyping

From the several techniques available for creating prototypes, the implementation of a high-fidelity one is recommended, even if low-fidelity prototypes are used in preliminary phases. A high-fidelity prototype is an interactive prototype with realistic input and output interfaces. Thus, it is adequate since the intention is to validate the product idea and the adequacy of each interface component with future V/U.

In the creation of the iTV prototype, and as suggested by Chorianopoulos (2004), some key elements should be considered, namely:

1) *The Hardware platform* – a TV set should be used as an output device; a remote control should be used as an input device. A laptop and an infrared receiver (as for instance, the IRMAN infrared sensor available at: http://www.intolect.com/) can be used in the setup. It allows simulating a "typical watch TV environment", that is to say, an environment which includes the viewer, a TV set and a remote control. In order to avoid interference with the TV viewing experience, no other hardware should be visible to the V/U.

2) *The Software platform* - there are no iTV authoring tools offering an explicit iTV conceptual model or a TV-based grammar to help the design process. Thus, for the development of iTV applications, traditional programming languages and authoring tools are often used. For instance:

- For the OpenTV platform, the iTV application may be developed by using C programming language or a generic visual authoring environment;

- For Multimedia Home Platform (MHP) platform, the iTV application may be developed by using Java programming language or an authoring environment like Alticast MHP;

- For the MSTV (Microsoft TV) platform, the iTV application may be developed by using HTML and Javascript. Another solution might be using Microsoft Visual Studio, which has lots of tools for the design, development, test and deployment of an application. (Chorianopoulos, 2004).

Important to remember that, especially when a new type of iTV project is being created, evaluate it may became a difficult task for the V/U's, since they have nothing similar to compare it with. In that case, the development of more than one prototype is encouraged.

2.2.3 Formative – Usability and Affective - Evaluation Framework

The evaluation should be of two types: formative evaluation which should occur during the whole process of development, and final evaluation, which should occur after the conclusion of the prototype. Formative evaluation should be based in expert's opinion and also V/U feedback from a user-centered design perspective. In a very early phase of design and once the first prototype sketches have been created, conduct an "expert" usability evaluation using heuristics and streamlined cognitive walkthroughs (Lamont, 2003a). Also, conduct a V/U usability evaluation using the "benchmarking lab studies" (Lamont, 2003b). For both, experts and V/U, conduct an affective evaluation (Chorianopoulos, 2004). For more detail, see figure 1, where the specific iTV applications evaluation methods and tools are highlighted. Note that the affective evaluation process involves the use of some tools, namely:

- SAM – *Self Assessment Manequin* to measure affect;
- AD ACL – *Activation Deactivation Adjective List* to measure motivation;
- Pii scale – *Personal Inventory Involvement Scale* to measure involvement;
- PL scale – *Program Liking Scale* to measure program liking;
- Log Files – to measure engagement;
- HQ scale – *Hedonic Quality Scale* to measure hedonic quality.

The measuring tools presented, and which were found to be appropriated for iTV applications, were retrieved from usability engineering, communication, advertising and consumer research literature.

2.3 Final Evaluation Stage

Final evaluation should be based in expert's opinion and V/U feedback and it may be conducted in a similar way than the formative evaluation process, but carried out on the final application, with all information and operation implemented.

3 CONCLUSIONS AND FUTURE WORK

A model for the planning, development and evaluation of iTV interfaces was presented. First feedback obtained from professionals and experts in the areas of interactive television and HCI was
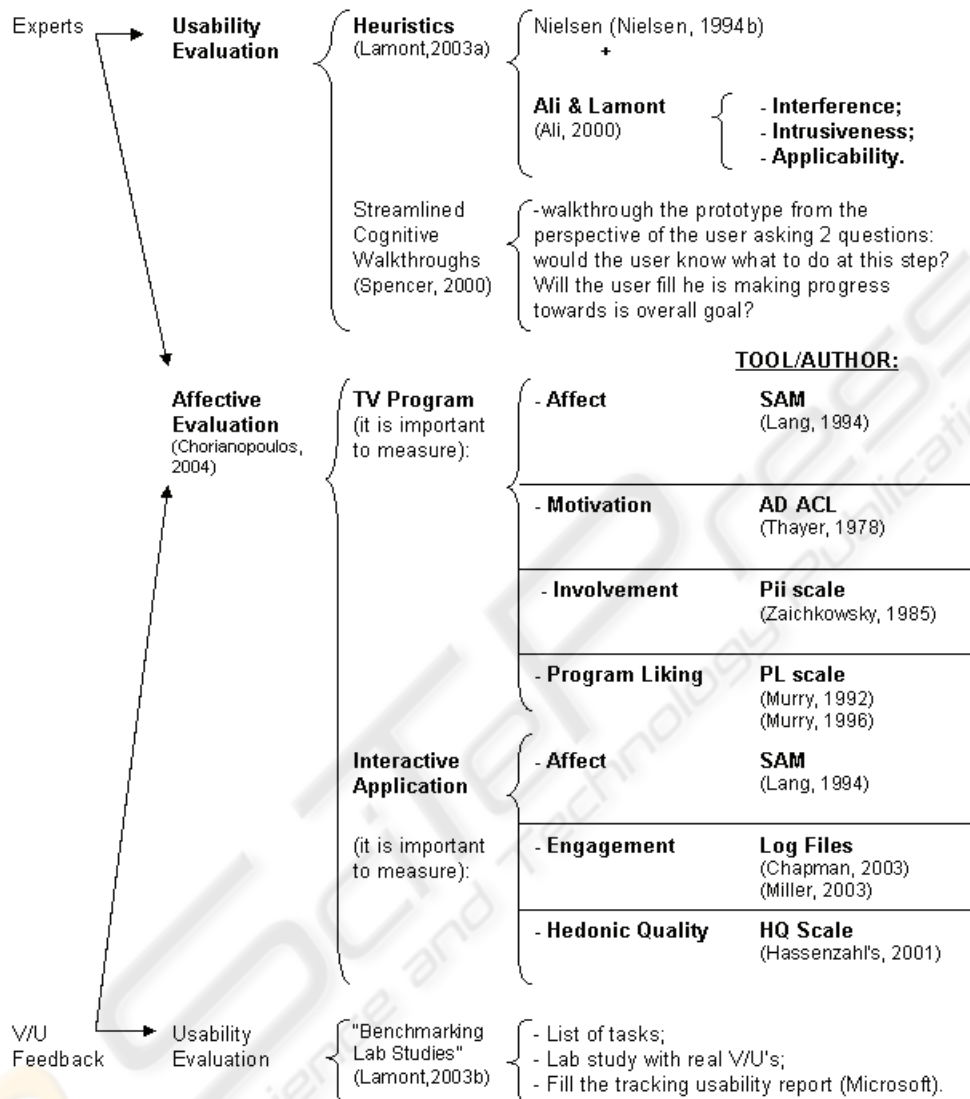
Figure 1: Usability and Affective Evaluation Framework.

encouraging. Some iTV designers and developers, will use the model in real situations soon in order to test its adequacy. As to future work, we are researching the design and development of novel iTV applications and plan to enrich this model with new findings and insights.

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