

# Usability evaluation of the Philips HTS-8100 DVD Home Theatre system

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## ABSTRACT:

The study evaluated the out-of-box experience (OOBE) of the Philips HTS-8100 DVD Home Theatre system over the steps of unpacking, setup, configuration, actual use, and extended use. A total of 8 tests were conducted with participants at their homes to investigate their performance and experience of the OOBE. Participants having prior knowledge and experience with home electronic products were faster at completing setup tasks and were able to recover from errors faster. Nevertheless, the participants faced problems with the unpacking, installing the Soundbar, using the remote control, and navigating the on-screen interface. During the session, users expressed delight and satisfaction with the visual appeal of the product and the audio quality. However, the unpacking and setup procedures brought down the level of satisfaction. Though the OOBE was considered an important aspect for judging the quality of a product, it was not considered critical to making a purchasing decision. The OOBE was seen to significantly influence the perceived quality and ease of prolonged interaction with the product during future, regular usage.

## KEYWORDS:

Usability testing, Home theatre system, consumer electronics, out of the box experience

## INTRODUCTION:

The Philips home theater system is a one-piece integrated system. It is a new technology that is replacing the usual five speaker surround system (two front, two rear, and one centre). The system exists of the Soundbar with the build in DVD player and subwoofer. It is designed to match a flat TV and is recommended to be wall mounted underneath the TV with a wall mounting bracket. It can also be placed beside the TV unit. The Philips home theatre system is a completely self-contained set-up. It is compact and is supposed to fit into a modern home interior as a functional and aesthetic piece of furniture. Philips aims at combining stylish design with unique picture and sound technologies. The product has the MP3 line-in, the USB port, AM-FM radio and iPod connecting port for sharing and playing photo's and music.

## PRODUCT COMPONENTS:

The packaging contains:


1. Quick start manuals in different languages
2. Subwoofer
3. Soundbar
4. Wall mounting mechanism
5. Box with accessories, cables, and extended usage manual



The Soundbar

1. The main unit's design, soundbar hides speakers behind the grill
2. DVD is concealed behind motorized door
3. LCD display and motorized sliding glass panel on the front moves aside when inserting a disc.
4. The disc is mounted inside with a click.
5. A set of basic controls are placed along the system's top.
6. The cables to the soundbar are connected at the back of the bar.



	
<p>The Subwoofer</p> <p>The top of subwoofer have a black glossy finish with the mirror effect.</p>	

### THE USABILITY TEST

The Out-of-box experience (OOBE) of a product is critical for product acceptance, satisfaction, and perception of quality. Landauer [1] identifies low usage as one consequence of system non-acceptance. Also, other previous research [2, 3] confirms that perceived ease of use is “an important factor influencing user acceptance and usage behaviour of information technologies.” First impressions are important, and, hence, so too is the OOBE.

IBM [4] proposes seven OOBE steps which create the user’s initial hands-on experiences with the product and which are present in most cases of putting a new product into use:

1. Packaging and unpacking
2. Hardware set-up
3. Power-on
4. Configuration
5. Initial use
6. Doing work
7. Further assistance

These steps provide an initial structure for getting organised with OOBEs. Ketola [5] suggests extending these seven steps with two more:

8. Product replacement, and
9. Product extension

Out of these nine, Packaging and unpacking, Hardware setup, Configuration, Initial use, and Product extension were the dimensions which were relevant for the HTS-8100. These were chosen as a basis for formulating research questions and the usability test setup.

#### The research objective:

To evaluate the packaging and unpacking, hardware setup, configuration, initial use, and product extension of the Philips DVD HTS-8100 home theatre system for its usability, in order to apply these insights in redesigning the out-of-box-experience of the HTS-8100.

#### The research questions:

- What are participant actually doing during unpacking, installation and the first use of the DVD system? What usability problems are they facing (in terms of perception, cognition, action, experienced effort)? At which specific instances are problems observed within the entire process?
- What role is played by formal and functional characteristics of the packaging in the emergence of usability problems?

- What role is played by the user's physical environment and context in the emergence of usability problems? How do room dimensions, living conditions, and other natural distractions affect performance?
- What is the role of specialized knowledge and technical expertise of users in the nature of usability problems faced?
- What is the criticality of the usability problems identified (safety, desirability, satisfaction)?

#### **Outline of the test method:**

##### *Context of test*

The package of the DVD system was handed to the participants in their homes. The participants had to imagine that they bought this product and that it had to be unpacked, set up and used for the first time. Thereby 2 tasks were giving as the instructions for their handlings when interacting with the product.

##### *Test set up*

The test ran for approximately 60 minutes. The users' steps and handlings were videotaped and were analysed after all test are done. Two researchers were present during the tests: one giving the test instructions and the other takes session notes. After the test the participants answered interview questions about their experience with the product.

#### **DETAILED TEST SETUP**

##### **Test prototype**

The participants were presented with the package of the DVD system in an off-the-shelf condition. External, internal packaging was kept intact, and so was the positioning of various components within the package. The inventory of all pre-shipped parts and accessories was preserved and presented in the package.

The package was handed over to the participants in their homes, and so, the process of delivering the package from the store to the participants' homes was not considered in this test. The package was unpacked at within the participants' homes, while allowing them to naturally select the most appropriate area within for unpacking the product.

##### **Selection of research environment**

The DVD system aims at providing high definition surround sound experience in rooms with a lack of generous space. The compact and sleek design of the system is aimed at reinforcing this functionality. The system computes the optimum quality of audio output by taking into account the spatial attributes of the user's environment. Thus, spatial area and layout become critical factors determining the quality of the product function.

The complete process of setup and installation of the system took about 45 minutes. In the natural environment of the users, a span of 45 minutes has the potential to introduce multiple distractions, since users are typically involved in multiple tasks simultaneously – persistent and non-persistent. It was assumed that this could have a consequence on the cognitive behavior of the users during the process and would reflect on the perceived quality of the experience. To account for the influence of spatial parameters, the test was conducted in participants' homes where the difference in spatial layout and area could potentially affect the perceived quality of the product. To test the assumption pertaining to natural distractions during use, the precaution was taken to see that the research setup did not deny these distractions as and when they occurred, but took note of their occurrence and the effect they had on the test performance.

##### **Test participants and context**

The DVD system is aimed at users between 25 to 40 years of age. It was thought possible that users who bought/used the product did not have a flat TV, but were planning to acquire one in the future. Hence, the product's compatibility with diverse makes of TV was included as an aspect in the test.

The size of the household unit has considerable influence on the home environment. For example, the interior space within the house of a young couple is very different from that of a middle-aged couple with three young children. It was assumed that the home environment and the dynamics between the members of the household could be a strong source of distractions. Especially with kids, it was possible that they would join the process of unpacking and installation, or, in the case of couples, they both take part in the process together. It was assumed that the participants' experience and knowledge about audio systems could affect their performance. Hence, experience with audio systems was introduced as a proxy.

To test these assumptions, the participants were selected such that they provided sufficient variability over the ranges of the parameters of age (between 25 – 35), size of household unit, type of housing, type of television and accessories, and level of understanding of, and experience with, similar audio systems [Table 1].

	User 1	User 2	User 3	User 4	User 5	User 6	User 7	User 8
<b>Age</b>	26	32	30	34	29	24	26	31
<b>Household</b>	2	2	4	4	2	2	1	2
<b>Type of house</b>	Apart.	Rowhouse	Rowhouse	Rowhouse	Apart.	Apart.	Apart.	Rowhouse
<b>Television</b>	CRT	CRT	CRT	CRT	CRT	CRT	Flat TV	Flat TV
<b>Experience</b>	Low	Med	Low	High	Med	Med	High	High

**Table 1: Demographics of test participants.**

### Test Set-up

The test was designed to run for approximately 60 minutes: 45 minutes for observation and 15 minutes for the post session interview. The test setup involved video recording the entire process of product use, and also the follow-up interview with the participants. There were two researchers present at the location – one administering the instructions for the test, and the other taking session notes.

The test was divided into the following episodes for analysis:

- Packaging and unpacking
- Hardware setup
- Configuration
- Initial use
- Product extension

Attention was given to observe the following indicators:

Ease-of-use: Physical effort, load on memory, confusion, forgetfulness, frustration, time taken for each episode, deviation from normal/recommended action sequence.

Desirability: Enthusiasm about the product gauged from what users say, their perception of the quality of the product after the test session.

Safety: Accidents during use, potential hazardous practices.

### Method of eliciting data

#### Tasks

Participants were given two tasks at the beginning of the test session that covered all the stages of the out-of-box experience of the product:

#### a. Task 1

For Task 1, participants were given a movie on a DVD and were presented with a task card describing the task. Participants had to “*Imagine that the DVD system that you had ordered two days ago has finally arrived. You are excited and want to watch a DVD. You need to: Install the system and play the DVD, and then skip to chapter/scene 5 on the DVD.*”

On completion of Task 1, one out of Tasks 2 a, b and c was presented. Tasks 2a, 2b and 2c were distributed amongst the 8 total test participants in order to obtain observations related to different extended use cases (Radio, portable audio, pictures). For the task with the iPod, only those participants who owned an iPod themselves, or were well versed with using an iPod, were presented with the task. Apart from this, the distribution of Tasks 2 a, b, or, c was not predetermined.

#### b. Task 2a

*You have an iPod and you think it would be wonderful to use the DVD system to listen to a song through high quality speakers. Play the following song from your iPod through the DVD system.*

#### c. Task 2b

*You have photos from your recent vacation on your USB flash drive. You want to see them together with your friends as a slideshow on your TV screen. Play a slideshow of the photos from your USB stick on your TV screen.*

d. Task 2c

*You like the sound quality of the DVD system and think it would be wonderful to listen to the radio through these high quality speakers. Tune the system to the “Radio 3” 96.8 FM radio channel, and save the channel on position 3.*

The participants were encouraged to think aloud during the process of completing each task. The note taker recorded his observations following a predetermined task division according to ‘packaging and unpacking’, ‘hardware setup’, ‘configuration’, ‘initial use’, and ‘product extension’, and noted points of interest for follow-up. No assistance was provided by the test administrator during the test.

**During the test**

The note taker qualified each episode within the task as either:

- Completed without any assistance (from the user-manuals)
- Completed with some assistance
- Completed with a lot of assistance
- Not completed/abandoned

Points in the episodes where the user exhibited any problematic symptoms were noted. After the session, the overall experience with the product was discussed with the user. Problematic symptoms were addressed and the user was urged to provide deeper insight as to the nature of the problem. Good things and bad things about the experience were discussed with the user. Finally, the desirability of the product was discussed in the follow-up interview.

The following division of tasks between researchers will be used during the test:

Facilitator	Note taker
Camera control	Notation on laptop
Facilitator notes	Follow-up Interview

**Test Materials**

Test materials included Product description sheet, Facilitator’s Notes, Notetakers Template, and a Post-session interview points-of-attention sheet. Notes were maintained for the facilitator to ensure consistency between different facilitators and notetakers while administering test sessions. The notes contained instructions and reminders for proper introduction, test explanation, and recording.

*Product description sheet*

The product description sheet was a printed version of the product description found on the official product website. The test assumed that the participants were aware of the basic characteristics of the product as they would be if they had selected and purchased the product themselves. The product description sheet was given to the participants before handing out instructions for the first task.

*Notetakers template*

Task no. : 01

Episode: Hardware setup

Task result:

- Completed without any assistance (from the user-manuals)
- Completed with some assistance
- Completed with a lot of assistance
- Not completed/abandoned

Observations	Interpretations	Remarks
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*Post-session interview*

1. How many people live in your house?
2. How experienced are you with using modern electronic devices (TV, PDAs, iPods, PC)?
3. What is your level of understanding of how audio or home theater systems work?
4. How would you describe your experience with the product today?
5. *[Note: Let the participant speak freely. Then refresh the participant's memory by guiding him through each test episode, in order to make him reflect over all stages of the experience:  
Unpacking, Setup, Configure, Learning, Actual use, Extended use]*
6. What were the good things? *[Note: Ask the following of EACH point that the participant describes]*
7. What went wrong? *[Note: Ask the following of EACH point that the participant describes]*
8. Imagine that you are looking for a surround sound system for your home. What would be important aspects that you would consider while choosing such a system? Would you consider this system? What are your concerns about it?
9. If you had to recommend this system to your friend based only upon what you have seen of it till now, how would you describe this product?
10. What was your impression of the quality of the product when you looked at the packaging? How has this impression changed now that you have installed and used it? *[Note: Extract specific aspects of the unpacking process]*

**Method of analyzing data**

Analysis was conducted independently by the researchers. Every test session was analyzed by two researchers and observations and interpretations were notated separately in order to make subjectivity explicit. All the individual observations and interpretations were collated and summarized later to form conclusions. For a result, at least one of the two analysts was required to identify the problem. In cases where a problem was interpreted by only one of the two analysts, such problems were later discussed by all the researchers together, and a decision was made about the result.

**RESULTS**

Age	26	32	30	34	29	24	26	31
Room	bedroom	Living room	Living room	Living room	Living room	Living/ bedroom	Living/ bedroom	Living room
	User 1	User 2	User 3	User 4	User 5	User 6	User 7	User 8
Problems with handling subwoofer								
Non-standard cables								
Space Problems while unpacking								
Mounting frame recognizing								
Subwoofer orientation								
Back Cover Opening								
Back Cover Closing								
Forgetting to close back cover								
No enough space for hand (back panel)								
Unclear cable recognition / orientation / connection								
Dangerous plugging system								
Unclear Quick guide								
No Feedback for a "complete installation"								
Problems with Dvd Slider								
No Feedback Turn On/ Off								
Using Suondbar buttons (too small)								
Red Label taken off								
Finding MENU key (remote control)								
Use of Round Navigation for Dvd (remote control)								
Could not understand logical structure (remote control)								
Not completing extended tasks								
Unclear position of USB port								
Non-recognisable system generated folder and file names (iPod interface)								
Wrong Use of round navigation button for picture (remote control)								
Wrong Use of round navigation button for Radio setup ( remote control)								
Unclear sequence for RADIO setup (remote control)								
	no tasks completed	iPod	USB (picture)	Radio	USB (picture)	Radio	iPod	USB (picture)

**Table 2: Summary of significant usability problems identified across test participants.**

All 8 participants completed Task 01 successfully. Participants who had to use the iPod failed in Task 02. Episodically, all participants completed unpacking without any assistance from the user manuals. However, all further episodes were characterized by a heavy reliance on the Quick Start guide. In most cases (6 out of 8) the Quick Start guide instructions were considered to be clear and sufficient for completing setup tasks. The significant problems identified within each episode, and their distribution across users, are summarized in [Table 2]. The out-of-box-experience of the Philips HTS-8100 DVD home theatre system fails to engage users in an exciting, easy way. The main usability problems contributing to a mediocre user experience are physical and ergonomic discomfort observed during product transportation and handling [Fig 1], lack of clear visual cues on the product components and packaging [Fig 2], lack of cognitive assistance and feedback seen from the users' perpetual reference to the user manual [Fig 3], awkward integration into users' home environment by creating clutter and using up a lot of space [Fig 3], difficult connections between components [Fig 4], and an unintuitive mapping of controls for on-screen user interaction in the case of the remote control.



Fig 1: The subwoofer needs 2 people to lift out of the box due to its weight and the way it is packed.



Fig 2: There are no clear clues as to the orientation of the subwoofer.



Fig 3: A user constantly referring to the manual and surrounded by the debris of the package.



Fig 4: The connections at the back of the soundbar are difficult to access.

## **DISCUSSION**

From the tests it was seen that all 8 participants started with unpacking all the components of the system and then referring to the Quick Start guide for further procedures. The subwoofer is a cause for physical discomfort because of its weight and lack of holding mechanisms. Participants tried to solve this problem by lifting the subwoofer along with its bottom foam packaging, but had to bend low and pick up the heavy subwoofer in an awkward position. The glass sliding DVD cover and the heavy, opaque packaging make the Soundbar seem fragile. The glass slider easily slides open when the Soundbar is tilted. This problem is temporarily solved by the attached red warning patch, but this was proven ineffective during the tests. Users did not take the patch off at the moment suggested in the Quick Start guide. Users have a tendency to take it off right after unpacking the Soundbar and this causes the slider to open accidentally during subsequent handling. The angled rear access for connecting cables and the lack of space in the recess at the back of the Soundbar make it hard to find and connect cables to their connection points. The back panel cannot be closed by the lack of space of fitting cables properly in the recess. The general lack of space can cause physical injuries and discomfort. The setup and configuration process is not obvious and requires heavy referral of the Quick Start guide. The components are not presented to the user following a logical sequence of connection. The guide does not distinguish between critical and non-critical components for a basic setup. The schematic pictures in the guide are not clear enough to help users relate to the actual components and their connection.

Upon setup, the system does not give a feedback of a successful or complete installation on the TV screen. This causes confusion and does not allow users to correctly identify and diagnose problems with setup. The system provides insufficient feedback about its On/Standby states resulting in users failing to power the system ON via the remote control. The grouping of buttons on the remote control is not clear and requires some amount of familiarity and learning. The round navigation button is confusing as it doesn't have any labels and serves as a navigation control for different tasks. This causes a misfit in what the user expects the button to do, and what the button actually does.

The system provides very short timeout duration while searching and saving a Radio channel to a specific position. Users expect the USB port to be on the subwoofer as most of the other accessories connect to the subwoofer. Choosing the option for a slideshow is not clear. Users selected a photo and found out that the system automatically starts playing the slideshow. Playing a slideshow of pictures from a USB flash drive generated a slow response time and this time interval was not modifiable. The system is not compatible with reading file systems from external devices using the FAT32 file system like the iPod. It generates incomprehensible names for files and folders on such devices making it impossible for the user to properly navigate through the information on such devices.

The unpacking of the product takes up almost 6 sq. meters of floor space. In the natural context, the system can be installed in diverse locations in the user's home – living room, bedroom, TV room, or library. In such cases, users have a tendency to put packaging material wherever they may find a place for it, and this can potentially block movement around the room and cause accidents. The problem is compounded by the foam packaging and the boxes serving no active function during and after the unpacking. The size of the packaging box and its weight makes it impossible to be handled by one person and carried up multiple levels in case of apartments.

Users with prior knowledge and experience with similar electronic products were faster in setting up the system, and were able to recover from errors faster. However, Table 1 displays problems that were observed irrespective of the level of experience of the users.

Users start with an initial excitement about setting up the system. During the setup, the level of excitement decreases until the moment when the system is setup and they start playing a DVD. At this point, users express delight and satisfaction after looking at the DVD cover sliding mechanism and listening to the audio quality from the system. In general, users said that they did not find the unpacking and setup to be a satisfying and delightful experience. Users said that the out-of-box experience is an important aspect contributing towards satisfaction and acceptance of a new product; however, it is not a critical aspect for decisions regarding purchasing such systems. We believe that users do not buy a product because it provides a great out-of-the-box experience, but users qualify a product in totality. However, a bad out-of-the-box experience with a product is sufficient for users to lose trust and respect for the brand, and is more likely to actively discourage product adoption among peers.

## **CONCLUSION**

The out-of-box-experience of the Philips HTS-8100 DVD home theatre system fails to engage users in an exciting, easy way. The main usability problems contributing to a mediocre user experience are physical and ergonomic discomfort, lack of cognitive assistance and feedback, clumsy integration into users' home environment, and an unintuitive mapping of controls for user interaction. A successful redesign should address

these issues and aim at providing a seamless, efficient and quick OOBE which is like an adventure film engaging the user in an involved climax that is not excessively long drawn. Further, the OOBE should extend the brand vision and provide an elegant, minimal, and transparent experience to users.

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