Identifying Usability Problems in a Smart TV Music Service

Sheau-Farn Max Liang, Yi-Chung Kuo, and Shu-Chin Chen

National Taipei University of Technology, Taipei, Taiwan
maxliang@ntut.edu.tw

Abstract. Thirty-one usability problems for a smart TV music service system have been identified by different user groups through the cooperative evaluation method. Design solutions can be provided based on the priority of the identified usability problems, the classifications between functionality and quality issues, or between display and control issues, and the foci on specific user groups.

Keywords: Smart Interactive Television, Usability, Music Service.

1 Introduction

After the surge of smart phones and tablets in the market, information communication technology industry now aims at the next promising market: smart televisions (TVs). There are several relevant terms, such as the Internet Protocol TVs (IPTVs), Connected TVs, and Internet TVs to emphasize the capability of connecting with the Internet; the digital TVs to highlight digital information contents; and the interactive TVs (iTVs) to indicate the nature of interactivity. In this paper, we use "smart TVs" as the term to represent the TVs that can connect to the Internet and provide digital contents to people through their interactions with the TVs.

Various applications and services have been launched on the platform of smart TVs. However, application designers and service providers are still exploring the ways of understanding this new context of use and its associated user requirements. Cesar and Chorianopoulos [1] predicted that the traditional production-distribution-consumption model will be replaced by the new creation-share-control model. This new model could be achieve through the user interface design to enable the capabilities for TV viewers to act as directors for participating content authoring [2].

Compared to the context of using desktop computers, the interaction with smart TV is more entertainment-oriented and home-based rather than work-oriented and office-based. Families with different generations are usually the use groups of smart TVs. An ethnographic study in Austria about TV viewing experience reported that older households were more interested in receiving information from TVs compared to younger households who were used to receiving information from computers [3]. A telephone survey in Taiwan pointed out that the younger generation was more willing to adopt smart TV services than the older generation at home [4].

P.L.P. Rau (Ed.): CCD/HCII 2013, Part I, LNCS 8023, pp. 306–312, 2013.

The design of interactions between users and smart TVs is a key to the success of smart TVs since people now not only passively watch smart TVs but also proactively use and interact with them. Conventional remote controls are still the major input appliances. A usability test revealed that users pushed arrow buttons more than the color buttons, and still had difficulty in text-inputs with conventional remote controls [5]. Therefore, new technologies and methods of smart TV control have been proposed, such as the second screen to use smart phones or tablets as the remote controls [6], automatic viewer detection technology [7], and control by gestures or voices [8].

This paper presents a usability analysis of a smart TV music service. The service has not met provider's expectation in terms of subscription rate, and the manager would like to know what might go wrong with the service. However, little literature has been published on smart TV music service. Previous research about the mobile music services has found out that the sound quality and content variety of the service were important to consumer adoption, whereas the personalization and usability of the service were the most desired features [9]. A design for home music appliances which focused on visual information seeking and screen displays has also been proposed [10].

Similar to its personal computer version, the home page of the studied music service system was clean and simple at the first glimpse. As shown in Figure 1, six rounded rectangle buttons were listed at the bottom of the screen from left to right. They represented six main functions of (1) billboard list, (2) random play, (3) new albums list, (4) song search, (5) my favorites list, and (6) my account management. A conventional TV remote control was the device to interact with the music service system. A preliminary expert review was conducted and found many potential usability problems related to system performance, display content and format, navigation, and control. To confirm our findings of usability problems, we decided to recruit prospective users to try out the system by applying the cooperative evaluation method [11].

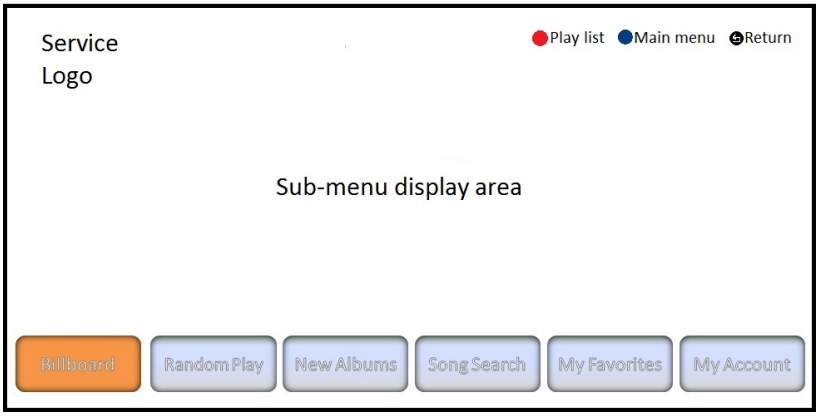

Fig. 1. Schematic screen layout

2 Method

Cooperative evaluation was introduced by Monk and his colleagues [11]. It was an effective method for obtaining data about critical usability problems with the minimum of effort. The four main steps of this approach were: (1) recruit users, (2) prepare tasks, (3) interact and record, and (4) debrief [11].

2.1 Participants

Due to the time constraint, only five participants were recruited to represent three groups of users. Among the five participants, three were female and two were male. Two females were office workers in their early thirties, whereas the third female was a sixty-year-old stay-at-home mom. Two males were college students in their mid-twenties.

2.2 Apparatus

A room was set up to mimic a living room with a couch, a coffee table, an LCD TV connected with a set-up box, and a conventional remote control. A voice recorder was put on the coffee table for recording what participants said during the session.

2.3 Procedures

Each participant spent about two hours individually in trying out the music service system with the presence of the authors. Participants were asked to perform following tasks:

- Log in the account
- Find a specific song
- Find some songs and put them into my favorites list
- Go to random play and put the song heard into my favorites list
- Go to my favorites list and delete a specific song

During the session, participants were encouraged to speak out their opinions and feelings about the system, and to explore different functions as many as possible. Usability problems were then identified based on data about what participants said and what we observed during each session.

When the participant completed the tasks, an interview was conducted to understand participants' music listening habits, preferences on service functionality, and ideas for system improvement.

3 Results and Discussion

Total thirty-one usability problems have been pointed out by participants. Among these problems, ten have been identified by all five participants, four have been

identified by four participants, seven have been identified by three participants, four have been identified by two participants, and six problems have been identified by only one participant. Table 1 lists the usability problems and the corresponding number of participants who identified them.

Table 1. Identified usability problems

	Usability Problem	#
1	System response lag	5
2	Difficulty in finding a song	5
3	Invalid songs in the playlist	5
4	Difficulty in using the remote control	5
5	Excessive results from the song search	5
6	Confusion with the music catelogs	5
7	No play control in the random play mode	5
8	No add-to-my-favorite function in the random play mode	5
9	No turn-a-page function and indication for the playlist	5
10	No back-to-the-first-page function on the last page of the playlist	5
11	Possibility to exit the system by accident	4
12	Duplicate songs in the playlist	4
13	Ambiguous organization of song search results	4
14	No playlist display function in the random play mode	4
15	No move-to-the-next-song function except in the karaoke mode	3
16	Unexpected addition of the song played into the playlist	3
17	No delete-multiple-songs function in the playlist	3
18	Incomplete display of song serach results	3
19	Response lag of the return-to-main-menu function	3
20	No back-to-main-menu function in the palylist	3
21	No lyrics display fuction in the karaoke mode	3
22	No standard English-to-Chinese traslation of artists‘ names	2
23	No partial modification function for type-ins	2
24	Incompatible layout between virtual keyboard and remote control	2
25	No find-movie-soundtracks function under the movie catelog	2
26	Possibility to delete all songs in the playlist by accident	1
27	No select-a-song-by-remote-number-buttons function in the albums list	1
28	No replay function in the playlist	1
29	Foreign language (English) for logging in the account	1
30	No log-in window displayed on the home page	1
31	No record of list for songs played in the random play mode	1

Note: #: The number of participants identified the problem

There was not much different in the numbers of usability problems identified per participant (ranged from 17 to 24). Thirteen out of the 31 usability problems (No. 1-10, 11, 13, and 19 in Table 1) have been identified by the three groups (young female workers, young male students, and old stay-at-home mom). Nine usability problems (No. 12, 14-18, and 21-23 in Table 1) have been identified by both the groups of young female worker(s) and male student(s) but not by the old stay-at-home mom.

Two usability problems (No. 20 and 24 in Table 1) have been identified by both the young male student(s) and old stay-at-home mom but not by the young female worker(s). Four usability problems (No. 25, 28, and 30-31 in Table 1) have been identified by only the young male student. One (No. 26 in Table 1) usability problem has been identified only by the young female worker, and two (No. 27 and 29) usability problems have been identified only by the stay-at-home mom. Figure 2 presents the percentages of identified usability problems from different combinations of the three user groups. It indicates that while every group identified their own usability problems, about 80% of the usability problems have been identified by at least two of the three user groups.

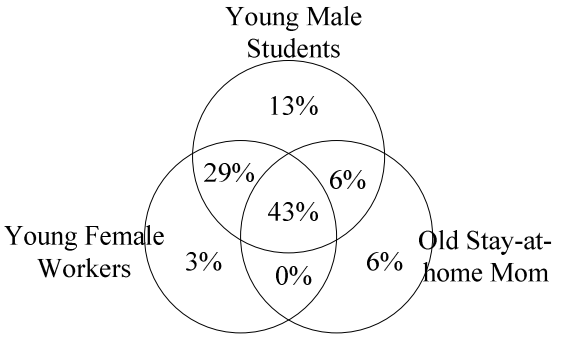

Fig. 2. Percentages of identified usability problems among the three user groups

The identified usability problems can be categorized into the problems related to functionality issues and quality issues. While functionality issues are about what the system is expected to have, quality issues are about how good to perform a function. Table 2 shows the corresponding usability problems and percentages of these two categories.

Table 2. Usability problems: fuctionality versus quality

Category	Corresponding Usability Problems	Percentage
Functionality	7-10, 14, 15, 17, 20, 21, 25, 27, 28, 31	42%
Quality	1-6, 11-13, 16, 18, 19, 22-24, 26, 29, 30	58%

As shown in Table 2, the studied music service system had significant usability problems in both functionality and quality issues.

These usability problems can also be classified as display issues and control issues. Table 3 shows the corresponding usability problems and percentages of these two categories.

Table 3. Usability problems: display versus control

Category	Corresponding Usability Problems	Percentage
Dispaly	3, 5, 6, 12, 13, 18, 24, 30	26%
Control	1, 2, 4, 7-11, 14-17, 19-23, 25-29, 31	74%

As shown in Table 3, the studied music service system had more significant usability problems in control than in display.

4 Conclusion

Results of the usability analysis were consistent with the findings from the preliminary expert review. The cooperative evaluation method applied in this study could identify usability problems with an effective and efficient manner. The findings of this research support the idea that the design suggestions therefore can be provided with various aspects: the priority of solving the usability problems can be based on the order listed in Table 1. While functionality and quality design issues can refer to Table 2, display and control design issues can refer to Table 3. Based on the findings, the service provider can also find better solutions for the (re)design of applications and services of smart TVs music service with the foci on specific user groups. A limitation of this study is that the numbers of participants were relatively small. It would be interesting to examine if any new usability problem will be identified with more participants to represent their user groups. Further research can also extend the results to the study of user experience on smart TV music services.

Acknowledgement. This research is funded by the Industrial Technology Research Institute (ITRI) of Taiwan. Thanks to Chao-Yin Chi of the ITRI for her coordination of the project.

References

1. Cesar, P., Chorianopoulos, K.: The evolution of TV systems, content, and users toward interactivity. Foundations and Trends in Human-Computer Interaction 2(4), 279–373 (2008)
2. Chorianopoulos, K.: User interface design principles for interactive television applications. International Journal of Human-Computer Interaction 24(6), 556–573 (2008)
3. Obrist, M., Bernhaupt, R., Tscheligi, M.: Interactive TV for the home: An ethnographic study on users' requirements and experiences. Interactional Journal of Human-Computer Interaction 24(2), 174–196 (2008)
4. Li, S.-C.S.: Exploring the factors influencing the adoption of interactive cable television services in Taiwan. Journal of Broadcasting & Electronic Media 48(3), 466–483 (2004)
5. Bernhaupt, R., Obrist, M., Tscheligi, M.: Usability and usage of iTV services: Lessons learned in an Austrian field trial. ACM Computers in Entertainment 5(2), Article 6, 14 pages (2007)
6. Cruichshank, L., Tsekleves, E., Whitham, R., Hill, A. Kondo, K.: Making interactive TV easier to use: Interface design for a second screen approach. The Design Journal 10(3), ID 774, 14 pages (2007)
7. Silva, T., de Abreu, J.F., Pacheco, O., Almeida, P.: User identification: A key factor for elderly viewers to benefit from interactive television services. In: Cruz-Cunha, M.M., Varajão, J., Powell, P., Martinho, R. (eds.) CENTERIS 2011, Part III. CCIS, vol. 221, pp. 40–48. Springer, Heidelberg (2011)

8. Cooper, W.: The interactive television user experience so far. In: uxTV 2008, Silicon Valley, CA, USA, October 22-24, pp. 133–142 (2008)
9. Vlachos, P., Vrechopoulos, A.P., Doukidis, G.: Exploring consumer attitudes towards mobile music services. Int. J. Media Mgmt. 5(2), 138–148 (2003)
10. Rose, M.: Music in the home: Interfaces for music appliances. Pers. Tech. 4, 45–53 (2000)
11. Monk, A., Wright, P., Haber, J., Davenport, L.: Improving Your Human-Computer Interface: A Practical Technique. Prentice-Hall, New York (1993)