

Designing Usable Blu-ray Disks and DVDs

Holger Rada

University of Applied Sciences, Bremerhaven
Department of Digital Media

Abstract– In contrast to web design, few authoritative guidelines exist for an efficient and user friendly design of the user interfaces of DVD and Blu-ray disks (BD). Many titles display elaborate designs, but in numerous cases a complex menu structure and sometimes severely lacking navigational concepts lead to serious usability issues. The goal of the presented research is the accumulation of a catalogue of design guidelines for DVDs as well as BDs. These guidelines are based on a thorough analysis of existing disks, an user survey, and usability tests with specially designed prototype disks.

Index Terms– Blu-ray, DVD, Interface Design, Usability

I. INTRODUCTION

DVDs and BDs are amongst the most important entertainment media. In the first six months of 2008, 7.4 million Blu-ray disks were sold in the USA alone, a volume of 194 million US\$. The total turnover of rental and sales of DVDs and BDs in the same time span was 10.77 billion US\$ [1]. In view of these numbers, one could expect that video disks not only technically are in conformity with the highest standards and requirements, but also with regard to design and usability, and thus provide a highly positive user experience. However, many DVDs are severely lacking in these areas of quality. Frequent deficits include readability problems, unclear structure and even misleading navigational concepts. Blu-ray suffers from similar issues, and here the format wars with HD-DVD led to a number of additional features that may be partially useful, but also raise the question whether they are at all necessary. In fact, some BDs show design and usability problems that have disappeared from professionally designed web pages many years ago. New formats are apparently doomed to repeat the mistakes made on previous media.

Reference [2] described the complex and unclear navigation and the lack of design standards of DVDs as early as 2001. Reference [3] was the first systematic survey of the usability of DVDs. This study located the weaknesses in user guidance and functionality of selected DVDs using an usability test and a heuristic evaluation. The resulting guidelines consisted of ten recommendations, focusing on the end user and intended to aid DVD authors with optimizing usability and navigational structure of DVDs. The works of [4], [5], and [6] from 2005 and 2006 were also mostly based on heuristic evaluations and tests using standard DVDs. Their guidelines are the largest and most systematic work on DVD usability to date. However, apart from these works there is only very little additional scientific literature. Books and web sites on DVD design can be seen as practical guides at best, focus on specific authoring

software, offer tutorials and sample projects or are design handbooks without any empirical basis. And for Blu-ray disks, there seem to be no systematic studies of their usability or user guidance at all.

II. GOALS

The goal of this survey is the development of design guidelines for usable DVDs and BDs and for the efficient design of menus and usage concepts. These rules should be based on common standards for user-centered design instead of existing studio-internal guidelines. Such guidelines will help disk authors and designers avoid design problems already in the planning phase of user interfaces and disk authoring, and will also allow a systematic analysis of existing media and the identification of usability problems.

III. METHODS

The development of the design guidelines was performed in three steps. First, existing DVDs and BDs were analyzed using a rating matrix. This analysis allowed the identification of possible existing standards and also usability weaknesses and inconsistencies in user guidance and navigation. In the second step, these results were the basis of an online questionnaire. This survey was designed to shed light on the usage context of video disks, and provide socio-demographic data of the users as well as additional information on media usage. Also, the analysis was used to formulate a set of requirements for the development of prototype DVDs and BDs. This development led to usability tests in step three, where users were given highly specific tasks to identify weaknesses in the user guidance and possible solutions to these problems were identified.

A. Video Disk Analysis

Before the actual analysis, a random sample of DVDs and BDs was explored. Standard tasks such as selecting a chapter or choosing the menu language were used to identify the usage and design concepts of various studios and production companies. The insights were then ordered systematically and used to develop the analysis categories. The final rating matrix for DVDs consisted of the following categories: *Disk, Disk Intro, Main Menu, Chapter Menu, Settings Menu, Extras Menu, Extras, Accessibility, Buttons, Menu Transitions, Navigation and Disk Structure, Orientation, and Remote Control*. The BD matrix additionally included the category *Pop-up Menu*. Each category was then subdivided into several

rating criteria; for example the category *Main Menu* of the BD matrix included the criteria *Menu Intro*, *Intro Duration*, *Background Music*, *Design Style*, *Fonts*, *Animated Menu*, and *Timeout Function*. The DVD matrix consisted of 59 criteria; the BD matrix had 66. In total 54 DVDs and 14 BDs from 2003 to 2008 were evaluated, however the main focus was on recent productions. A wide range of genres was used, such as *Drama*, *Thriller*, *Fantasy and Science Fiction*, *Comedy*, and *Horror*.

B. Online Survey

Based on the results of the video disk analysis, an online questionnaire was developed. In addition to the usage habits of end users, this survey was intended to give insights on the requirements on design, usability, and functional range of video disks. The questionnaire itself was arranged in twelve thematic blocks. The main focus of the questions was the use of the disk itself; additional topics included the current and future use of the media. The target audience were current users of DVDs and Blu-ray disks, and participants were selected passively. Links to the questionnaire were placed on German web portals focusing on DVD and BD reviews, sales and rentals. In total, 1.593 questionnaires were completed; this count was reduced to 1.484 after filtering duplicate IP addresses and cookies. Only three percent were women, and 74 percent of the participants were aged between 25 and 44. Far more than half of the participants were salaried employees, and 13.2 percent were students. 69 percent had a higher education (graduate degree), a level of education that was far above the statistical average. 77 percent watched DVDs at least once per week and were rated as experienced users. About 39 percent used Blu-ray disks once or twice per week.

C. Prototype Development and User Test

The results of the online survey were the basis of the development of several DVD and Blu-ray prototypes. In total, five DVDs and BDs were created with varying structure and navigation, using common authoring software such as DVD Studio Pro (Apple) and DoStudio BD (NetBlender). In addition, test participants were asked to complete simple, exemplary tasks using two commercial BDs. The participants in this test were 14 students and employees of the University of Bremerhaven. Half of the participants were aged between 18 and 24, a relatively high percentage. The others were aged between 25 and 44. Regarding the frequency of DVD use, two groups could be differentiated: frequent users (once or twice per week), and occasional users (at most once or twice per month). BDs were only used by two participants. The test environment was a Blu-ray capable laptop computer; input was performed with the built-in keyboard to simulate the use of a remote control. The individual tasks were guided; for each task the elapsed time as well as the number and type of keyboard inputs were registered. The screen and keyboard inputs were also recorded on video. Participants were asked comprehensive questions between and after the tasks.

Additionally, general questions on the design and readability of video disks were asked at the end of the test.

IV. RESULTS

The disk analysis showed that some titles were designed using consistent standards, but those were based on studio internal specifications and not on general principles of user-centered design. Identified problems included excessively long intros that could not be skipped, unreadable fonts, unclear arrangement of buttons and chapter preview images, graphically overloaded menu pages, ineffective methods for choosing languages and subtitle options, aberrant labeling of standard buttons, illogical button routing, lack of orientation aids, unassigned menu buttons on the remote control, and – on some BDs – an incoherent interaction between disk and pop-up menus.

The results of this analysis, in combination with the results of the user survey, made clear that many commercial titles did not comply with the user requirements for design and usability. Menus were interchangeable and of unclear structure, remote control features were left unused, and in many cases navigation was cumbersome. Also, many participants clearly had different requirements regarding disk features than the producers.

These findings were corroborated by the user tests. However, it was somewhat surprising how confident and intuitive even users without prior experience with BD were able to use well designed pop-up menus of Blu-ray disks. Effectiveness, efficiency and also the subjective impression of this new navigation scheme were far superior to the traditional navigation of DVDs. On the other hand, the new features offered by BD-J did not always lead to useful concepts. Many participants were more or less at a loss when asked to perform a very simple task using one of the two commercial BD titles. This illustrated a trend towards playful, overloaded designs that eclipse any functional aspects.

The DVD tests showed that advanced users used the menu and next buttons of the remote control more often than less experienced users, and thus were able to complete tasks more quickly. Most participants preferred a manual language selection prior to the menu. The users enjoyed animated main and chapter menus, but for settings and extras they preferred a more functional, static design. Intros and transitions were regarded as desirable, but it should be generally possible to skip them.

Further interesting results pertained to the disk structure and navigation. The test participants favored the right and down arrow keys, and expected them to also apply to selecting rows and columns. In contrast to DVDs, the BD allows arrow keys not only for the selection of options, but also to trigger actions. Without exception, the test participants favored the use of arrow keys to display the second and third pop-up menu levels and also to close the pop-up menu. Although already found on many titles, a separate option for closing the pop-up was deemed unnecessary. Also, the tests corroborated

a finding of the prior user survey: motion picture titles should have no more than three vertical menu levels.

V. GUIDELINES

In total, 42 guidelines were established in 13 categories. Each guideline includes a description of the element or problem, a recommendation, the rationale behind the recommendation and a reference to the source of the recommendation. The guidelines are mostly based on the prior studies and tests. Some recommendations were supported by technical aspects and restrictions, such as the rendition of colors and lines on TV screens with interlaced lines [7]. In other cases, important findings on on-screen typography, and especially font display on TV screens, contributed to the recommendations [8].

A. Disk

The disk intro should be five to ten seconds at most, and it must be possible to skip it. If possible, warning notices should be left out, or at least made skippable using the next or menu button. Trailers should not play automatically at the beginning, but be manually selectable from the extras menu. The user should also be able to skip trailers using the menu or skip button.

B. Menu Design

If the main movie is produced in 16:9 format, then the menu should be designed using the same aspect ratio. For DVDs, the minimum font size is 16 pt, and 24 pt is recommended. Sans-serif typefaces should be preferred to serif typefaces. As long as the readability is maintained, fonts could also be used that match the general style of the movie. Capitals and boldface are also recommended. For BDs, the minimum font size is 32 pt, and 48 pt is recommended. The high resolution of BDs allows serif typefaces to be used. Pure white and highly saturated red colors, and complimentary color contrasts are best avoided. Horizontal hairlines and hard, horizontal edges should not be used. Especially for DVDs, the title safe region must be respected (anamorphic aspect ratio: at least 36 px left and right, 29 px top and bottom); for BD the title safe margins are 96 px (left / right) and 54 px (top / bottom). Menu transitions are not strictly necessary but may be used to augment the user experience. They should not be longer than 1-2 seconds. It must be possible to skip menu transitions, and they should never be used when returning to a higher level menu.

C. Main Menu

Although not obligatory, a menu intro is recommended for DVDs. It should take five to ten seconds and the user should be able to skip it. For BD, the intro can be left out if pop-up menus are used exclusively. The intro should not be shown if the main menu is selected directly, or when returning to it. It should blend seamlessly to the main menu itself. The main menu should be animated. For BD, pop-up menus are better left static, without motion. The menu design should follow the

visual style of the movie, and make use of its visual symbols and metaphors to build a bridge to the movie itself. It is not recommended to simply show individual scenes. Background music is a must for DVDs, but impracticable for BD pop-up menus due to the ongoing movie sound. The time-out function should be avoided.

D. BD Menus

Blu-ray disks should have a main menu in addition to the pop-up menus. However, the disk author should have a clear idea about which additional value the main menu could offer, and how its design could set it apart from the pop-up menu. In addition to the main movie, the pop-up menu should also be available for all extras. It is imperative that the arrow keys are used to trigger actions. Instead of the 'close' button often found on BDs, pop-up menus are better closed using the down arrow.

E. Scenes

The main movie should not have more than 20 chapters. Ideally, each page of the DVD chapter menu should show four to six preview images. These clips or images are best arranged as a block (2x2 or 2x3), in rare cases as a single row (4x1). For BDs, a maximum of ten preview images can be shown in a single row. If more chapters are available, the list can be scrolled using the arrow keys. In addition to the small preview images, Blu-ray disks should also present a larger, separate chapter preview. The border and aspect ratio of the preview should match the main movie. Preview images should be set clearly apart from the background. For DVDs, animated chapter previews are preferable; for BDs static images are sufficient. In addition to the purely visual information, a short text should hint at the chapter contents.

F. Settings and Extras

Language and subtitle options should be presented on a single menu page. Alternatively, the settings menu can be replaced with separate items for language and subtitles. In contrast to the main menu, the settings and extras menus need not be animated; depending on the design it may actually be preferable to use a purely static screen. Standard extras are a "making of" feature, deleted scenes and outtakes, trailers, interviews and comments. Games are not necessary. For BDs, additional functionality consists of the mandatory pop-up navigation and picture-in-picture (PiP) options.

G. Subtitles and Accessibility

While authors of DVDs should use sans serif fonts exclusively, serif fonts can be used on BDs in some circumstances. For DVDs, the recommended subtitle font size is 32 pt, and 60 pt for BDs. A standard typography using mixed cases and boldface is obligatory. The text should be set in light gray. To set the text apart from the background, black outlines or shadows should be used. In subtitles for a hearing impaired audience, multiple colors should be used to differentiate between actors. Subtitles should be shown centered and span one or two lines with no more than 40

characters per line. Subtitles are generally set on the bottom of the screen, but can also be shown at the top if they would obscure important detail. Subtitles for hearing impaired are mandatory for feature films; audio tracks for visually impaired are also desirable.

H. Buttons

Buttons should be labeled using standard terms: *Play* or *Play Movie*, *Settings* or *Set Up*, *Scenes* or *Scene Selection* and *Extras* or *Special Features*. In addition to these four parts, it is also possible to replace the Settings button with Languages and Subtitles buttons. The Play button should always be the first button and be pre-selected when opening the menu. Generally, the order should be either “Play Movie / Settings / Scene Selection / Extras” or “Play Movie / Scene Selection / Settings / Extras”. On DVDs, the buttons should be shown as one or two rows at the bottom; for BDs a single row arrangement is recommended, also at the bottom of the screen.

I. Disk Structure and Navigation

The disk structure should be standardized. Immediately after the disk intro, the user should be able to manually select the menu language. If absolutely necessary, warning notices can then be presented. The menu intro then leads to the main menu. Here, the user can choose between the main movie, individual chapters, settings, and extras. Trailers should not be shown during the disk intro, but be available via the extras menu. The menu depth should be at most two or three levels for DVDs; for BDs up to three layers can be easily used.

In general, the user expects reasonable bindings for navigation: down arrow selects the option immediately below the current selection, the right arrow the one to the immediate right. However, it is useful to also provide a linear navigation. For example, in a single row layout the right arrow should lead from the last (rightmost) element back to the first element. For a layout using multiple rows, the right arrow should lead from the rightmost element of one row to the first element of the next row. For DVDs, it must be guaranteed that the user can always return to the next higher menu level. Upon returning, the previously activated button should be selected.

J. Orientation

The movie title should be shown in the main menu of DVDs. On BD pop-up menus there is usually no room to do so, but it is also unnecessary since the movie is already playing in the background. The title should not be shown on other menu pages; however these should have a clear indication of their function.

K. Remote Control

Apart from the video angles menu, all available keys of the remote control should always be used. In addition to a direct jump to the main menu (Title) and to a context sensitive selection (Menu), users also expect to be able to directly access the menus for language, subtitle and chapter selection. It is imperative to use a consistent functional assignment: The Title key should always lead to the main menu, and the Menu

key should return to the last used menu. For BDs, the pop-up menu should not only be available within the main movie, but also in all other motion picture content on the disk.

VI. CONCLUSION

By using a methodic approach consisting of disk analysis, user survey, and user tests, guidelines for the menu design of BDs and DVDs were developed that focused on the end user. Also, using custom prototypes it was possible to verify that authors and producers could easily resolve the identified usability problems. This was especially important, since the presented recommendations are intended to assist authors with respecting standards for usable BDs and DVDs. Future work will focus even more on this aspect and also investigate the perspective of DVD authors, possibly in collaboration with production studios.

REFERENCES

- [1] T.K. Arnold. (2008, July 13). „Home video biz holding up“. [Online]. Available: http://www.hollywoodreporter.com/hr/content_display/news/e3i5dab627a6e5e9f679ddd011c795b2425.
- [2] D.A. Norman. (2001, December 9). „DVD Menu Design: The Failures of Web Design Recreated Yet Again“. [Online]. Available: <http://www.useit.com/alertbox/20011209.html>.
- [3] G. Wood-Bradley and M. Campbell, „The Degree of Usability from Selected DVD Menus and Their Navigational Systems,“ in *Proc. of the 6th Asia-Pacific Conference on Computer-Human Interaction (APCHI 2004)*, LNCS 3101, Springer, June 2004, pp. 540–549.
- [4] T. Költringer, M. Tomitsch, K. Kappel, D. Kalbeck, and T. Grechenig, „Implications for Designing the User Experience of DVD Menus,“ in *Extended Abstracts of the ACM Conference on Human Factors in Computing Systems (CHI 2005)*, 1565-1568.
- [5] K. Kappel, M. Tomitsch, T. Költringer, and T. Grechenig, „Developing User Interface Guidelines for DVD Menus,“ in *Proc. of ACM CHI 2005 Conference on Human Factors in Computing Systems*, 2005, pp. 1565–1568.
- [6] T. Költringer, M. Tomitsch, K. Kappel, and T. Grechenig, „Guidelines for Designing Usable DVD Menus,“ in *Proc. of the 20th British HCI conference (HCI 2006)*, Vol. 2.
- [7] T. Stapelkamp: *DVD-Produktionen. Gestalten – Erstellen – Nutzen*. Berlin, Heidelberg: Springer 2007, ch. 3.
- [8] T. Stapelkamp: *Screen- und Interfacedesign. Gestaltung und Usability für Hard- und Software*. Berlin, Heidelberg: Springer 2007, ch. 1.2–1.3.