IS SMART TV REALLY ‘SMART’?

USER EXPERIENCE RESEARCH REPORT

OCTOBER 2014
WHY SMART TV?

We would like to invite you to read the very first, independent user experience report on Smart TV conducted in Poland. We’ve put our heart and soul into it since the following report is also the first publication created by WitFlow team on such a large scale.

This is definitely not a commercial publication. The general idea of this research simply occurred to us while we were working on another project for the multimedia industry. Clearly, the Smart TV market is growing and becoming increasingly important. However, designers lack reliable user studies they could draw upon in their designs. This is the reason why we decided to share our research findings with you.

We based our study on real-life scenarios. The first one was related to the very first steps with a brand new Smart TV that has just been set in front of the couch. In the second scenario, we were interested in the typical patterns of Smart TV usage and activities performed by its users on a daily basis. Our large-scale research project was highly exploratory in nature because we did not know what to expect. Being aware of their advantages and limitations, we decided to use qualitative methods. It was more important for us to understand people’s needs and to have the opportunity of observing the actual interaction rather than getting just respondents’ declarations.

We were mainly interested in the user experience and human-computer interaction issues. Our goal was to discover which design patterns can be applied to Smart TV, as it is neither a computer, nor a traditional TV set.

The research concerned both Smart TV interface and applications. However, we would like to present the general findings, not associated with the drawbacks of particular software.

The report will provide you with answers to the following questions:

— what are the users’ expectations towards Smart TV, and for what purposes is it really used?
— how do they navigate through the Smart TV interface and the dedicated applications?
— which buttons on the remote control won the popularity contest?
— which parts of the interface need to be improved in terms of affordances?
— does more mean better?
— do voice commands win out over the obsolete old friend: remote control?
— what is the most time-consuming action while using Smart TV?

We would like to present to you the report the whole WitFlow team has been living and breathing during the last two months.
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RESEARCH METHODS AND PARTICIPANTS
1. RESEARCH METHODS AND PARTICIPANTS

1.1. RESEARCH PROBLEMS

We wanted to learn about Smart TV users: find out what ‘the intelligent TV’ means to them, what are their goals while using it, what problems they encounter and what their first impression of Smart TV is. Since we are a user experience design studio, we were particularly interested in the interactions with the TV and remote control interfaces.

We arranged a large scale research project. We started with grasping what Smart TV really is. Then, on the basis of Internet sources and experts’ opinions, we created the definition shown below.

Our aim was to find and understand how people use Smart TV. We were looking for answers to the following research questions:

- what are the users’ goals when using Smart TV?
- what functions do they use?
- what is the Smart TV usage pattern?
- what are the users’ needs towards Smart TV and which of them are priorities?
- what are the troubles and difficulties in using Smart TV?
- do remote controls fail as navigating devices?
- how do users deal with typing text in Smart TV applications?
- do users customise their Smart TVs, and if so, what do they change?
- what are the possible areas for improvement in Smart TV?

SMART TV DEFINITION

Smart TV is a function (usually in a TV set, but also possible in a set-top box, Blu-Ray player, game console) linked with the embedded Internet access that enables a wide range of services – from VOD and social media to a web browser. The services available depend on the Smart TV model and brand.
1. 2. RESEARCH METHODS

Our research project was divided into two parts: diary studies followed by a cultural probe, and user tests. We invited two different groups of users to take part in our project: beginners – the people that were not familiar with Smart TV, and experienced Smart TV users that sit in front of their screens on a daily basis. The research was conducted in Wroclaw, Poland in 2014.

1.2.1. DIARY STUDIES AND CULTURAL PROBE

We chose the diary study to find out what the usage patterns of Smart TV were. This method enables collecting the data associated with habits and typical behaviour. Such patterns would not be discovered in a declarative study, since people are unaware of some of their actions and needs. What is more, we wanted to observe the frustrations and problems with Smart TV in the users’ natural environment. The data was being gathered for 5 days, thus decreasing the possibility of the incidental answers and actions. Moreover, the extended time of data collecting enabled us to observe much wider variety of situations.

In addition to the diary studies, in order to find out what the users’ unconscious needs were, we decided to incorporate the cultural probe method into our research project.

A set of tasks based on projective techniques was attached to each diary. Funny and amusing tasks were to inspire the users to generate creative answers and ideas.

Before each diary set was handed over, we had had a conversation with the user at his/her place. The interview consisted of 9 in-depth questions. Talking with our participants gave us vital data indicating the context of Smart TV usage. Then, we introduced each user to the tasks for the next five days, and the respondent had the opportunity to ask questions, have a look at the materials, express and remove doubts.
1.2. RESEARCH METHODS

1.2.2. WHAT WERE THE DIARY STUDIES MATERIALS?

Smart TV Video-Diary, i.e. reportage – the participants were asked to record a 5-10-minute video every day, showing how they used their Smart TV, and to comment on their actions aloud. The users who did not have their own devices were given cameras with video recording (supplied by Neo24.pl, our partner in this project). Furthermore, each day, the reportage was complemented by the observation sheet, i.e. six questions concerning the Smart TV usage.

Cultural Probe – five envelopes for five days, each containing tasks regarding Smart TV. The tasks were varied and well-rounded, some of them had a projective character. The participants were asked to record a video manual, look at their remote control and paper over the buttons that were not frequently used, and fill out the dinner party – a matrix of Smart TV needs. They also provided us with three wishes for the goldfish and their reflections from the point of view of their own grandmas.
1. 2. RESEARCH METHODS
1.2.3. USER TESTS

Apart from the diary studies, we ran user test sessions at the WitFlow lab. We recruited novice users – none of the participants had been using Smart TV before. It was our goal to learn how they would deal with the Smart TV interface while making their first steps.

All in all, we conducted 15 user tests, 5 sessions using each of the three common TV models: Samsung UE40F6 400 AW, Phillips 42PFH6109, LG 426B650 (the latter two were available thanks to our partner – Neo24.pl). WitFlow research lab had been temporarily rearranged so that it resembled a cozy living room with a couch, TV set and something tasty for a sweet tooth.

Each session was led by the moderator on the basis of a research scenario prepared beforehand. The tests were recorded using two digital cameras and lasted 40-60 minutes each. Our participants had six complex tasks to accomplish. The order of the tasks was changed after each session, so as to eliminate the learning effect and its impact on the results. Furthermore, the think aloud protocol was applied – we asked the beginners to comment on their actions, emotions and the system’s reactions.
1.3. PARTICIPANTS

1.3.1. DIARY STUDIES PARTICIPANTS

13 users took part in the cultural probe. All of them were inhabitants of towns or cities (Wroclaw, Opole, Bęchatów). Users’ age and professional background were highly diverse. They were recruited using the snowball sampling method and purposive sampling, while the key criterion was having and using a device with a Smart TV function (various types and brands). The majority of the participants declared that they used their Smart TVs on a daily or weekly basis (9 participants, N=13). The most popular applications they were using included YouTube, Ipla, TVP VOD and Player (all video-related software).

Goals of using Smart TV during 5 days of a diary study (N=13)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>listening to music</td>
<td>19</td>
</tr>
<tr>
<td>watching films</td>
<td>18</td>
</tr>
<tr>
<td>watching TV series</td>
<td>14</td>
</tr>
<tr>
<td>watching TV programmes</td>
<td>13</td>
</tr>
<tr>
<td>watching news</td>
<td>9</td>
</tr>
<tr>
<td>checking weather forecast</td>
<td>6</td>
</tr>
<tr>
<td>radio</td>
<td>5</td>
</tr>
<tr>
<td>games</td>
<td>4</td>
</tr>
<tr>
<td>social media</td>
<td>0</td>
</tr>
</tbody>
</table>
1.3.2. USER TESTS PARTICIPANTS

15 beginners that took part in the user tests were recruited using the snowball sampling method and purposive sampling. The main criterion was no previous contact and experiences with Smart TV. The sample was varied in regard to age and profession as well as the familiarity with technology.

Even though none of the participants was a Smart TV user, all of them were using computers, and 14 out of 15 respondents had a smartphone. There were also two tablet users and three game console users in the sample. The data concerning the use of other devices was vital due to the possibility of a positive transfer of the skills.

Age structure of the Diary Studies participants

<table>
<thead>
<tr>
<th>Age Range</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-25</td>
<td>50%</td>
</tr>
<tr>
<td>26-35</td>
<td>40%</td>
</tr>
<tr>
<td>46-55</td>
<td>10%</td>
</tr>
</tbody>
</table>
SIT DOWN, TURN IT ON & WATCH

In-between reality and a Smart TV user’s desires
2. 1. BUYING SMART TV

2.1.1. WHAT DO I REALLY WANT?

Regardless of the users’ experiences in using Smart TV, all of them were asked which functions, in their opinion, were indispensable, attractive or simply nice to have. The dinner party method was applied in both user tests and cultural probes. The data analysis revealed that the remote control, video on demand and app store were the most important functions for the experienced users. They considered YouTube and radio a little less important, whereas games, Skype, e-mail and voice control turned out to be the icing on the cake. As for the novices, VOD, YouTube, radio, possibility of looking through their own photos and access to websites were of the highest significance. Facebook, Skype, e-mail and cloud data were less necessary for them.

It is worth highlighting that the majority of the beginners changed their minds after their initial session with Smart TV. That was because of certain crucial problems that occurred during the tests. For example, the app store and secondary devices became more important for the users. They gave up (or decreased the importance of) voice control and the functions requiring typing long texts (e.g. Facebook).

Most common wishes for the Smart TV goldfish

<table>
<thead>
<tr>
<th></th>
<th>EXPERIENCED USERS</th>
<th>NOVICES</th>
</tr>
</thead>
<tbody>
<tr>
<td>VEGETABLES</td>
<td>remote control, VOD, app store</td>
<td>VOD, YouTube, radio, websites, own photos</td>
</tr>
<tr>
<td>MEAT</td>
<td>YouTube, radio, own photos, secondary device</td>
<td>Skype, cloud data, e-mail</td>
</tr>
<tr>
<td>DESSERT</td>
<td>Skype, games, e-mail, voice commands</td>
<td>Facebook, app store</td>
</tr>
</tbody>
</table>

**Most common wishes for the Smart TV goldfish**

- **6 x** easier control (with a remote control, voice, gestures, thoughts)
- **4 x** faster responses
- **3 x** more apps (also in mother tongue and for free)
- **3 x** precise and comprehensive system messages
- **3 x** secondary device for control or a keyboard in a remote control
All participants were given an opportunity of adding their own ideas and needs to the list – they were not limited to the set of functions that we provided. The most frequent characteristics added included ‘a better interface’ and ‘a clearer menu’. As you can see, the users strongly emphasised the need for better usability.

### 2.1.2. WHAT HAVE I BOUGHT?

Amongst the participants, there were both the ones who bought their devices randomly, without in-depth consideration of their functions, and the ones that based their decision on an expert’s recommendation, a sales person’s advice or forum posts. Screen size and price were of high importance for many users. The vast majority of them highlighted VOD as a key feature of Smart TV.

Our participants regarded Smart TV as an additional source of entertainment. Thanks to applications and the Internet access, Smart TV was considered as an alternative or a device complementary to the computer. What is more, in contrast to the traditional TV and television, Smart TV enables access to largely diverse entertainment whenever it is desired.

Some of the respondents described their first steps with Smart TV as very positive. However, there were also many disappointed users, frustrated by Smart TV functions, interface look and feel, its slow performance and numerous problems that will be described later on. It is worth noting that one of the participants was so disappointed that she decided to return her newly-bought Smart TV just after the last day of the diary studies.

We want to return it. We are disappointed: it’s working incredibly slowly, it’s clunky and unintuitive, there are plenty of errors in the software. We think that it doesn’t make sense, it’s not tailored to our needs.
2. 1. BUYING SMART TV

In the cultural probe, we wanted to get to know whether Smart TV was in any way considered to be a better device than a computer, a tablet, a smartphone or a game console. It turned out that the pattern of Smart TV usage was deeply rooted in the mental model of traditional TV. Thus, it was most commonly used for watching TV series, programmes and films. Music, Skype, reading news, social media or watching one’s own videos or pictures – these are activities usually performed using a computer. Smartphones are necessary while listening to music or checking the news or social media. When it comes to tablet users, they usually use their devices to read articles, play games or check on Facebook.

There is one vital question: is Smart TV an alternative or rather a device complementary to other hi-tech appliances and gadgets? It is highly possible that due to the problems with the interface and the general quality of the services provided, users simply cannot fully benefit from the Smart TV’s options. Thus, one device is not able to replace other ones, at least in the context of home usage. On the other hand, the most important needs towards Smart TV (i.e. VOD) are fulfilled by this type of equipment. To conclude, it seems that designers and manufacturers should focus on easily accessible and intuitive features related to watching films, TV series and programmes.

THE TOOLBOX

Which device are you most likely to use to perform particular actions? Most common activities (188 choices totally):

<table>
<thead>
<tr>
<th>Device</th>
<th>Activity</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMARTPHONE</td>
<td>reading news and articles</td>
<td>9 x</td>
</tr>
<tr>
<td></td>
<td>social media</td>
<td>9 x</td>
</tr>
<tr>
<td>COMPUTER</td>
<td>listening to music</td>
<td>12 x</td>
</tr>
<tr>
<td></td>
<td>Skype</td>
<td>11 x</td>
</tr>
<tr>
<td></td>
<td>reading news and articles</td>
<td>11 x</td>
</tr>
<tr>
<td></td>
<td>watching own videos/photos</td>
<td>11 x</td>
</tr>
<tr>
<td>TV</td>
<td>watching films</td>
<td>11 x</td>
</tr>
<tr>
<td></td>
<td>watching TV series and programmes</td>
<td>11 x</td>
</tr>
</tbody>
</table>
2. 2. FIRST STEPS

2.2.1. WHICH REMOTE CONTROL SHOULD I USE?

During the user tests carried out at the WitFlow lab, we were observing the novices taking their very first steps in the world of Smart TV. One of the TV models being tested had two remote controls: a traditional one and the other with a touchpad – similar to that found in notebooks. The latter two were equipped with one classic remote control.

Our results suggest that a TV set and a remote control are inseparable. As soon as the participants sat down on the couch, they grabbed the remote control. Turning Smart TV on itself was obvious and easy thanks to the well-known buttons and the LED signal. However, the presence of two remote controls and their doubled features were the source of many troubles. Most of the participants were completely lost: they did not know what each remote control was for. We suppose that the presence of two such devices activated the mental model created by past experiences, where one remote control was traditionally dedicated to one device (e.g., one remote control for the TV set, the other for the VCR). The data collected in the diary studies and the cultural probe confirm that complicated remote controls, even when there is only one remote control provided, are definitely neither a good nor a user-friendly strategy. Apparently, the best solution is to have one simple remote control and access to more sophisticated functions or settings provided on the screen interface.
2.2. FIRST STEPS

2.2.2. WHERE IS SMART TV IN MY SMART TV?

The next step after turning on the TV was starting off the enigmatic Smart TV feature. It turned out to be quite a challenge for the majority of the novices.

Too many buttons on the remote-control – new users found it difficult to find the right button. Since there were so many buttons, glancing through the new remote control was tough. The presence of two remote controls for one of our TV sets made the whole ‘search for the Smart TV button’ even harder.

Unclearly labelled buttons – the Smart TV button had a completely different label and was placed somewhere else in the case of each remote control. Issues related to unknown and unintuitive terminology, often in a foreign language (i.e. English), arose on several occasions. Generally, the Smart TV button was not distinguished and visible enough for the novices.

MAN

AGE 25

I haven't used these buttons a single time. They may have some purpose but for me they're useless.
2. 2. FIRST STEPS

2.2.3. WHAT AM I LOOKING AT AND WHAT DOES IT MEAN?

Usually, the novices needed quite a while to start off the Smart TV feature. Several users required a hint or help from the moderator. Understanding what Smart TV was and what it offered was the next challenge. The participants got lost many times. They had difficulty in defining where they were and what they saw, whether the interface in front of them was already Smart TV or not. Lots of users did not discover the whole Smart TV main menu because they couldn’t spot any visual cues or information suggesting that there was another screen or menu layer available. Furthermore, a remote control legend (i.e. the purpose of the buttons used to perform a particular action) was also misleading on many occasions (see the picture below). Even if a participant managed to spot the legend, he/she still had trouble understanding how it worked – should the user click on the element on the screen or rather push the button on the remote control.

MAN
AGE 29

Is it the TV or am I such a bonehead?
No differentiation between the applications that are already installed and the ones that can be bought was another issue. Furthermore, the participants did not understand the way the applications were arranged. ‘Are they favourites, most frequently used, newest, or are some other, unknown criterion is applied here?’ – they kept asking. Moreover, they were confusing the elements of the interface – for example applications with ads. One of the novices was sure that an ad banner was actually the app store.

Empty but active fields at the end of the application list, designed to be filled with new apps, were misleading too. Unfortunately, once installed, applications did not appear in those fields automatically. It resulted in disorientation increased by the fact that the empty fields were highlighted (when selected with the remote control). It would be better to replace the fields in question with a message or a call to action ("Add favourite app") instead of leaving empty, yet misleading tiles.
The screen appearing just after turning Smart TV on was the point of departure, with all the possible interactions and applications available, which was pretty much the same as in the case of a computer desktop or a dashboard in an application. However, the customisation options were limited and that was why the effectiveness of Smart TV usage could not be significantly increased. It is the user who should decide which applications are visible, which are hidden and in what order they appear. On the other hand, Smart TV should have ‘smart’ default settings described by explicit and comprehensive labels.

„Downloaded” – by me myself or generally by the people on the web? And „recently used”? Well, I certainly did not use them!
Ironically, a bigger screen does not mean more space for additional features. It is essential, even more in the case of a TV screen than of a computer, to decrease the number of elements on a single screen and visually emphasise the most important content. Usually, users sit at quite a distance from the TV set. Thus, it is crucial to ensure that the fonts are big and the contrast high enough. In order to make the labels more legible, it is recommended that similar elements be grouped and distinguished from the rest of the content (e.g. using background colour for particular actions). Consistency is the key here. Categories should not contain any random elements and the way a particular feature is being highlighted should always be the same. Furthermore, it is necessary to distinguish those elements of navigation that show users their whereabouts in the Smart TV structure.

During the user tests, we identified plenty of advantages of a big screen, but also its limitations. The vast majority of the participants claimed that thanks to the high quality and screen size, watching films, TV series and programmes on Smart TV was simply enjoyable.

However, when it comes to Smart TV application interfaces, the big screen size was not that beneficial, especially if a non-VOD app was used. Small fonts, too many elements on a single screen, countless distractors (ads, colours, movement) – all these things made it difficult to spot crucial elements of the interface.

| WOMAN  | AGE 31 | It’s really hard to say what that red or yellow icon means. 
(…) There are two question marks. What are they for? |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>WOMAN</td>
<td>AGE 25</td>
<td>Now it’s just huge chaos. It needs some order.</td>
</tr>
</tbody>
</table>
2. 3. CHALLENGES & EVERYDAY ACTIONS

2.3.1. NAVIGATION STRATEGIES

Both the novices and experienced Smart TV users were using different means of navigating through the interface. Some of them were using only one strategy whereas others were switching between different methods depending on their goals. Most important strategies are presented below:

Using arrows
Arrows, accompanied by the OK button, were definitely the most common choice. It's worth noting that the participants were using them not only to navigate through the main menu but also to use other features. Some of the users claimed that the arrows and the OK button area on their remote control was actually the only one they really used. These observations can be reflected by the pictures of redesigned remote controls (one of the tasks in the cultural probe).

The arrows failed only in the case of very complex structures, for example web pages. Navigating through Internet pages while using the remote control (both the one with the touchpad and the traditional one) was a tiresome and an unpleasant experience for all the participants.
Users’ strong habits in terms of navigating with arrows should be taken into consideration when designing the navigation. Easy access to the main features through navigation with arrows would be especially beneficial for the less advanced users. However, excessive nesting of the information architecture may occur in consequence, thus leading to the necessity of making a number of steps to get to the desired location deep in the structure. In such cases, secondary devices should work much better. On top of that, consistency in the use of shortcuts and buttons throughout different applications would certainly make the navigation much easier.
Remote control with a touchpad

Only a few novices decided to use a remote control with a touchpad. A traditional device inspired much more confidence, especially for those who were taking their very first steps with Smart TV. The touchpad remote control brought to mind devices such as a smartphone or tablet. As a consequence, the participants expected similar reactions and patterns of use while using the remote control with a touchpad.

For instance, one of the novices wanted to swipe to another screen/desktop in the main menu, yet it was not possible. During the user tests, the beginners were complaining about the oversensitiveness of the remote control – it was too easy to skip an element. On the other hand, while surfing the Internet, it sometimes took ages to move the cursor from one place to another because the touchpad was too slow.

Ergonomics and responsiveness of the device – under these conditions can this type of Smart TV navigation be developed and appreciated. Otherwise, the touchpad remote control will be a useless oddity. When designing touchpad remote controls, the patterns of use typical for other haptic devices such as tablets or smartphones should be taken into account.

MAN

AGE 29

Jesus, seriously?! Is it possible to make this cursor move faster? It's so slow that I could fall asleep before typing anything.
Voice commands and gestures

It was mostly the novices who were enthusiastic about voice commands. They considered it as an attractive novelty and they were looking forward to trying it out. Our research scenario also encouraged them to check out this feature. Unfortunately, initial excitement gradually turned to frustration and dissatisfaction. Voice commands were highly imperfect: either too sensitive or not sensitive enough.

The participants did not know when they could speak to the Smart TV, which application received voice and when. Due to the lack of any feedback from the interface, the users were never sure whether their command was heard or not. It led to their disappointment and, as a result, they changed their minds about the voice function. Amongst the experienced participants there was only one user familiar with the voice commands. However, he claimed that he preferred using his tablet or remote control instead.

Voice commands need further development and improvement:
- sensitivity optimisation,
- implementation of comprehensive validation and error messages,
- adding a choice of language (e.g. due to English titles and names),
- visualisation of the voice reception in the system (e.g. a flashing microphone icon),
- contextual presentation of available voice commands whenever it is possible to use them.

Unless these crucial changes are introduced, it may be more reasonable to give up such an underdeveloped feature.
2. 3. CHALLENGES & EVERYDAY ACTIONS

2.3.2. IN SEARCH OF THE CONTEXTUAL MENU

While observing the novices in their first contact with Smart TV, we noticed that they often tended to look for a contextual menu. A vast majority of the users were trying to find a substitute of the right mouse click. It was mostly looked for in order to perform basic actions such as deleting, adding or moving a selected element.

In search of such a function, they were unavailingy trying out different buttons on the remote control (Menu, Options, Settings, etc.). Sometimes they were looking for the desired features in the TV set main menu since they found it hard to see a difference between the TV settings and the settings referring only to Smart TV. The distinction was not clear even for the experienced users.

Perhaps the TV set settings (available from a button on the remote control) should be distinguished from the Smart TV and applications settings. In the case of Smart TV, a button labelled as ‘Settings’, placed in the main menu (dashboard) should be considered, so that users could reach it with arrows and the OK button on the remote control. Furthermore, it’s advisable to consider having two modes on the dashboard: one for preview (browsing applications) and the other for editing, just as it is in smartphones. There should always be a separate button (e.g. ‘add app’) for adding a new application. When it comes to applications, it is necessary to expose the contextual menu (by using a colour, shape or by placing it closer to the selected element), which is now easily missed without close attention.
2. 3. CHALLENGES & EVERYDAY ACTIONS

2.3.3. ISSUES WITH ENTER, EXIT & RETURN

Inconsistencies in performing basic actions turned out to be a nightmare for users and a huge obstacle to enjoyable contacts with Smart TV. We identified some serious issues concerning the button-related operations: exit, back, return, OK. In fact, pressing them gave completely different results depending on the application and the menu level of either the Smart TV or the TV set. The buttons in question were undoubtedly necessary as the participants were willing to use them and considered them as useful and simple. Yet, the number of possible combinations and the varying results of pressing them made it impossible to learn how to use them efficiently.

The solution to the navigation inconsistency problem seems to be crucial for the further development and popularisation of Smart TV. It is the manufacturer’s role to impose a set of rules that the application providers would have to follow. Smart TV should have its own UI guidelines and design patterns, similarly to Apple or Android.
Some of the participants (also the novices) understood the connection between the remote control and the TV screen. For instance, it was clear for them that they could use coloured buttons in order to perform particular actions. They might have found it easy due to their previous experiences with teletext.

The analogy between the screen and the remote control was, however, not that obvious all the time. 8 out of 15 novices had difficulty or failed to enter the search engine marked with a yellow ‘c’ letter. Moreover, the icon on the screen did not always correspond with the button on the remote control (e.g. ‘c’ on the screen and a coloured dot on the remote control). Such inconsistencies made it impossible to learn how to operate Smart TV. Again, pressing the same button in different situations resulted in different actions, which made it impossible to predict the outcomes and caused lots of problems.
On many occasions, the participants thought that the legend was just another active element of the interface, and they were trying to reach it using their favourite arrows and the OK button. The best understanding of the connection between the remote control and the legend could be observed in the simplest and most basic interface of the Philips TV.

2.3.5. ACTION – REACTION!

“I click and...nothing happens!” – we heard it really often during our research project. Generally, the majority of problems with the responsiveness was rooted in the TV equipment itself and not in the Smart TV function. It was common for all three TVs we were testing that they were constantly losing the Wi-Fi connection. Even plugging in the LAN cable did not always help, though the Internet connection was perfect. The cultural probe clearly revealed that other models and types of Smart TV had similar problems.

No network connection, disconnecting, loading errors and issues related to specific applications (such as updates) – it seems that this is exactly what the reality of Smart TV users looks like. Both novices and experienced users were dealing with such issues in a very similar manner. Usually, they were simply turning the TV off and on. If it didn't help, they were trying to reset the router or modem.

Another issue significantly impeding the effective interaction with Smart TV was the remote control slow response time. Due to such time lapses, the participants were often pressing the buttons too many times, which frequently resulted in leaving a given application unintentionally or typing a wrong letter. It was highly frustrating. Users were used to rapid reactions of their computers and smartphones and therefore they got easily discouraged and either considered the device to be inefficient or they blamed themselves for lack of skills.

One possible solution to this problem is highlighting the legend (with all possible actions available from the remote control) by consistent visuals, either icons or images. Such visuals need to be clearly distinguished from the elements which can be selected by the arrows or the OK button. Recognisable differences in affordances (i.e. visual elements suggesting how an object may be interacted with) of these two interface elements would provide clear information on whether to navigate using the functional buttons or arrows.
Smart TV manufacturers should consider adding a secondary device to the Smart TV set, for example a tablet that would serve as a remote control and would guarantee faster communication thanks to the Wi-Fi connection (instead of IrDA). 8 out of 13 experienced users were using a secondary device (a tablet, a mouse, a laptop or a smartphone) while recording the reportage. If Smart TV wants to compete with other multimedia devices, it should respond much faster to users’ commands and should have crucial problems with the Internet/Wi-Fi connection eliminated.
2.3. CHALLENGES & EVERYDAY ACTIONS

Another array of difficulties is related to the interface of applications and of the smart menu itself. Both experts and novices were repeatedly confused since Smart TV did not communicate its current actions. They didn't know whether an application was loading, the system froze or maybe they simply broke the TV set altogether. It was often the case that a blinking LED was the only sign of the TV's reaction. Yet, it did not prevent our participants from pressing the buttons 'so that it finally gets it'.

Moreover, even if Smart TV showed a message that an error occurred, it did not suggest any methods of fixing the problem. Users were confused, lost and they often decided to employ the only known strategy: turning the TV off and on. We did observe situations in which they were discouraged to such an extent that they did not want to come back to the problematic issue anymore (for example logging to Facebook).

If Smart TV wants to be 'smart', it needs to inform its users what is happening on an ongoing basis. It should also display error messages when a problem occurs, and provide a possible solution.

<table>
<thead>
<tr>
<th>Identified User</th>
<th>Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>WOMAN AGE 25</td>
<td>Something has just got skipped over and I don't know why.</td>
</tr>
<tr>
<td>WOMAN AGE 54</td>
<td>Did I do something wrong? Because I don't know.</td>
</tr>
<tr>
<td>MAN AGE 29</td>
<td>This TV is completely unpredictable! Damn it!</td>
</tr>
<tr>
<td>WOMAN AGE 54</td>
<td>What have I done?! I think I broke it.</td>
</tr>
</tbody>
</table>
Browsing categories and using the search engine – these are the two most common strategies of getting to the desired content that we observed. Let’s have a look at the issues related to them.

### 2.4.1. BROWSING CATEGORIES

A journey through the multilevel, hierarchical menu and navigating through the categories is most likely to occur when users freely explore the Smart TV content or a particular application. In the case of VOD applications, they also reach the desired episode of a TV series or programme using this strategy, which is fostered by a deep, folder-based structure. And what about users’ frustrations here?

**Thumb pain** – too much clicking and pressing since the structure is too deep. The above-mentioned issues related to returning to higher levels (back, return, exit buttons, etc.) and the lack of consistency made it even harder and more troublesome.

**Getting lost in the jungle of categories** – going through such a huge number of elements may be time-consuming and exhausting. The feeling of being lost is increased by the lack of any information saying where the user currently is.

**Messy categories** – items that obviously do not match a given category and the lack of logical and consistent way of arranging items within a category are highly misleading. It is often unclear what the criterion is (are they listed alphabetically? frequently used? most popular? free or paid?).

**Lack of labels** – unlabelled items inside categories are another headache to users. Enigmatic, unclear icons or missing labels as well as no further information about the purpose and function of an item pose a lot of problems, especially at the main navigation level.

All of the above-mentioned issues are typical usability problems. They prove the importance of an iterative design process taking end users into consideration. This methodology is well-known and frequently applied when designing web and desktop interfaces. It is impossible to design positive user experience without taking good care of basic usability issues.

Jesus, it doesn’t make sense! There is the 56th episode at the top and the 120th below it. I have no idea what the order is.
2.4.2. SEARCH ENGINE

If users are interested in finding the particular content (e.g. a song), they usually direct their steps to the search engine. This strategy is also chosen when the search area is vast and contain a large number of elements. Therefore, search engines should always be easily accessible, visible and located in the same place within each application. Unfortunately, there is plenty of problems with search engines in Smart TVs.

**Poor visibility** – search engines are either hidden deep down in the menu or far too small in comparison with other elements on the screen.

**Time-consuming typing** – described in detail in the next chapter.

**Inconsistency** – search engines look different and work in a different way in each application and Smart TV, which is a source of many errors.

**Imprecise search results** – sometimes search engines do not show search results that do exist or too broad search results are displayed.
2.4. GETTING TO THE CONTENT – STRATEGIES

2.4.3. TYPING TEXT

Smart TV did not handle the dictation test – this in one of the most striking observations in the entire project. The more letters there were to be typed in, the more nightmarish it was. Most of the advanced Smart TV features and apps required using some type of keyboards. Different keyboards could be found when listening to music, logging in, posting in social media or searching. Both novices and experienced users were complaining about typing text.

SCREEN KEYBOARD AND REMOTE CONTROL

Screen keyboard is the most popular tool for typing. During our project, the participants were trying out different types of screen keyboard: QWERTY, alphabetical with either one or several rows of letters, and numpad. We identified 8 crucial usability issues related to this strategy of typing:

1. Users usually navigate through the screen keyboard using the arrow buttons on a remote control. No matter what the arrangement of letters is, this activity requires pressing the buttons repeatedly, even if the text is relatively short. The problem gets even worse when the rows with letters are too long and, as a result, the distance between two letters is increased.

2. Lack of loop in the screen keyboard prevent users from coming back quickly to the beginning or the end of the row with letters. It prolongs the time of typing and forces users to click through the whole keyboard, which is considered as frustrating and disturbing.
2.4. GETTING TO THE CONTENT - STRATEGIES

QWERTY keyboard

Alphabetical keyboard

Numpad

Alphabetical keyboard
3. Response time, i.e. a time lapse between pressing a button and a visible system reaction, often causes mistakes while typing, or results in a letter being omitted.

4. The participants did not know how to enter Polish letters (such as ą, ę, ł) using screen keyboards.

5. The appearance of functional buttons such as space or backspace was unintuitive and, as a result, it took a lot of time to reach them.

6. In the case of a numpad (working similarly to older cell phones), the lack of letters on remote control buttons was an issue. The users were forced to repeatedly look at the screen and back at the remote control. Furthermore, several of our respondents did not even guess that the numpad on the screen enabled typing the text.

**MAN**

**AGE 29**

I'd rather die than type in the whole name [of the song].
It seems that the QWERTY keyboard is not the best option in the case of the TV interface and the navigation based on a remote control. The logic of the QWERTY layout does not apply to screen keyboards. Well-learned finger movements are unlikely to be of any help on the TV screen.

All above-mentioned issues are magnified by the fact that each and every application has its own keyboard. Therefore, users are forced to learn how to use numerous types of keyboard in order to operate a single device.

When it comes to applications that cannot use prompts effectively (e.g. social media), typing speed could be increased by consistently working buttons such as enter, space, backspace or .com located on the screen keyboard. Moreover, there should be one and the same keyboard in the entire Smart TV system. Each and every application and menu level should enable typing in the same way, just as in the case of mobile devices (tablets or smartphones).
What turned out to be very effective were intelligent prompts in the search engines. They reduced the search time significantly.

8 out of 15 novices used prompts while searching for a music clip on YouTube.

Regardless of the type of screen keyboard, typing by means of a remote control is laborious. Therefore, the alternatives presented below are worth considering.

**TABLET OR SMARTPHONE**

During the user test sessions, we asked participants if they understood the idea of pairing devices. The vast majority of the participants interpreted this option properly and were eager to use it. Such a solution was seen as a tremendous opportunity for searching the content faster. Furthermore, at least in some contexts of use (e.g. a party), paired devices could facilitate remote operation. As for the experienced users taking part in the cultural probe, several of them were using secondary devices as well. Despite slight delays in communication between Smart TV and a secondary device, and imperfections of the applications, the users were generally satisfied with this way of navigation.

It’s good that there are prompts. I wouldn’t want to type in each end every letter to search for the phrase.
Users’ positive approach towards the very idea of connecting Smart TV with other devices shows that this solution has great potential. 8 out of 13 Smart TV owners decided to try out one of the secondary devices: a tablet, a smartphone, a mouse or a laptop (in order of popularity).

However, there are also certain areas requiring further development. Improvements are necessary when it comes to the form of pairing devices – the process itself needs to be simplified and a guide explaining particular steps needs to be introduced. Currently, the pairing process demands far too much effort from a user. The remote control is still the basic navigating device and it is deeply rooted in the users’ mental model. In the diary studies (reportage), remote controls were used 53 times whereas other navigation methods – 11 times. Changing the way of thinking about navigation requires time and effort to show people that using secondary devices is possible, efficient and simply handy.

8 out of 13 Smart TV owners tried out a secondary device to navigate through Smart TV.
2. 4. GETTING TO THE CONTENT – STRATEGIES

EXTERNAL KEYBOARD/MOUSE
A few experienced users were using this solution in diary studies. One of them complained that she wanted to connect her Smart TV and the computer keyboard but the devices turned out to be incompatible. Another person was using the computer mouse in order to facilitate typing on the screen keyboard. New users taking part in the user tests also expressed the need for an additional external keyboard which they expected to make browsing websites, social media activity or searching much easier and faster.

VOICE COMMANDS
It was often the case that Smart TV did not recognise the words spoken by users. There wasn't also any message whether it ‘heard’ the user or not. The lack of information brought frustration and confusion. On top of that, the process of recognising words in voice commands was faulty. Typing using the voice feature needs further improvements in terms of microphone sensitivity and word (including proper names) recognition. It should also enable changing/selecting the language, so that users could provide either English names or words in their mother tongue.

The respondent wanted to search for a music video using voice commands. He wanted to search for TUPAC, yet, Smart TV recognised his words as:

DUPA
‘ass’ in Polish
2.5. SUMMARY OF THE SMART TV RESEARCH

Have Smart TV turned out to be ‘smart’? On the basis of our findings it can be said that it has big potential and users’ expectations towards this function are very high. However, there is a lot to be done before Smart TV will live up to the expectations. Numerous features require redesign or refinement. The arrangement of the elements within the interface, navigation, voice commands, typing and system stability – these are only some of the problems that the designers and manufacturers have to deal with.

It is possible for Smart TV to be something more than just a TV set. Provided that it is tailored to the users’ needs, skills and habits, it will be able to compete with laptops, smartphones and tablets. Smart TV will be far smarter if those who decide to have it in their living rooms are taken into consideration in the design process.
We are an interdisciplinary team of human-computer interaction professionals, combining the competences of social researchers and interface designers. We develop engaging experiences, we examine user interactions, we provide training in the field of user experience. We have extensive experience in testing usability and designing user experience for clients in a variety of industries, including eBay Classifieds, PKN Orlen, KGHM International, Opera Software, Vattenfall, Egmont, Polskapresse or ITI Neovision.
IS SMART TV REALLY ‘SMART’?

MEDIA PATRONAGE

AD MONKEY

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