

Using Experts Review to validate an interactive TV user interface for the unification of contents

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ABSTRACT

In a context of great transformations regarding the consumption habits along with an increase in the offer of On Demand services, complementary to the traditional TV operators, the TV ecosystem requires new and disruptive approaches to cope with such demanding scenario. This paper presents the results of an expert review of a user interface aiming to offer a unification of contents as means to address the new viewing habits and interactive television (iTV) trends. The primary goal of using this assessment method was to promptly validate the concept of unification of linear and nonlinear contents in the same interface by using a semi-functional prototype, in order to provide insights into further stages of Lab tests and field trials with end users. Important feedback about unification and personalization features, likewise specific interaction and UI issues were identified to be considered in higher fidelity versions by the research team or by other players of the iTV industry. This research is developed under the UltraTV project that results from a partnership between the academic field and the industry to bring innovation to the iTV domain.

Keywords

Television, Interactive TV, User Interface, Expert Evaluation.

1. INTRODUCTION

The TV ecosystem has been witnessing fundamental changes in the way viewers get access to TV contents, increasingly supported by (Video) On Demand (VoD) services in opposition to the traditional lineup of TV contents. This transformation on viewing habits is supported by recent solutions that allow accessing the available contents anytime and anywhere [1][2]. In addition, it is possible to observe, mainly among the Z generation of consumers, a shift towards accessing content in the cloud [3], especially movies and series that can be found in services like Netflix, YouTube or even Facebook. This current trend follows the original offer of the commercial TV media devices, such as Chromecast, Apple TV and Android TV, which have promoted the consumption of Over the Top (OTT) content, contributing significantly to an increase in the amount of content viewed from Internet sources [4][5]. In response to that, the services of traditional Pay-TV operators have been trying to adjust to the contemporary scenario, namely by introducing services like the “catch-up TV” and “time-shift” [6], changing the pre-programed TV to become more flexible.

This paper describes the ongoing research within the UltraTV project, focused on the expert review conducted to validate an interactive television (iTV) concept and prototype for the unification of contents. Section two introduces the TV Flow as the grounding concept for the proposed user interface (UI) in response to the current demands within the iTV domain. The development and assessment methodology are described in section three, followed by section four that contextualizes the expert review. Section five gathers the obtained results, followed by the Conclusions that present the most relevant remarks for future work.

2. UNIFICATION OF CONTENTS AS MEANS TO ADDRESS CURRENT VIEWING HABITS

The current TV scenario is suffering profound changes, mostly caused by a transformation on consumers’ habits. In order to adjust to this new context, the services supported by Pay-TV operators are adding new features to assure flexibility for clients regarding content availability and mobile access. At the same time, OTT players are offering a great diversity of online videos, making harder to determine which content to watch. This scenario leads to the hybridization of the ways TV is viewed [7]. In this regard, the industry solutions have been trying to break the existing paradigms and go beyond the common textual menu-based interface and the traditional TV controller. These new iTV trends are translated into different features of the UI, such as disruptive interfaces that emphasize the dynamics of the navigation supported by transition effects and three-dimensional grid space; content aggregation provided by applications (Apps); multimodal interaction, like gestures or voice-controlled interfaces; the integration of different devices to watch complementary information or to control the TV.

In order to encompass these trends and demands of the new viewing habits, the UltraTV project proposes a unification of contents and sources for the TV ecosystem, founded on a partnership that connects the research field and the industry to bring innovation to the iTV domain. The main goal of the project is to develop an interactive TV ecosystem that supports the most innovative services while integrating audiovisual content in a unified way counterpartying the apps silo-based approach that rely on distinct UIs and interaction models. This project is focused on facilitating the access to on demand content in an integrated UI, surpassing the linear and traditional logic of the channel’s lineup. The development of the project encompasses the design of new models of interaction and user interfaces and the validation of its feasibility through an iterative process based on gradual assessments. These goals have been pursued in a UI proposal named as ‘TV Flow’. The optimal user experience that the UI ambitions to achieve, by means of unification of content and sources through an immersive grid navigation, alludes to the concept of ‘Flow’ from positive psychology renowned by the work of Mihály Csíkszentmihályi. This mental state is associated with a pleasurable feeling triggered by a hyperfocus on a given task from which users receive immediate feedback and confidence on success. Essentially, the TV Flow proposed by the project aims to promote a unified, consistent and fluid User eXperience (UX) during the interaction with an engaging interface, which provides access to recommended profile-based content, without leaving that interface and by performing easier tasks with the lowest number of clicks.

3. PROTOTYPE DEVELOPMENT

The UltraTV project is being developed according to a User-Centered Design approach, which includes an iterative development cycle based on early testing of prototypes with experts and further tests with end-users. These tests are conducted

using versions of the UI with an increasing fidelity based on the feedback of previous assessments by experts and users. To begin, a user and task analysis was developed to address the system requirements and guidelines drawn from the TV Flow goals of aggregation and unification of content. Then, it was possible to sketch the first mock-ups to test and sustain a new model of TV navigation and viewing, based on the unification of content from different sources, namely Managed Operated Networks (MON) and OTT players. Further, a medium-fidelity prototype was developed encompassing an exploratory UI supported by a grid-based navigation using the four directional keys on the remote control.

In the proposed solution, the content is structured in columns (organized by genres and sources) and rows (presenting content clusters tagged as ‘Keep watching’, ‘Trending’, ‘Popular’, among others). The main column – the “Live” content – is centered by default when initiating the system as shown in Fig. 1. The closest columns (“Mix TV” on the left and “Mix Web” on the right) include content suggested to the user (based on his profile, considering the viewing habits, the time of the day and other factors). The left-hand side columns sort broadcast content by thematic categories and genres. The right-hand side columns display content from OTT players (e.g. YouTube, Facebook Videos, Netflix). The graphical layout of the UI is organized in two areas: The Header that displays the Menu button and settings information regarding the list of available categories, the active viewing mode and profile; and the Body, with a navigable grid. The presentation of the grid is available in two selectable viewing modes. The Wide viewing mode as shown in Fig.1 is an overview of the grid with 5 full cards and half of a card on each side, while the Zoom-in mode in Fig.2 shows a navigation focused on the selected item, presented on a larger scale, with a hint of half of each next card surrounding it. Navigation through the cards is made using the vertical and horizontal axis, to match the D-pad of the remote control. When selected, the content is enlarged and pushed to the center of the screen (moving the entire grid) resting on the highlighted blue column with overlaid contextual information.



Fig. 1. Wide viewing mode wireframe (bottom-left) and UI (top-right).

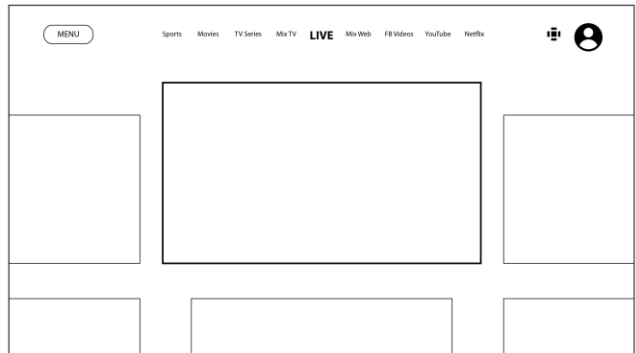


Fig. 2. Zoom-in viewing mode wireframe (top) and UI (bottom).

After pressing the ‘OK’ key on the remote control, the content is displayed in full screen. Pressing the ‘Menu’ key it invokes on the bottom of the screen an informative contextual menu regarding the selected content as shown in Fig.3. Using a ‘tap & hold’ command (pressing OK for a few seconds) a circular contextual menu appears on the screen with options such as “Info” (comprising synopsis, more episodes and cross-content recommendations), “Favorite” (bookmarks the content saving it on a customized list), “Like” (refines the recommender system) and “Dislike” (removes that content from the grid and refines the recommendation algorithm) as displayed in Fig.4.



Fig. 3. Informative contextual menu (full screen).

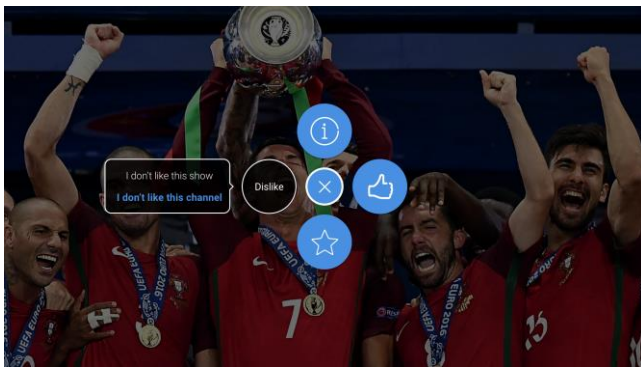


Fig. 4. Circular contextual menu with the 'Dislike' option selected (full screen).

4. ASSESSMENT METHODOLOGY: EXPERTS REVIEW

Regarding the UX process, the evaluation of a prototype by experts represents a crucial step towards the assessment of a product's usability and a quick mean to obtain relevant suggestions. In this regard, two points are important to highlight: i) the evaluation of the UI should be as early as possible in order to offer designers the chance of getting feedback for the redesign process [9]; ii) the selection of suitable evaluators considering their background, expertise and previous experience with similar systems [10]. After the definition of the experts is important to define methods and the tasks that will be applied [11]. Heuristic evaluation, cognitive walkthrough and guideline review are some of the most common methods for expert UX evaluation. The heuristics consider a set of UI related principles. The experts evaluate the interfaces and make considerations about their features, identifying potential problems. A cognitive walkthrough is similar to a heuristic evaluation but with an emphasis on a task scenario that evaluators need to perform in the UI. The experts must go through predefined steps and identify issues concerning the interface and navigation. Finally, a guideline review involves having an evaluator compare an interface against a detailed set of guidelines.

For the first expert review of the proposed UI the cognitive walkthrough, with experts that already know and understand the heuristics, was chosen as the most suitable inspection method to quickly highlight the potential problems prior to user testing. According to Nielsen's recommendations [12] regarding the advisable number of multiple evaluators, five experts were selected to maximize the number of issues identified and

circumscribe overlapping problems. The user and task analysis were converted into task scenarios describing specific navigations paths for a cognitive walkthrough by the evaluators, using a storyboard on a semi-functional prototype. Also, a presentation and a video including transitions and animation effects of menus embedded in the navigation were produced to reinforce the look & feel of the UI. Additionally, during a semi-structured interview, an exploratory overview of the prototype using a think aloud protocol was encouraged. For this UI testing, mainly focused on navigation and graphic look & feel, 2 panels of experts were arranged and the evaluation was held in three sessions, two in Chicago (USA) and another in Aveiro (Portugal). Panel 1 comprising two expert reviews was held with professors from a university of Chicago with expertise related to Human-Computer Interaction (HCI) and UX, while Panel 2 included a group of three developers from an IPTV operator, based in Aveiro.

The tests in Chicago took place on the 11th May 2017 and adopted a protocol comprising a brief presentation of the project and an introduction to the interface concept and layout. The presentation was followed by a video with a demo navigation including animations and transitions to translate the look & feel of the interface. Then, each evaluator was invited to perform a cognitive walkthrough within predefined paths, using a semi-functional prototype, according to a storyboard. They were also encouraged to think aloud during the navigation. The tests were conducted individually (2 experts were involved), being finalized with a semi-structured interview to outline all the feedback and suggestions. The expert review in Portugal took place on 25th May and followed the same protocol held in Chicago. However, in this case, the prototype was reviewed collectively by three experts from a research lab of one of the main IPTV providers in Portugal. This company is also a member of the consortium of the UltraTV project, thus offering precise expertise in the field of iTV ecosystems development. Although they were familiarized with the concept and goals of the UI, this group did not have a prior deep knowledge of the prototype.

Among the main issues identified by the experts some topics are worthy of highlighting as they refer to four important topics to be validated in new versions of the prototype: regarding Unification, lack of hierarchy was identified in content organization which should be related to user habits; in what concerns Personalization, the two proposed viewing modes were controversial requiring further testing; about the UI the main issues are related to lack of contrast to emphasize some elements of the UI, namely the focus of the selected objects; and finally regarding Interaction, reducing the number of clicks was advised as well as including a 'back to top' button to optimize the navigation through the grid.

5. RESULTS

Early testing is crucial to the success of any system, as the development cycle highly benefits from those inputs both in terms of time and costs. It also gives the opportunity to promptly test design alternatives in low-fidelity prototypes, allowing the iterative refinement of the versions presented to evaluators. Experts review is an important asset during the entire process, as it gives access to the background experience of the evaluators (as developers, researchers and users), which represents a surplus value on both levels: to the development process and to the end-user solution. Since the tests with experts were essentially aimed at the first layout and navigation review to guide the design process further on, the evaluators' opinion about some specific features was particularly relevant. The main topics under

inspection included: a) Grid-based layout (navigation and content sorting); b) Viewing modes (several contents with smaller preview or larger preview with fewer contents); c) Interaction and access to menus; d) Graphic look & feel (including transitions and animation); e) Unification of sources (with the inclusion of OTT players side-by-side with the TV lineup, arranged according to live and non-live genres) and cross-source recommendations (e.g. YouTube video as a complementary content to a linear TV show) based on user profiles.

Regarding the grid navigation, that holds the aggregation and unification of content and sources, experts made clear that this kind of approach could be limited by the quality of the available thumbnails and the privileges to access the content's sources APIs. Another concern had to do with information overload and how to promptly lead the way to the right content for each user. To such achievement, it will be crucial to mirror, in the UI, the mental model of the user, providing a comprehensive structure for content sorting and display, with the right amount of hierarchy and contrast. In what concerns content sorting, using a double categorization: thematic genres and sources in columns and viewing categories in rows (like 'Keep watching', 'Trending', 'Popular', etc.) proved to be confusing.

On the other hand, a discover/shuffle feature was also a highlighted topic since one of the main goals of the project is to catch the attention of users that are detached from regular TV consumption and are used to explore the Web for new content. A suggestion for approaching this content browsing and discovery was the use of the viewing modes, namely by including an option of getting more related content. Despite these insights, the viewing modes were controversial among experts, having one of the experts stating that he would only use the Zoom-in mode. As for the amount of content to be presented in each view, besides the lack of contrast and hierarchy to clearly highlight the selected card, experts pointed the need to reduce the size of what is not selected in the Wide mode. On the other hand, the Zoom-in mode space could be optimized by enlarging the selected item and reducing the size of the surrounding cards, making them work basically as hints for navigation.

As for the circular contextual menu, there were some reservations about using a dark translucent texture to dim the background content. On the other hand, the animation effects were considered highly suitable for this menu and, additionally, useful as visual hints across the interface to provide information about which keys to use for navigation and menu activation.

Considering the current viewing habits and industry UI trends, the experts' recommendations proved that an iTV user interface approach for content unification is a sustainable and relevant proposal, although there are still some issues to be addressed and improved.

6. CONCLUSIONS

Within the UltraTV project research, an experts review was used as a method to prove the relevance and applicability of the TV Flow concept and evaluate the navigation and graphic look & feel of a UI presented in a semi-functional prototype. The TV flow concept may be considered a different zapping approach focused on user preferences to find content to watch either from regular TV sources but also from players that typically are not available in a regular IPTV service, or at least not in an integrated way. With this aggregation and unification mindset, the UI under expert review intends to reconfigure the way people perceive and interact with the TV ecosystem.

The evaluation of the UI for the unification of TV contents was carried by 5 experts with double expertise, both in Human-Computer Interaction and in the specific domain of iTV development and assessment. Experts agreed with some of the issues, namely with the grid concept, the need to focus on the active content and to better highlight the selected content. Experts also expressed their positive feedback on the profiling features and the contextual menus. But some issues were not shared among experts. As an example, the viewing modes were not consensual with one referring to its disturbance and others valuing it. However, these divergent opinions are not incompatible since the dual mode can be integrated but with less emphasis on the changing option. Finally, the unification of content, the main feature of this solution, got the approval from all. As for future related work, from these results the UI may be adjusted to allow its integration into fully functional prototypes. In overall, the expert review proved to be a very important evaluation stage, since it allowed, based on their background and experience, to identify the most relevant problems and most valuable solutions that can lead to better and more efficient later field trials with end users.

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REFERENCES

- [1] Abreu, J., Almeida, P., Teles, B.: TV Discovery & enjoy: a new approach to help users finding the right TV program to watch. Proceedings of the 2014 ACM international conference on Interactive experiences for TV and online video, ACM, pp. 63-70 (2014).
- [2] Vanattenhoven, J., Geerts, D.: Broadcast, Video-on-Demand, and Other Ways to Watch Television Content: a Household Perspective. Proceedings of the 2015 ACM international conference on Interactive experiences for TV and online video, ACM, pp. 1-10 (2015).
- [3] Nielsen Company. The Battle for Eye Space in a TV-Everywhere World. Retrieved March, Nielsen Homepage, <http://www.nielsen.com/content/dam/corporate/Italy/reports/2015/Nielsen%20Global%20Digital%20Landscape%20Report%20March%202015.pdf> (2015), last accessed 2017/06/23
- [4] Abreu, J., Nogueira, J., Becker, V., Cardoso, B.: Survey of Catch-Up TV and other time-shift services: a comprehensive analysis and taxonomy of linear and nonlinear television. In: Telecommunication Systems, Vol. 64. pp. 57-74 (2017).
- [5] Abreu, J., Almeida, P., Teles, B., Reis, M.: Viewer Behaviors and Practices in the (New) Television Environment. Proceedings of the 2013 ACM European Interactive TV Conference and Video, ACM, 5-12 (2013).
- [6] Gonçalves, D., Costa, M., Couto, F. M.: A Large-Scale Characterization of User Behaviour in Cable TV. In: 3rd Workshop on Recommendation Systems for Television and online Video (2016).
- [7] Cardoso, B., de Carvalho, F.: Trends in TV: OTT, Apps, Ads. Homepage, http://www.alticelabs.com/content/07_TV.pdf, last accessed 2017/06/23
- [8] Csikszentmihályi, M.: Flow. The Psychology of Optimal Experience. Harper Perennial Modern Classics. New York (1990).

- [9] Demetriadis, S; Karoulis, A; Pombortsis, A.: “Graphical” Jogthrough: expert based methodology for user interface evaluation, applied in the case of an educational simulation inter- face. *Computers & Education.* 32, 385-299 (1999).
- [10] Jin, J; Geng, Q; Zhao, Q; Zhang, L.: Integrating the Trend of Research Interest for Reviewer Assignment. *International WWW Conf.* 1233-1241 (2017).
- [11] Rohrer, C. P; Boyle, F; Wendt, J; Sauro, J; Cole, S.: Practical Usability Ratings by Experts: A Pragmatic Approach for Scoring Product Usability. *Chi.* 16. 38, 333-358 (2016).
- [12] Mack, R.L.; Nielsen, J.: Usability Inspection Methods: Executive Summary. *Readings in Human Computer Interaction: Toward the Year 2000*, Morgan Kaufmann, pp. 170-181 (1995).