

Optimizing Usability on Video Streaming Devices and Smart TV's

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Abstract. This presentation will provide a study of usability aspects for four Video Streaming Devices (VSD's) including Apple TV, Vizio Co-Star Google TV, Hisense Pulse Google TV, and Roku 3 devices. The objective is to show the evaluation of user experience on these devices across multiple usability dimensions; and compile a list of what works best and what needs to improve in each device to compile a list of guidelines for designing better-optimized UX.

We employ Cognitive Walkthrough techniques to evaluate the usability aspects of each device. We selected a group of common tasks to make our evaluation more objective, and comparison more precise. We hope that these results can be used as a checklist for UX designers when designing Video Streaming Devices.

Keywords: Usability, User Experience, Cognitive Walkthrough, Smart TV, Testing.

1 Introduction

There has been rapid growth in consumer adoption of devices such as Roku, Apple TV and Google TV boxes from several OEM's over the last few years. This is indicative that Video Streaming Devices (VSD) are positioned to become one of the main components of the connected home concept as it is emerging.

Yet, studying the user experience (UX) of many of these VSD's, even the popular and successful ones, shows that the user interface (UI) and other user impacting aspects of these devices are not yet fully matured. We performed usability study on four of the available VSD's in the market to evaluate their UI and UX design. In this study we aimed to evaluate each device's UX and identify areas that the UX is well designed, and also the areas that the UX is poorly designed. The devices in our study included Apple TV generation 3, Vizio Co-Star Google TV, Hisense Pulse Google TV, and Roku 3 which are illustrated in Fig.1. We later summarized our findings in a series of suggested guidelines for other UX designer to use.



Fig. 1. Devices used for evaluation

2 Methodology

Our methodology begins with building a framework to objectively compare usability issues from a novice user’s perspective, based on cognitive walkthrough technique. We first performed task analysis to identify tasks that are common across all devices. For example, “Find the latest episode of The Daily Show”, constitutes a task. We then decomposed each task into its atomic subtask. In the next step, we evaluated each subtask across five usability dimensions: Visibility, Accessibility, Feedback, Responsiveness and Efficiency, and quantized the results. We then analyzed the data to identify where each device excels, and where it falls short to compile a list of best practices in user experience design. At the end we distilled this into a set of guidelines on optimizing usability on VSD’s. Fig. 1 illustrates our approach.

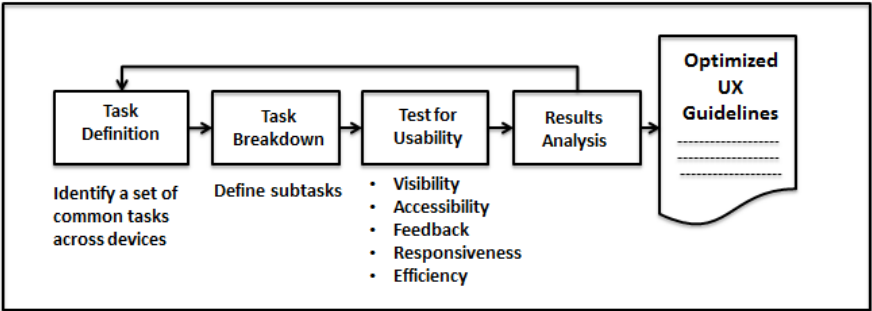


Fig. 2. Usability Evaluation and Analysis methodology

In order to streamline our analysis and make it more objective, we limited our scope of evaluation to two areas. First we wanted to see how well the set up procedure has been designed on each device. The set up procedure is often referred to as “Out Of Box Experience” or OOBEx for short. OOBEx is one of the main determinant factors in how users perceive a device’s usability since it is the first encounter they have with a device. For the second area we opted to evaluate different aspects of content discovery and consumption tasks. Netflix is an application that is available on all devices that we studied, and hence Netflix was chosen as the proxy for content discovery and consumption features for all devices that we evaluated.

OOBEx Evaluation: For evaluating OOBEx, we defined six distinct criteria for set up process that could be evaluated across all four devices. These criteria are shown in Table-1.

Table 1. Evaluation criteria for OOBEx procedure

	OOBEx Use Case	Score range
1	How well managed set up dependencies are?	1-5
2	How easy it is to locate the Setup procedure?	1-5
3	How logical and sequential are the series of steps in the Setup procedure?	1-5
4	Can Setup be completed in less than 20min?	1, 5
5	Does Setup process provide enough feedback and control to the user?	1-5
6	Is end of Setup well communicated?	1-5

Video Content Discovery and Consumption Evaluation: For evaluating content consumption, we defined nine distinct tasks in a way that we could perform and evaluate across all different implementations of Netflix in these four devices.

Table 2. Common Use Cases

	Video Discovery & Consumption Common Use Cases
UC1	Launching Netflix
UC2	Search for content
UC3	Accessing recently watched content – Top 5
UC4	Accessing recently watched content – All
UC5	Browse recommended
UC6	Play a title (movie or TV episode), Forward/Rewind/ Pause
UC7	Play a TV show from Episode 1 in sequence
UC8	Play a title/ Forward/ Rewind/ Pause
UC9	Browse categories

Additionally, we evaluated each use case outlined in Table 2 across five different Usability dimensions to rate each device for these common use cases. We used the following Usability dimensions:

Table 3. Usability Dimensions for evaluating each Use Case

Usability Dimensions		Description
1	Visibility	How visually easy it is to identify the right UI element
2	Accessibility	How easy it is to start the use case from the Gateway page?
3	Feedback	How much feedback and control is provided to the user
4	Responsiveness	How responsive and snappy the device is when performing the use case?
5	Efficiency	How fast the use case can be completed, i.e. how many steps needed to complete the use case?

3 Summary of Analysis and Results

The result of our analysis revealed interesting facts on how product, UX and UI design decisions could impact usability of the device. In general, we found that the design of the remote control has significant impact on the usability of the device, across variety of use cases. Our analysis shows that even though minimalist design for remote control may be aesthetically superior, it hinders several usability dimensions. Again, we found due to various needs of connected devices for alphanumeric data entry during the setup procedure, having a remote with full keyboard enhanced the usability of the setup procedure. The summary of our analysis is illustrated in Fig. 3. Fig. 3-a illustrates the usability scores for each device, across each of the nine use cases outlined in Table 2. Fig. 3-b illustrates the overall average score for each of the usability dimensions outlined in Table 3, and finally Fig. 3-c shows the average scores for overall OOB software setup procedure across the usability criteria outlined in Table 1. In short, based on our findings we found that the following guidelines can be useful when designing UI/UX for VSD’s:

- A remote control with full keyboard on one side and navigation, playback and quick launch buttons on the other side enhances overall usability. GoogleTV based devices all ship with a remote with this design.
- Optimal navigation UI for TV episodes is multi-pane set of left to right panels. The first panel allows for selecting the desired season, the next one to the right the episode and next panel displays the detail information on the series and the episode.
- Google TV based devices provide this type of TV episode navigation UX.
- On the detail page of a movie, providing a list of similar items – or “More-Like-This” –increases Efficiency and Accessibility of discovery -as in Apple TV.

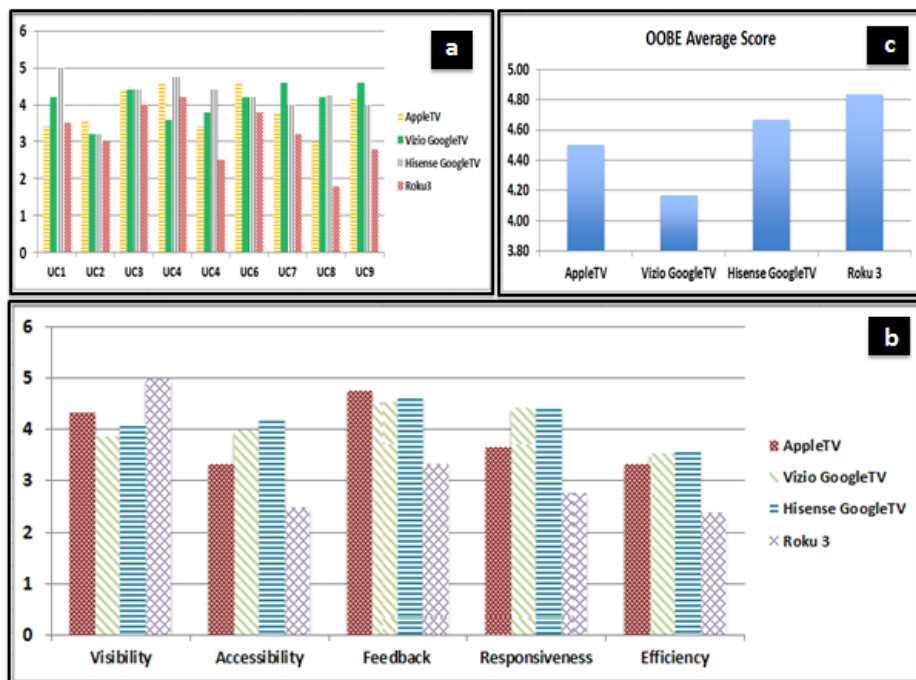


Fig. 3. a) Usability evaluation of each Use Case, b) Usability Dimensions and c) OOB scores

- While larger icons increase Visibility, they severely limit screen's real-estate utilization and navigation speed, and lower Accessibility and Efficiency of content search and discovery. Roku 3 suffers from large icons, and in contrast, Apple TV and both Google TV devices have cut a good balance between Visibility and optimizing screen area utilization. 3-4 rows of content can be optimally placed on each screen for a typical TV screen size and watching distance.
- Explicitly outlining the stages of OOB at the beginning is very confidence building, while the user is going through the setup procedure. We found that Roku excels here, and provided the best OOB setup experience.
- Including touch based UI, and touchpad on the remote decreases the usability scores of the experience. We found that touch based UI is not a good input method for TV based interactions.

Optimum UX/UI Design for DSV: As a result of our analysis, we combined best practices from each device we evaluated, to design an optimum device:

1. Hisense remote control – minus the touchpad
2. TV episode control of Google TV – either of the Vizio or Hisense devices
3. Movie detail page of Apple TV
4. Physical design and aesthetics of Apple TV box
5. OOB setup procedure of Roku 3

Bonus Feature: Roku 3's on-remote headphone jack.