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ARTICLE *in* PROCEDIA COMPUTER SCIENCE · SEPTEMBER 2015

DOI: 10.1016/j.procs.2015.08.508

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## Discovering TV contents in a second screen app: perspectives from Portuguese and Brazilian markets

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### Abstract

The actual trends in the TV ecosystem present considerable social, organisational and technological challenges in the value-chain of Pay-TV operators. Among these is the global increase in bandwidth, the shifting of the storage capacity in the cloud, and the affordability of traditional content providers when facing the competitiveness of OTT content. In this framework, Pay-TV operators are presenting their customers with a huge offer of contents available from linear-TV, Catch-up TV and VoD services. However, this overloaded TV ecosystem is likely to lead viewers to get lost and face difficulties when deciding what to watch on TV. To overcome these difficulties and be competitive, operators need to provide innovative and trustable solutions, alternative to traditional EPGs, enabling users to discover the right content for a specific context.

To target this problem, a second screen application (GUIDER) was developed to offer an original user interface, based on a multidimensional spatial representation of TV contents for those mindless zapping situations where viewers do not know, in advance, what they are in the mood to watch.

This paper reports on the evaluation of the GUIDER App, aiming to determine the level of interest in the several features implemented and in the filtering criteria available; identify usability issues; and predicting the future uses of the App in domestic scenarios. The evaluation was made in Portugal and Brazil with a convenience sample of 20 participants in each country. Despite the differences in the TV ecosystems, both countries appear to be promising markets for this new kind of second screen applications, with Brazilians showing a higher perception of the added value of GUIDER.

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Peer-review under responsibility of SciKA - Association for Promotion and Dissemination of Scientific Knowledge

*Keywords:* value-chain; second screen; discovery; EPG; recommendation; evaluation.

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## 1. Introduction

The current television ecosystem has been going through very significant changes, one being the huge increase in the existing TV content, either live or on demand, which is available to users with access to pay-TV solutions. In several countries this offer has been increased because, in addition to over a hundred of linear-TV channels and thousands of contents available on the Video On Demand (VoD) service provided by most of the TV operators, they also offer Catch-up TV services (based in automatic cloud recordings) of the TV programs aired in the last 7 days. In this context, the viewer has constant access to a huge TV offer that may exceed 20,000 different TV programs.

Considering that many times when viewers sit in front of the TV they don't know in advance what to see, this huge offer of content means that they may feel "lost" with such offering. This may lead to a typical "mindless zapping" behavior to find something matching their preferences; possibly missing a specific TV content that would be of their real interest. It is precisely to assist the user in this context that the authors had been focused on developing technological solutions to assist the user in discovering the TV content most suitable for his/her actual situation. Following the work on TV Discovery & Enjoy (TDE) project that lead to the development of an IPTV application to assist the user in finding the content to watch on his/her TV set<sup>1</sup>, this paper reports on a second screen approach, by proposing a tablet application as an alternative to traditional EPGs, to support the discovery of content and to assess how second screens, interconnected with an iTV platform, can improve the residential TV ecosystem. The App, implemented for iOS, was branded GUIDER and allows users to discover TV content from unified sources.

After this introduction, section 2 presents the literature review, focused on recommendation systems and second screen applications for content discovery and recommendation. Section 3 provides a description of the GUIDER application and its features. Section 4 describes the evaluation process, followed by the results presentation and discussion on section 5. Finally, section 6 includes the study main conclusions.

## 2. State of the art

The discovery of TV contents enriched with recommendation systems, relying on TV or second screens as the supporting device, has been a motivating field of research with many projects being developed over the past few years. In 2007 the "AIMED" system<sup>2</sup>, proposed recommendations based in the activities, interests, mood, experience and demographics. As a hybrid recommendation system it combined two different techniques: content-based recommendation (based on the user's television footprint) and collaborative recommendation (based on the preferences of users with similar profile)<sup>3</sup>. The Fraunhofer FOKUS has also introduced an application for the recommendation of TV content called "TV Predictor". This system analyses the viewing habits and content ratings from users to identify, among other things, channels, genres, directors or favorite actors, as well as preferred viewing times<sup>4</sup>. The "Sybil Recommender System", an experimental prototype for the web, funded by BBC Research & Development, introduced a model for the evaluation and recommendation of TV programs. The system displays a set of recommendations that can be filtered by gender (e.g. children, comedy or drama). For that, users drag and drop the recommendations to "Like" or "Dislike" boxes<sup>5</sup>. Considering alternative approaches for displaying TV content, it is relevant to mention the "iEPG" research project that provides a nonlinear way to search for content in the DVR. This prototype converts the stored content into a diagram consisting of a central node to which various items are attached radially (e.g. if the central node is a film, the peripheral items may be actors or directors). By selecting one of these items it becomes the primary node surrounded by other items<sup>6</sup>.

Research concerning the use of complementary mobile devices, has been done even prior to the recent dissemination of tablets. From the proposals about using mobile devices as TV remote controllers<sup>7,8</sup> to the work of Cruickshank, et al. proposing in 2007 the inclusion of a second screen in the TV ecosystem providing a set of features including an EPG<sup>9</sup>, many have discussed the role these devices may have in the TV ecosystem. Cesar et al. also discussed the possible uses of second screens, including the possibilities of acting as a personal content selector<sup>10</sup>. This trend also led to the development of several industry based proposals. In this field one can highlight Shufflr<sup>11</sup> as a mobile device App that gathers content from multiple sources and recommends it to users based on their social profile and the activity of their friends. The popular App Beamly<sup>12</sup> apart from check-in and social features provides an EPG that allows users to sort content based on different criteria like audience, social buzz,

friends' preferences or content genre. The Fan TV<sup>13</sup> ecosystem presents as a hardware solution gathering content from multiple sources providing discovery features based on multiple search criteria and social recommendations.

The Guider App follows the possibilities that these devices and applications carry by providing the discovery and visualization of TV programs from different sources (of a commercial IPTV platform) over an innovative user interface approach using multidimensional spatial representation.

### 3. The Guider application

As referred, the first steps of the development of the GUIDER iOS application started in the TDE research project<sup>1</sup>, whose main objectives were to understand and identify the cognitive processes associated with the discovery of TV content. This study allowed developing a prototype of an IPTV application supporting viewers in the search and selection of a TV program to watch. At the time, the authors also wanted to identify implementation strategies and opportunities for having a similar support using TV companion devices. Therefore, a medium fidelity prototype was developed, being the genesis for the development of the fully functional GUIDER application.

During the evaluation of the former TDE project, evaluators detected some problems, both in terms of features, graphic interface and interaction. Therefore, the research team tried to map these outcomes on the implementation of the GUIDER App, engaging efforts on a revision on the functional specifications and a partial redesign of the existent medium fidelity prototype. Considering the functional revision, the changes were motivated mostly by two factors: i) the results of the TDE evaluation revealed that some filtering criteria (e.g. mood) were not highly appreciated<sup>1</sup>; ii) the GUIDER was to be released as a beta App and therefore there was the need to reduce the dependency of features that were supported by third party players, by focusing on the services supported by the main Portuguese IPTV provider. To comply with the iOS7 design guidelines, that appeared at an early stage of the project, and to accommodate the aforementioned improvements, there was the need to create a set of wireframes of the main application areas (Fig. 1a). Through basic graphics, the wireframes allowed the team to decide on the changes to make and how contents and features would organize in each screen.

#### 3.1. System architecture

Considering the system architecture (Fig. 1b), the GUIDER is supported by a client and server approach. The client side includes the iOS device (typically an iPad) interconnected via Wi-Fi to the Set-Top Box (STB) of the IPTV provider, allowing to start playing the program that was selected in the GUIDER App on the TV set. If the App is used in a different TV operator from the one it was developed to, this control of the STB is not available (it is worth to say that to maintain the same evaluation scenario between Brazil and Portugal this feature was disabled).

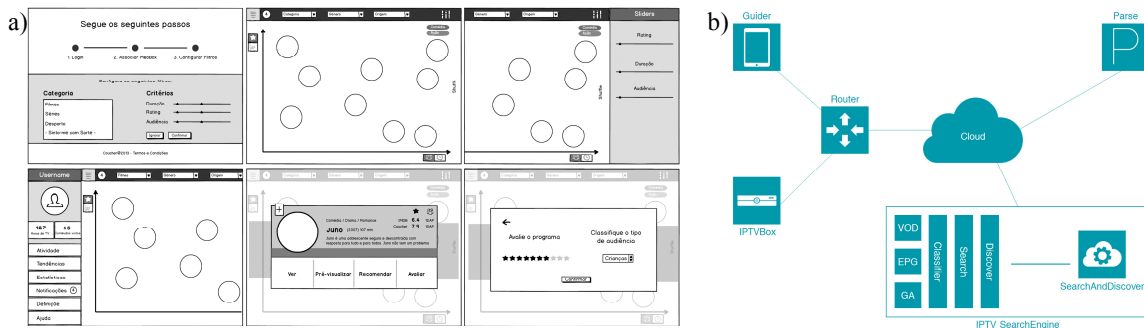


Fig. 1. (a) Guider wireframes; (b) System architecture.

At server side, the SearchEngine of the operator is responsible for the classification of TV contents and the search and discover features. In parallel, a module ©Parse is used to store all the information related to the use of the application, namely the answers to in App evaluation forms (later described). In the next section a description of the GUIDER features and interface is presented.

### 3.2. Main features

The main GUIDER area is the discovery screen (Fig. 2a). This area is structured as a multidimensional graphic presenting the TV programs according to the criteria defined by the user. Programs are represented as circles and spatially distributed according to its classification (IMDB) (x axis) and duration (y axis). The user can easily change these values. The size of the circles varies accordingly to the popularity of the programs, which is determined by its popularity in the Catch-up TV service of the operator and the VOD viewers' evaluations. Additionally, each circle (program) has one or more colored labels to identify the content genre. The genre identification appears on the lower part of the screen as shortcuts that can be turned on and off.

Users may interact with GUIDER setting filters like program categories (e.g. movies, series, entertainment and lifestyle); genre (e.g. comedy, drama...); content source (e.g. TV, VOD); age rating (e.g. <12, 12-16 and >16), and; starring decade. The user may also interact with the multidimensional graphic using a pinch-to-zoom feature to reveal hidden contents (when they superimpose) and choose any program to get similar ones or access to detailed information about that program (a video with an overview of GUIDER is available at <http://tinyurl.com/ns5dbdp>).

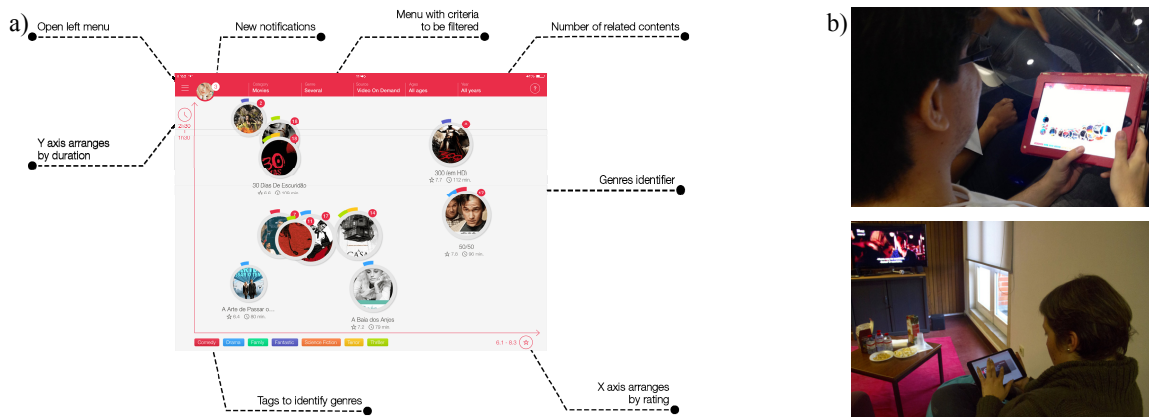


Fig. 2. (a) Main screen of the Guider App; (b) Evaluation sessions (up - BR, bottom - PT).

The details panel about a program consists of general information of the program, such as genre, year, length, a brief synopsis and score (IMDB rating is presented along the GUIDER users' rating). Through this panel users can also add programs to their favorites, watch a trailer, share or recommend it in social networks, evaluate the program (score - GUIDER users' rating) and target audience and, if in a compatible TV ecosystem, play it in the TV set.

Complementary to the discovery features, GUIDER provides tracking, social and configuration features which include: user statistical data (time on GUIDER, TV program views...); view and manage favorite programs (tagged by the user to be notified about related events - e.g. for Catch-up TV programs the user is informed when its availability is reaching the end); view notifications and App settings.

### 4. The evaluation process (protocol and data collection tools)

The final step of this research was targeted to the evaluation of GUIDER in real contexts of use. Although the application was designed to be used by clients of a Portuguese IPTV provider the research team decided to open the scope of the evaluation to try to predict if it has the potential to be adopted in other markets, namely by Brazilian users. To accomplish this it was decided to evaluate the application (Fig. 2b) in both countries with a convenience sample<sup>14</sup> of 20 participants in Brazil (herein referred as BR) and other 20 in Portugal (herein referred as PT). The number of evaluators in each country was decided in order to make the best usage of the Attrackdiff tool<sup>15</sup> that complemented the evaluation of the user experience. The evaluation goals were related to: determining the level of interest in the several features of the application, filtering criteria and future features; identifying usability issues; and predicting the future uses of the GUIDER application in domestic scenarios.

The research team chose to carry a lab evaluation in both countries respecting the same methodology, which allowed assessing, in a controlled environment and with the direct support of the researchers in all the stages of the evaluation, application features and particularities. The lab sessions took place at three universities (in Brazil at UFPE and UFPA - in the end of November 2014; and in Portugal at UA - in the first days of January 2015) in rooms prepared to recreate a friendly atmosphere, in some way similar to what one can find in a living room with some sofas and a TV (Fig. 2b). Participants of both groups were characterized in several dimensions by a first online questionnaire (Q1). In most of the cases they answered this questionnaire some days before the evaluation session. Just before the evaluation session, a brief overview of the application was made based on a promotional video (available at <http://tinyurl.com/ns5dbdp>). Then they were asked to freely explore and use the application, which took an average of 20 minutes per session.

In order to ensure a complete data collection during the evaluation sessions (and during a future regular use of the application) to allow future improvement of GUIDER, the team chose to use two complementary data gathering methods. The first method consists of an internal rating system, based on closed questions that appear contextualized while users interact with the App. These inApp questions are triggered when a specific GUIDER feature is used a certain number of times – being the related threshold configured in the associated ©Parse platform. For each functionality two questions are triggered, one concerning the level of interest on that feature and the other about usability related issues. Users are not obliged to answer the inApp questions. The second data collection method involves monitoring the user actions in the application by integrating the ©Analytics tool, suitably configured to gather information about the most popular areas and features.

At the end of the evaluation sessions, participants answered a final questionnaire (Q2) to gather complementary opinions on several dimensions (see session 5). The questions of the Attrakdiff were included as an optional final section of the questionnaire. All participants were able to answer, allowing the research team to subsequently enter these answers on the online platform of the Attrakdiff tool and have access to the automatically generated reports.

## 5. Results and data analysis

### 5.1. Sample characterization

As referred, the sample consisted of 20 evaluators from Brazil and 20 from Portugal. They are mainly early technology adopters within an average age of 27 (BR) and 26 (PT) years old. 38 participants (19 in each group) have an academic or professional activity somehow related to the ICT area; being 30 (equally divided) already graduated. The majority (12 participants in both groups) live with other adults and the remaining share the home also with children; whereas a small number (2 BR and 4 PT) live alone. Despite both groups are balanced in what relates with access to a pay-TV service (16 in BR and 17 in PT), the key differences are mainly related to the TV ecosystem of both countries. In this regard, it is worth to say that participants of the BR group have a higher TV consumption than those of the PT group. An average of 3,3 hours of viewing time per day (BR) against 2,5 hours (PT) during the weekdays was estimated; with a smaller difference during the weekend: 4,7 hours per day (BR) against 4,0 hours (PT). Participants were also asked about their frequency of use of several STBs functionalities, making clear that participants of the BR group have access to a smaller set of STB features as compared with what is already common in European countries. This is reflected in a smaller frequency of use of some features. In a weekly base, it was estimated that the “pause-TV and time-shifting” is used only once (BR) against 6,3 times (PT); the VoD service 0,1 (BR) versus 0,5 (PT); and the Catch-up TV (a barely existing feature in Brazil) only 0,6 (BR) against 1,8 times (PT). Despite that, it was estimated that a more common feature, such as the EPG, is slightly more used within the BR participants (5,1 times per week) than within the PT participants (4,6 times per week).

Finally, it was possible to perceive that the adoption of multitasking behaviors is somehow balanced between the 2 groups (15 participants of the BR group stated that they use mobile devices as a companion device while watching TV, against 14 of the PT group). Nevertheless, participants of the BR group appeared to be much more active in secondary screen tasks related to the TV content: 12 (BR) against 10 (PT) stated ‘googling’ about what they see on TV; 11 (BR) versus 8 (PT) are used to follow (or comment) TV gossips in the social networks, whereas 8 BR participants mentioned using informative services and 4 stated that they use specific Apps (of a TV-show or TV channel), while none of the PT participants referred using these kind of services or Apps.



As it can be recognized in the subsequent discussion of the evaluation results, the aforementioned differences are especially relevant for the analysis proposed in this paper.

5.2. Results from the evaluation sessions

The post-test questionnaire (Q2) addressed several sets of questions related to: the rating of the App characteristics (Fig. 3a - top); the level of interest in each App feature (Fig. 3a – bottom; Fig. 3b) and in each of the filtering criteria (Fig. 4a - top); the overall usability concerning several topics of the application (Fig. 4a – bottom; Fig. 4b); and the predicted level of interest in some potential features - to be incorporated in a future release of the App (Fig. 5) - and in using the GUIDER in the future – if made available in the Apple Store.

Participants scored all questions using a 5-point Likert scale (e.g. Very poor, Poor, Average, Good, Very good). However, for a clearer interpretation of the results a (WA) weighted average (-2, -1, 0, 1, 2) of the answers of BR, PT and ALL participants was adopted in the graphics. A green shadow is used to highlight the situations with a difference greater than 50% between the two groups of participants. Some open questions were also incorporated in the questionnaire to allow users to provide a more qualitative evaluation. It is worth to say that the inApp answers and the results from the Attrackdiff questionnaire are not addressed in this paper, being the comparative analyses of all these different tools the focus of another on-going paper.

Considering the average of the answers of both groups (magenta column) one can observe that the evaluated GUIDER characteristics (Fig. 3a - top) scored higher or equal to “good”. With the exception of the organization of the left side menu, all remaining characteristics got a higher evaluation from BR participants, with a significant difference (>50%) in the “ease of interaction” rating.

Regarding the level of interest of the participants in the several features of the application (Fig. 3a - bottom; Fig. 3b), the main concerns to be addressed in a next release are related to the features: f2) spatial representation of the contents; f3) the pinch-to-zoom feature to reveal hidden contents (when they superimpose); and f4) the iconography (a number within the red circles) used to indicate other related content (opened in a 2nd level). Three features scored with a difference higher than 50% between BR and PT participants: f3, f4 (a considerable lack of interest on behalf of PT participants was noticed) and the f6 - recommendation of programs to friends.

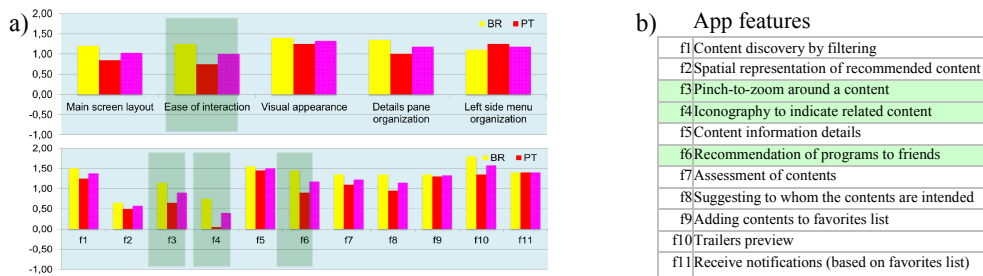


Fig. 3. (a-top) Rating of the application characteristics and (a-bottom) level of interest in relation to each; (b) feature.

Taking in consideration Fig. 4a - top, one can say that in average the participants showed a considerable interest for all filtering criteria. However, the criteria “source” (that enables the user to choose contents from linear-TV; Catch-up TV; VoD) and the criteria “age” (enabling a kind of parental control in the selection of TV contents) were rated by PT participants lower than 50% in relation to the level of interest of BR participants.

The section of the post-test questionnaire related to usability issues was based on the typology of questions of the SUS questionnaire<sup>16</sup>. The level of agreement of the participants with a group of eight statements is depicted in Fig. 4a - bottom; Fig. 4b. The answers related to sentences s2, s5, s6 and s8 might translate some explicit usability problems since their total weighted averages are clearly below 1,0. Correlating these results with the open answers (that participants had the chance to give along the questionnaire) it is possible to conclude that the major problems are related to some graphical and interaction paradigms of the UI and the lack of other type of filtering criteria and search methods. Actually, from the analysis of both data gathered during the evaluation sessions and from open answers, it was possible to quantify that there were several remarks related to this kind of problems: 12 related to the

spatial distribution of related contents (even with the pinch-to-zoom feature to reveal hidden contents participants reported a high level of overlapping); 7 related to the iconography; 11 suggesting other filtering criteria (e.g. award-winning films, Director, Language) and 9 asking for a simple text search feature. The meaningful differences between the two groups of participants (detected in the answers to sentences s1, s5 and s6) revealed that BR participants felt fewer usability issues than PT participants.

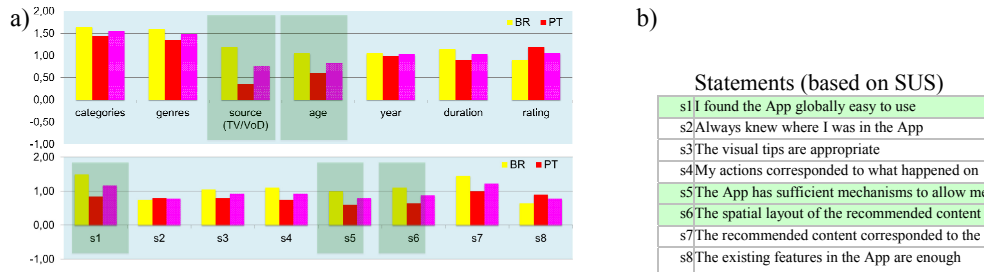


Fig. 4. (a-top) Level of interest in relation to each of the filtering criteria and (a-bottom) agreement with the; (b) statements.

Participants were also asked to state their level of interest in possible features to be incorporated in a next release of the GUIDER application (Fig. 5). “Chat with friends or others who are watching the same content” and “Receive additional information and gifts in exchange for loyalty or seasons watched” were the two features that in average were less valued. However, both were surprisingly much more appreciated by participants of the BR group, as was also the case of a feature to enable users to “know which of their friends have seen a particular content”.

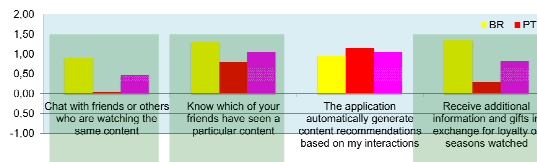


Fig. 5. Level of interest in each of the above future features.

Finally, participants were asked to estimate their level of interest in using the GUIDER App in the future. The total weighted average of the answers was very positive (1,4 in a scale from -2 to +2), being 1,7 from the BR participants and 1,1 from the PT participants.

**6. Conclusions**

Despite the fact that the results here presented are not generalizable due to the limited number of participants and the specific goals of this research, they allowed the research team to identify the pros and cons of the GUIDER application and detect some significant differences between the two groups of evaluators. The considerable good score of the main application features confirmed that the conceptual model of the App has a very interesting potential and it is relevant as a second screen alternative to help users finding a TV content to watch on the TV set.

However, some of the adopted approaches (f2, f3 and f4 – see fig. 3) revealed scores only slightly above the medium value of the Lickert scale, corroborated by the qualitative data, being that a matter of concern for the research team. Therefore, the strategy related to (f2) the spatial representation of the contents; (f3) the pinch-to-zoom feature to uncover overlapped contents and (f4) the iconography to warn about other TV programs needs to be improved (in terms of UI and usability) for a future release of the App.

Notwithstanding the good scores on the main adopted filtering criteria (categories, genres, year, duration and rating), it is important to further analyze the lower level of interest related to the criteria “source” and “age”. Regarding the criteria “source”, probably users did not consider this as a filter that enables them to differentiate free content (coming from linear-TV and Catch-up TV) from paid content (coming from the VoD service). Regarding the criteria “age” it is the understanding of the research team that if a higher number of older participants were at



stake (adults living with kids) the results would probably be different. Still related to the filtering criteria, the research team is going also to consider the main suggestions gathered: to increase the filters with the criteria of Award-winning films, Director, and Language; and to embed a text search feature.

Considering the globally better scores from the BR group, in particular those highlighted in the graphics, one must consider the discrepancies in the TV ecosystem of both countries. The greater TV consumption, the rather small offer of ‘advanced’ STBs features<sup>17</sup>, eventually balanced by a more active behavior in secondary screens by the participants of the BR group, may justify a higher commitment and a better perception of the added value of the GUIDER application.

From the gathered results, both countries (although with a prominence on Brazil) appear to be promising markets for this kind of applications, showing a considerable level of trust and confidence in this new type of technology. The authors encourage other researchers involved in the development of such kind of applications to consider the discussed results since they are relevant for the value-chain of Pay-TV operators.

## Acknowledgments

Our thanks to PT Inovação and RedAUTI for the financial support granted to this study. Former fellow researchers Bruno Teles and António Pereira also deserve our thanks for their priceless support in developing the application as well as the colleagues from (UFPB and UFPE) Brazil and all participants involved in the evaluation.

## References

1. Abreu J, Almeida P, Teles B. TV discovery & enjoy: a new approach to help users finding the right TV program to watch. In *Proceedings of the ACM international conference TVX '14*. ACM, New York, NY, USA; 2014. p. 63-70. DOI: <http://doi.acm.org/10.1145/2602299.2602313>.
2. Hsu S, Wen M-H, Lin H-C, Lee C-C, Lee C.-H. AIMED- A Personalized TV Recommendation System. In P. Cesar, K. Chorianopoulos, & J. Jensen (Eds.), *Interactive TV: a Shared Experience*. Springer Berlin / Heidelberg; 2007. vol. 4471, p. 166–174.
3. Adomavicius G, Tuzhilin A. Toward the Next Generation of Recommender Systems: A Survey of the State-of-the-Art and Possible Extensions. *IEEE Trans. on Knowl. and Data Eng.*; 2007. vol. 17(6), p. 734-749.
4. Krauss C, George L, Arbanowski S. TV predictor: personalized program recommendations to be displayed on SmartTVs. In *Proceedings of the 2nd International Workshop on Big Data, Streams and Heterogeneous Source Mining: Algorithms, Systems, Programming Models and Applications (BigMine '13)*. ACM, New York, NY, USA; 2013. p. 63-70.
5. BBC Research & Development. Sibyl Recommender System. Retrieved December 26, 2013, from <http://sibyl.prototyping.bbc.co.uk/>.
6. Harrison, C., Amento, B., & Stead, L. (2008). iEPG: An Ego-Centric Electronic Program Guide and Recommendation Interface.
7. Enns N, Mackenzie I. Touchpad-based remote control devices. In *Companion Proceedings of the CHI '98, Proceedings on Human Factors in Computing Systems*. New York: ACM; 1998. p. 229-230.
8. De Vet J, Buil V. A personal digital assistant as an advanced remote control for audio/video equipment. In *Proceedings of the 2nd Workshop on HCI with Mobile Devices*. Brewster, S.A. & Dunlop M. D. (Eds.). Edinburgh, Scotland; 1999.
9. Cruickshank L, Tsekleves E, Whitham R, Hill A. Making Interactive TV Easier To Use: Interface Design For A Second Screen Approach. In *The Design Journal*; 2007. vol. 10(3).
10. Cesar P, Bulterman D, Jansen A. Usages of the Secondary Screen in an Interactive Television Environment: Control, Enrich, Share, and Transfer Television Content. In *Proceedings of the 6th European conference on Changing Television Environments (EUROITV '08)*. Manfred Tscheligi, Marianna Obrist, and Artur Lugmayr (Eds.). Springer-Verlag, Berlin, Heidelberg; 2008. p. 168-177.
11. Shufflr. Shufflr. Retrieved January 12, 2015, from <http://shufflr.tv/>
12. Beamly. Beamly. Retrieved January 12, 2015, from <http://beamly.com>
13. Fan TV. Fan TV. Retrieved January 12, 2015, from <http://fan.tv>
14. Kam, C D, Wilking J R, Zechmeister E J. Beyond the “narrow data base”: Another convenience sample for experimental research. In *Political Behavior*; 2007. vol. 29.4, p. 415-440.
15. Hassenzahl M. The interplay of beauty, goodness, and usability in interactive products. In *Hum.-Comput. Interact*; 2008. vol. 19, 4, p. 319-349. DOI=10.1207/s15327051hci1904\_2 [http://dx.doi.org/10.1207/s15327051hci1904\\_2](http://dx.doi.org/10.1207/s15327051hci1904_2).
16. Brooke, J. SUS: a "quick and dirty" usability scale. In *Usability Evaluation in Industry*. P. W. Jordan, B. Thomas, B. A. Weerdmeester, & A. L. McClelland. London: Taylor and Francis; 1996.
17. BECKER, Valdecir . A evolução da interatividade na televisão: da TV analógica à era dos aplicativos. In *Lumina (UFJF. Online)*; 2013. v. 7, p. 2.