DELIVERABLE

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D3.2. Intermediate evaluation report

Revision: 1.3

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Abstract: This document gathers all the activities of TV-RING partners to develop and to evaluate mockups and prototypes of the services to be deployed in the pilot regions. This includes all the methods used in the various iterations, as well as the evaluation results.
## Revision History

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Statement of originality:
This deliverable contains original unpublished work except where clearly indicated otherwise. Acknowledgement of previously published material and of the work of others has been made through appropriate citation, quotation or both.
1. Executive Summary

This deliverable documents the work of TV-RING Task T3.2: “Mockups and intermediate evaluation”. These evaluations of our service pilots were the basis for the iterative enhancements in the development process on the path to achieving the pilot services in Task T3.3. Based on Deliverable D3.1 and user requirements tasks T2.2 and T2.3 (phase 1) the process involved successive co-creation efforts with different user panels at each pilot both inside the partner organizations and externally. The co-creation efforts resulted in iterative development of service mockups, first through paper prototyping, later through the creation of digital mockups. In the interactive sessions with both professionals and end users co-creation was also inherently a method of evaluation. In some instances questionnaires were also used to assess the respective mockups.

Concerning the mockup strand of our work, both paper mockups and digital mockups were used – successively - as envisaged in the DoW - as two generic ways of producing service mockups. Paper mockups rely on manual creation using a simple piece of paper or cardboard and sketching the ideas with pen or pencil, specifying all the interactions between the user and the panel service. In turn, digital mockups are created through various design programs and evaluated.

Co-creation, paper prototyping, creation of digital mockups and evaluation are documented in respective sections for each pilot, taking into account that each country has developed their own assessment process as each pilot is unique. However, to compare and make easy reading the same structure is applied to each pilot section.
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3. Introduction

3.1. General

This deliverable presents the outcome of Task 3.2 “Mockups and Intermediate Evaluation” which is part of Work Package 3 “Pilot preparation and application development”. It started in month 4 of the project and will now, end of Month 12, be concluded with the submission of this document. Only the pilot partners RBB, NPO, KU Leuven, i2CAT and TVC were involved. The basis of this work is the detailed description of the service concepts and storyboards laid down in Deliverable 3.1 “Service and application concepts” which were derived with the help of the first phase of Tasks T2.2 “End User Requirements” and T2.3 “Professional User Requirements”. In turn, its results will on the one hand be fed into the second phase of the user requirements Tasks T2.2 and T2.3 and on the other hand will be vital for the actual application development and implementation work of Task T3.3 which will be finalized in April next year (M 20).

It is clear that the three TV-RING pilots are working on varied service developments, subsequently tending to use different working methods and approaches. But as T2.2, T2.3 and T3.1 do document: all services are showing resemblance and are based on a common bouquet of concepts and requirements they finally provide similar approaches and conclusions to build the mock-ups and later applications. In the preparation phase of Task T3.2 TV-RING partners agreed on synchronise their activities. Everybody was ready to choose the mockup approach as a common development tool, starting with paper mockups and deriving digital mockups. The approach of how to evaluate these mockups was also agreed on, as well as how to gather user feedback and how to assess and to document the results.

By starting T3.2 the set-up of this task was to combine a co-creation workshop to first devise service concepts and to use the result of this process for evaluating paper mockups and also clickable wire interfaces. The three pilots (Dutch, German and Spanish) all had more than only this one co-creation workshop but, apart from that, largely followed this set up in the same way with some variations and, on their way, shared and fine-tuned best practices.

A mockup refers to a scaled or full-size model of a product or service, elaborated for visualizing features and design of the future product and enabling testing of design, to acquire feedback from users and be able to enhance the product or service. We can distinguish different kinds of mockups, taking into account the expected result and its utility. In this document we distinguish between a) Paper Mockups and b) Digital Mockups. We use the following definition of mockups from the TV-RING Description of Work:

“Mockups are defined as a representation of the user interface of the system which can be evaluated with users. Mockups can be very rough hand-drawn sketches (low-fidelity) or very detailed graphical designs (high-fidelity). They can be static, only representing the look and feel of the interface, or interactive, allowing users to perform actions with it when evaluating”.

This document presents a comprehensive and detailed report of all mockup and evaluation efforts and results at each pilot site. It is structured along the pilots as follows:

- X.1 Co-creation activities (overview)
- X.1.X Co-creation activities one by one and the results (mockups)
- X.2 Methodology of creating mockups
- X.3 Results: The mockups created as such (both paper and digital versions)
- X.4 Evaluation of the mockups and
- X.5 finally the conclusions for each pilot.
3.2. Approach

3.2.1. Dutch set-up

The Dutch pilot involves three different applications. The first one is a DRM application for on-demand content, and has a more technical focus. For this application we conducted a literature review into the factors that determine the willingness-to-pay for high quality video content.

For the second application, the recommender, we aim to make it smarter. For this we conducted an in-depth investigation into the way households watch TV. Participating households brought a four-day diary concerning TV viewing to a co-creation workshop, where the results were organized and analyzed. The outcome helps us to improve the algorithms behind the recommender as well as the interfaces between the user and the recommender.

For the third pilot, the second screen application two iterations of mockups were created and evaluated by groups of participants in our lab (which is set up to look like a living room). For the first iteration paper mockups were created. The results of this first iteration served as input for the second iteration of digital mockups. The mockup session resulted in some important points for the pilot phase. There is a wide diversity between technology skills in the group of potential users. Where possible, alternatives should be provided that cater to both the tech savvy and the less technologically skilled. Making use of both the first and second screen to present game elements seems to strengthen the group feel when playing along. Having every participant’s scores visible on the main TV screen enhances the feeling of competition and makes it feel like playing a family game. When presenting questions or statements show them on both of the screens as this strengthens people’s trust in the application. Playing along with the application also seems to keep people more focused on the show and less prone to indulge in distractions like Facebook. However the amount of (cognitive) load they can cope with before the game itself becomes a distraction from the show is a delicate one. There are clues that this load will depend on how often people participate in the game. It will be very interesting to see how this develops over a longer term during the pilot phase. The same goes for social interaction. There was a lot of social interaction going on in the paper session but during the digital mockup session this was a lot less. It could have been due to the difference in load or because of a genre difference (straight up quiz versus statements based on information presented in the TV show). Either way it will be interesting to see if there is also an evolution in the amount of social interaction during the pilot phase.

3.2.2. German set-up

As defined in the set-up of this task in the TV-RING DoW, the evaluation process at RBB went through several stages of paper prototyping and thus paper mockup creation and evaluation and finally digital mockup creation and evaluation, involving RBB internal professionals as well as external users when needed. The service ideas were formed and the mockups were designed, developed, evaluated and then improved in an evolutionary approach through exchange and discussions, balance, assessment and decision.

RBB performed three rounds of co-creation: The first was an internal workshop at RBB, which involved editors and engineers, with the result of a first version of paper mockups. The second was also an external workshop, which took up considerable effort and involved young students and scientists from the local M.A. programme “Cross-Media” and also three broadcasting engineers at the Hochschule Magdeburg-Stendal. This resulted in renewed concepts – and
refined paper mockups for the early HbbTV applications and screens. The third wave of co-creation activities was performed together with RBB broadcasting editors, engineers and managers, now with digital mockups built on the earlier paper prototyping process. While the first two rounds were more about content elements and functionalities the digital mockups were more about designing the information architecture with a strong focus on usability.

### 3.2.3. Spanish set-up

Similar to RBB, TVC started with an early version of paper mockups. Three separate versions were created. After that, an internal co-creation workshop was held at TVC to evaluate these mockups and chose one of them, for the future development process. This version of paper mockup was the basis for creating the first version of the digital mockup for the Spanish pilot. An iterative usability testing of this digital mockup was performed as only this kind of mockup permits the interaction between the user and the interface, visualizing to the potential user all possible options and functionalities. The testing was performed with nine individuals separately in three iterations, using only the digital mockup to capture the maximum of the functionality of the future service. The evaluation process was divided into questions and tasks to complete. The first version of the digital mockup, and its consecutive enhancement, were evaluated jointly by TVC and i2CAT, using internal employees of both organizations as users. The results gathered from all three user tests are described in the corresponding section of Spanish pilot.
4. Dutch Pilot

The Dutch pilot is comprised of three different applications: a novel approach to recommender systems and interfaces, an exploration of second screen interfaces used to augment TV shows, and a DRM (digital rights management) system taking into account video image quality. Concerning the latter: a literature review was conducted to investigate the relation between image quality and willingness-to-pay (See Annex 0). The first two applications, the recommender and the second screen application, are described in this section.

4.1. Co-creation activities

For the recommender application, a brief diary study was conducted with seven households. The results of those diaries was then discussed and analysed in a co-creation workshop.

4.1.1. Diary Study

The goal of the diary study was to gain insight into the way TV activities are organized in households (families with children). The background behind this goal is related to recommender systems. Research in this area usually focuses on improving the algorithms behind those systems. With this study (combined with the co-creation workshop) we aimed to gain a better understanding of the actual viewing context in the home in order to improve those algorithms, and the way recommended items are offered to the users via the user interface.

A diary was created, containing four pages; participants received the assignment to log the programs they watched, who else was watching, which devices were used (1st and 2nd screen), the mood they were in, and the place where they were watching the program for four days; two of those days were weekend days. The diary was first pilot tested by the three researchers involved in this study. Abreu et al. (2013) conducted a survey into the factors that determine how people decide what to watch, and revealed that among others, mood, the group, genre, and time are quite important. Such surveys are mainly quantitative; therefore we aimed to study these factors more in-depth via a qualitative study. The participating households were asked to bring the completed diaries to the co-creation workshop, organized shortly after the diary period (in the same week). The co-creation workshop is explained in the next section.

4.1.2. Co-Creation Workshop

The workshop took place at the Centre for User Experience Research (see Figure 1), and was organized in three rounds:

1. In the first round, participating households were each seated at a different table. Each table contained a large sheet of paper with one of the themes (time, viewers, genre, and mood). For this theme they were asked to write down all the watched program items from the diary, and explain how it matched the theme (see Figure 2). After approximately 20 minutes, households would rotate and each household would move on to the following themes. After four tables, each household would have covered all themes.

2. In the second round, the collected sheets from the tables, which contained information from all participating households, would be placed next to each other on the wall in front of the room (see Figure 3). Now the households had to connect the four themes (see Figure 4): by taking at least one relevant post-it from each theme,
they were to create clusters (of at least four post-its). These clusters would illustrate different situations related to TV viewing in their own home, in their own household.

3. In the final round, we asked households to present their clusters, and talk about it so we could get a more narrative insight into these clusters (see Figure 5). After all, just mentioning the related post-its does not really explain that much. These presentations were recorded on video and transcribed for analysis.

Figure 1: Co-creation workshop setting (round 1)

Figure 2: Round 1 - A participant working on the theme "Time"
**Figure 3:** Round 2: Four themes in front of the room

**Figure 4:** Round 2: Linking the themes
In order to analyse all the information, the video recordings were transcribed and the clusters of all the households were organized in a spreadsheet. This allowed us to sort the information and look at the data from different angles. All the data was sorted on time, on viewers, on mood, and on genre separately. This process allowed us to distil the meaning behind the clusters. Afterwards, going back to the video transcripts of the presentations, allowed us to check if our interpretations of the data were still accurate. The overview of the results is presented in Table 1. In the first column we named the viewing situation; the other columns contain the common themes across the seven households.

<table>
<thead>
<tr>
<th>Context</th>
<th>Mood</th>
<th>Content</th>
<th>Viewers</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children’s weekend mornings</td>
<td>happy, cheerful, fun</td>
<td>music, kids tv, comedy</td>
<td>children</td>
<td>weekend mornings</td>
</tr>
<tr>
<td></td>
<td>relax, lazy, awakening</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>When the kids are sleeping</td>
<td>relaxing, tired</td>
<td>soap, drama series</td>
<td>parents</td>
<td>late evening</td>
</tr>
<tr>
<td></td>
<td>exciting, addictive</td>
<td>drama series</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>cheerful</td>
<td>movies, comedy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family quality time</td>
<td>relaxing, fun, laughing</td>
<td>comedy, reality tv,</td>
<td>family, diverse</td>
<td>after supper, prime time</td>
</tr>
<tr>
<td></td>
<td>together, good mood, good mood</td>
<td>hidden camera, soap,</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>together, diverse</td>
<td>movie, diverse</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relaxing after school</td>
<td>relaxing, cheerful</td>
<td>kids tv, animals,</td>
<td>children</td>
<td>after school, before supper</td>
</tr>
<tr>
<td></td>
<td>cheerful</td>
<td>exciting, drama series</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A free moment</td>
<td>emotional, exciting</td>
<td>reality tv, drama series,</td>
<td>mother</td>
<td>a free moment during the</td>
</tr>
<tr>
<td></td>
<td>cheerful</td>
<td>emotional series</td>
<td>(housewife)</td>
<td>day</td>
</tr>
<tr>
<td>Men and sports</td>
<td>relaxing, lazy, resting</td>
<td>sports</td>
<td>sons, fathers</td>
<td>after supper, prime time,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sunday evening, weekend</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>afternoons</td>
</tr>
<tr>
<td>Lazy afternoons</td>
<td>relaxing, lazy, resting,</td>
<td>comedy, kids tv, movies,</td>
<td>diverse</td>
<td>weekend afternoons</td>
</tr>
<tr>
<td></td>
<td>laughing together</td>
<td>sports, recorded programs</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(catch up), hidden camera,</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>diverse</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1: Co-creation results overview

The first situation happens on weekend mornings, when children are already awake and their parents usually are not. Then, the children get up and turn on the TV to watch content for children. The second typical situation is that late at night when it is past bedtime for the children, parents have the time to watch something for themselves. In contrast, during the “family quality time” period, after dinner and during prime time, it is often the case that the
children still choose the content for the whole family. Since the group in front of the TV is then rather large, the content watched can also be quite diverse. During the school year, children reported to arrive home and watch TV, because they were tired from school. They watch some easy-going content on TV. For the mothers in our seven households, it happened that there was a free moment during the day, in which they would watch something for themselves. Usually, this concerned reality TV, drama series and soaps. Fathers and sons were reported to watch sports. They watched live sports events such as football and cycling, and sports programs during the evening. Finally, on some weekends, or on bank holidays for example, households sometimes had some time to watch different kinds of content. They reported that this was an ideal time to watch some previously recorded content in order to catch up on programs they missed during the week.

These results allow us to improve the recommender algorithms and related user interface designs. For the recommender algorithms we aim to better predict who will be in front of the TV at what time. For example, during weekend mornings, it will probably not be useful to offer content for adults, since they are not in front of the TV. We will also adapt the design of the user interface depending on the viewing situation. This will be explored in the next sections of this document.

4.2. Methodology

- Recommender Application

Concerning the methodology of the digital mockups: the results of the co-creation workshop formed the basis for exploring different types of interaction with a television set. As described earlier, the co-creation workshop delved deeper into the way households with several children actually watch TV: when they watch, how they feel, what they watch, and who (which group of people) is watching. The digital mockups were created along these insights. The goal of the evaluation with the digital mockups (presented in Section 4.2.1) was to see how far participants did or did not go along in these directions.

- Second Screen Application

For the second screen application the goal is to develop a quiz/game companion application that mixes elements on the first and second screen to create a stimulating experience for the participating viewers. The requirements gathered in work package two, formed the basis for this application. Taking these requirements into account, the next step was to create a paper mockup and test it with potential end users. The results from the paper mockup evaluation would then serve as input for a more focussed digital mockup.

4.2.1. Paper Mockups

The only paper mockups in the Dutch pilot were for the second screen quiz/game application. The goal of the paper prototype was to quickly test a few different variations of the different facets of an interactive quiz. We established four steps:

- The setup (setting up the quiz, getting all participants registered)
- The Identification (letting all participants choose a way to represent themselves on the screen)
- The Questions (actually playing the quiz)
- The Visualization (the way the scores would be displayed on the TV screen)

Finally we added a fifth wildcard category to try some extra ideas.
4.2.2. Digital Mockups

4.2.2.1. Recommender Application

For the recommender application, several digital mockups for tablet were created based on the co-creation activities (see section). The mockups were created using the Axure prototyping tool. The goal of these mockups was to explore several ideas from the co-design workshop. The designs are not definitive or finished; they might even be a bit explicit because we wanted to make sure the differences between these mockups was very clear, and that the participants could understand and judge these differences.

4.2.2.2. Second Screen Application

The paper mockups of the second screen application gave some valuable insights on how to proceed with the development of the app. There were also some questions left unanswered. How would the users’ attention be spread over first and second screen when there was an actual show running on the TV? And how would this impact the (social) interaction between the participants? The created mockup was actually a hybrid paper digital mockup with a fully interactive tablet application created in Axure and paper for the visualisations on the TV.

4.3. Results

4.3.1. Paper Mockups

The main goal of the paper mockups was to let the participants experience several different versions of the aspects mentioned in the previous paragraph. Because the goal was to create an application that utilizes both first and second screen, there was a main paper TV screen and a paper tablet for every participant.

There were four key points to be explored and three mockup variations for each point. First there was the way people would ‘link’ the tablet to the TV to participate in the quiz. This could be done by scanning a QR code on the TV with a tablet, entering a six digit numerical code from the TV into the tablet and finally to a ‘Master’ system. In the ‘Master’ system one participant would scan the QR code from TV thereby becoming the master-device. The other participants would then scan a QR code that appeared on the master-device. In essence this was a (slightly more complex) variation on the QR code, but one that was more easily implemented from a technical perspective so it was interesting to see how participants would react to it.
Figure 6: Setup Screens

The next step was the ID selection. Participants were offered a selection of five ways to identify themselves for the Quiz. They were given the option to choose either a name, a colour, an avatar (in this case a cartoon animal picture), sign up through Facebook to use their profile picture and keep track of quiz statistics or sign up for a ‘Quiz account’ to keep track of statistics and use a custom picture.
After choosing an ID participants were showed three different options their scores could be displayed on the television: with traditional numbers, with icons that were changed size related to the scores and through a podium that just showed the ranks of the participants.
Figure 8: Visualisation Screen

Then it was time to play the actual quiz questions. Participants had to answer three questions the difference was in the way the questions were presented to them. In one option the question was only displayed on the TV, in one it was only displayed on the tablet and in one it was shown on both the tablet and the TV. Scores were always displayed on the TV and the answer buttons were always on the tablet.
Finally there was the ‘wild card’ category. Here we wanted to try a few extra concepts to see what people thought of them. In the first participants had to press a button on the tablet as fast as possible when they heard a certain word said on the quiz show to win a bonus point. The second concept was similar but this time participants had to press the button when they saw a particular visual on the quiz show. For these concepts we still used the paper tablets but we showed participants a clip form a quiz show on an actual TV. The last concept was a gamble element. The first participant to rightfully guess the quiz contestant that would win the show would receive a bonus point. So participants could either wait until they were almost sure who would win but risk someone guessing before them or gamble early but risk that candidate not winning the quiz. This concept was only explained to the participants because it was not possible to ‘do it for real’ in such short amount of time.
4.3.2. Digital Mockups

4.3.2.1. Recommender Application

This section describes the digital mockups for the recommender application. The first mockup was created to reflect the different viewing patterns that we observed with the participating families (see Figure 11). The users can select in which situation they are; consequently they are served with the right content. Based on collected viewing information for the respective household, the right choices could already be selected, saving the user some time.
Figure 11: Selector screen: first column with different moods, second column with different viewers, third column with different times. This example illustrates the pattern of children wanting to relax after school.

Figure 12: Interface for children

Also based on the observed viewing patterns, several mock-ups were made, exploring different graphical styles, different content offerings, and different modes of interaction. For the children we designed a playful, colourful interface that included content for children (see
Figure 12). As we have seen in the co-creation workshop, weekend mornings are a typical moment where only the children are watching TV. This interface could be presented at such times.

![Figure 13: Interface for women](image)

Another pattern was that housewives tended to watch when they had some free time at any moment during the day. For this moment we created a more feminine looking UI, which contained content that was typically watched by the women involved in our study during these moments (see Figure 13).
Then there is a special interface for sports programs or events, usually watched by men and boys in our study. The goal here was to provide an overview of relevant and recent sports-related content, make the look & feel look sporty, and include some of the latest results (see Figure 14).

Finally, we introduced two mock-ups in which we wanted to evaluate one interface matching an active, dynamic viewing mode, and one interface matching a more relax viewing mode. The focus for the evaluation here was more on the interaction mode, rather than on the content or the graphics. Dynamic viewing mode includes more options for filtering the content: the duration of the content can be determined, the kind of content (live, free, rental, recorded...), and the suitability of the content for different ages (see Figure 15).
The interface that is intended for a more relaxed viewing mode only incorporates one button that allows users to immediately move to the next recommended item (see Figure 16), supporting a laid back, relaxed way of watching TV.

Figure 15: Active, dynamic viewing mode interface with filter options: duration, type, and suitability for different ages.

Figure 16: Interface for relaxed viewing mode, with only one button
4.3.2.2. Second Screen Application

The second iteration of the second screen mockups was a hybrid paper digital mockup. The tablet had a fully interactive prototype created with Axure. The visuals on the TV were paper cut-outs that were stuck on top of the TV. In this second iteration we used an episode of a Dutch show called “De Rijdende Rechter” (Judge on the Road). The show is about small civilian disputes where both sides plead their case to a judge who also takes a look at the location. The episode that was used here for instance deals with a dispute between two neighbours who disagree on the location of the fence that stands between their yards.

Participants get to play the role of the judge by answering statements that deal with the dispute like for example “The judge will rule that you have no right to argue about the placement of a fence after ten years have passed.” They would answer these statements on a five point scale from completely agree to completely disagree and scored points based on how close their ruling was to the final ruling of the judge. On top of this there were two side games. There was a button participants could press when they heard a certain word in the show for a bonus point and they could gamble which of the two parties would win in the judge’s final ruling. The first participant to make the right guess would also earn a bonus point.

Just like with the paper prototypes participants started with a setup step. Based on the results from the paper prototype, they could choose to either scan a QR code from the TV or enter a six-digit numerical code. It would be interesting to see what participants would choose and why.

Figure 17: TV With QR and Code options
When they used one of the options to connect and participate in the game, they were prompted with an explanation screen. From the paper mockups it became clear that people tend to skip over any explanation. We tried to keep the explanation as brief and as visual as possible. There were two variations of this explanation screen. The goal was to see how well these would function in getting to concept across.
Figure 19: Tablet Explanation Screens
For every participant that logged on a scorecard would be attached to the TV. These scorecards were based on the Lady Justice Scale and would show the participants towards which of the two parties they were leaning during the show. The goal of the scores was to get the participants more involved and to strengthen the game as a group experience by having everyone’s scores visible on the main screen.

![Image of TV screen with scorecards and statement](image)

**Figure 20: TV Screen with scorecards and statement**

This is also when the episode of “De Rijdende Rechter” would start on the TV. From then on participants would get statements at specified moments. Just as in the paper mockups statements could be presented on the TV, the Tablet or on both. The goal was to find out if participants would have the same preference when there was an actual show playing on the TV.
When the judge had made his ruling, a podium with the end rank and scores was displayed. It showed both the rank and the numeric scores as this was the preferred way in the paper mockup session. The goal of the end scores was to stimulate the feeling of a competition between the participants.

4.4. Evaluation

4.4.1. Gathering data

4.4.1.1. Recommender Application

Participants were invited into the design room, where a set up was made for them to sit in front of a laptop-controlled flat screen, and a tablet with the mock-ups. First, they were asked to confirm the scenarios or situations that we obtained from the co-design session. Therefore, we asked them to provide feedback on a paper that contained a written-out version of the
scenarios. Then, we presented them with the selector interface (see Figure 11), and asked them to use it in each of the seven scenarios to evaluate whether this way of interacting made sense. Finally, we presented them with the different explorations of the recommender interface (see Figure 12 through Figure 16), one-by-one, and asked them to indicate with which scenarios each interface would fit. In this final exercise, they would indicate an item to watch, and the researcher would then start that item on the flat screen via the laptop in order to increase the realism.

4.4.1.2. Second Screen Application Paper Mockup

Since one of the key features of the interactive quiz is stimulating social interaction, it was crucial to do the prototype session with groups who watch TV together regularly. Five groups of various compositions were recruited that amounted to 14 people in total.

<table>
<thead>
<tr>
<th>Group</th>
<th>Gender</th>
<th>Age</th>
<th>Relation to Each Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>F</td>
<td>20</td>
<td>Friends</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>19</td>
<td>Friends</td>
</tr>
<tr>
<td>2</td>
<td>M</td>
<td>21</td>
<td>Son/Brother</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>23</td>
<td>Daughter/Sister</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>52</td>
<td>Mother</td>
</tr>
<tr>
<td>3</td>
<td>M</td>
<td>19</td>
<td>Brother</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>21</td>
<td>Sister</td>
</tr>
<tr>
<td>4</td>
<td>F</td>
<td>42</td>
<td>Friends</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>42</td>
<td>Friends</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>48</td>
<td>Friends</td>
</tr>
<tr>
<td>5</td>
<td>M</td>
<td>23</td>
<td>Couple/Friends</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>26</td>
<td>Couple/Friends</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>41</td>
<td>Friends</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>27</td>
<td>Friends</td>
</tr>
</tbody>
</table>

Table 2: List of Participants for the Paper Mockup of the Second Screen Application

They were invited to our lab that is set up in a way that makes it look like a living room. They were asked some questions upfront about their TV watching habits and then played through the different steps mention in the methodology section. The order of the steps was always the same but the order of the alternatives in each step was randomized. After each step participants were asked what they thought about the alternatives and in the end to rank them
according to their preference. There was a closing interview about the whole experience at the end.

There were two experiment leaders present. One made sure the paper TV screen was always up to date with participants’ actions the other made sure they got the appropriate paper screen when they interacted with their tablets.

The sessions were also recorded through the cameras in our lab. These cameras are not very visible and therefore do not intrude on the participants experience much. There are three cameras one was focused on the paper TV one on the participants and one had a more overview shot.

4.4.1.3. Second Screen Application Digital Mockup

Just as with the paper mockups the focus is still on the group interaction, so again we recruited groups who watch TV together regularly. Five groups of various compositions were recruited that amounted to 12 people in total.
### Table 3: List of Participants for the Digital Mockup of the Second Screen Application

<table>
<thead>
<tr>
<th>Group</th>
<th>Gender</th>
<th>Age</th>
<th>Relation to Each Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>F</td>
<td>24</td>
<td>Couple</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>27</td>
<td>Couple</td>
</tr>
<tr>
<td>2</td>
<td>M</td>
<td>23</td>
<td>Couple</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>21</td>
<td>Couple</td>
</tr>
<tr>
<td>3</td>
<td>F</td>
<td>60</td>
<td>Friends</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>62</td>
<td>Friends</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>56</td>
<td>Friends</td>
</tr>
<tr>
<td>4</td>
<td>F</td>
<td>52</td>
<td>Couple</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>60</td>
<td>Couple</td>
</tr>
<tr>
<td>5</td>
<td>F</td>
<td>26</td>
<td>Daughter</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>53</td>
<td>Father</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>54</td>
<td>Mother</td>
</tr>
</tbody>
</table>

They were invited to our lab that is set up in a way that makes it look like a living room. They were asked some questions upfront about their TV watching habits, did the setup step, and then were asked to play along with the episode as if they were playing at home. The order of the location of the statements (TV or tablet) was randomized. After the show ended the participants were interviewed about the whole experience.

There was one experiment leader present to make sure the paper score cut-outs and statements on the TV screen were always up to date. The participants controlled their own tablets.
The sessions were also recorded through the cameras in our lab. These cameras are not very visible and therefore do not intrude on the participants experience much. There were three cameras one was focused on the TV one on the participants and one had an overview shot.

4.4.2. Outcome

4.4.2.1. Recommender Application

Concerning the recommender interface, we present the validation of the scenarios, the evaluation of the selector interface, and the linking of the different explorations of the recommender interfaces to the different scenarios.

Firstly, the scenarios were confirmed mostly. In one family, one scenario did not take place, namely “relaxing after school” in which children watch some TV to relax after school. In this family the children were not allowed to watch TV during the week. For the first scenario, “weekend mornings”, in which children watch TV on weekend mornings while their parents are still sleeping or getting up, there was still some doubt after the co-creation session. The issue was that sometimes participants indicated an active mode of viewing, while others indicated a more relaxed mode of viewing, or in other words, the children were also not completely awake. The feedback now showed that this active/passive distinction is very difficult to make; they are very active and still a bit drowsy in the morning at the same time. After dinner, the family watches TV together; this was also confirmed. One family noted that at this time, the programs are chosen by the children. On the “lazy afternoon” scenario was added that recorded content is watched often, in order to catch up with shows that couldn’t be watched at the time of broadcast.

Secondly, the selector interface concept was found to be clear. Moreover, the selections that were made concerning mood, viewers, and time, were in line with the results from the co-design workshop. The only difficulty here remains mood: participants use several moods, sometimes contradicting moods, at the same time to describe one viewing situation. For example, relaxed, tired and lazy go together. But also relaxed and laughing together. Of the three items on the interface, viewers, time, and mood, the latter is definitely the hardest to pinpoint. After participants used the selector for the seven scenarios, they confirmed that they understood the concept. The main benefit as stated by the participants was “saving time”; especially, when the application would pre-fill the characteristics of time, mood, viewer, based on historical TV usage.

Finally, different explorations of the recommender interface were explored and used to select an item to watch. Participants would also indicate for which scenarios each interface could be used. The interface for children was suitable for scenarios 1, 3, and 7. The interface for mothers was suitable for scenarios 5 and 7. The sports interface related to scenarios 6 and 7. Then we explored two opposite interfaces, one supporting active viewing, and one supporting more relaxed viewing. Important to note here is that the active viewing interface was not liked because participants found that there were too many buttons on it.

4.4.2.2. Second Screen Application Paper Mockups

The outcome for the first round of mockups was a table with the rankings for every tested aspect of each participant. However far more interesting were the comments and actions participants performed while interacting with the mockups. A full list of categorized quotes and observations can also be found in the annex however these are all in Dutch. In this section some highlights will be discussed illustrated with translated quotes.
- Big difference in experience and handling of tablets

The test sessions showed there was a big difference in technological familiarity between the participants. Quite a few participants did not know about QR codes and there were people trying to scan them with the side of a tablet like a barcode for instance. Also the ‘cogwheel’ icon used in many apps and on websites to indicate a ‘settings menu’ was not familiar to all.

This also had a big impact on the preferences people had during the setup step. The QR code was found the fastest and least error prone way by those who were familiar with it.

G1, F: “I thought the last one the QR code was the easiest with the Code you can easily make typing mistakes and with that first one (the ‘master device’) we both made mistakes.”

G5, M: “The QR is number one why make it hard if it can be easy.”

Others preferred the familiarity of using the numeric code:

G4, F: “The code is also something I’m familiar with from digital TV. I’m also not much of a tablet user.”

The ‘Master Device’ option was found overly complicated and difficult:

G2, M: “The one with the ‘master device’ is annoying because you have to have to designate someone as the head user.”

Related to this it has to be taken into account that many households don’t just have a tablet or smartphone for everybody who wants to participate.

G2, M, “We are a little behind in that area we only have one tablet and a laptop at home.”

G3, F: “We would definitely participate if we had a tablet for everybody, or we could play in pairs.”

Main lesson: Be aware that not everybody is equally skilled in technology. Offering only a scan option for instance can alienate many potential participants. The app should be as simple as possible and offer alternatives for the more and less technological savvy were appropriate. An example would be offering both a QR code and a numerical code during the setup step.

- On screen explanations are hardly ever read

What was also very obvious from both observation and what participants said, is that explanation on screen even if it was just a single sentence is hardly ever read. People seem to glance over any text that is presented to them that has no immediate impact.

G1, F: “You look at the paper and think I have to scan and then you do so even before you really read what is says.”

G3, F: “Maybe that’s something from our generation, but when I see a layout like this (the ID screen), I don’t even look at the top (four word explanation location) anymore.”

Especially in the master setup phase were it is explained on the TV that just one of the participants has to scan the QR code on TV almost everyone skips over the text and just starts scanning.

Main lesson: Try to minimize text to a minimum and use a visual style of explanation (create clear affordances). If text has to be used, be aware there is a good chance it will not be read so make it fault tolerant.
First versus second screen presentation

When questions were presented on both the tablet and the TV, people tended to look at their tablets more. However they say that they would like at least some things to be displayed on the TV as well to keep the group feeling.

G2, F: “That last option (only tablet) is sort of stupid, why is that big TV there if nothing is presented on it.” “Then you are essentially just playing by yourself.”

G4, F: “Rather on the TV, for the togetherness feeling.”

Although for a few the TV screen should just be about the show.

G3, F: “If it’s a show on the TV like in the past, I think you would rather just have the game on the tablet and keep that the TV.”

In the end most participants seem to prefer the option were questions are presented on both the tablet and the TV and scores are only presented on the TV. An important reason for this is that people want to be sure that the question they are answering on the tablet is the same as on the TV. Another reason is the comfort of being able to look anywhere or because they wear glasses.

G2, M: “For me having it on both is simply the best. F: “same for me“ F:”yes for me as well”

G2, M, “For me it is preferable if I have the same on both tablet and TV because you will be sure, if there is only ABCD on the tablet you are not sure in case of synchronization options.”

G5, M, “You are following the show on the TV and you give reactions on the tablet. It is just easiest if they show the same thing.”

Participants liked the scores on the TV to strengthen the group feeling. For the way it is presented they seemed to largely prefer the ‘traditional’ numbers because of the precise way they get the score across. Some however liked the podium style, for the increased feel of competition. There were also suggestions to use the podium at the end or combine the podium with the numbers.

G5, F: “I prefer the numbers because you know exactly how much you are behind or how many points someone has over the last placed person.”

G3, F: “Numbers are just the most clear.”

G1, F: “I like the podium for the end results.”

G5, M: “I like the podium because you can immediately see who is first.” M:”Me too but then also with numbers underneath the steps.”

Main lesson: It seems the idea of presenting game elements on the TV succeeds in the goal of creating more of a group feel. Participants seem to experience it in this way. Having too much on the tablet gets people focused on the tablet more but they do seem to prefer having questions displayed on the TV as well. This is something to definitely have a good second look at in the digital mockups and see if these findings stay the same when there is a show running on the TV.

Wildcard extras and attention

Everybody seemed to like the concept of the gambling question.

G2, F: “The prediction element is the most fun.”

G3, M:”It is pretty cool it makes it more exciting.”
G5, F: “What is nice about the gambling is that during the quiz you can make comments like “hey my team is in front!””

For the ‘speed concepts’ both the visual and the audio ones reactions were a bit mixed. Observing the participants, they were very competitive about them there was a lot of talking, smashing down on the paper tablets, laughter and victory exclamations. When asked about them many of the participants mentioned they were so focussed on these queues that they missed part of the questions on the show (these were played with a clip form a game show playing on a TV). Some also found it stressful. There were also people who enjoyed the extra tension and competition.

G1, F: “If you are waiting for a queue, then you are so focussed on it that you are not paying attention to the quiz anymore.”

G2, F: “My fear is that if you can win extra points with these, that it will become less relaxing.”

G3, F: “The audio was fun but I was so focussed on the word that I wasn’t following the content so well.”

G3, F: “This would be my favourite part of the game the tension, you can just feel it.”

G5, F: “It could also be nice to have it during the commercials.” M: “Yes that way you would even watch them.”

Main lesson: People seemed to enjoy these extra competitive elements but also expressed worry that they might distract too much from the TV show. Here they were just part of short game-show clips. The digital prototype sessions should explore how this is if they are part of a whole show companion-app experience.

- Enjoyment

People seemed to enjoy themselves a lot. Especially during the questions and bonus sections people were discussing and laughing a lot with each other. For quite a few of them participating felt like playing a family game together.

G5, F: “Sometimes you are already playing along with the questions and if you can keep track of your scores like this it makes it extra enjoyable.”

G2: M: “I normally don’t watch quiz shows, but if you can participate interactively I would. For example on a night with friends now we would play a board game but then we could say we are going to participate in ‘De Pappenheimers’ (a Flemish quiz show).”

G3, F: “I would like it to be available. It’s like a family game while you are watching TV. Then are mom and dad can also not have any comments/criticism anymore.”

G5, M: “We sometimes play monopoly and this would make a nice alternative.”

Main lesson: Try and maintain the family game feeling and enjoyment people seemed to get from the paper prototype, by keeping the focus on the group experience.

4.4.2.3. Second Screen Application Digital Mockups

Just as in the paper mockup sessions, the outcome for the second round of mockups, were all the comments and actions participants performed while interacting with the mockups. In this section all the important findings will be discussed and illustrated with translated quotes.

- Setup

During the paper prototype session it became apparent that there is a big difference in technological skill between people. For the setup step in the digital mockup session we gave
participants the option to choose between scanning a QR code and entering a numerical code. The same mix of preferences was observed with some enjoying the simplicity of the QR and others preferring the familiarity of the numerical code.

G5, F: "I would also use the code because I’m not familiar yet with this scanning"

G4, F: <about QR> "That was big and I have trouble reading numbers so for me it was the easiest."

**Main lesson:** Offering both options ensures no one gets confused and no one gets frustrated that they have to do it in a way they deem inefficient.

- **Extras and Explanation**

The extra features i.e. the Yellow speed button that had to be pressed when a participant heard the word that was written on it and the gamble toggle that could be used to predict which party would win in the final ruling, where not well understood.

The yellow button function was not clear for some while the gamble options were unclear to most. The problem seemed to be mainly in the way these were explained in the beginning and/or people not reading these instructions.

G2, M: "I didn’t really get the thing above" <the gamble toggle> He also mentions not really reading the explanation.

G3, F: <after explanation of the gamble button> "We did not know that"

G4, M: "I thought that if you were sure of your answer for the statement you could push the yellow button for a bonus point" <like a joker>

Other participants understood them but did not succeed in scoring the bonus points. They made remarks that showed they were already taxed by the regular statements.

G1, M: "You were already busy playing the game"

G2, M: "about the ‘Peanuts’ (the first word they were looking for), I was trying to keep my ears out for it but I never noticed it being said"

Almost everybody said they would enjoy these features though. They seemed to think that playing the game a second time, they would have time enough to use and enjoy these features because they would be more familiar with ‘the base game’ and have more resources to spend on the extras. A clue that this would indeed be the case was in the timed statements. Participants had 30 seconds to answer each question. On the first statement some of the participants did not notice the timer and failed to answer in time. They did not seem to mind and did not miss any of the consecutive questions.

G3, F: "I think it would be nice you will watch even more focused"

G3 F: <about the yellow button> "I didn’t think about it because it was the first time. If we play this more I’m sure we will do."

G4, M: "If you know all that upfront it would make it even more fun"

G5, F: "If you can earn extra points with those features I would enjoy them."

**Main lesson:** Even though the explanation was kept very light in text, many participants still seemed to glance over it. Either the elements need to be redesigned or an animated form of explanation needs to be used. Another option is to keep them as is and see if participants do get these elements on a subsequent play through. It will be very interesting to see in the field trial, if people will indeed do better on the extra elements when they have participated in the quiz several times, like some of the participants seemed to think.
- **Attention versus Distraction**

Participants said they are more concentrated then when they are normally watching a show and would not get distracted so quickly because they wanted to play the game well.

G1: F: “You are more concentrated I think to answer the statement right if you only follow it partially you will miss a lot. So you will be more concentrated and not go on Facebook or anything.”

G2, F: "I thought it was fun watching the show and participating like this. Normally I would have run to the kitchen to get something already" <Why?> “Because you want to give the right answer and think along and be right when he says he was in the right”

G4, F: “I think that you pay more attention, you have to, otherwise you can’t answer”

G4, M: “You are way more involved, you also think about it while otherwise you just let it play out in front of you. People want to score some points you don’t want to do bad.”

But there were also comments that showed some participants thought playing along made them miss part of the show and enjoy it less.

G2, M: "I might have enjoyed it more and laughed a bit more without the game part but then I might have also become bored in between"

Participants also expressed concern, that if too many game elements were introduced, it would no longer be a TV show with added features but become just a game.

G2, M: "You could add another feature where you have to press a button if something comes on screen, but I think it might become more of a game then and not a show anymore.”

G3, F: "For me there could have been more statements to answer" F2: “But you also still have to be able to follow the show so for me it was enough”

G4 M: <about the gamble option> "You also have to take care it does not become too much" F: “Yeah but I think it is a concept that will be used for many shows and once you know it, it won’t be a problem” M: "Yeah now it looks like a lot but if you play five times, that’s the same as any other game on the computer. If you make it too simple people will also abandon it. It’s a another difficult balance."

**Main lesson:** It is difficult to find the right balance between too few and too many game elements. Too many and people get distracted from the show, too few and people become bored and start doing other unrelated things like Facebook or going to the kitchen. The app like it is now does seem to do a good job of getting people to focus on the show more although it is also clear a companion app is not for everyone and some people seem to just prefer to watch TV in a pure lean-back manner. Again it will be interesting to see in the field trial if playing the game several times will have a big impact on the way people experience the (cognitive) load generated by playing the game and if something that kept them focused the first time will become too easy eventually.

- **First versus Second Screen**

Here results showed pretty much what the paper prototype also showed. Most participants either wanted both, to be sure they were answering the right question and the TV and tablet were synced correctly. Some preferred just the tablet, but weren’t opposed to having it on the TV screen as well.

G2, M: "If the question was only on the TV I would be slightly scared that I pressed once too often and I’m answering all the wrong questions from then on"
G4, F: "Both for me sometimes you look at your TV a bit loner and not your tablet or the other way around"

G4, M: "to see that this information matches with that information I see it there I look at the tablet I see the same"

G5, M: "It would be best if they were on both tablet and TV it’s more clear and you will not miss any statement because they are on both screens."

Main lesson: It seems that the best way to present statements to people is indeed offering them on both the first and second screen. This sets peoples mind at ease concerning synchronization options and is also the most comfortable for most.

- **Enjoyment and social interaction**

Just like in the paper mockup phase most participants seemed to really enjoy themselves playing along on the companion app for “De Rijdende Rechter”.

G3, F: ”I think it’s better than simply watching TV” ”It’s also an active thing I don’t like the boring stuff that’s on TV sometimes”

G4, M: "If it’s free especially for these kinds of shows I think I would play and also watch a bit more TV again in the winter" "It’s also noncommittal if you are bored with it after 15 minutes you can just stop playing."

G4, F: "When can we play it?"

G5, F: "I found it interesting because it’s a show I would not normally watch and it is nice like this, it makes it less boring"

Although there were a few who said it just was not for them and they would never play it.

G5, F2: "I would never play this at home I just want to watch the show and not have to play a quiz while doing so; I have no interest in that"

Also just like in the paper mockup version, participants remarked that participating has the feel of playing a family game.

G1, F: “It’s similar to a family game.”

G2, F: "It becomes like playing a game when there are points involved"

But when we look at the social interaction between the players we observed a different picture. Instead of talking and laughing a lot about the questions, some groups were mostly silent during the show. None of these groups seemed to mind this though.

The difference could be because there was an actual show running in the background in this test but it could also be because the genre is different. In the paper prototypes we used a ‘classic’ quiz where you either know the answer or you don’t. Here you had to gather the information for the answer from the show, which required you to pay attention to the show in order to score well. It is partially the other side of the enhanced concentration medal.

G2, F: "I think it’s mainly about how serious you take the point scoring"

G4, F: "I think that you pay more attention, you have to, otherwise you can’t answer"

Main lesson: The digital mockup seemed to have retained some of the family game charm. Most participants really seemed to enjoy themselves very well although we still see second screen experiences are not for everybody. For the field trial it would be very interesting to see how the decreased social interaction would change over time.
4.5. Conclusions

4.5.1. Recommender Application

When we look at the recommender evaluation, we observed seven patterns in households’ viewing behavior, and we were able to describe each of those patterns with four categories of information: mood, viewers, time and genre. This insight was then used to design different kinds of interfaces, interfaces that suited those viewing patterns in different ways. Our first evaluation using digital mockups confirms that this is a suitable way to help people choose what to watch. The outcome of these research efforts will now be used in two ways: firstly, to refine the interface designs of the recommender interface to be able to target different viewing situations; secondly, to inform the design of the recommender algorithms behind the interface.

4.5.2. Second Screen Application

For the second screen application two iterations of mockups, a paper session and a digital session, were done. During this mockup phase some important points for the pilot phase were discovered. There is a wide diversity between technology skills in the group of potential users. Where possible alternatives should be provided that cater to both the tech savvy and the less technologically skilled. Making use of both the first and second screen to present game elements seems to strengthen the group feel when playing along. Having every participant’s scores visible on the main TV screen enhances the feel of competition and makes it feel like playing a family game. When presenting questions or statements show them on both of the screens as this strengthens people’s trust in the application. Playing along with the application also seems to keep people more focussed on the show and less prone to indulge in distractions like Facebook. However the amount of (cognitive) load they can cope with before the game itself becomes a distraction from the show is a delicate one. There are clues that this load will depend on how often people participate in the game. It will be very interesting to see how this develops over a longer term during the pilot phase. The same goes for social interaction. There was a lot of social interaction going on in the paper session but during the digital mockup session this was a lot less. It could have been because of the difference in load or as speculated before it might be because of a genre difference (straight up quiz versus statements based on information presented in the TV show). Either way it will be interesting to see if there is also an evolution in the amount of social interaction during the pilot phase.
5. German Pilot

Summing up the detailed descriptions of Deliverable D3.1, RBB’s concept for the TV-RING Pilot is an HbbTV-based social media service for HbbTV-enabled Smart TVs offered alongside the nationwide TV documentary series with the working title ‘Abenteuer Liebe’ (Love Adventures). The young viewers of the target group are to be enabled to access additional social media content via the TV screen as such, which is pioneering work for RBB and even ARD. The plan is to fully engage the target user group of teenagers before/during and after the TV broadcast of the show by making use of a website, a blog and of video clips, pictures, profiles, voting, and comments from social networks such as Twitter, YouTube or Instagram.

In the daily documentary six teenagers between 13 and 15 are asked to create three short films on the theme of ‘first love’. Over a period of 14 days, the three boys and three girls, accompanied by professional film makers, develop fictional material on various thematically-related topics like ‘Major Crush’, ‘Butterflies in your Stomach’, ‘Jealousy’, etc.

RBB defined a list of minimum feature requirements for the HbbTV-app. The TV editors are to provide the viewers with the possibility of accessing the following material via HbbTV:

- Profiles of protagonists and guests of the documentary
- Image galleries and video clips about protagonists and events related to the documentary
- Daily quiz to trigger participation
- Voting on questions around ‘first love’ and the protagonists
- Curated social media feed during live broadcast
- Rating of content (“I like”)

A smartphone or tablet might serve as an input device, but not all young viewers will use or have access to such a Second Screen device and we do not want to give the impression that we expect them to have such equipment. As navigation is of highest importance for TV services, and is traditionally possible only via the remote control handset, it is a service target that navigation commands can be given only by the direction keys, the OK button and the four coloured buttons on the remote control.

After describing and defining the service as documented in D3.1 the challenge of this task was to fine-tune the concept and incorporate feedback of end users and professionals in iterative steps. What should the service look like? What makes sense? Which elements will be featured how in our applications?
5.1. Co-creation activities

As defined in the set-up of this task in the TV-RING DoW, the co-creation process went through several stages of prototyping / mockup creation, both involving RBB internal professionals as well as external users when needed. The service ideas were formed and first paper mockups and later digital mockups were designed, developed, evaluated and then improved in an evolutionary approach through exchange and discussions, balance, assessment and decision. Evaluation was inherent in this process: In the different co-creation sessions the results which had been obtained so far were evaluated and improved, moving from paper mockups to digital mockups in the end which underwent a final evaluation round.

RBB performed three rounds of co-creation: The first was an internal workshop at RBB, which involved editors and engineers, with the result of a first version of paper mockups. The second was an external workshop, which took up considerable effort and involved young students and scientists from the local M.A. programme “Cross-Media” and also three broadcasting engineers at the University Magdeburg-Stendal. This resulted in renewed concepts – and paper mockups for the early HbbTV-applications and screens and then in the creation of digital mockups. The final evaluation round was then performed in co-creation with RBB broadcasting editors, engineers and managers, now with the digital mockups.

The outcome of the paper prototyping phase was then fed into the work on digital mockups and their evaluation. A nearly complete click-through mockup was developed here, and presented to users.

5.1.1. Internal workshop at RBB: Early Paper Mockups

The first workshop was the starting point of the development process and involved editors and engineers. Here a list of key features of the service was defined and several paper screens were developed with different alternative solutions for certain functions, using cardboard, paper, glue and pencils, incorporating all the major features of the planned application. Especially for the start and the video player screen several alternatives were created. Inevitably these functions served as basis for the prototyping work in the external co-creation workshop, when two groups of people were asked to take care of the start screen and the other two groups of the video player screen.
Figure 24: Paper mockup stand

Figure 25: Scribbles before handicraft
Figure 26: Paper mockup of a video player screen

All the results were documented by taking photographs. For two of the screens, the start and the video player screen, several alternative variants were discussed and created, which led to the decision of taking these screens to the following iteration, the external co-creation workshop at Hochschule Magdeburg-Stendal.
5.1.2. External workshop at the University Magdeburg Stendal: Second version Paper Mockups

The purpose of this event was to evaluate the early paper mockups described above and to co-create new version from this. In order to further tune the first paper-based mockups the second workshop was held externally at the University Magdeburg-Stendal. It took place in a co-creation environment together with students and scientist from the local M.A. program Cross-Media and three broadcasting engineers. The aim was to utilize expertise, knowledge and also user experience of all participants, to interact and to learn while creating paper mockups focused on the teenage target group.

Figure 27: The external co-creation workshop
5.2. Methodology

5.2.1. Paper Mockups at second co-creation Workshop in Magdeburg

The participants of the external co-creation workshop were divided into four groups of 3 or 4 people. Each group was supplied with a hand-out with technical and application information and features, as well as with a list of tasks that they had to fulfil.

Two groups were given the task of developing a screen from scratch according to their own preferences. The other two groups were to use the existing paper mockups from co-creation workshop one as the basis for the development of their screen. Each group was allotted 45 minutes for their task. The workshop hosts spoke with each group, asking questions and offering suggestions. Each group presented its results and discussed them with other participants. The outcomes were documented with photos and notes. Finally, the manner in which the results would be integrated into RBB and the TV-RING project was explained to the participants.

The tasks:

Each group was tasked with developing a screen for the ‘Abenteuer Liebe’ HbbTV application:

- A start-screen (for use both during and before/after the actual broadcast)
- A player screen (for video playback, player controls, comments, back button, blog)

Figure 28: The chosen start screen variant as workshop basis
For each task, there were two groups: one worked with the previously-developed paper mockups as pictured above, the other developed ideas from scratch. Each group was asked to later present its results using Post-It notes and oral descriptions.

5.2.2. Digital Mockups in succession of Paper Mockups

For creating (clickable) digital mockups, RBB used the software Balsamiq Mockups. After identifying the key functionalities and content from the paper mockups derived in the described two internal and external co-creation rounds, these were sorted in a card sorting process to establish information architecture capable of holding the diverse editorial content of the planned service. The key screens for each category were designed, summing up to 11 different screens for the “strict” design and another 6 for an alternate, “minimal” version, which was used to contrast the main draft and challenge further simplification of the design.

The digital mockups created thus were then dealt with in the last RBB co-creation session. This was again an internal evaluation session involving six professional participants, who explored the interface and helped unveil inconsistencies and wording problems in the interface.
5.3. Results

5.3.1. Paper Mockups

The attendees of the co-creation workshop at the University Magdeburg-Stendal were grouped in four teams. The results of their work are documented below.

**Group 01: Develop a start screen from scratch**

The first group developed a means of monitoring additional content during the broadcast. They produced playful methods of presenting this content on the TV screen, such as the use of speech/thought bubbles.

This additional level of information presentation could be made still more engaging by presenting the user with optional voting and discussions in parallel to the broadcast.

Where additional content is too complex for presentation as an overlay on the TV screen, it could be presented on the second screen, i.e. the smartphone.

Viewers can choose to enable the HbbTV functionality. More ‘conservative’ viewers who chose not to enable the functionality would therefore not be disturbed by it.

![Figure 30: Result of group 01](image)

**Results overview:**

- Target group: probably more smartphone users than tablet users
- „What are they doing there on the screen?“
  - visualisation of the thought bubbles as „secret thoughts“
- Live TV with a cartoon-like overlay
- Viewers want to know who the person on the screen is:
  - person selected on smartphone, thought bubbles displayed
  - thought bubbles can be „liked“
  - photos, profiles etc. can also be „liked“
- Users can question coaches, blogs, performers
- Everything is customisable

The most important result of this group was that additional content must be, suitable for the young target group, displayed in a playful way, for instance as overlaid pop-ups for each TV episode on screen (if the HbbTV app is started). Especially data not possible to transport within the classic TV show, like for instance the thoughts of protagonists must be added in an amusing way.

In addition, most probably users will use their smartphone as the input device for the live blog, for chatting with experts and editors during the show, for submitting comments and opinions etc.

**Group 02:** Improve the start screen we provided (see Figure 4).

The second group dropped the task completely and proposed the creation of an interactive game, for use independently of the broadcast. The viewer can ‘pair up’ the protagonists; the current state of development of the documentary could be shown. Particular elements could be selected and evaluated by the viewer.

Various profiles could also be developed, such as Wikipedia entries or messages to various entities.

Additional players, such as coaches, experts and other actors, could be included in the game.

A further suggestion was the creation of users’own profiles and thus the possibility of finding compatible ‘friends’. The basic functionality of the game on the TV should be exactly the same as on the second screen, but the interaction could be more extensive on the mobile device; content could be further explored, screenshots could be created, profile images uploaded etc.

![Figure 31: Result of group 02](image)

**Results overview:**
- Screen for during/outside the broadcast
- A ‘hot or not’ voting function
• Persons/profiles are selectable (using up/down keys), linked by the elements which connect them/are common to them
• Focus can be switched between selected persons/profiles using blue/green keys
• Connections can be selected with yellow button, created by editors and also drawn from social networks, scrollable, semantically analysed
• The heart shape shows the visualisation of the selected focus – gradually fills as viewers vote for the pair, indirect voting
• Second screen is the same as the TV screen but content can be further explored, connections can be collected and selectable
• Small ‘share’ button at the top, to share screenshots
• Users could upload own content

Funny graphics, simple and easy participation, configurable at best, and a hot-or-not in-app game - in this group also it was an obvious result that the service must be presented as playful as possible. The focus is not on complex, editorial info – it’s better to avoid long texts. Also, the focus is more on the characters and the fun of participation; this is what is relevant for the target group. There does not have to be a direct connection between the moment of broadcast and the use of the app; the app is more an add-on, to strengthen the brand ‘Abenteuer Liebe’.

**Group 03: Develop a video player screen from scratch**

The third group developed an idea for a player screen for use during the actual TV broadcast. The basic idea was the graphic representation of a particular development, i.e. the number of user questions. In this way complex issues could be displayed during the broadcast without distracting the viewer. The group focussed upon interaction, expression and display of opinions.

The idea was that the viewer could use a ‘buzzer’ to send selected phrases (‘Well done!’) during the broadcast, and would also be able to see other viewers’ responses and interaction. Top phrases could be voted on, via social media.

Navigation – the suggestion was to reduce the TV picture and to introduce tabs on the right-hand side of the screen, as this navigation method is well-known from other popular websites. Here you could then select Buzz-ticker, Chat, Like, etc.
Results overview

- Live player screen for broadcast
- TV-screen Buzzer function for ratings during transmission
- At the top right – select a person, browsable
- On the right side:
  - Ratings
  - Chat
  - Buzz ticker
- Bottom right – graphic showing development of particular aspect
- Possible alternative to Buzzer – editorial questions/voting

Group 03 provided an additional remarkable result: viewer opinions and the development of interactivity numbers over time are of interest. Those number and results must be represented graphically and, again, in an amusing way. Interaction possibilities for viewers via TV must be easy and simple, areas with additional data must be exchangeable easily. In general, graphics are dependent upon the actual programme character, and are part of the editorial process.
Group 04: Improve the video player screen we provided

The fourth group stayed closely to the guidelines and developed an improved screen for use outside the broadcast. The navigation bar should be changed from left-right to up-down. The video image should be made larger and the control functions should be simplified and controlled by the coloured buttons.

The chat function should be always visible and displayed as speech/thought bubbles in the top right of the screen. There was no consensus about how the chat function should be navigated. The group were unanimous that the components should be of a playful nature. Viewers can make their opinions/feelings known via the heart display.

Figure 33: Result of group 04

Results overview:

- Video picture was too small
- Lists should be on the left
- Videos should be selectable
- Videos should then play in player
- Player functions should be controlled with colour buttons
- Chat should be shown above at edge, or it can be moved to the second screen
- Chat input should be via second screen only
- Protagonists top right edge, with dynamic heart symbol to display current rating
- Colour buttons useable within the entire application

Similar to group 03 – users of such a service should have the possibility of adding simple rating and voting features, and the overall results of all participating viewers should also be visible onscreen.

There should be no long and deep menus - control functions could be accessed easily via the colour buttons. Users may be accustomed to ARD’s Mediathek player menu, so whether this route is suitable would have to be assessed. The slow performance and response of some TV sets may be another reason to avoid using the colour button control method. Other interaction can also be accessed via colour keys. Thus it would be possible to have other
control functionalities on the screen, which were not controlled by the up/down/left/right keys of the remote.

5.3.2. Digital Mockups

5.3.2.1. Mockup “strict”

- (1) Main Screen

The main screen shows the content that is updated on a daily basis and links to all other content. It is the standard start screen when the programme is not currently live. All elements are directly navigable; especially the voting can be used without opening a modal (overlay-) screen.

![Main screen mockup](image)

Figure 34: Main screen mockup

<table>
<thead>
<tr>
<th>Co-Creation Comments</th>
<th>Possible Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Too much information on the start screen.</td>
<td>Re-Think which content should be shown when. This view is used when the live programme is not running, thus we could add viewing the latest episode on-demand and maybe move the quiz or voting to the live view.</td>
</tr>
<tr>
<td>Content scrolling would be expected to go to right according to the ARD HbbTV de facto standards.</td>
<td>If we wanted to add more content on the start page, this could be done by side scrolling. A slightly tricky problem is that having two rows makes it more difficult to find a suitable chronological order.</td>
</tr>
<tr>
<td>In the mockup view, the active element (Neues) in the main menu is not recognized.</td>
<td>This is a mock-up-specific problem, but could also indicate, that “Neues” is not a fitting term to describe the main view of the application.</td>
</tr>
<tr>
<td>Not clear what differentiates the category “specials” from other</td>
<td></td>
</tr>
</tbody>
</table>
(2) Live-View (Blog)

The live-view is shown at application start when the programme is currently live. A toggle switch allows to change between (1) main view and this view. The TV picture is scaled proportionally to approx. 2/3 screen width. This allows displaying the curated social media blog edited through Scribble Live, a Platform-as-a-Service solution for social media curation. The upper right corner shows a preview of possible pictures or videos (without sound), that are shared via twitter. On the HbbTV device, it is not possible to enlarge these assets further in order to preserve the live TV image at all times. The bottom field is used to display information on how to connect a second device or participate via twitter. Also, a menu allows to switch between the social media feed and information on persons and places that appear during the episode.

Figure 35: Live view (blog) mockup

<table>
<thead>
<tr>
<th>Co-Creation Comments</th>
<th>Possible Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right and bottom container appear unconnected.</td>
<td>The connection can be visually emphasized in the final visual design.</td>
</tr>
<tr>
<td>(2) and (3) use a different navigation scheme (choosing blog entries in the right column vs. choosing thumbnails in the bottom container)</td>
<td>Unify display format for person/place portrait and live-blog entries. This is not a trivial task though, because of the differences in information depth between blog entries and person/place portraits.</td>
</tr>
<tr>
<td>How to switch to full screen video?</td>
<td>Showing/hiding the application is always possible via the red button. The question is whether to introduce an additional button on this screen, which switches to full screen mode. We would discourage that to avoid uncertainties about the state of the application (is it hidden or is it in full screen view mode).</td>
</tr>
</tbody>
</table>
When the episode is broadcast live, this should be the standard view. Otherwise one would not expect that view.

This should be the standard behaviour of the application.

I might be afraid to click “live-blog” or “personen & orte”, as the live picture might disappear.

Related to other issues mentioned before – the connection between the right column and the bottom container should be made clear visually.

“connect smartphone” is a too technical term; this option should anticipate what you can actually do with the smartphone.

Change wording towards user perspective.

I would have expected the blog content below the TV screen (in the left bottom container).

Possible, but looks awkward with the usual blog content (e.g. quoted tweets). Would be more suitable if the content should not be navigated but would just be displayed as it comes. Still, the mapping between control and display elements has to be improved in this screen.

Layout uses screen space well.

<table>
<thead>
<tr>
<th>Table 5: Comments and solutions for live view (blog)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(3) Live-View (Persons &amp; Places)</td>
</tr>
</tbody>
</table>

This part of the live-view lists persons & places in the bottom container in the order of appearance in the TV show. The bottom container is used to choose between different items, the right container displays a short dossier about the person or place. The live view does not provide more details about persons or places, even if they should be available. The viewer may explore those in (1) main view, which is accessible during the live broadcast via the toggle button or after the show.

Note: The focus in the bottom container must be movable, i.e. the focus moves, not the content bar behind.

![Figure 36: Live view (p&p) mockup](image-url)
<table>
<thead>
<tr>
<th>Co-Creation Comments</th>
<th>Possible Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bottom container could be confused with a timeline view to navigate the video.</td>
<td>Visual cues can be used to avoid this impression. To a certain extent this impression is also on purpose, as the order of the items would ideally reflect the order of appearance in the show.</td>
</tr>
<tr>
<td>Video/home story would be good content for person category, not too much text</td>
<td>Videos will be accessible from the main menu. Here the text/image combination is chosen on purpose in order to avoid interference with the live broadcast.</td>
</tr>
<tr>
<td>Length of portrait text okay, but should not be longer.</td>
<td></td>
</tr>
<tr>
<td>Not sure what can be selected in the menu bar at the bottom. I would be afraid that the live TV screen disappears.</td>
<td>It is not immediately clear where the information selected in the lower menu will be displayed (related to the first comment). Visual cues must make it clear that the content selected in the bottom menu bar appears on the right.</td>
</tr>
<tr>
<td>I was positively surprised by the richness of live features.</td>
<td></td>
</tr>
<tr>
<td>Not sure, whether “places” is actually an exciting category.</td>
<td></td>
</tr>
</tbody>
</table>

*Table 6: Comments and solutions for live view (p&p)*
• (4) Episode overview

This screen provides an overview of the episodes of the daily documentary that have been shown so far.

![Episode overview mockup](image)

**Figure 37: Episode overview mockup**

<table>
<thead>
<tr>
<th>Co-Creation Comments</th>
<th>Possible Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual cue is missing to afford scrolling to the right (or down).</td>
<td>Depending on the choice of scrolling direction e.g. pointing triangles can be added (tbd by visual design). Argument for scrolling to the right is compliance with ARD best practice. Argument for scrolling down would be that the chronological order was more intuitive (from left to right and then down – down then right is more ambiguous).</td>
</tr>
</tbody>
</table>

**Table 7: Comments and solutions for episode overview**
• **(5) Single Episode View**

This view shows an episode chosen in (4) and offers the content from the person/places tabs that have been made available for the live broadcast. The social media feed is not shown for the reason that the major part of the social media conversation can only be understood from the current broadcast context, so unless the social media feed is linked to the episodes timeline when played on demand, it should be left out.

![Single Episode View](image)

**Figure 38: Single episode view mockup**

<table>
<thead>
<tr>
<th><strong>Co-Creation Comments</strong></th>
<th><strong>Possible Solution</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>In these kinds of views I am not sure whether the main navigation should go away.</td>
<td>The main menu was eliminated in order to reduce clutter on the screen. If only for the menu bar, it probably could be preserved, with the advantage of a faster navigation to the other categories and keeping constant access to the toggle button for the live view. This would come at a certain cost of navigation consistency (which menu item would be active? None or the root category of the current view?)</td>
</tr>
<tr>
<td>Video full screen control is separated from video by navigation bar below video.</td>
<td>Re-arrange controls.</td>
</tr>
<tr>
<td>“Full screen” and “back” controls take too much space.</td>
<td>Find better position, maybe show controls only when video is focused.</td>
</tr>
<tr>
<td>I would expect to directly have the player controls when choosing to watch an episode.</td>
<td>Start video right away and/or focus on player controls (player controls are not part of this early mockup). Alternatively, go directly into full screen view.</td>
</tr>
<tr>
<td>I don’t understand what the right column is connected to.</td>
<td>Related to the other issues – make connection between bottom bar and right column clearer.</td>
</tr>
<tr>
<td>Content about persons is too scarce. At</td>
<td>This has to be considered against the distraction</td>
</tr>
</tbody>
</table>

Content about persons is too scarce. At
least a larger photo should be available, maybe even a separate page.

Table 8: Comments and solutions for single episode view

Suggested Re-design for this view:

The user suggests moving the video-related controls closer to the video and making it more explicit that the bottom and the right element belong together logically.

Figure 39: User’s re-design
(6) Single Episode Full screen View

From (5) the viewer can choose to view the video in full screen mode.

Figure 40: Single episode full screen mockup

<table>
<thead>
<tr>
<th>Co-Creation Comments</th>
<th>Possible Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>It takes to many steps to finally watch the video in full screen mode.</td>
<td>Like argued in the discussion of (1) the latest episode could be directly available from the main view.</td>
</tr>
<tr>
<td></td>
<td>Also, the full screen video could be the standard view instead of the Single Episode View. The additional content would then be turned off by default, with the risk that fewer people will actually notice that it is there at all.</td>
</tr>
</tbody>
</table>

Table 9: Comments and solutions for single episode full screen
(7) Places View

This screen gives an overview over the places that appear in the documentary. The location of the place is shown on the map along with a short description of the place, ideally in the same format as used in (3) and (5).

Figure 41: Places view mockup

<table>
<thead>
<tr>
<th>Co-Creation Comments</th>
<th>Possible Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>How does the focus traverse in the places list when it hits the bottom element?</td>
<td>Lists can either be have a rolling focus, which appears at the top again if it hits the bottom or they can just end. In this case, the traversal target from the bottom would indeed be ambiguous – should it jump to the top of the list, into the main menu bar or not at all? The latter is the most consistent solution, but with a longer list it would be annoying to click up all the way back.</td>
</tr>
<tr>
<td>The additional icons in the places list are distracting (this small detail had been added specifically for the test, but it obviously made no sense).</td>
<td>Leave place entries in left list with name only. Show map with place location when selected.</td>
</tr>
<tr>
<td>I wondered whether I just see one place on the map or an overview with all places.</td>
<td>Showing all places in one map of Berlin would give only a rough orientation where in Berlin those places are. On the other hand, a detail view gives no information about the wider surrounding of the area and the distances between the places. Probably one wide map where the currently selected place is highlighted would be the best solution.</td>
</tr>
<tr>
<td>Picture and description on the right appears very small.</td>
<td>Maybe this can be extended when the size of the map is reduced. Also the second map view might be redundant.</td>
</tr>
</tbody>
</table>
Don’t know how to

Table 10: Comments and solutions for places view

Suggested Re-design for this view

The co-design participant suggests using a preview image of the video to start the video instead of a separate play button.

Figure 42: User’s re-design
• (8) Places – Overlay Video
The places video overlay is the only modal screen used in this application and may be questioned in general for that reason. It is meant to show a video for each of the places.

Figure 43: Places video mockup

• (9) Persons Overview
This view shows all persons appearing in any of the episodes. Scrolling should be implemented in the same way as in (4).

Figure 44: Persons mockup
- **(10) Person Details View**

For each person, there will be linked video and image content, starting with the home story of the protagonists. The content can be selected in the bottom container, while on the right a static description of the person is shown. Note: Function of the bottom container and the right container vary slightly between (2), (3), (5) and (10). An option towards harmonization could be to use the right container not only for the person description, but as a dynamic preview of the content selected in the bottom container.

![Person Details View Mockup](image-url)
• (11) Specials View

The application shall also provide space to further extra content (videos and image galleries), that does not adhere to any categorization (despite being disjoint with any other category in the app). In lack of better sorting criteria, this content shall be sorted by publishing date, which makes an understandable order principle while still displaying a good mix of different content.

**Note:** All these videos could probably be sorted to persons or places, rendering this particular view useless. The only (but good) reason to have this category is that new videos would be more visible to the users. This could also be solved by a feed of recent content on the (1) main view.

![Specials View Mockup](image)

**Figure 46:** Specials view mockup

<table>
<thead>
<tr>
<th>Co-Creation Comments</th>
<th>Possible Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>I would expect the player to be started like in the episode overview.</td>
<td>The player can possibly the same, only that these videos would probably have no extra content, so a view like (5) would not make sense.</td>
</tr>
<tr>
<td>I would expect a full screen view for both videos and image galleries and then controlling the latter with left/right.</td>
<td>This is the intended implementation.</td>
</tr>
</tbody>
</table>

**Table 11:** Comments and solutions for special view
5.3.2.2. Mockup „minimal“

This mockup tries to reduce the different screen layouts to a minimum while still retaining a similar depth of content as the “strict” variant. It is not as far elaborated, but more a visual proof-of-concept.

Note: The bottom container has static content in this concept. This could be combined with the approach taken in the “strict” mockup to allow for more versatility and better overview of the content available.

- (1) Start View

The Start View already introduces the general layout and controls used in this mockup. The main canvas is used as a multi-purpose screen to display both live and on-demand content, video and images. In the bottom container we see general information about the show and the app. The main menu is positioned on the top of the right column, offering the feed of new extra content, the social media blog and persistent information on persons and places respectively.

Note: Instead of scrolling the feed can be browsed by pagination, the buttons right below the menu offering to browse forward/backward in time. The reason is that otherwise scrolling downwards would mean that the same number of clicks would be needed to reach the upper menu bar again. Alternatively, the “ok” button would have to be sacrificed for mode change when then list is focused, introducing all the known problems when introducing modal elements to an otherwise non-modal interface. Apart from that, pagination saves a lot of clicks, as all elements in the list change at once and not just one by one, which may be critical in an HbbTV interface used with remote control only.

Figure 47: Start view mockup

<table>
<thead>
<tr>
<th>Co-Creation Comments</th>
<th>Possible Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>This design feels too tight in comparison with the other approach.</td>
<td>This might just be a problem of contrast. Also, adding a bit more whitespace in between the containers could influence the perception</td>
</tr>
<tr>
<td>Positive Feedback</td>
<td>Suggestion</td>
</tr>
<tr>
<td>---------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>The scrollbar is the wrong indicator for pagination.</td>
<td>Replace with more appropriate design pattern to indicate pagination (dots, page numbers, etc.)</td>
</tr>
<tr>
<td>Not clear, how “Impressum &amp; Datenschutz” is integrated into the focus traversal.</td>
<td>Re-Think positioning of that element, maybe as part of the ARD standard footer.</td>
</tr>
<tr>
<td>I feel I don’t have an overview of what content is available at all.</td>
<td>This mockup lacks an understandable information architecture. This could be improved by introducing concepts from the other mockup.</td>
</tr>
<tr>
<td>It is always the same template, control elements are always at the same positions. This is an advantage.</td>
<td></td>
</tr>
<tr>
<td>The space in the right column appears very limited. One would need some other place to display content.</td>
<td>The canvas is not recognized as multi-purpose (probably due to the nature of the mockup). The bottom container is not well used here.</td>
</tr>
</tbody>
</table>

Table 12: Comments and solutions for start view

Suggested Re-Design for view (1)

A co-design participant suggests giving a better preview on available content on the start view.

Figure 48: User’s re-design
(2) Quiz Content

This is an example how the list area on the right may be used for different kinds of context. In contrast to (1), two list elements are joined here to show a quiz/voting element. Thanks to the pagination approach, the quiz can be filled in directly with the remote control.

Figure 49: Quiz content mockup
(3) Social Media Blog

This view shows the social media blog curated via Scribble live. This content shall only be available during the live broadcast. A button to switch back to live view on the main canvas has been added (albeit probably not at the perfect location). The list element has now been split into four parts, demonstrating the versatile usage of the list grid. The button at the bottom of the right column opens the modal dialogue (4) to connect a smartphone.

![Figure 50: Social media blog mockup](image)

<table>
<thead>
<tr>
<th>Co-Creation Comments</th>
<th>Possible Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>It is unclear what is displayed on the left canvas.</td>
<td>This is a problem of this particular mockup, as the “content” of the canvas does not change depending on what is clicked.</td>
</tr>
<tr>
<td>The “kommentieren” button appears to be unreachable.</td>
<td>The scroll-bar (which probably should be another kind of pagination indicator) looks like a barrier preventing focus traversal.</td>
</tr>
<tr>
<td>If I press “ok” a tweet, can I comment on it?</td>
<td>The intended behaviour would be the display of possibly attached content on the canvas to the left (mostly pictures).</td>
</tr>
<tr>
<td>“Sendung einblenden” should rather be “zurück zur Sendung”</td>
<td>German wording problem and a problem of metaphor – “einblenden” (show) is a more technical concept, while the users feel more like going back to the live TV (because they “have been there before”), translating to “zurück zur Sendung”.</td>
</tr>
</tbody>
</table>

Table 13: Comments and solutions for social media blog
(4) Smartphone Connection View

This is a modal screen explaining how to connect a smartphone to the HbbTV application to be able to join the social media conversation about the daily documentary.

Figure 51: Smartphone connection view mockup

<table>
<thead>
<tr>
<th>Co-Creation Comments</th>
<th>Possible Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>More explanation needed for the QR-Code connection.</td>
<td>Extend explanatory text in this screen (although lengthy explanations often remain unread).</td>
</tr>
</tbody>
</table>

Table 14: Comments and solutions for smartphone connection view
(5) Persistent Info

The right column offers to browse information on people and places. Note that there is no way to consciously navigate this content. The content could be sorted by alphabet as a workaround; previews could be added above and below the current content item or the bottom container could be used for navigating between content items.

Figure 52: Persistent info mockup

<table>
<thead>
<tr>
<th>Co-Creation Comments</th>
<th>Possible Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>It is hard to find certain content without a preview in the navigation. / The info feels less sorted.</td>
<td>Add a navigation bar in the bottom container as shown in mockup “strict”.</td>
</tr>
<tr>
<td>Content on the canvas left should only change when content item is explicitly chosen with “okay”. This shall prevent to accidentally changing the content.</td>
<td>This is the intended behaviour. Also, the design should be changed so in live mode one could always return to the live picture.</td>
</tr>
<tr>
<td>The button for the home story video is not recognized as a video start button.</td>
<td>Make video choice button more explicit.</td>
</tr>
<tr>
<td>I miss the map of places, this would give better orientation.</td>
<td>Introduce some concepts from “strict” design.</td>
</tr>
</tbody>
</table>

Table 15: Comments and solutions for persistent info
• (6) Home story View

Additional content offered in the description in the right column can be displayed on the main canvas, with the disadvantage that any live broadcast content would be hidden (although this feature could be deactivated in live mode).

Figure 53: Home story view mockup

Figure 54: User's re-design
5.4. Evaluation

As RBB has chosen an iterative co-creation process in three cycles (two paper prototyping sessions and one digital mockup session as described above), evaluation and improvement was a continuous process inherent to the actual co-creation methodology.

5.4.1. Gathering data

During the paper prototyping process, RBB used the mockups and their descriptions by their creators as a source for qualitative analysis. After an intermediate card sorting session based on the findings from the early stages, the digital mockup session were conducted. They used a mixture of interviews and task-based thinking aloud testing. Printouts of the digital screens were provided if participants wanted to express their improvement ideas visually.

5.4.2. Outcome

The paper prototyping revealed a large interest in people and social relations when it comes to additional content. Ratings were often integrated as an easy way to provide participation. Also, chats were integral part of the ideas, which is reflected by the integration of a “Scribble live” curated social media blog, which is similar to a chat, but more versatile.

The content categories as devised in the paper prototyping sessions where sorted into 5 categories that were determined by a card sorting process. During the design process we changed from categories oriented at content formats (pictures, videos) to more content-focused categories (people, places).

The digital comparison of the “minimal” and the “strict” design approaches revealed that although the simplicity of the “minimal” approach gets praised, it lacks a decent information architecture which makes the richness of content available in the application graspable. The “strict” approach has a better information architecture and will be the basis for the final application. All issues identified in that design can be improved with reasonable effort. Both approaches show a good usage of screen space and we will try to apply a touch of the simplicity shown in “minimal” to the “strict” concept.

5.5. Conclusions

The key players in the programme are the protagonists, and this should be reflected in the accompanying social media. Engaging with the protagonists offers the possibility of encountering young viewers in their own environment, as distinct from that of the ‘grown-up’ presenters and editors.

A TV application must be simple to use on the TV itself, rather than on a smartphone or PC. All functions should be reachable within a couple of clicks. Navigation should be straightforward and direct. In functional terms, if something is not achievable, it should be discarded.

For the target group, playfulness is of prime importance. Learning is not their main motivation, but of course it’s not bad if learning is part of the overall context, especially if it’s enjoyable. It’s not information which is in the foreground, but the fun which viewers can have with the app. Young people want to gain points, share their opinions, see their views represented and interact.

Once the content and functionalities were fixed through this approach, the digital mockup process has helped to find a suitable information architecture and identify an innovative, remote-control and screen estate-optimized design solution for the application.
6. Spanish Pilot

6.1. Co-creation activities

During the process of mockup development we carried out a couple of workshops, both internal and external, to mold and enhance different versions of the mockups and to conceptualize the interface of the future pilot. Co-creation of mockups helped to visualize the overall idea and determine the possible scenarios and alternatives.

The first workshop was performed after having created all paper mockups and before starting with the digital versions in order to debate paper alternatives. The second one was then carried out after having developed the first digital mockup and had the objective of debating possible enhancements for the next versions of these click-through mockups.

6.1.1. Internal workshop: Basis for creation of digital mockup VERSION 1

After having created three versions of paper mockups, which will be described in the following section “The Paper Mockups”, the next step was to create a digital version to be used in the evaluation process. For that, we carried out an internal workshop to analyze all three alternatives and choose one option for the future development of the pilot. Using paper mockups we were able to easily modify the interface on the spot to show all possible options and visualize the sequence of screens and all its functionalities.

Figure 55: Paper mockup workshop
The version selected during this workshop was the “The Paper Mockup VERSION 2”, and based on this interface we then created the first digital mockup, described in the section “The Digital Mockups”
After having successfully completed the first process of user testing, with results shown in Annex 9.1, we carried out a second workshop, this time between TVC and i2CAT to reframe and improve the evaluation process so that we could obtain more reliable results and fine tune the future interactive TV service.

By showing the results achieved until that point of time, we collaboratively came up with the following improvements to the first version of the digital mockup (see “Digital Mockup VERSION 1”) of the TV3 a la carta application:

- In the full-screen mode there should be no visible background – the video should be shown totally in the full screen, even for high-resolution television sets.
- Photos should be replaced by real videos so that the experience for user during the testing will be as close as possible to the actual application.
- The evaluation questionnaire (see “Second version of Questionnaire”) should be extended by adding System Usability Scale (SUS) as the final part, a 10 item questionnaire with 5 response options (from strongly disagree to strongly agree). Its aim is to measure perceptions of usability of an interface.
- Additionally, in a future iteration of the mockups it would be recommendable to concentrate on the remote control issue.

The enhanced digital mockup resulting from the above improvements is shown in the section “The Digital Mockup VERSION 2” and its associated evaluation questionnaire is described in section “Second version of Questionnaire.”
6.2. Methodology

The tasks at hand are composed of various consecutive steps, starting from a previous preparation contained in the Deliverable 3.1 “Service and application concepts” where all user requirements and key points are included. After having realized that preparation, the first step of this task was to create different types of mockups to visualize the user interface of the TV-RING service, in this case the Spanish Pilot’s basic HbbTV application TV3alacarta. As explained in the Introduction part of this document, mockup is a mockup of a model of product or service with the aim of displaying its functionality and makes it easier to understand for the potential user all its possible options. It also can serve as a means of evaluation of an idea while receiving user feedback. We can distinguish two generic types of mockups: paper and digital ones, with further detail in the following sections.[1]

After developing a set of paper mockups, those were presented to the group of engineers working on the project, to analyze various alternatives of user’s interface and finally choose the one that will be used as a foundation of the future service development. The digital version of the mockup was based on this version, chosen from all paper mockups that were elaborated for the Spanish pilot.

The next step to finalize the task was the elaboration of a questionnaire used for testing this digital mockup. Questions include both multiple choice answers or open ones so that the user was not limited and could express whatever he thought about the mockup utility and design. Also we can distinguish between quantitative evaluation, with objective of measuring performance rates or other relative data, and qualitative evaluation that considers more subjective aspects of the test.

Then, when the evaluation questionnaire was done, we established testing groups, composed of both consumer and professional users, in the way that each testing was carried out on only one user at a time. The last step of this research activity was to collect all valuable answers, analyze them with diligence, and create a data base of feedback and opinions for a continuous use in the iterative process of developing and enhancing the TV-RING application.

It is worth to distinguish between two separate types of mockup’s usability testing: formative and summative. First one, a formative usability testing is usually conducted in the early prototyping stage to help guide the design and extract behavioral insights. Normally it covers the functionality of paper mockups. On the other hand a summative testing tends to be performed later to measure the usability of a completed system and to identify its problems.[2]

In a formative testing which consists on an iterative design process, where the main objective is to shape the user interface, it is highly recommended to work on a small user testing groups (approximately 5 people) and increase the number of tasks that each user has to perform instead. On the other hand, in the case of a summative usability test, where the objective is to calculate statistics (for example an average task performance time) it is recommended to boost number of participants to minimum 20 people to minimize the response differences and obtain a significant sample.[3]
6.2.1. Paper Mockups

Like at RBB, the first type of mockup creation refers to paper mockups, which is a traditional way of formation. The manual development of the mockups can be made using a simple piece of paper or cardboard, sketching the ideas on it and mark all possible buttons and interactions between the user and the service. This kind of mockup can be created only by professionals or can include different degrees of user’s participation in the creation process, even requesting user to create a mockup from zero, based on their own expectations. In its basic version, paper mockups are not interactive and it might be hard to imagine what would happen if I click a certain button. To resolve this obstacle there is a technique called “Human-in-the-loop”. The idea is that the user speaks out loud what he is doing and someone (the human in the loop) performs the changes in the interface, that is, switches the cardboards or similar.

6.2.2. Digital Mockups

In the case of digital mockups, the objective is the same, i.e. display user interface, but with the difference that it is created using a computer and various programs or design software. Here we can also find different types of digital mockups like: wireframes, which are digital versions of paper mockups (non-interactive); Clickthrough Mockups, which links several mockups through hyperlinks so that the user can discover what lies behind each button; and finally, Software Mockups, which consist on coding a simple version of the application or service.

Taking into account those characteristics for both paper and digital mockups, we can clearly conclude that first type is much easier to elaborate and alter by any changes. It can be readily handled by cutting off the pieces or sticking/detaching buttons, while using a digital design it is not so easy and every change has to be checked and elaborated with more accuracy and slowness. Also a traditional elaboration does not require any technical knowledge and we can even ask a potential user to elaborate a mockup according to its own expectations. Thus, we decided to create various versions of paper mockups and only one in the digital form. However, several iterations of this digital mockup evaluation were performed to enhance the mockup with time, but always using the same foundation.
6.3. Results

In the case of the Spanish Pilot, the TV3alacarta application, at first various versions of paper mockups were created in order to see and evaluate different alternatives of the user interface, and after that, a digital mockup was elaborated, based on the chosen version of the paper mockup. As we have seen in the Methodology part, both types have features in common and also substantial differences, mainly in terms of interactivity between the user and the service. Thereby, for the evaluation part only the digital mockup will be presented as it consists of a higher grade of interaction between the user and the service. The following mockups were initial versions and after the feedback process, an enhancement process occurred until the final formulation.

6.3.1. The Paper Mockups

After describing with details all features of the Spanish Pilot in particular and also listing all user’s requirements, and furthermore specify the definition of what a mockup is, we could move forward to perform the next step which was the creation of real mockups.

First of all, simple paper mockups were created using paper sheets, pen, marker and few colors. Using a paper it is very easy to handle any changes in the design, comparing to the digital design, where the whole html has to be reproduced and checked every time. Because of this ease of use and manipulation, we were able to create three versions of paper mockups of the TV-RING service; in this case, the TV3alacarta application, available via HbbTV enabled devices, for both on-demand and live content.

6.3.1.1. The Paper Mockup VERSION 1

- **ON-DEMAND content**

This storyboard covers a scenario in which user accesses an on-demand content using HbbTV application. This service already exists within the actual version of TV3alacarta application, available for the users that possess adequate equipment, described in the Deliverable D3.1: “Service and application concepts”. The objective of this mockup is to integrate new features into the existing version. Those features are regarding the integration of the multi-camera service and a high-quality seamless streaming.

In this scenario, a user starts from displaying DTT channel of one of the TVC’s programs, when a pop-up window shows up to encourage the user to enter HbbTV application by pressing the red button on the remote control, as it is shown on the Figure S8.
When user calls to action by pressing the red button, he enters an initial screen of the TV3alacarta application, as shown below (Figure 59). In the overhead bar there are situated main menu’s buttons like: Home, Programs, Last Week (showing only recent programs), Most Viewed and finally, TV3 LIVE access. Also a symbol of loupe gives the possibility of a direct search of a program from database available for the service.
These two displays are common for on-demand and live content, as the selection whether the user wishes to watch direct or differed videos, comes after visualizing above screenshot. In the case of on-demand content, we can choose between highlighted videos and highlighted programs from the initial screen or go directly to the Programs section (Figure 60). Here the user can choose between searching between “in emission” and “archived” programs. Then, the alphabetic list of all available programs is at the user’s disposal. When he chooses a specific program, the list of all videos is shown on the right side of the screen. If a multicamera option is available, the correspondent icon is shown by the video’s description to inform the user.

During the entire navigation of the application, the Exit button is available in the right-down corner, so that the user can turn back rapidly to the initial DTT channel. The same action is undertaken by dialing again the red button on the remote control.
The next component of the paper mockup visualizes user’s interface after choosing a particular on-demand video to be streamed. As we can see on the Figure 61, the video is displayed straightaway in the full screen mode for both regular and multi-camera content. In the case of multi-stream content, the designated default view is played automatically. By pressing any button on the remote control it appears an overlaid control bar, with the features like pausing, minimizing the screen and, for multi-camera streaming, a button to switch the view. To provide a seamless experience for the user, the time of the switching will be minimized as much as possible and besides that, the secondary streaming source will be displayed with the same quality as the main view.
When user decides to leave full screen mode by pressing the minimize button from the control bar from the view above, then he turns back to the initial design with a menu bar in the upper side, like we can see on the Figure 62 below. The perspective that was currently shown on the full screen mode now is presented minimized on the left side of the page. Then, if multiple-streams are available for the program, remaining cameras are listed on the right side, so that the user can explore other perspectives of the same content. Once the alternative live stream is chosen, the user experience should be the same as with the default one, in terms of the video quality and a seamless projection.

Figure 61: Video on-demand full screen mode streaming
When the program displayed is finished or when the user switches to navigate in another section, a dialog on the screen will show up and displaying a short and simple satisfaction survey (Figure 63). The objective of this survey is to extract valuable opinion and feedback from end-user and incorporate it in the development process of the service.
• Flowchart of on-demand content paper mockup version 1

![Flowchart of on-demand content paper mockup version 1](image_url)

*Figure 64: Flowchart on-demand paper mockup v1*
LIVE content

The second storyboard covers the scenario in which a user chooses to watch live content via the HbbTV streaming application, integrating multi-camera and high-quality characteristics into the content. First step is the same as in on-demand content scenario: user starts from displaying a DTT channel on the TV screen, when a small screen indicates that there is a TV3alacarta application available by pressing the red button on the remote control (Figure 65).

![Figure 65: DTT channel of TVC](image)

When the user decides to enter the application by pressing the red button, he enters the home page of the application, shown in the figure below (Figure 66). As we have explained before, in the upper part there are situated main menu’s buttons, like: Home, Programs, Last Week, Most Viewed, TV3 LIVE access and also a symbol of loupe that gives the possibility of a direct search of a program. On the main space highlighted videos and programs are displayed, which refer to the on-demand content. In this scenario, as the user is interested in live content, he chooses the button “TV3 LIVE” from the overhead bar.

As in the case of on-demand content streaming, during the whole navigation of the application, there is available an “Exit” button in the right-bottom corner, so that the user can turn back rapidly to the initial DTT channel. The same action is undertaken by dialing again the red button on the remote control.
Figure 66: Initial page of TV3alacarta application
In this scenario, as the user is interested in live content, he chooses the option “TV3 LIVE” from the overhead bar. As we can see in Figure 67, the list of all five channels is shown (TV3, El 33, 3/24, Canal Super3 and Esport3) for both normal and multi-camera content. If in this moment a program with multi-streams is displayed, a proper logo will inform the user.

![Figure 67: Live content channels](image)

After choosing the live content section, the video will start straightaway in the full screen mode. Initially there will be only one live streaming channel at the same time (the one from DTT channel) and it may consist on normal or multiple-camera content. If various views are available, the designated previously default view will be played automatically. As we can see in Figure 68, an overlaid control bar pops-up on the bottom part of the screen with options like pause/stop the video and a button to leave the full screen mode for the single-stream live contents. If more than one camera stream for the content exists, then additionally a proper icon is clearly identified on the control bar, which permits switching the perspective in a seamless way and obtaining the same quality as while watching default stream.
When the user decides to leave the full screen mode by pressing a minimize button from the control bar, then he turns back to the initial design with a menu bar in the upper side, like we can see in Figure 69 below. The perspective that was currently shown on the full screen mode now is presented minimized on the left side of the page. Then, if multiple-streams are available for the program, remaining cameras are listed on the right side, so that the user can explore other perspectives of the same content. Once the alternative live stream is chosen, the user experience should be the same as with the default one, in terms of the video quality and a seamless projection.

Figure 68: Live content full screen mode streaming
As in the case of on-demand content, when live streaming is finished or when user decides to navigate in other section, a simple satisfaction survey is offered in a totally voluntary way. It should not contain more than 3 options so that the responding rejection is minimized. The objective of this survey is to gain user’s feedback essential in enhancing the service.
Figure 70: Satisfaction survey of the service
- Flowchart of live content paper mockup version 1

Figure 71: Flowchart live paper mockup v1
6.3.1.2. The Paper Mockup VERSION 2

The second version of paper mockups (both for on-demand and live content) implies changes regarding the multi-camera streaming. The idea is to create a separate pilot application that collects only videos with available multi-streaming option, which will be separated from the actual application TV3alacarta, so that any changes in it will be conducted.

- **ON-DEMAND content**

The starting point, as in the case of the first version, is the live display of the DTT channel of one of TVC’s programs (Figure 72). A pop-up screen appears to inform the user about the TV3alacarta application. The user calls to action by pressing the red button and enters the initial screen (Figure 73).

![Figure 72: DTT channel of TVC](image)

In the home page of the initial application there is one change. On the left-bottom corner a button to enter the multi-camera application appears, which is a separated one from the actual TV3alacarta application. The rest of it remains the same in this scenario.
After pushing the multi-camera button the user enters directly into another application, which collects only content with multi-streaming. As we can see in the Figure 74, in this application there are shown two lists of videos: one for the live content streaming, and another one for on-demand streaming.
When the user chooses a specific content from one of the lists above, the video is always displayed straightaway in full screen mode for a seamless experience with designated default view of multi-streaming. An overlaid control bar appears by pressing any button on the remote control. To switch the view in the multi-camera mode, the user presses the proper icon on the control bar and the display switches to a mosaic design as it is shown on the Figure 76. All available views are shown here and the user can switch the view using the arrow keys from the remote control. Also an overlaid control bar is available here.
Figure 75: Video on-demand full screen mode streaming

Figure 76: Mosaic view of the available cameras
After choosing a different view, the video is displayed again straightaway in the full screen mode as before with an overlaid control bar on the bottom of the screen.

![Video on-demand full screen mode streaming](image)

**Figure 77:** Video on-demand full screen mode streaming

Once again the user can decide to switch the view by pressing the multi-camera button and the mosaic display will be shown (Figure 76) and after that, again a video in the full screen mode is displayed (Figure 77), until the user decides to exit the full screen mode (by pressing minimize button) or when the video ends. If one of those occurs, the next screen is shown (Figure 78), where the video in the streaming is minimized on the left side of the screen and the recommended videos are visualized on the other side. Also there is available a “like” button under the video that was streamed so that simple feedback can be received from the user. It is a simplified version of the satisfaction survey from the first scenario.
Figure 78: Recommended videos and feedback screen
- Flowchart of on-demand content paper mockup version 2

*Figure 79: Flowchart on-demand paper mockup v2*
• **LIVE content**

The live streaming scenario is the same as in the case of on-demand content, which was described above, with a difference that in the Figure 82 the user decides to watch a video from the live multi-camera list.

All mockups of this particular scenario are listed below in the order of appearance:

![Figure 80: DTT channel of TVC](image-url)
Figure 81: Initial page of the application with the multi-camera button

Figure 82: List of on-demand and live content for multi-camera streaming
Figure 83: Live content full screen mode streaming

Figure 84: Mosaic view of the available cameras
Figure 85: Live content full screen mode streaming

Figure 86: Recommended videos and feedback screen
• Flowchart of live content paper mockup version 2

**Figure 87: Flowchart live paper mockup v2**
6.3.1.3. The Paper Mockup VERSION 3

- LIVE content

The last version of the paper mockup corresponds only to the live streaming scenario. It consists on adding an additional pop-up window while displaying DTT channel as it is shown in Figure 88, only in the case where different cameras of the content viewed on the DTT channel at this moment, are available. By pressing the blue button on the remote control, the user accesses directly the multi-camera application from the version 2, the mosaic view in particular, as it is shown in Figure 89. Here user can check available views of the same content as watched on the DTT channel and choose an alternative streaming to exploit unconventional perspectives. After choosing the streaming, the new video is displayed straightaway in the full screen mode (Figure 90) in the same quality as the default view. User can repeat the whole process by pressing the multi-camera button from the overlaid control bar and turn back to the mosaic display again. In the moment when the video in streaming ends or the user minimizes the view, a list of recommended videos is displayed as we can see in Figure 91. Also there is available a “like” button under the video so that a simple feedback can be received from the user. It is a simplified version of the satisfaction survey from the first scenario.

All mockups of this particular scenario are listed below in order of appearance:

![Figure 88: DTT channel of TVC with multi-camera button](image-url)
Figure 89: Mosaic view of the available cameras

Figure 90: Live content full screen mode streaming
Figure 91: Recommended videos and feedback screen

- Flowchart of live content paper mockup version 3

Figure 92: Flowchart live paper mockup v3
6.3.2. The Digital Mockups

When we already had created three versions of paper mockups described above, we subsequently carried out an internal workshop (see section 806.1.1 of this document) with the objective of choosing one of the alternatives for the creation of the digital version of the mockup. The version chosen was “The Paper Mockup VERSION 2” and based on its interface architecture, we created the first version of the digital mockup.

The methodology used for creating this was a “Clickthrough Mockup”. This type of mockup permits link various mockups’ display screens through hyperlinks so that the user can see what is hiding behind a certain button or link. Technologies used in creation of this mockup were html, css and JavaScript code. As in the case of the paper versions, digital mockups were created for both on-demand and live content.

The flowchart of both scenarios of the digital mockups is shown in the following pages. As it is an exact digital version of the paper mockup, the sequence and content of each display is the same, which is why no specific explanation will be provided.

It must be added that all visual elements are only images and no video streaming is available in this version of the digital mockup.
6.3.2.1. Digital Mockup VERSION 1

- ON-DEMAND content

Figure 93: Flowchart of on-demand content digital mockup
• LIVE content

Figure 94: Flowchart of live content digital mockup
6.3.2.2. The Digital Mockup VERSION 2

After completing the first iteration of the user testing, we undertook a second workshop, this time between two consortium partners – TVC and i2CAT, with the objective of improving the whole evaluation process and the interface of the digital mockup VERSION 1. For more details about the workshop, see section 6.1.2.

The enhancements of the digital mockup were only related to the visual part of the mockup, so that the interface will be more user-friendly and will reflect the future pilot as much as possible.

Thus, the principal improvements made in this iteration are the following:

- The photos have been replaced with real videos so that the experience for user during the testing will be as close as possible to the actual application
- The video is shown totally in the full screen mode, even for high-resolution television sets
- The evaluation questionnaire has been expanded adding as the final part the System Usability Scale (SUS), which is a 10 item questionnaire with 5 response options (from strongly disagree to strongly agree) which aims to measure perception of usability of an interface.

The enhanced digital mockup resulting from above improvements is shown in the following pages. As the flow of the mockup is the same as the principal version, no flowchart will be shown. Moreover, it consists of a common version for both, live and on-demand content.

Figure 95: DTT channel of TV3
Figure 96: Initial page of TV3alacarta application

Figure 97: Multi-camera part of the application
Figure 98: Video in full screen mode (camera 1)

Figure 99: Mosaic view of available cameras
**Figure 100**: Video in full screen mode (camera 4)

**Figure 101**: Minimized view of the content
6.3.2.3. The Digital Mockup VERSION 3

After having performed a second iteration of user testing with the results documented in Annex 9.3.2.1, we decided to enhance the digital mockup and create yet another version of it, for the third and last user testing.

First of all we added one more video, the one that is displayed through the actual DTT channel, with the objective of giving more authenticity to the mockup. This video does not dispose of the multi-camera view, so it will be used only in the regular part of the application.

![Figure 102: DTT channel of TV3](image)

Furthermore, the same video is streamed in the initial page of the application (Figure 103) in the minimized view, so that the user can see the preview of what is displayed on TV, while navigating through the application.

In the same page we have changed the multi-camera button situated in the left-bottom corner, by adding an explicative text “multi-camera” next to the camera icon. As there is still no icon associated to the multi-camera function, for a better understanding it is necessary to provide that explanation.
When we enter the multi-camera part of the application by clicking the proper button situated in the left-bottom corner, we can see the list of videos that has available multi view for both, live (left side) and on-demand (right side) content.
After clicking on particular content, the video is displayed automatically in the full screen mode, using a default camera (if there is more than one). To switch the view there is a mosaic button available in the left-top corner, which alternates the screen to one from the Figure 106.

Figure 105: Video in full screen mode (camera 1)

Figure 106: Mosaic view of available cameras
Here the process is the same as in Figure 105 and it can be repeated as many times as desired. When we decide to leave the full screen mode, we click on the minimize button situated next to the multi-camera button and the video is visualized as it is shown in Figure 108.

Figure 107: Video in full screen mode (camera 3)

Figure 108: Minimized view of the content
Finally, we have also added a “Help” page accessible from the bottom part of each page with valuable information about the multi-camera option, like what is the multi-camera and how to use it.

![Help page](image)

Figure 109: Help page
6.4. Evaluation

The next and last step of this task was the evaluation of the mockups. As explained previously, only the digital mockup was used for the evaluation process as it permits interaction between the user and the service, using a click-through system that connects pages with each other.

For the evaluation process, the mockup was presented to groups of altogether nine end-users or professionals in three iterative rounds. Details are provided in the subchapters below. Each participant was asked a couple of short questions, both open and multiple-choice, to collect as much feedback as possible and incorporate it in the iterative development process of the service.

In the first part of this section the questions used in the evaluation survey are shown which were presented to all participants of the digital mockup testing. After collecting all valuable responses, we analyzed with diligence the results of the evaluation to be as comprehensible and outlined as possible for a quick and short feedback in the second part.

6.4.1. Gathering data

As the method of gathering data for the Spanish pilot we decided to implement an evaluation questionnaire, composed by multiple-choice questions, open questions and tasks to complete by the user. In the following sections two versions of this questionnaire are presented. First one (“The first Questionnaire”) has been used for the first iteration of user testing carried out in TVC buildings with participation of one internal user. On the other hand, the second questionnaire (“Second version of Questionnaire”), which is an expanded version of the former one, was used for the second and third iteration of user testing, which took place in Castelldefels with the collaboration of i2CAT. Users that participated in these tests were internal employees of this foundation.

6.4.1.1. The first Questionnaire

In the case of the digital mockup, where we can already attain a certain degree of interaction between the user and the interface, it is recommended to carry out a summative usability test to be able to identify functional problems and measure the usability of a completed system.

The evaluation process is divided into questions and tasks to complete. Each participant will be asked to perform some tasks during the testing and the observer or evaluator will assess them or measure the time of its realization. Also during the whole testing there is a list of questions for the evaluator to respond according to the user’s behavior and performance. Finally, after ending the process of navigating the service by the user, there will be asked couple more questions to the participant about the overall functioning and satisfaction of the service. [4]

The questionnaire sheet presented to each component of the testing group is listed below.
EVALUATION QUESTIONNAIRE OF TV-RING MULTI-CAMERA DIGITAL MOCKUP

Questions for evaluator (during the testing):
1. Which part (display) provokes more questions from the users and why?

2. Which screen provokes more confusion and why?

Tasks (during the testing):
1. Find the multi-camera option \( \Rightarrow \) seconds
2. Enter the multi-camera live content \( \Rightarrow \) seconds
3. Enter multi-camera on-demand content \( \Rightarrow \) seconds
4. Switch the view in multi-camera option \( \Rightarrow \) seconds

Questions for participants (after the testing):
1. Where would you put the multi-camera button?
   a. In the main menu bar
   b. I wouldn’t change it
   c. Other (specify): ............................................

2. Can you name some missing functions/buttons?

3. When you start the multi-camera content you prefer:
   a. Start from default content in the full screen
   b. First choose the view from mosaic (or similar view)
   c. Other (specify): ............................................

4. What were the aspects that turned the mockup easy or difficult to understand?

5. List the sequence of buttons you need to use to switch the camera in multi-view:
   a. 
   b. 
   c. 
   d. 
6.4.1.2. Second version of Questionnaire

After the second workshop, the one conducted between TVC and i2CAT (see section 6.1.2), the idea emerged of expanding the evaluation questionnaire by adding one additional part, the System Usability Scale, at the end of the questionnaire, leaving the rest unchanged. After the second phase of user testing, there is also a possibility of adding more tasks for the user, if any come out.

The System Usability Scale (SUS) is a questionnaire that aims to measure perceived ease of use and gives an overview of the subjective evaluations of the usability of any tool or system through its interface. It is very fast, but reliable tool for measuring usability. It allows evaluating a wide variety of products and services including hardware, software, mobile devices, websites and applications.[5]

SUS is a Likert type scale. To carry out this questionnaire, 10 statements are presented to the user, who then specifies the degree of agreements or disagreement with each of them on a 5-point scale. The scale is a symmetrical scale of agreement-disagreement, which means that there is equal number of positive and negative components. Likert scale also assumes that distances between each element are equal.[6]

- **Scoring SUS**

  1. For odd statements (positive declarations): subtract 1 from the answer of the user
  2. For even elements (negative declarations): subtract the response from 5
  3. It creates a scale of all values from 0 to 4 (4 being the most positive response)
  4. Sum converted responses for each user and multiply the total by 2.5, so the range of possible values is converted into 0-100 (instead of 0-40) for each user.

- **Values interpretation**

The calculated values for each user are between 0 and 100, still they do not represent the percentages and should be considered only in terms of its percentile ranking.

The average SUS score is 68. Thus, a score above 68 would be considered above average and anything below 68 is below average. However, the best way to interpret the results is to turn them into a percentile rank through a process called normalization.[7]

The second version of the questionnaire used in the second and third iteration of the user testing is shown in the following pages.
EVALUATION QUESTIONNAIRE OF TV-RING MULTI-CAMERA DIGITAL MOCKUP

Questions for evaluator (during the testing):
1. Which part (display) provokes more questions from the users and why?

2. Which screenprovokes more confusion and why?

Tasks (during the testing):
1. Find the multi-camera option → [ ] seconds
2. Enter the multi-camera live content → [ ] seconds
3. Enter multi-camera on-demand content → [ ] seconds
4. Switch the view in multi-camera option → [ ] seconds

Questions for participants (after the testing):
1. Where would you put the multi-camera button?
   a. In the main menu bar
   b. I wouldn’t change it
   c. Other (specify): ...........................................

2. Can you name some missing functions/buttons?

3. When you start the multi-camera content you prefer:
   a. Start from default content in the full screen
   b. First choose the view from mosaic (or similar view)
   c. Other (specify): ...........................................

4. What were the aspects that turned the mockup easy or difficult to understand?

5. List the sequence of buttons you need to use to switch the camera in multi-view:
   a.
   b.
   c.
   d.

Evaluator’s comments:
6. How do you feel about the following statements regarding the application?

<table>
<thead>
<tr>
<th>Questions</th>
<th>Strongly Disagree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I think that I would like to use this system frequently</td>
<td>1</td>
<td>2  3  4  5</td>
</tr>
<tr>
<td>2. I found the system unnecessarily complex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. I thought the system was easy to use</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. I think that I would need the support of a technical person to be able to use this system</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. I found the various functions in this system were well integrated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. I thought there was too much inconsistency in this system</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. I would imagine that most people would learn to use this system very quickly</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. I found the system very cumbersome to use</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. I felt very confident using the system</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. I needed to learn a lot of things before I could get going with this system</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Table 16: After test questions*
6.4.2. Outcome

6.4.2.1. First iteration of user testing

In the first iteration of user testing of the Spanish pilot as an interface we have used the first digital mockup (see “Digital Mockup VERSION 1”) and as a gathering data method we have implemented the “The first Questionnaire”. In this trial iteration, carried out 6th of March of 2014, only one user was participating, an internal employee of TVC. As it was explained in the “Gathering data” section, we used three types of questions. First of all, four tasks have been presented and the time of its realization has been measured. Secondly, a couple of multiple-choice and open questions were asked to the user. Additionally there were also two questions targeted directly to the evaluator regarding the overall performance of the user. After completion of all three parts and answers registration (see Annex 9.3.1.1 for full answer sheet), we were able to reach the following observations.

First of all, the concept of multi-camera is still unknown, which means that only a logo of camera is not enough to encourage entering, as it might be not clear for a new user. To enter the multi-camera application there should be a button with the name “multi-camera”. The important thing repeated many times by the testing user was the existence of an exit button in every screen (even in the menu bar of the full screen mode), so that in every moment the user can leave the application and return to the DTT channel. The principal menu should be always the same, adding the multi-camera button to it. While entering the multi-camera application there should be highlighted videos of both on-demand and live content and an option to enter another screen with all available videos for live and on-demand content (separated displays). Also there should be a clear differentiation between the button and the logo, especially in the case of multi-camera. There has to be made a specification if it works only as the information for the user (logo) or gives them an option (button). For example, while navigating in the initial page of the multi-camera service, the logo of the multi-camera should be on the video, not aside, so that it is not mistaken with the button.

A very important point of view was made in terms of the type of the selection of each item as the digital mockup was made using a computer so every choice is made with the mouse pad, in comparison with the future service that will be navigated using a remote control. This brings considerations like minimization of the number of buttons so that the experience is easier and the user can choose different options faster.

In addition to functional comments that the user facilitated us, he also mentioned design notions, so that the interface is more user-friendly (different colors, etc.), but those are not the consideration of the testing as the objective is to examine the functionality of the interface.
6.4.2.2. Second iteration of user testing

After successfully completing the first evaluation process, we carried out a workshop between two consortium partners (see “Workshop between TVC and i2CAT”) to discuss possible enhancements in the mockup and the assessment method. As a result, we obtained the “The Digital Mockup VERSION 2” and in terms of the evaluation, we expanded the initial questionnaire by adding System Usability Scale (see “Second version of Questionnaire ”). Both of them were used in the second iteration of the user testing.

This iteration was carried out in collaboration with i2CAT, on 15th of May of 2014 in Castelldefels. The testing was performed on four users on an individual basis, which were internal employees of the organization. Full answer sheets of all four users are listed in the Annex 9.3.2.1.

Due to various questions asked to the users and personal observations of the evaluators, we were able to extract main issues of the interface, which are the following:

- The multi-camera button is not clear for users. As it is still a new option, people do not have any icon associated to it. Besides the icon type, it also should be more visible in the home page (bigger and highlighted)
- In the mosaic view of available cameras it was not intuitive for some of the users to click directly on one of the views to switch the camera
- The live/on demand screen split is not clear in the multi-camera initial page
- While watching a video in the full screen mode, the button that visualizes available cameras (mosaic view) is not visible enough
- There are too many steps to arrive at the mosaic view, especially if you are particularly interested in the multi-camera content
- Users lacked some kind of explanation or tutorial of what the multi-camera is and how to make use of it
- While watching the video in the full screen mode, it was inconvenient for users that the menu bar and other buttons were disappearing while inactive. They would prefer to have the button that switches the view available at any time
- Users would like to see a preview of what is displayed in the DTT channel while navigating the application

Most of the users would not change the location of the multi-camera button, and while asked how they prefer to start watching the multi-camera content, they stated predominantly that they would prefer to see the mosaic view first so that they can directly recognize available cameras.

On the other hand, we also have carried out tasks that measure quantitative aspects of the usability, i.e. the time of its realization, which measures implicitly the level of difficulty when it comes to navigating.

In the following table we can see the time (in seconds) of performing four tasks by each of the users and the average time of the task.

<table>
<thead>
<tr>
<th>Task</th>
<th>User 1</th>
<th>User 2</th>
<th>User 3</th>
<th>User 4</th>
<th>AVERAGE TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>Find the multi-camera option</td>
<td>36</td>
<td>20</td>
<td>16</td>
<td>16</td>
<td>22</td>
</tr>
<tr>
<td>Enter the multi-camera live content</td>
<td>20</td>
<td>35</td>
<td>12</td>
<td>12</td>
<td>20</td>
</tr>
<tr>
<td>Enter multi-camera on-demand content</td>
<td>22</td>
<td>15</td>
<td>7</td>
<td>7</td>
<td>13</td>
</tr>
<tr>
<td>Switch the view in multi-camera option</td>
<td>40</td>
<td>45</td>
<td>17</td>
<td>10</td>
<td>28</td>
</tr>
</tbody>
</table>

Table 17: Task time in seconds of the second iteration of user testing
To respond previous issues, we were able to extract following recommendations for the digital version of the mockup, so that the next iteration of the testing can be carried out:

- Add hovering text to multi-screen button in main page, instead of a simple icon of camera, so that the button will be more intelligible, as there is still no symbol associated to the multi-camera option
- While displaying the video in the full screen mode, change the multi-screen icon from the current ‘video-camera’ icon to a ‘mosaic of video-cameras’ icon, for better user understanding
- Add text titles on top of multi-camera page (live/on demand screen) to clarify the distinction between the two columns
- Add a “Help” page accessible from the bottom part of each page with information about how to use multi-camera function
- Add one more video displayed as the one from the DTT channel to give more authenticity to the mockup. Moreover, add the preview of the same video while navigating the application.

The SUS score of the application in the second iteration of mockup testing was 77.5 (see Annex 9.3.2.2 for the calculation). This is already a rather good score and it is above the average. It suggests that only a handful of minor improvements are required to the final version of the mockup.

Additionally, we also were able to extract recommendations for the future development of the pilot that cannot be implemented in the mockup, due to its particular navigation through mouse pad and its simplicity:

- There should be some kind of legend that the user can access at any moment, but that do not disturb in the experience, which explains the significance of each button from the remote control (red button, green button, etc.). The legend should be based on commonly expected behavior of remote control commands (like: green button – enter, red button – exit)
- Enable the “Search” function at the top of the first screen
- Add a short 2-3 slide tutorial that tells the user how to use the multi-camera function when the application is accessed for the first time.
6.4.2.3. Third iteration of user testing

The third and last iteration of user testing, carried out on 16th of June, 2014, was conducted in the same conditions as the previous one, i.e. in i2CAT office in Castelldefels with participation of four internal employees examined on an individual basis (for full responses check Annex 9.3.3.1). This time, the third and the last version of the digital mockup was tested, after deploying enhancements and recommendations arisen from the previous iterations. The methodology implemented for measuring the usability remained the same, i.e. the second version of questionnaire was used.

In the following table we can see the results of four tasks performed by each user and time of its realization in seconds:

<table>
<thead>
<tr>
<th>Task</th>
<th>User 1</th>
<th>User 2</th>
<th>User 3</th>
<th>User 4</th>
<th>AVERAGE TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>Find the multi-camera option</td>
<td>15</td>
<td>5</td>
<td>10</td>
<td>15</td>
<td>11</td>
</tr>
<tr>
<td>Enter the multi-camera live content</td>
<td>15</td>
<td>20</td>
<td>13</td>
<td>12</td>
<td>15</td>
</tr>
<tr>
<td>Enter multi-camera on-demand content</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>12</td>
<td>11</td>
</tr>
<tr>
<td>Switch the view in multi-camera option</td>
<td>24</td>
<td>20</td>
<td>25</td>
<td>25</td>
<td>24</td>
</tr>
</tbody>
</table>

*Table 18: Task time in seconds of the third iteration of user testing*

Comparing the results of second and third user testing we obtain the following diagram:

![Diagram of the test results](image)

*Figure 110: Diagram of the test results*

We can clearly observe that for each of four tasks, the time of its realization decreased significantly proving an important enhancement in the mockup, especially in erasing the user pain point in finding the multi-camera function. Only by adding an explicative text to the multi-camera option in the main page, we managed to reduce the time of the first task in 50%. The rest of the tasks have not suffered such a radical change, because as users have said, once you enter the multi-camera part of the application it is quite intuitive and easy to navigate.

However, half of the users in this third test felt that the multi-camera icon was still not highlighted enough: although it is one of the main functionalities of the application, the icon to access it is not different from the “Help” or “Back” icons. Changing the icon’s color or making it larger would solve this minor issue.
If the application is accessed from the multi-camera functionality icon at the main screen, it seems to make more sense for users to see the mosaic first, as the user is interested strictly in the multi-view option. However, users should know which of the cameras is the main one, so basic labels should be added for each camera, that would explain the characteristics and scope of each of them (i.e. “Main view”, “Messi’s view”, “Match highlights”, and so on).

The SUS score of the application in this last iteration of mockup testing was 89.375 (see Annex 9.3.3.2 for the calculation). This is considered to be an excellent score, indicating a very high level of usability of the test application.

![Graph showing the evolution of SUS score between tests 2 and 3]

**Figure 111:** Evolution of SUS score between tests 2 and 3

If we analyze the evolution of System Usability Scores between the testing session of May 15th and June 16th, we can see a sharp increase of the average perceived overall usability of the mockup application.

Finally, it is important to mention that we compare quantitatively only two last tests mainly for two reasons. First, we have added the SUS part of the questionnaire after the first testing. Secondly, the time of task performance is not comparable as in the second and third tests we have used videos instead of simple photos so the time of loading the video has to be added, which would create a delusion that tasks of first tests were performed faster.
6.5. Conclusions

For Task 3.2 we performed various successive steps starting from Deliverable 3.1 “Service and application concepts”, where all user requirements and key points for our service were included. At first three different versions of paper mockups were created as they are more flexible and easier to alter by any change in the design (cutting off or detaching pieces) as compared to the digital design, where the whole html has to be reproduced and checked every time.

After having chosen one final version from the three early paper mockups - which was paper mockup VERSION2 - the elaboration of the digital mockup were made based on this. As all the characteristics of the mockup had already been specified in the paper version, creation of the digital variant was very fast and agile. A usability testing of this digital mockup was performed as it permits the interaction between the user and the interface, allowing the potential user all possible options and functionalities. The testing was performed with nine individuals separately in three iterations, using only the digital mockup to capture the maximum of the functionality of the future service by providing an interactive interface.

The evaluation process was divided into questions (a special questionnaire) and tasks to complete. Thus, each participant was asked to perform tasks such as finding the multi-camera option or switching the camera view. The performance was assessed by the evaluator and the time of task realization was measured. Questions concerned factors like location of the multi-camera button, preferences about enhanced functions or general factors about the use of the interface. Other questions were flexible according to the user’s behavior and performance, such as which screen had “provoked more confusion for the participant”.

The last step of our research activity was to collect all valuable answers, analyze them with diligence and create a database of feedback and opinions for a continuous use in the iterative process of developing and enhancing the TV-RING service. All the answers of each participant can be found in the Annex section of the Spanish pilot. As a result we were able to extract valuable feedback from the users so that the service can be enhanced now. Moreover, thanks to mockup creation, we incorporated professionals’ decisions regarding design and functions of the future service.
7. Global Conclusions

**KU Leuven:** We have investigated two different applications in-depth: the recommender and the second screen quiz application. For the recommender it became clear that there are TV viewing patterns across households that can help improve recommender systems. The algorithms can improve by better predicting who will be in front of the TV; the interface designs we explored, can better suit the different viewing situations via specific content, graphical style, and interaction design.

For the second screen application it became clear that where possible, alternatives should be provided which cater to both the tech savvy and the less technologically skilled. When presenting questions or statements show them on both of the screens as this strengthens people’s trust in the application. Playing along with the application seems to keep people more focussed on the show and less prone to indulge in distractions like Facebook. However the amount of (cognitive) load they can cope with before the game itself becomes a distraction from the show is a delicate one.

It will be very interesting to see how both the (cognitive) load and the social interaction develop over a longer period of time, during the pilot phase.

**RBB:** The key players in the programme are the protagonists, and this should be reflected in the accompanying social media. Engaging with the protagonists offers the possibility of encountering young viewers in their own environment, as distinct from that of the ‘grown-up’ presenters and editors.

A TV application must be simple to use on the TV itself, rather than on a smartphone or PC. All functions should be reachable within a couple of clicks. Navigation should be straightforward and direct. In functional terms, if something is not achievable, it should be discarded.

For the target group, playfulness is of prime importance. Learning is not their main motivation, but of course it’s not bad if learning is part of the overall context, especially if it’s enjoyable. It’s not information which is in the foreground, but the fun which viewers can have with the app. Young people want to gain points, share their opinions, see their views represented and interact.

Once the content and functionalities were fixed through this approach, the digital mockup process has helped to find suitable information architecture and identify an innovative, remote-control and screen estate-optimized design solution for the application.

**TVC:** Through the entire deliverable we have seen the progress of service mock-ups, placing emphasis on their digital version, as it permits a high grade of interaction between the user and the interface. Thus, we have carried out three iterative usability tests of the digital versions with the participation of nine users in a separate way.

We have analysed measures of both quantitative and qualitative type to get to know the level of user satisfaction and the ease of navigation through the interface. In quantitative terms, we have measured the time of task completion, such as finding the multi-camera option or switching the camera of multi-view, and we were able to observe a pattern of decline in time for all four tasks, which validates the improvements in the ease of navigation and the clarity of the interface. It was possible by discovering the main point, which was finding the multi-camera function from the main page, as according to users, once you enter the multi-camera part of the application it is quite intuitive and easy to navigate.
On the other hand, analysing more qualitative aspects, we have discovered that most of the users does not have a clear idea of what multi-camera is and also that the visibility and diffusion of this function is not enough. Thereby, for the last iteration of the testing we have enabled a “Help” page with important information about the multi-camera and how to use it.

Finally, we additionally have applied the System Usability Scale (explained in the section 6.4.1.2) to measure perceived ease of use of an interface. For both tests (SUS was applied only for second and third) we have observed scores above average with an increasing pattern – 77,5 in the second and 89,4 in the third iteration.

It is also noteworthy that the testing would be more reliable if conducted using a remote control, and not a mouse pad. This has to be taken into account in future development of the application, giving an emphasis on minimizing number of buttons for an easy navigation with arrows, and also creating some kind of remote control legend where functions are associated to specific buttons.
8. Bibliography & References

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[3]. Explanation of number of participants needed for each type of testing http://www.userfocus.co.uk/articles/2-kinds-of-usability-test.html


[6]. Likert Scale http://en.wikipedia.org/wiki/Likert_scale

[7]. System Usability Scale http://www.measuringusability.com/sus.php
9. Annex I – Test results

9.1. Dutch pilot observation results from the paper mockups of the second screen application

**Code is bekend maar QR makkelijker en minder fouten als juist gebruikt**

G1: veel heen en weer kijken bij invoeren code

G1:M: ik vond de laatste (QR) het makkelijkste bij de 2e (code) kun je makkelijk fouten maken bij het overtypen en bij dat eerste (master) hebben we beide fouten gemaakt"

G2:J: De methode van te scannen zal wat minder fouten geven denk ik"

G3: Code, Voeren de code getrouw in wel veel op en neer kijken

G3: wijzend op de code So: die is wat er nu meestal gedaan wordt. Af en toe als je geen goed toetsenbord hebt gaat dat niet zo vlot"

G4: A: het tweede (QR) was het eenvoudigste dat iedereen zijn eigen code scant"

G4: I: Dat derde (Master) dat zijn meer stappen en dat is niet nodig eigenlijk"

G4: A De code is ook iets waar ik van digitale TV al mee vertrouwd ben dat van tablet op tablet ik ben ook geen tablet beheerder"

G5: Code, er wordt nu wel druk van TV naar Tablet gekeken

G5: QR, L: Oh ja nu moeten we allemaal scannen en iedereen scant vlot zonder problemen"

G5: L: De code vond ik eigenlijk de gemakkelijkste"

G5: Kik ook want als maa 1 iemand moet scannen is de vraag heb je dat nu al gedaan?"

G5: T: Maar bij de QR moet je niets intypen L: "Maar dan moet je gaan staan" K: "Dat typen is toch gemakkelijk" T: "Ja maar je moet wel twee keer kijken"

G5: L: Dat eerste met het hoofdapparaat nee want wie gaat dan het hoofdapparaat zijn?"

G5: T: De QR op 1 waarom veel moeite doen als het ook gemakkelijk kan"

**Iemand aanwijzen als 'hoofdgebruiker' is onhandig**

G2: J: Met het hoofd apparaat is vervelend want je moet iemand de functie geven van jij bent de hoofdgebruiker" A: ja wie weet komt dat later ook nog terug dat wij dingen aan hem moeten doorgeven dan is het makkelijker als iedereen zijn eigen heeft"

G3: Vervolgens kleine discussie dat ze beide hoofd device willen zijn

**Account VS Anoniem**

G1: Marie: Geen facebook want als je voor het eerst quizt en je zou bijvoorbeeld een super slechte score halen dan wil je niet dat iedereen het ziet"

G2: A: Ik wou al eens graag mee spelen met de canvascrack(ging niet vanwege account) omdat je denk dat kan ik beter dus zelfs alleen zou ik dat al eens doen"

G3: Si: wat ik zou kiezen hangt er van af als ik het vaak zou spelen en het was mijn favoriete quiz dan zou ik wel een quiz account maken of facebook om met: tegen vrienden te spelen als die denken dat ze beter zijn"
G3: Soals facebook enkel functioneert als een login zou dat nog wel handig zijn"
G4: A: niet facebook want niet iedereen heeft facebook"
G5: L: ik zou direct inloggen met facebook dat is het eerste dat ik zou doen"
G5: K: ik wil niet dat mijn punten op facebook verschijnen" L: "dat kun je misschien nog wel kiezen"
G5: T: Het maakt mij niet zo veel uit behalve dat facebook dat iedereen dan dingen gaat zien ik heb daar zelf een hekel aan.
G5: K: ik zou een avatar kiezen voor de eerste keer maar als ik de quiz regelmatig zou spelen zou ik toch de quiz account nemen"
G5: B: Facebook misschien als je regelmatig meespeelt maar geen quiz account heb al accounts genoeg"
G5: L: Bij facebook kun je misschien vergelijken met vrienden of zo dat lijkt me dan ook wel leuk"

Uitleg wordt nauwelijks gelezen

G1: M: "Je ziet dit papier en dan denk je ik moet ook scannen en dat doe je dan al voor dat je het eigenlijk goed leest"
G3: Master, Verwaring over het scannen van de code de uitleg op TV werd niet gelezen en ze scannen beide de code van TV
G3: So: Misschien is dat eigen aan onze generatie maar als ik zo een layout zie (ID) dan kijk ik eigenlijk niet meer naar het bovenste (uitleg)"
G3: Si: ik zou denk ik een naam opgeven inloggen met facebook en dan een prentje kiezen en dan realiseren dat ik een prentje heb maar geen facebook en naam"
G4: Wederom wordt er niet naar de aanwijzing op de TV gekeken l: ik denk dat het persoonlijk is dat iedereen dat moet scannen"
G5: Master, iedereen kijkt even naar de tablet en begint dan gelijk met scannen van de QR code
G5: Jullie scannen allemaal de code?" K" ja dat moet toch zo?" L: "tenzij je de mogelijkheid hebt om via wifi alles door te linken"
G5: Pas als ze op de TV gewezen worden zien ze dat slechts 1 persoon moest scannen T die de eerste scanner was claimt het wel gezien te hebben. T: ik was toch degene die hem scande"

Groot verschil tussen hoe personen met tablets omgaan qua kennis

G1: scannen van de QR code gebeurt door vooruit leunen met de tablet
G2: A: ik zou eerder jochen laten scannen omdat hij het meeste af weet van tablets"
G2: scannen gaat door op te staan en naar de TV te lopen
G2: scannen vd tweede code is wel gelijk duidelijk maar ze scannen wel met de verkeerde kant vd tablet
G2: Voor J en M gelijk duidelijk wat het settings icoon doet dit zouden ze ook gelijk bekijken, voor A is het niet duidelijk
G1: Settings icoon is wel iets dat actie uitlokt voor beide personen G: "ik zou eens op deze klikken om te zien wat dat is"

G4: QR, scan van zorgt voor verwarring ze drukken op scan maar hebben niet door wart ze zouden moeten scannen

G4: Code, ook de code zorgt voor wat verwarring An probeert de code van haar eigen digitale TV in te geven; Er wordt dus niet op de TV gelet.

G4: Ze weten niet wat het instellingen icoontje doet maar An drukt er wel vrijwel direct op Aik dacht dat dat gewoon was om mijn kleur te bevestigen""

G5: Ze hebben wel gelijk door dat het icoontje voor instellingen is. T is ded enige die er ook gelijk op drukt.

G5: K vindt dat het alternatief met 'wijzig ID' wel duidelijker is

Beschikbaarheid van devices

G2: J op dat gebied lopen we nog een beetje achter we hebben 1 tablet en 1 laptop <NAKIJKEN>

G3: So: Zouden zeker meedoen als we allemaal een tablet hebben of anders per twee meedoen"

G4: A: als mijn dochter dat begint te doen ga ik nog een tablet aanschaffen"

G5: B: je moet dan wel idereen een tablet hebben natuurlijk"

Als vragen zowel op TV als tablet staan wordt er meer naar de tablet gekeken

G1: 1st screen, bij beantwoorden vraag korte blik op scherm en dan druk op tablet

G1: 2nd screen langere blik op tablet weinig kijken naar TV

G1: beide, marie voornamelijk tablet gericht gwen kijkt op en neer

G3: beide, geen blik op TV maar die was ook een fractie later dan de tablet

G4: Beide, Ze kijken enkel aandachtig na de tablet.

Deelnemers willen vaak _ook_ dingen op de TV zien om het meer een gezamenlijke ervaring te laten blijven

G1: G: "beide is het beste dan hoef je niet heen en weer te kijken" "Het is leuke als je niet alleen op je tablet hoeft te kijken. Dan heeft het niet veel nut dat je op TV aan het spelen bent."

G2: A: De laatste optie(alles tablet) is eigenlijk stom waarom staat die grote TV er nog bij als er niets op staat""

G2: M: Liever alles op TV dan alles op Tablet omdat je toch samen aan het spelen bent en dan samen een scherm hebt""

G2: J: ja gezamenlijke punten" A: "anders zit ge eigenlijk voor uzelf bezig"

G4: I: Ik heb ze liever alleen op de tablet dan kun je vlugger "wijst op tablet" A: "ja ik ook"

G4: A: je bent wel zo geneigd alleen hier te kijken als het daar staat "kijkend naar tablet" I" ja dat is waar""
G4:AMm ja dan toch misschien alles op de TV als je samen een quiz doet kijkt iedereen op zn tablet en alles staat op het tablet dan kijkt niemand meer naar TV dat is zo ja"
G4:Aliever op de TV voor de samenhorigheid"

**Tablet om geen 'rommel' op TV te hebben/Handeling**

G3:So:Voor een televisie programma misschien zo weinig mogelijk op de TV"
G3:So:als het echt een programma is op TV zoals vroeger denk ik dat je het het liefst gewoon volgt zet spel op de tablet en dat is de TV"
G3:So aangezien je toch zoveel op de tablet kan zetten als je wilt is het handig als het daar ook staat"
G5:L:Als het maar op 1 komt dan liever de tablet om dat je daar ook je handeling moet doen"

**Beide is populair vooral vanwege de duidelijkheid**

G2:J:De beste vind ik gewoon die met beide" A:"ik ook" M:"ja ik ook""
G2:A:voor mij is dat omdat ik een bril heb om naar TV te kijken ver maar eigenlijk niet om te lezen nu gaat het omdat alles mooi groot is maar als mn tablet klein is dan moet ik eerst de TV bekijken en dan de bril afdoen en de tablet bekijken"
G2:J:ik vind het fijn dat als er op TV en tablet hetzelfde staat dat je dan zeker bent. als er nu op de tablet enkel ABCD staat ben je niet zeker met synchronisatie problemen enzo"
G2:J:Ben ik nog voor de volgende vraag aan het duwen of de vorige met enkel TV was er dan totaal geen feedback waar je mee bezig was"
G4:S:ik heb het liever ook op de tablet want ik zie het niet goed op de TV"
G5:K:bij de eerste was het ambetant dat de vraag niet op de tablet erbij kwamen"
G5:B:Je bent op TV aan het volgen je moet een reactie geven op de Tablet dan is het gemakkelijk als het juist hetzelfde is"
G5:L:Ja anders oet je nog een keer terug kijken op de TV van was het nu A of B"

**Voor score display verkiest vrijwel iedereen duidelijkheid boven 'fancyness’**

G1:de getallen zijn favoriet voor de precisie het podium voor de ranking de iconen zegt niets
G2:M:getal scores dan weet je hoeveel je hebt" A"ja inderdaad de andere zijn subjectief" J"ik heb wel graag cijfers"
G2:J:ik vinde die tweede icoon scores" M"die zijn mooi" J"nee ik vind ze juist onduidelijk"
G3:SoGetallzen zijn het duidelijkst maar het is wel leuk om eens wat anders te hebben en het is gewoon voor de ontspanning en niet dat ze met iets wetenschappelijks bezig zijn"
G5:L:Getallen omdat je dan precies ziet hoeveel je achter staat of die heeft é punten verschil met de laatste"

**Podium leuk maar wel zorgen voor het afvallen van 4e en meer spelers/Inclusie!**
G1: Je kunt wel getallen op het podium zetten maar dan valt de 4e zo weg maar ik vind het podium zo wel heel goed voor het einde"

G2: A: ik vind het podium dat is niet fijn we zijn nu maar met drie maar als je dan met 4 of 5 speelt en er zijn een paar kinderen bij dan vallen die eraf"

G3: So het podium is ook wel goed gevonden maar dan valt er altijd eentje af"

G4: S: Het podium is klassiek"

G4: A: Je ziet bij het podium in 1 oogopslag wie er aan het winnen is" l" het duidelijkste"

G4: A: Het stimuleert"

G5: T: podium" B:" podium" L" dat vind ik gelijk weer zo macho" T" ja wat had je dan verwacht?"

G5: T: bij het podium zie je direct wie eerste staat" B:" ja maar het liefst nog wel met punten onder de blokjes"

G5: L: Gelijk de mannen zeggen een combinatie tussen podium en score zou ook gaan"

G5: Ze zouden het wel allemaal leuk vinden als bij het podium niet alleen de eerste 3 spelers in beeld komen

**De gokvraag vindt eigenlijk iedereen leuk**

G1: M: De gokvraag lijkt me leuk want daar kun je echt een spel van maken zo wat tactisch spelen dat is helemaal niet saai denk ik"

G2: A: "het voorspellen is het leukste eigenlijk"

G3: S: Dat is best wel tof dat maakt het spannend"

G3: S: dat gokken is wel neig omdat je dan nog meer gaat inleven in het spel je gaat hardere supporteren"

G4: A: de gokvraag is minder stresserend vind ik je hebt meer tijd om te doen dat is meer strategisch dit is op het moment snel zijn"

G4: I/ daarmee hoef je het ook niet perse te volgen als je even naar de keuken gaat kan je nog steeds meedoen en bij dat andere mag je niet van uwe stoel"

G5: L: Wat leuk is aan het gokken is dat je dan tijdens de quiz kunt zeggen hé hé die van mij staan voor he"

**De visual/audio cue vindt iedereen interessant maar vraagt aandacht en leidt soms af van de show**

G1: M: Als je op een que moet wachten ben je daar zo op aan het letten dat je de quiz niet meer volgt"

G1: G: ik vond audio wel beter want dan moet je echt luisteren en bij video kijk je alleen tot het op het scherm komt"

G2: J: ja de andere vond ik niet leuk eigenlijk omdat je dan niet meer op de quiz aan het letten bent"

G2: A: ik vrees een beetje dat als daar extra punten mee gewonnen kunnen worden dat dat het minder ontspanne maakt"
Iedereen is erg fanatiek

G1: visueel, opperste concentratie op het TV scherm vinger in de aanslag boven de tablet

G2: visual, kijken aandachtig naar scherm J en M hebben de hand boven de tablet A niet

G2: audio, hier zit juist A met de vinger boven de knop iedereen kijkt wel weer geconcentreerd

G2: ook dit keer gelijk gelach M roept direct ik was de eerste A volgens mij ook maar ze hadden het nog niet eens gezegd en geeft M een duwtje

G2: zodra het lijkt dat het woord tijger dadelijk zal vallen zit iedereen in de aanslag

G3: Sofie juicht als ze het goed heeft, Gelach
G3:Tijdens de uitleg: So: "sowieso de tablet kapot"
G3:alvast een fanatieke blik van So naar Si die ook beantwoord wordt
G3:audio, ze kijken beide geconcentreerd Sofie heeft de hand in de aanslag
G3:zodra ze door hebben dat tijger zal komen voorovergebogen en steeds verder vooroverbuigen met de hand in de buurt van de knop
G3:Sofie drukt net iets later en maakt een 'verdorie' gebaar
G3:So: Dit zou mijn lievelings opdracht zijn van de hele quiz zo de spanning je voelt dat"
G3:visual, hier ook volle aandacht op het scherm tijdens het fragment
G3:Sofie drukt dit keer net iets sneller en is zichtbaar blij
G4:Voor de visuele que begint A al direct met een vinger boven de knop
G4:Als de D in beeld komt drukken ze alledrie vrijwel meteen ja en er volgt gelach"
G4:Vijfdaarna drukken ze allemaal A begint weer te lachen
G5:Lach bij B als hij de enige is die de vraag goed heeft
G5:T heeft het goed en juicht enthousiast
G5:T:Handen op de knop"
G5:L heeft de hand boven de knop de rest niet maar iedereen kijkt wel geconcentreerd"
G5:L heeft de hand boven de knop nu ook boven de knop
G5:T:Ja ik was eerst" er volgt nog wat nagepraat"
G5:Audio, nu iedereen behalve T de hand boven de knop
G5:L geeft ook antwoord op de quiz vraag heeft het fout en moet lachen
G5:Vrijwel iedereen drukt gelijk en ze moeten allemaal lachen

Tijdens de vragen wordt veel gepraat van te voren en veel gelachen na afloop
G1:gelach nadat beide de vraag fout hadden
G1:Gelach na het afdrukken net zoals bij de video que
G2:gelach na de uitslag A en M
G2:discussie over de 2e vraag M dat weet ik absoluut niet" A "ik kies zout"
G2:J ik kies bitter A nee dat zeker niet M maar je hebt al gedrukt"
G2:Gelach als blijkt dat niemand het goed heeft
G2:discussie over de 3e vraag A en M kiezen iets J twijfelt M:je mag het zelde nemen ook he"
G2:2nd, hier wordt enkel door An nog even heel kort naar de TV opgekeken na het beantwoorden van de vraag
G2:wederom gelach als niemand het goed heeft
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G2:A: zeg maar welke quiz is dat hier ergens de canvascrack?"
G3:rustig overleg Si:volgens mij bestaan er helemaal geen bruine M&Ms" So:"jawel ik kies geel want ik weet het echt niet"
G3:1st, Blik eerst op TV toch beetje heen en weer kijken
G3:korte discussie Si: zeg italie" So:"hoe weet je dat?"Si:"ja dat denk ik gewoon" So:"ik zeg griekenland nee japan nee toch griekenland"
G4:over de ouzo vraag A: dat is een gemakkelijke"
G4:Si: kijkt erg uitgebreid naar de TVterwijl ze nadenkt
G4:Nadat ze het allen goed hadden volgt gelach en een 'ja' er wordt ook nog even nagepraat over de vraag
G4:AOei dat vind ik een moeilijke"

Het concept roept voor veel deelnemers een familie/gezelschapsspel gevoel op

G2:J:ik kijk eigenlijk nooit quizen maar als je daar interactief aan mee kan doen zou ik dat wel doen. Bijvoorbeeld een avond bij vrienden dan gaan we nu een gezelschap spel spelen maar dan zouden we nu kunnen zeggen we gaan mee doen aan de pappenheimers"
G2:JIn plaats van TV kijken wordt dat al een soort van gezelschapsspel"
G3:So: ik wil wel graag dqt het er komt het is eigenlijk een soort gezelschapsspel terwijl dat je naar de TV kijkt dan hebben ons mama en papa ook niets meer te zeggen"
G3:Si:dan mag ik ook gewoon door de TV praten" So:"ja dat zou meer een belevenis kunnen zijn van het gezin"
G3:Je kunt normaal ook wel roepen naar de TV maar als je nu iemand hebt ingemaakt ofzo dat geeft ook extra stof aan tafel, Simon: ja het geeft extra waarde
G5:B:"we spelen soms monopoly en dan is dit een leuk alternatief"

Tegen Elkaar vs Tegen een Groep

G1:M: het zou ook wel leuk zijn als je samen kunt winnen"
G1:G het zou wel leuker zijn als je die anderen kent dus als er een optie is dat je kunt afspreken zou dat goed zijn maar als je niemand anders vind kan het ook wel tegen vreemden"
G2:M:als een team spelen zou ook leuk zijn" A:"ja dan zit ge echt samen bezig"
G3:So:Het roept een huiselijke sfeer op en dat is wel fijn als je gewoon met zn allen Tv kijkt is dat niet zo gezellig maar als je dan samen meespellet is dat wel leuk dus doe maar een beetje voort"
G3:Over spelen tegen anderen so:dan moet wel alle software en hardware er zijn want als het allemaal kei lang duurt pff het moet echt smooth zijn en dan is het wel leuk"
G3:Quizen onder elkaar is leuker dan quizen tegen anderen
G5:Tegen andere groepen spelen? B:dat is nog plesanter he"
G5:Ber is niks zo leuk als paintballen tegen vreemden" "Je gaat minder compassie hebben tegenover mensen die je niet kent"
Wel niet meedoen:

G4:A: ik vond het leuk maar ik ben wel niet zon quiz man ik weet niet of ik dat zou doen"

G4:Aik kijk daar wel na(doelend op de pappenheimers" maar enkel als amusement en ontspanning niet om na te denken over de vragen"

G4:I wat leuk zou zijn is als je altijd eerst het antwoord kunt geven voor dat ze dat op TV geven"

G4:Ahet kan ook wel verslqvend zijn"

G4:S:ja ik heb ook vrienden zo van met die boerderij dat kan echt verslavend zijn"

G4:Aik wil ondertussen eigenlijk ook nog wat anders kunnen doen en zo quizen of spelletjes vind ik eigenlijk een beetje tijd verlies"

G4:A:maar het concept is op zich wel leuk misschien ook voor mensen die niet zo sociaal zijn"

G5:L:"ik zou het zeker spelen"

G5:L:Soms doe je sowieso al mee met de vragen en als je dan zo echt je score kunt bijhouden maakt het toch wel extra leuk"

G5:L:en als je via facebook of gewoon tegen andere zou kunnen spelen zou ik dat iedere avond doen"

Extras

G2:J:ik denk dat er meer mee te doen valt je hebt een vrij powerful device in uw hqnden en het is eigenlijk nogal stom om dat gewoon voor druk knoppen te gebruiken"

G2:J:je kunt misschien iets met geluid doen meezing programma's of zoiets "je hebt ook een multi touch scherm daar kun je misschien puzzels mee doen"

G2:M:ja dat je bijvoorbeeld bij de slimste mens ook de puzzel kunt mee spelen"

G2:J:of misschien voor de mensen thuis hints toeveogen. Dat je een hint kunt krijgen maar dan is je vraag nog maar 3 ipv 5 punten waard"

G2:extra suggestie om een foto van iets, bijvoorbeeld het antwoord op een vraag, te trekken en dat als eerste te uploaden

G4:A:het zou wel mooi zijn als je het op pauze kon zetten om iets te halen of naar het toilet te gaan"

G5:B:"wat je dan ook nog zou kunnen doen is een quiz cafe"
9.2. German pilot test results data
This is the collection of the test results with the digital mockups. All test persons were provided with a similar general introduction and a number of tasks and questions.

1. Introduction


Um die Zielgruppe vor / während / und nach der linearen TV-Ausstrahlung auf KiKA zu erreichen und Möglichkeiten zum Austausch zu bieten, wird das gesamte Projekt auch über eine Webseite und Blogbeiträge („ScribbleLive“) begleitet, unter Einbeziehung aggregierter Nutzerbeiträge aus bestehenden sozialen Netzwerken wie Twitter, YouTube und Instagram. Die redaktionelle und technische Umsetzung wird nach den ARD-Richtlinien zur Sicherung des Jugendschutzes sowie in enger Abstimmung mit dem KiKA geschehen.


Der Bereich Innovationsprojekte der rbb Produktions- und Betriebsdirektion koordiniert die gesamte Social Media Begleitung in enger Absprache mit der rbb Familienredaktion. Zusätzlich wird der Bereich Innovationsprojekte im Rahmen eines EU-geförderten Projektes die sendungsbegleitende HbbTV-Anwendung für aktuelle HbbTV-fähige TV-Geräte (SmartTVs) produzieren und für „Abendteuer Liebe“ zur Verfügung stellen.

- Person 1

2. Card Sorting

Sortieren Sie die Karten so zusammen wie sie die denken. Sie können auch Unterkategorien bilden und Elemente darunter zusammenfassen.

- Spruch des Tages
- Hashtag #verknallt14
- Hinweis zur nächsten Sendung?
- Homepage URL verknalltundabgedreht.de?
- Sendezahlen?
- Tägliches Quiz, (ein großer Losopf, am Tag der letzten Folge steht der Gewinner fest)
- E-Mail Adresse?? → 2nd Screen
- Tägliches Voting
- Orakel?
- Karte mit Pins – Infos zu den Orten (Bilder, Text und Links)?
- Insgesamt 20 Episoden, 3Wochen Mo.-Do.
  - Wenn Episoden nicht live geguckt werden könnte der Chat (geschlossen) abgebildet werden.
- Steckbriefe
- 6 Steckbriefe der Protagonisten, Zusatzcontent, wie zum Beispiel Homestories (Videos) Kommentare
- 17 Steckbriefe der Mitwirkenden inkl. Videos, Bildergalerien, weitere Infos (Links)
- Videos
  - Zusätzlicher Content, z.B. Fete de la Musique, Sprayer Areal, Interviews
  - 3 Kurzfilme
  - 10 oder 11 Clips: Guses unnützes Liebeswissen
- Bilder
  - Mindestens eine neue Bildergalerie pro Tag

Protokoll:

- Die ganzen Steckbrief Sachen → interessant auch wenn man die Sendung guckt will man vielleicht mehr über die Leute wissen
- Alles was täglich ist auch Spruch des Tages → das finde ich weniger wichtig, eher persönlich dass ich da nicht so mitmachen würde.
- Wo man was zur Sendung findet – Hashtag, Website
- Videos, Bilder, Behind the scenes, 10 Guse Clips, kommentieren → besonders wichtig
- 4 Kurzfilme, 20 Episoden
- Wanns kommt und karte

3. Walk Through
Beschreiben Sie den Start-Screen.

Protokoll:
Ich glaube vollbild würde ich ja nur machen wenn ich gar nichts machen will, ansonsten würde ich es so lassen, dann würd eich oben schauen was ich da machen kann mit den 4 buttons

Steckbriefe mit pfeiltaste und ok ausgewählt und steckbrief ausgewählt mit ok

Wenn ich weiterlesen will würd eich mal scrollen das würde ich mit nach unten, wenn ich wider zu machen will würd eich nach rechts gehen, da muss ich jetzt überlegen, da muss ich dann noch nach oen, ok, wenn ich dann wieder zum anfangsbild zurück will, weiß ich nicht genau, nach links (da ist die liste zuende, passiert nichts) dann würde ich zu episoden gehen → keine
ahnung wie ich zurück kommen sollte. Wäre nicht darauf gekommen dass über logo zu machen, das müsste man deutlich kennzeichnen.

Wieder zurück auf start screen

Rechts sind sozusagen Kommentierungssachen und wenn ich selber machen will dann geh ich über die Pfeiltasten zu kommentieren und klicke ok.

Wenn die Sendung nicht läuft


Entdecken Sie die Applikation mit der Fernbedienung, Sven klickt das dann auf dem Bildschirm mit. Bitte denken sie laut, das heißt Sie kommentieren was Sie machen, beschreiben Ihre Erwartungen und Empfindungen. Das hilft uns dabei die Anwendung zu verbessern.

Protokoll:

4. Co-Creation: Paper Prototyping of specific Screens

Suchen Sie sich einen Screen ihrer Wahl aus und bauen diesen nach Ihren Vorstellungen um bzw. neu.

Protokoll:

Das mit dem Logo zurückkommen finde ich nicht gut, vielleicht noch einen weiteren Button im Menü zurück zur Sendung und wenn die Sendung nicht läuft „Startseite“. Ich würde die Anordnung der Button anders machen, ich würde die karte nach oben nehmen weil ich das interessanter finde, mit den Buttons das ist gut strukturiert. Den Spruch würde ich weglassen, das interessiert mich nicht das die Internetseite da angezeigt wird finde ich gut, aber öffnen kann man die nicht oder?

5. Questions

Was fanden Sie besonders gut?

Protokoll:

Die Aufteilung, das menü oben. Ich finde es gut das es so klar strukturiert ist. Das zeitgleiche kommentieren stell ich mir auch lustig vor.
Was ist Ihnen negativ aufgefallen?

Protokoll:

*Das ich nicht wusste wie ich zurück zur Sendung komme, das war völlig unklar.*

Gibt es noch etwas was Sie gerne zufügen würden oder etwas wo sie besonders drauf hinweisen möchten?

Protokoll:

- Person 2

2. Card Sorting

Sortieren Sie die Karten so zusammen wie sie die denken. Sie können auch Unterkategorien bilden und Elemente darunter zusammenfassen.

- Spruch des Tages
- Hashtag #verknallt14
- Hinweis zur nächsten Sendung?
- Homepage URL verknalltundabgedreht.de ?
- Sendeeiten?
- Tägliches Quiz, (ein großer Lostopf, am Tag der letzten Folge steht der Gewinner fest)
- E-Mai Adresse?? Diese für 2nd Screen
- Tägliches Voting
- Orakel?
- Karte mit Pins – Infos zu den Orten (Bilder, Text und Links)?
- Insgesamt 20 Episoden, 5Wochen Mo.-Do.
  - Wenn Episoden nicht live geguckt werden könnte der Chat (geschlossen) abgebildet werden.
- Steckbriefe
- 6 Steckbriefe der Protagonisten, Zusatzcontent, wie zum Beispiel Homestories (Videos) Kommentare
- 17 Steckbriefe der Mitwirkenden inkl. Videos, Bildergalerien, weitere Infos (Links)
- Videos
  - Zusätzlicher Content, z.B. Fete de la Musique, Sprayer Areal, Interviews
  - 3 Kurzfilme
  - 10 oder 11 Clips: Guses unnützes Liebeswissen
- Bilder
Protokoll:

Steckbriefe mitwirkende gehört zu steckbriefe protagonisten, steckbriefe gehören alle zusammen

Nächste sendungen, verknallt und abgedreht .. → das sind sendungsinformationen

Die Website ist nur ein hinweis kommt auch zu informationen genau wie der hashtag

Episoden, kurzfilme un dguse clips würde ich so zusammen tun – das ist das offizielle material

was man sowieso sieht

Videos, behind the scenes, bildergalerien sind dvd bonus tracks – was man sonst im fernsehen

nicht bekommt,

voting, quiz kommentieren ist wo man mitmachen kann, interagieren

spruch des tages, orakel ist eher was man schnell liest, das findet einmal kurz witzig, filler

priorisieren: was ist dir wichtig

also die hinweise sind nur informationen

spruch+orakel sind

zentral ist: ich kann was machen aber das kann ich auch online machen

wdie episoden und so hab ich bestimmt schon normal gesehen, nicht so wichtig

wirklich wichtig ist das bonusmaterial und das auf dem tv zu sehen

und während der sendung sind die steckbriefe und so total wichtig und auch danach wenn man

sich zum beispiel in jemanden verliebt hat und den steckbrief nochmal angucken will die

protagonisten sind das wichtigste, dieses man kann nochmal anschauen gerade kinder und

jugendliche haben noch so ein repeat verhalten, immer wieder etwas anzuschauen, wie mit

musik, immer wieder das gleiche lied

die episoden sind auch wichtig, aber wenn man die verpasst hat findet man auch den weg.

- Person 3

2. Card Sorting

Sortieren Sie die Karten so zusammen wie sie die denken. Sie können auch Unterkategorien

bilden und Elemente darunter zusammenfassen.

- Spruch des Tages
- Hashtag #verknallt14
- Hinweis zur nächsten Sendung?
- Homepage URL verknalltundabgedreht.de ?
- Sendezeiten?
- Tägliches Quiz, (ein großer Lostopf, am Tag der letzten Folge steht der Gewinner fest)
• E-Mai Adresse?? → 2nd Screen
• Tägliches Voting
• Orakel?
• Karte mit Pins – Infos zu den Orten (Bilder, Text und Links)?
• Insgesamt 20 Episoden, 3Wochen Mo.-Do.
  o Wenn Episoden nicht live geguckt werden könnte der Chat (geschlossen) abgebildet werden.
• Steckbriefe
• 6 Steckbriefe der Protagonisten, Zusatzcontent, wie zum Beispiel Homestories (Videos) Kommentare
• 17 Steckbriefe der Mitwirkenden inkl. Videos, Bildergalerien, weitere Infos (Links)
• Videos
  o Zusätzlicher Content, z.B. Fete de la Musique, Sprayer Areal, Interviews
  o 3 Kurzfilme
  o 10 oder 11 Clips: Guses unnützes Liebeswissen
• Bilder
  o Mindestens eine neue Bildergalerie pro Tag

Protokoll:

Hashtag, URL und Startzeit würde ich schon mal grob zusammen sortieren auch nächste Sendung – sind für mich so Grundinfos die irgendwo stehen, machste irgendwo ins generelle Layout

Dann alles was so zu Video gehört

Steckbriefe weiß ich nicht ist das nur Text oder sind das Videos

Quiz und voting gehört irgendwie zusammen

Die guse clips gehören für mich nicht so ganz zu den videos, aber irgendwie hat das ja auch mit der sendung zu tun also vielleicht da irgendwie doch zu den videos

Also Videos so als Oberkategorie und die anderen Videos dazu, Episoden und Kurzfilme sind da das wichtigste, behind eher drunter

Wenn das tägliche Orakel was für die Zuschauer ist dann gehört das für mich auf die Startseite wie auch das andere tägliche – die tagesaktuellen Sachen sollten schon direkt zu sehen sein, wenn ich die Anwendung aufmache

Steckbriefe sind wie Videos eine Oberkategorie oder den ganzen anderen quatsch drunter packen und das Extras nennen

Karte mit Infos zu den orten kann ich immer nicht zuordnen, da hat man nur einen live bezug, genau wie das kommentieren, ich will das nur live sehen wo das ist. Bei Kommentaren weiß ich auch nicht ob das spannend ist das nach der Sendung zu lesen – also die beiden in der live Situation mit direktem live Bezug, also die karte brauch ich nicht

In der of air zeit brauche ich die karte und Kommentare nicht da sind Videos und Steckbriefe und so quatsch wichtiger
Die url ist ziemlich lang

### 3. Walk Through

Beschreiben Sie den Start-Screen.

Protokoll:


Bei Bildern würd ich das auch so machen, Bilder anklicken Vollbild, zurück Button unten. → gleiche Logik, auch bei Steckbriefen. Bei Steckbriefen hab ich überhaupt keinen überblick, das finde ich nicht gut, da sind verschiedene Elemente in einem ding das ist alles durcheinander und dann noch in einem pop-up was oben drüber liegt. Und nach links gehen kann ich auch nicht gehen obwohl da ein pfeil ist.

Episoden, Episode 1, da finde ich es ok den play button zu haben, weil es ne extra seite ist

Noch mal bei videos, ich hatte gedacht karte ist ne karte, ich versteh auch nicht wieso die videos und die episoden nebeneinander sind und nicht die episoden in den videos also dann müsste die bezeichnung videos irgendwie besser sein spezifischer sowas wie sonstige videos also abgrenzen von der sendung

Entdecken Sie die Applikation mit der Fernbedienung, Sven klickt das dann auf dem Bildschirm mit. Bitte denken sie laut, das heißt Sie kommentieren was Sie machen, beschreiben Ihre Erwartungen und Empfindungen. Das hilft uns dabei die Anwendung zu verbessern.

Protokoll:

### 4. Co-Creation: Paper Prototyping of specific Screens

Suchen Sie sich einen Screen ihrer Wahl aus und bauen diesen nach Ihren Vorstellungen um bzw. neu.

Protokoll:
Ich würde das Orakel in direktem Bezug zur aktuellen Sendung sehen, das würde ich dann auch irgendwie an das live Bild koppeln.

Oliver bastelt pop-up um.

Player leiste ist unten und blendet sich nach ein paar Sekunden aus, mit Tastendruck kann man das wieder einblenden.

Siehe Bild.

5. Questions

Was fanden Sie besonders gut?

Protokoll:

Was ist Ihnen negativ aufgefallen?

Protokoll:
Die steckriefe, da erwarte ich Steckbriefe und zwar einen kurzen Text und nicht so viele Sachen durcheinander und dann noch in einem pop-up, ein pop-up muss ganz einfach sein, nur direkt anwählbares. Die information im pop-up ist mehr als vorher und der platz kleiner, die fülle passt da nicht – das gehört eine ganze seite pro protagonis t hin. Die immer verfügbaren buttons oben, das menü finde ich auch nicht elegant. Das oben grenzt sich nicht wirklich als menü ab, ich könnte auch auf die anderen sachen verzichten wenn ich z.b. in einer kategorie wie videos bin.

Gibt es noch etwas was Sie gerne zufügen würden oder etwas wo sie besonders drauf hinweisen möchten?

Protokoll:

6. Walk Through 2nd version

Beschreiben Sie den Start-Screen. Dann Entdecken Sie die Applikation mit der Fernbedienung, Sven klickt das dann auf dem Bildschirm mit. Bitte denken sie laut, das heißt Sie kommentieren was Sie machen, beschreiben Ihre Erwartungen und Empfindungen. Das hilft uns dabei die Anwendung zu verbessern.

Protokoll:

Ich sehe ein tv bildschirm mit der anwendung, skaliertes tv bild und rechts nebenan kommentare, sich ständig aktualisierende liste in der ich auch navigieren kann, ich sehe am
scroll balken dass ich ziemlich weit unten bin ich würde erwarten dass die neusten kommentare oben bin, gefühlt bin ich weit unten bei den kommentaren

Ich kann hier auf vollbild gehen, indem ich das symbol anklicken, ich müsste wissen wo der fokus ist, dafür würde ich rumklicken um den fokus zu finden

Anwendung wieder aufrufen mit pfeiltasten

Der pfeil zwischen video und kommentare irritiert mich es sieht aus als könnt man in der liste weiter nach rechts gehen, aber ich hab ja das skalierte tv bild, versucht anzusteuern, pfeil ist nicht ansteuerbar

Was passiert wenn ich auf kommentieren klicke – mit pfeiltasten und dann ok, Webseite wird auf verbundenem 2nd screen angezeigt, kommentar auf mobile schreiben und abschicken

Kann ich einen kommentar anklicken, nach rechts und dann, ok das ist ein link, dann link angeklickt und dann sieht man ein vollbild, ist das ein foto oder eine website, wahrscheinlich ein bild von einem user, wenn ich die sendung gucke habe ich angst was anderes zu klicken, kann ich steckbriefe klicken – oh nein wo ist meine sendung, ok ich rfe einen steckbrief auf – klara, ich sehe text, ein video wenn ich nach rechts gehe wo ist dann mein fokus, wenn das ganze video gehighlitet ist, dann ok und dann ist erst der play button gehighlitet - ich finde es soll erst das video gehighlitet sein und wenn ich ok drücke soll das video starten und der fokus soll dann auf pause/stopp oder fullscreen liegen. Wenn ich das angehalten habe gehe ich mit rechts rüber und dann mit ok starten oder weiter es ist ganz wichtig, dass ich nicht weiß wie ich zurück zur sendung kommt – das geht nicht!

Protokoll:

7. Co-Creation: Paper Prototyping of specific Screens

Suchen Sie sich einen Screen ihrer Wahl aus und bauen diesen nach Ihren Vorstellungen um bzw. neu.

Protokoll:

Wir sind in der sendung, wenn die sendung läuft muss die sendung immer da sein, du musst konsumieren können und die sendung dabei gucken, wichtig ist es live

Es könnte sein, das es während der live sendung passagen gibt die ich nicht so interessant finde, zb wenn ich irgendwo nicht mag aber ich will ganz bewusst aus der sendung aussteigen.

Gibt es Inhalte die du während der live sendung un wichtig findest?

Die videos die episoden finde ich während der sendung nicht wichtig, am wichtigsten finde ich die sachen die auch live sind, die kommentare die sich direkt auf die sendung beziehen, von daher ist der startscreen schon ganz richtig, wen ich mich dafür interessiere dann finde ich das so auch gut, steckbriefe finde ich auch wichtig aber die sendung soll nicht weg gehen

Wie wäre es wenn oben das menü bei der live senung raus wäre

Ich glaube es würde mich nicht irritieren wenn ich wüsste das es irgendwo einen menüknopf geben würde also wenn ich das gefühl hätte es gibt das nicht mehr dann würde mich das irritieren. Das eine anwendung einen anderen zustand hat das kann man nachvollziehen, aber die infos dürften nicht vollständig verschwinden, das würde einen panisch machen

8. Questions

Was fanden Sie besonders gut?
Protokoll:

Ich finde den Startscreen gut aber es könnte aufgeräumter sein, also eher klar strukturiert. was mir gefällt ist der live charakter sendung und kommentare zusammen

Was ist Ihnen negativ aufgefallen?

Protokoll:

Ganz schlimm finde ich dass das live Sendung weg war als ich auf Steckbriefe geklickt habe

Ich fand die Steckbriefe etwas überladen, das schien schwierig zu navigieren, irgendwie fummelig

Pfeil auf Startscreen weg der irritiert

Ich würde kurze knappe Steckbriefe besser finden die man während der Sendung anschauen kann aber natürlich ist die Frage wie das ist wenn keine Sendung läuft und man braucht auch eine Übersicht.

Gibt es noch etwas was Sie gerne zufügen würden oder etwas wo sie besonders drauf hinweisen möchten?

Protokoll:

Bei video finde ich du verschenkst ganz schon viel Bildschirm, du nutzt nur einen kleinen streifen.

- Person 4
  2. Strict
    a. Walk Through - strict

Beschreiben Sie den Start-Screen.

Protokoll:

Entdecken Sie die Applikation mit der Fernbedienung, Sven klickt das dann auf dem Bildschirm mit. Bitte denken sie laut, das heißt Sie kommentieren was Sie machen, beschreiben Ihre Erwartungen und Empfindungen. Das hilft uns dabei die Anwendung zu verbessern.

Protokoll:

ich befinde mich wohl auf der startseite, dann sehe ich das menü hier mit den reitern, ich kann auch eine abstimmung machen und ein quiz – dafür könnte ich ne mail schreiben oder das mit dem handy machen, da geht dann bestimmt ein QR code auf.
Scrollen → ich würde nach rechts rüber gehen, ohne pfeil oder so hätte ich jetzt aber erwartet dass nicht mehr kommt. Ich möchte mich über neues informieren und klicke auf neues ok. (neues ist schon auf und wird nicht als solches erkannt)

episoden – navigation zur episoden und episode starten ok


Personen – wenn ich auf eine person gehe würd ich schon ein vollbild der person erwarten, ein großes foto, es könntte auch mehr infos zu einer person auf einer extra seite geben.

Orte – das ist wahrscheinlich die karte die ich bei episoden schon gesehen hab


Bei specials gehe ich davon aus es gibt videos und fotos vom dreh. Also kann ic das auswählen und dann ein video starten oder mir eine bildergalerie angucken kann, da Frage ich mich wie das dargestellt wird. Ich würd ererwartet dass es ein vollbild ist und man die bilder dann mit der rechts taste weiter schiebt und unten wäre ein zurück seite – eine seite mit bildern zu auswahl finde ich müehselig es wäre schon schön wenn man gezielt sachen aussuchen kann, ich würde gezielt fotos aussuchen. Vielleicht sollte man das auch unterteilen in videos und bilder also wenn das viel material ist und man lange suchen muss. Die anwendung ist vollbild un ich bekomme nicht mit was im programm passiert – ich frage mich was passiert wenn ich auf live ansicht gehe, ich hab die befürchtung dass ich ganz aus der anwenung raus bin oder ich bekomme ein kleines fernsehbild in der app. Mir ist nicht gzn klar wo der zusatzcontent dargestellt wird – da ich ja die senung gucke denke ich das zusatzkram links angezeigt wird also kurz, foto+text. Live blog – halt kommentare angucken und mich auch selber einbringe indem ich mein verbundens handy nutze. Ich hätte den blog unter dem bildschirm erwartet- also wenn man sich daran gewöhnt hat weiß man auch irgendwann das man unten navigiert und rechts was passiert aber intuitiv ist das nicht.

b. Co-Creation: Paper Prototyping of specific strict Screens

Suchen Sie sich einen Screen ihrer Wahl aus und bauen diesen nach Ihren Vorstellungen um bzw. neu.
Protokoll:

das symbol mit der kamera muss da weg und dann müsste der play-button annavigiert werden wenn man nach rechts geht. Da unten sieht man den gar nicht der muss deutlich in der mitte sein und mit play symbol, weil das universell verstanden wird.

Es wäre natürlich auch möglich ein video mit vorschau-bild zu symbolisieren und dann da den play-button drauf. Man könnte das alles als buttons machen, wenn man aufs foto klickt bekommt man das groß, genau wie das video und auch die karte man kann sich alles auf dem großen bildschirmbereich anzeigen lassen. Dann kann man links den ort wechseln und rechts die zusatzinfos ansteuern. Immer drei funktionen mit buttons, bild, video, karte.

c. Questions

Was fanden Sie besonders gut?

Protokoll:

Live-Screen, Zusatzinhle sind verfügbar und intuitiv scrollbar, wenn man das einmal gefasst hat ist das auch gut dass der zusatz dann rechts angezeigt wird das ist schon gut mit demplatz der ausgenutzt wird

Was ist Ihnen negativ aufgefallen?

Protokoll:


Gibt es noch etwas was Sie gerne zufügen würden oder etwas wo sie besonders drauf hinweisen möchten?

Protokoll:

3. Minimal

a. Walk Through - minimal

Beschreiben Sie den Start-Screen.

Protokoll:

ich erhalte auf dem linken bereich aktuelle videos, folge oder ein bild? Wenn ich jetzt nach rects gehe und neues auswähle da bekomme ich dann das neue in demfeld rechts angezeigt – das
heißt wenn die sendung läuft kann ich die weiter gucken. Wenn ich auf neuer oder älter gehe mit dem fokus gehe würd eich erwarten dass ich da drücken kann und dann nach rechts gescrollt wird. Ich denke aber auch dass ich runter auf ein item gehen könnte und dann nach rechts scrollen könnte.

Mir ist die ganze zeit nicht klar was im linken bildbereich dargestellt wird.

Blog – mir ist nicht klar wie ich runter auf kommentieren komme wenn ich durch die liste nach unten navigiere – kann ich mit ok auf einem tweet dann diesen tweeet kommentieren?

Bei infos bekomme ich infos über eine protagonisten, auch mit einem video da erwarte ich dass ich das selber starten kann, dass das nicht von selber abgespielt wird sondern eher einen play-button. Ich würde eher erwarten dass wenn ich das gestartet hätte dass ich dann zurück zur sendung komme aber die bezeichnung müste eher was sein wie zurück zur sendung.es gibt keine übersichten – das stört mich ich würde ungerne erst anna und karin angucken bevor ich zu max komme. Es ist irgendwie nicht so übersichtlich und man muss immer alles durchscrollen, das finde ich nicht so gut und dass die karte auch nicht dabei ist. Die karte finde ich gut um mich zu orientieren, das finde ich schade. Hier mit dem scrollen kann es passieren dass ich mich erst durch langweilige sachen durchscrollen muss und dann vielleicht aufhöre weil ich gar nicht weiß dass da noch was kommt das mich interessiert. Man bräuchte einfach mehr kleine bildchen und irgendwas symbolhaftes grafisches um eine übersicht zu bekommen wenn man sich durchrollt.

Entdecken Sie die Applikation mit der Fernbedienung, Sven klickt das dann auf dem Bildschirm mit. Bitte denken sie laut, das heißt Sie kommentieren was Sie machen, beschreiben Ihre Erwartungen und Empfindungen. Das hilft uns dabei die Anwendung zu verbessern.

Protokoll:

b. Co-Creation: Paper Prototyping of specific minimal Screens

Suchen Sie sich einen Screen ihrer Wahl aus und bauen diesen nach Ihren Vorstellungen um bzw. neu.

Protokoll:

ich würde immer erwarten dass ich ein element auswähle und wenn ich mit ok bestätige dass das dann rechts angezeigt wird

c. Questions

Was fanden Sie besonders gut?
Protokoll:

du hast immer die gleichen templates, die funktionen findet man immer an der gleichen stelle – das ist ein vorteil.

Was ist Ihnen negativ aufgefallen?

Protokoll:
nachteil ist dass die info auf der rechten seite immer recht begrenzt ist. Jeder inhalt muss vielleicht auch anders dargestellt werden. Bei der anderen finde ich dass vielleicht schwieriger das man sich in jeder seite erst mal einfügen muss aber wenn man das einal gemacht hat bekommt man auch die infos die man will. Das mit dem durchsrollen finde ich halt schlecht – erst durch die ganzen sachen ohne zuwissen was noch kommt.

Gibt es noch etwas was Sie gerne zufügen würden oder etwas wo sie besonders drauf hinweisen möchten?

Protokoll:

- Person 5
  2. Strict
    a. Walk Through - strict

Beschreiben Sie den Start-Screen.

Protokoll:

ließt spruch des tages, - spruch des tages schrift zu klein, voting und quiz als hauptelemente erkannt. Voting vielleicht mehr als drei varianten. Beim quiz sollte ersichtlich sein was es zu gewinnen gibt. Bedenken e-mail adresse raus zuschicken. Orakel des tages + guse → kein bezug zum rest.

Nachfrage sven scrollen → heiko: nach unten scrollen.

Navigation cersuchen und dann findet man sich schon irgendwann zurecht, lesen würde ich keine hilfetexte

Orte: google maps – klassisch. Links was auswählen, mit ok dann sollte sich die karte in angemessener skalierung aktualisieren. Oben rechts sollte sich die info/foto aktualisieren.

Specials – keine ahnung was sich da verbirgt, macht neugierig was man alternativ zu neues dann bei specias hat. Zu irgendwelchen terminen – das enttäuscht mich hier seh ich nichts spannendes, kommt wie resterampe vor – bei special erwartet man etwas anderes, reißerisches – extras oder bonus, nochwas, außerdem, hintergründe, nicht zu vergessen...würde besser passen.

Hat den eindruck das ganze ding erschlossen zu haben – ding zu.

Sven öffnet app neu und erklärt prozedere

mit handy verbinden kann man nichts anfangen

es fühlt sich eingemauert und beengt an, alles dreht sich nur um die sendung, es ist nicht klar wie man sein normales online verhalten damit kombiniert.

Entdecken Sie die Applikation mit der Fernbedienung, Sven klickt das dann auf dem Bildschirm mit. Bitte denken sie laut, das heißt Sie kommentieren was Sie machen, beschreiben Ihre Erwartungen und Empfindungen. Das hilft uns dabei die Anwendung zu verbessern.

Protokoll:

b. Co-Creation: Paper Prototyping of specific strict Screens

Suchen Sie sich einen Screen ihrer Wahl aus und bauen diesen nach Ihren Vorstellungen um bzw. neu.

Protokoll:


c. Questions

Was fanden Sie besonders gut?

Protokoll:

Internetähnliche und somit vertraute Anmutung.

Was ist Ihnen negativ aufgefallen?
Protokoll:

*Nichts.*

Gibt es noch etwas was Sie gerne zufügen würden oder etwas wo sie besonders drauf hinweisen möchten?

Protokoll:

*Beim Blog-Screen wäre es schön, wenn man den Bereich mit der Kommentar-Timeline komplett auf den 2nd Screen auslagern könnte, Zusammenhang darf dabei aber nicht verloren gehen.*

3. Minimal

a. Walk Through - minimal

Beschreiben Sie den Start-Screen.

Protokoll:

Entdecken Sie die Applikation mit der Fernbedienung, Sven klickt das dann auf dem Bildschirm mit. Bitte denken sie laut, das heißt Sie kommentieren was Sie machen, beschreiben Ihre Erwartungen und Empfindungen. Das hilft uns dabei die Anwendung zu verbessern.

Protokoll:

*Erscheint ungewohnter im Vergleich zu strict. Also ob Platzmangel herrscht. Wirkt weniger großzügig gestaltet. Im Prinzip, als ob zwei getrennte Bildschirme da sind. Und irgendwie mühevoller zu bedienen.*

b. Co-Creation: Paper Prototyping of specific minimal Screens

Suchen Sie sich einen Screen ihrer Wahl aus und bauen diesen nach Ihren Vorstellungen um bzw. neu.

Protokoll:

*Nichts. (Zeitmangel)*

c. Questions
Was fanden Sie besonders gut?

Protokoll:

*Nichts.*

Was ist Ihnen negativ aufgefallen?

Protokoll:

*Impressum und Datenschutz sind viel zu prominent. Wirken störend.*

Gibt es noch etwas was Sie gerne zufügen würden oder etwas wo sie besonders drauf hinweisen möchten?

Protokoll: *Nein.*

- **Person 6**

2. **Strict**

   a. **Walk Through - strict**

Beschreiben Sie den Start-Screen.

Protokoll:


*Personen: ich nehme an an dass es da noch weitere infos zu den personen gibt – die Frage ist was dann kommt. Hat man dann da so einen kurzen video abriß oder was ist das. Ich fände es*
gut wenn ich mir da ne homestory von anna angucken könnte – das wäre cool wenn das nicht so textlastig wäre.

Orte – ist das so spannend?

Jetzt kapier ich das erst mal nicht so richtig, bin mir nicht sicher die orte wären mir doch wurscht, das ist doch was soziales, das würde mich eher nicht interessieren, da wäre ich skeptisch, wenn die app sehr schnell ist würde ich vielleicht mal 2/3 anschauen sonst würde ich da aussteigen. Wenn man bei den orte immer weiter runtergehen würde wie verhält sich der fokus – würde die leiste sich bewegen und der fokus immer am gleichen ort bleiben oder würde man da runtergehen, was passiert dann wenn man ganz unten ist.

Specials
was ich jetzt erwarte ist vielleicht an der stelle ziemlich dvd geprägt, irgendwelcher metacontent, auch von der navi kommt das dvd ziemlich nah.


Strtscreen – bei den videos würde ich erwarten dass der player wie bei episoden gestartet wird.

Entdecken Sie die Applikation mit der Fernbedienung, Sven klickt das dann auf dem Bildschirm mit. Bitte denken sie laut, das heißt Sie kommentieren was Sie machen, beschreiben Ihre Erwartungen und Empfindungen. Das hilft uns dabei die Anwendung zu verbessern.

Protokoll:

b. Co-Creation: Paper Prototyping of specific strict Screens

Suchen Sie sich einen Screen ihrer Wahl aus und bauen diesen nach Ihren Vorstellungen um bzw. neu.

Protokoll:

vollbild und zurück würde ich komprimierter darstellen.

Der zusatzcontent wäre dann immer nur rechts angezeigt, die episode würde normal weiter laufen. Es müsste grafisch immer so zusammenhängen das man versteht was zusammengehört.

Ich weiß auch nicht ob das hauptmenü weg sein sollte – bei nur video ist klar das ist hauptinhalt da gibt es keine übergeordnete navi, ist das auch vermittelbar wenn da noch
related content ist. Die hauptnavi kann auf jeden fall nicht weg und eine andere navi dann dahin.

c. Questions

Was fanden Sie besonders gut?

Protokoll:

was mich erstaunt hat war die ive ansicht – da wären schon features die ich nicht erwartet hätte, das fand ich positiv überraschend. Bei social tv braucht man einfach die richtige zielgruppe.

Was ist Ihnen negativ aufgefallen?

Protokoll:

die verwirrende navigation bei den 2 screens, live blog und player mit dem sprung dass man unter dem video navigier tund rechts was passiert

Gibt es noch etwas was Sie gerne zufügen würden oder etwas wo sie besonders drauf hinweisen möchten?

Protokoll:

was bedeutet eigentlich handy verbinden? Sven erklärt
dann würd ich das wordig interessanter machen, etwas was interaktion verspricht- wie mit dem handy posten oder so

3. Minimal

a. Walk Through - minimal

Beschreiben Sie den Start-Screen.

Protokoll:

linke seite ist das was ich erwartet hätte, rechts das interessiert mich erst mal nicht. Ich erwar
dass man uf neuer und älter, der scrollbalken suggeriert das man eher so ein ziehen hat, bei schrittweiser navigation würde ich das mit einer punktleiste darstellen.

Aus datenschutz impressum würde ich mit hoch versuchen zu den menüpunkten oben zu kommen, es würd emich frustrieren wenn ich erst nach rechts müsste.

Auf social, ich weiß nicht ob sich die linke seite auch ändert

infos – und jetzt tpassiert links was. Was paasiet da, das ist de rhauptinhalt vom infokram und geht der dann schon los? Es ist auf jeden fallviel einfacher und klarer, man kann oben bereiche wechseln und die Inhalte wechseln. Blöd ist das man keine vorschaubilder hat, wenn ich anna gut finde dann ist es schwierig was von ihr zu finden wenn ich erst so durchsrollen muss. Die sozialen sachen die für jugendlich interessant sind, die kann man nur mit bildern abbilden.

Zurück zu den orten – das könnte man auch eher sozial denken mit konstellationen und spielerischer. Das könnte auch einfacher sein. Was mich noch ein bisschen verwirrt, ich bin bei anna und erwar
t wenn ich mich nach unten bewege will ich senung einblenden fkussiert
haben, das erwarte ich. Das ist ja irgendwie abhängig, ich würde erwarten, dass ich bewusst bestätigen muss, dass das Video nicht automatisch abspielt, sondern ich das aussuchen, kann ich will ja nicht wenn ich die Homestory von Anna sehe und zu Peter gehe dass das Video dann ausgetauscht wird. Das wird problematisch wenn die Sendung läuft da kann man ja nicht irgendwie wechseln zwischen Live und Homestory.

Bei kommentieren da finde ich wenn der QR-Code kommt müsste da irgendwas stehen wie geht sofort.

Entdecken Sie die Applikation mit der Fernbedienung, Sven klickt das dann auf dem Bildschirm mit. Bitte denken sie laut, das heißt Sie kommentieren was Sie machen, beschreiben Ihre Erwartungen und Empfindungen. Das hilft uns dabei die Anwendung zu verbessern.

Protokoll:

b. Co-Creation: Paper Prototyping of specific minimal Screens

Suchen Sie sich einen Screen ihrer Wahl aus und bauen diesen nach Ihren Vorstellungen um bzw. neu.

Protokoll:


c. Questions

Was fanden Sie besonders gut?

Protokoll:

die Navigation ist insgesamt gut erschließbar und leicht

Was ist Ihnen negativ aufgefallen?

Protokoll:

ich habe das Gefühl ich bekomme nicht alle Inhalte und ich habe keinen Überblick welche Inhalte sich in den Listen verstecken

Gibt es noch etwas was Sie gerne zufügen würden oder etwas wo sie besonders drauf hinweisen möchten?

Protokoll:
9.3. Spanish pilot test results data

9.3.1. First iteration of user testing

9.3.1.1. Answer sheets

Name: User 1
Date: 6/03/2014

EVALUATION QUESTIONNAIRE OF TV-RING MULTI-CAMERA DIGITAL MOCKUP

Questions for evaluator (during the testing):

1. Which part (display) provokes more questions from the users and why?
   The initial page of the multi-camera service (after pressing the multi-camera button) provoked more questions. The user was not sure which component is a button and which is a logo and how to access the whole list of the programs (on-demand or live).

2. Which screen provokes more confusion and why?
   More confusion for the user provoked the process of entering a specific video of the multi-camera service from the initial page of the existing service. The user, instead of entering the multi-camera live content, was trying to find the multi-camera option in the normal live content (it explains long time of realizing the task “Enter the multi-camera live content” from the next section).

Tasks (during the testing):

1. Find the multi-camera option → 5 seconds
2. Enter the multi-camera live content → 59 seconds
3. Enter multi-camera on-demand content → 5 seconds
4. Switch the view in multi-camera option → 15 seconds

Questions for participants (after the testing):

1. Where would you put the multi-camera button?
   a. In the main menu bar
   b. I wouldn’t change it
   c. Other (specify): Both. I would leave it where it is, and in addition, put another button in the main menu bar so that you can access the multi-camera application from every display.

2. Can you name some missing functions/buttons?
   - Highlighted multi-camera videos (on-demand content)
   - Exit button in every screen to be able to leave the application in any moment. Especially in the full screen mode or mosaic view.
   - In the full screen view, an option to scroll the video forward and backward

3. When you start the multi-camera content you prefer:
   a. Start from default content in the full screen
b. First choose the view from mosaic (or similar view)

The user enters the multi-camera application with the purpose of watching different views of the same content, so that option facilitates it to him.

c. Other (specify): ..............................................

4. What were the aspects that turned the mockup easy or difficult to understand?

For the testing user the thing that was easy to understand was the esthetics and general design of the service, which according to him was user-friendly.

On the other hand, the aspect that was difficult to understand and not very intuitive while navigating the application, was the fact that the multi-camera option is outside the actual application and first it was more natural for him to search the multi-camera views in the normal content.

5. List the sequence of buttons you need to use to switch the camera in multi-view (without watching the application):

   a. Call-to-action by pressing the red button
   b. Enter the multi-camera content by pressing the multi-camera logo
   c. Choose one of the multi-camera videos from the list (for example on-demand video)
   d. Minimize the full screen
   e. Press the multi-camera button from the minimized view.

Evaluator’s comment: This sequence is not correct as you can switch the camera view directly in the option bar in the full screen mode.
9.3.2. Second iteration of user testing

9.3.2.1. Answer sheets

Name: User 1 Date: 15/05/2014, 10:30

EVALUATION QUESTIONNAIRE OF TV-RING MULTI-CAMERA DIGITAL MOCKUP

Questions for evaluator (during the testing):
1. Which part (display) provokes more questions from the users and why?
   The multi-camera icon is not clear. As it is still a new function, people do not have any icon associated to it. Instead of camera icon, it should be just a simple text like “multi-camera”.

2. Which screen provokes more confusion and why?
   • In the initial page of multi-camera part of application, users were trying to click on the icon of multi-camera to start the video, which was only an information icon that a video has multi-view streaming, not a button.
   • In the mosaic view of available cameras, it was not intuitive for the user to click directly on one of the views to switch the camera. First he was confused searching more buttons to switch the view, but after couple of seconds he tried clicking on the video.
   • The live/on demand split is not clear enough for the user:

Tasks (during the testing):
1. Find the multi-camera option → 36 seconds
   User entered the multi-camera part of application after 36 seconds, but did not declare the end of the task. After 60 seconds he entered the mosaic view and declared the end of the task.

2. Enter the multi-camera live content → 20 seconds
3. Enter multi-camera on-demand content → 22 seconds
4. Switch the view in multi-camera option → 40 seconds
   User had problem finding out how to switch the view already being in the mosaic view.

Questions for participants (after the testing):
1. Where would you put the multi-camera button?
   a. In the main menu bar
   b. I wouldn’t change it
   c. Other (specify): ...........................................
   The significance of the icon itself is not clear, but the location is fine.

2. Can you name some missing functions/buttons?
   Instead of camera icon for the multi-camera option, there should be a text explaining the function, for example “multi-camera” or “switch the view”.
3. When you start the multi-camera content you prefer:
   a. Start from default content in the full screen
   b. First choose the view from mosaic (or similar view)
   c. Other (specify): ________________________________

4. What were the aspects that turned the mockup easy or difficult to understand?
   - It is not intuitive to click on the image to switch the camera in the mosaic view
   - While watching full-screen video, the button to return to choose from the available cameras (mosaic view) should be more visible, and placed in a more central location.

5. List the sequence of buttons you need to use to switch the camera in multi-view:
   a. Red button
   b. Multi-camera button
   c. Click one video of live or on-demand content
   d. Click on the camera button
   e. Switch the camera by clicking one of the views

   **Evaluator’s comments:**
   This sequence is correct.

6. How do you feel about the following statements regarding the application?

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly disagree</th>
<th>Somewhat disagree</th>
<th>Neither agree nor disagree</th>
<th>Somewhat agree</th>
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**Name:** User 2  
**Date:** 15/05/2014, 11:10

**EVALUATION QUESTIONNAIRE OF TV-RING MULTI-CAMERA DIGITAL MOCKUP**

**Questions for evaluator (during the testing):**

1. Which part (display) provokes more questions from the users and why?
   The user managed to access the multi-camera function, but did not realize that he had arrived there, because there was no indication about the uses and possibilities of this function. Also, it was difficult for the user to arrive to the mosaic view. If you are only interested in the multi-camera function – there are too many steps.

2. Which screen provokes more confusion and why?
   Entering the multi-camera option was the main bottleneck for this user. When the user got through the multi-camera button, the rest of tasks were easily completed.

**Tasks (during the testing):**

1. Find the multi-camera option \(\rightarrow\) 20 \(\text{seconds}\)
   User entered the multi-camera part of the application after 20 seconds, but did not declare the end of the task as he was not sure if this is it. He entered other options and finally after minute 1:50 he came back to the right one and declared the end of the task.

2. Enter the multi-camera live content \(\rightarrow\) 35 \(\text{seconds}\)
   First he entered live content from normal view.

3. Enter multi-camera on-demand content \(\rightarrow\) 15 \(\text{seconds}\)

4. Switch the view in multi-camera option \(\rightarrow\) 45 \(\text{seconds}\)
Questions for participants (after the testing):

1. Where would you put the multi-camera button?
   a. In the main menu bar
   b. I wouldn’t change it
   c. Other (specify): ...............................................

User prefers to have the multi-camera option integrated in the normal application.

2. Can you name some missing functions/buttons?
   • There should be an explanation on the home page of what multi-camera is and how to use it.
   • Instead of camera icon it could be a text, for example “see programs in multi-camera”
   • Buttons minimize and multi-camera should be available all the time while watching the video (do not disappear).

3. When you start the multi-camera content you prefer:
   a. Start from default content in the full screen
   b. First choose the view from mosaic (or similar view)
   c. Other (specify): ...............................................

This way user is aware of the multi-view option.

4. What were the aspects that turned the mockup easy or difficult to understand?
   • Simple and common options, like click on the video to switch the camera
   • Once you understand the functionality of the multi-camera option is agile
   • The multi-camera option should be more visible in the home page
   • There should be an explanation for new users of what multi-camera is, maybe in the form of an easy tutorial or how-to walkthrough, popping up the first time the HbbTV application is used.
   • The icon of multi-camera is not understandable for the user. The camera icon could be replaced with a photo of mosaic of different views
   • User would prefer to integrate the multi-camera function into the actual content, not as a separate application.

5. List the sequence of buttons you need to use to switch the camera in multi-view:
   a. Enter the application
   b. Click on the multi-camera button in the down-left corner
   c. Choose one video from live or on-demand content
   d. Click on the camera button in the left corner
   e. Choose one video from the mosaic

Evaluator’s comments:

This sequence is correct.
User thinks there are too many steps.
6. How do you feel about the following statements regarding the application?

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly disagree</th>
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EVALUATION QUESTIONNAIRE OF TV-RING MULTI-CAMERA DIGITAL MOCKUP

Questions for evaluator (during the testing):

1. Which part (display) provokes more questions from the users and why?
   The “search” function at the top of the application main screen is visible, but not active at the time. At the beginning this puzzled the user, who tried to search for multi-camera content but did not receive any result.

2. Which screen provokes more confusion and why?
   Enter the multi-camera part of the application for the first time is the most challenging part of the mockup for the user.

Tasks (during the testing):

1. Find the multi-camera option \( \rightarrow 16 \) seconds
   User entered the right screen after 16 seconds, but was not sure about it. Finally after 3 minutes and switching the screens, he came back to the proper one and declared the end of the task.

2. Enter the multi-camera live content \( \rightarrow 12 \) seconds

3. Enter multi-camera on-demand content \( \rightarrow 7 \) seconds

4. Switch the view in multi-camera option \( \rightarrow 17 \) seconds

Questions for participants (after the testing):

1. Where would you put the multi-camera button?
   a. In the main menu bar
   b. I wouldn’t change it
   c. Other (specify): ..............................................

2. Can you name some missing functions/buttons?
   There should be a tutorial that tells the user how to use the multi-camera function for the first time in 2-3 slides.

3. When you start the multi-camera content you prefer:
   a. Start from default content in the full screen
   b. First choose the view from mosaic (or similar view)
   c. Other (specify): ..............................................
   The display should start from the default view in the full screen mode, but there might appear a pop-up window with information that other cameras are available.

4. What were the aspects that turned the mockup easy or difficult to understand?
   It is clear enough and intuitive, like for example clicking on one of the four cameras to switch the view in the mosaic representation.
5. List the sequence of buttons you need to use to switch the camera in multi-view:
   a. Click the red button
   b. Click on the camera button on the left-down corner
   c. Choose one video from the list
   d. Click on the multi-camera icon from the left corner
   e. Click on one of the views in the mosaic to switch the camera

Evaluator’s comments:
This sequence is correct.

6. How do you feel about the following statements regarding the application?

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Name: User 4
Date: 15/05/2014, 12:25
EVALUATION QUESTIONNAIRE OF TV-RING MULTI-CAMERA DIGITAL MOCKUP

Questions for evaluator (during the testing):

1. Which part (display) provokes more questions from the users and why?

2. Which screen provokes more confusion and why?
   Entering the multi-camera application as the button is not intuitive and understandable.

Tasks (during the testing):

1. Find the multi-camera option \( \rightarrow \) 16 seconds
2. Enter the multi-camera live content \( \rightarrow \) 12 seconds
   User first entered normal life content (not multi-camera).
3. Enter multi-camera on-demand content \( \rightarrow \) 7 seconds
4. Switch the view in multi-camera option \( \rightarrow \) 10 seconds

Questions for participants (after the testing):

1. Where would you put the multi-camera button?
   a. In the main menu bar
   b. I wouldn’t change it
   c. Other (specify): ..........................................

   User prefers if the multi-camera option would be integrated in the actual application in the way that you first enter any content and then, in the case that there are other cameras available, you get a notification about the multi-camera or you click a specific button on the remote control to see available cameras. That way, there should be a button associated to the multi-camera function.

   In the case that it would maintain separate, there should be an explanation of what multi-camera is and how to use it.

2. Can you name some missing functions-buttons?
   • There should be some kind of legend that the user can access at any moment, but that do not disturb in the experience, which explains the significance of each button from the remote control (red button, green button, etc.)
   • A preview of what is displayed on DTT channel available at any moment
   • In the mosaic view – there should be a red square of selected view
   • While entering the application, the highlighted contents should be regarding the topic of program from DTT channel. Also there should be shown other live programs that are available through streaming at the same time.

3. When you start the multi-camera content you prefer:
   a. Start from default content in the full screen
   b. First choose the view from mosaic (or similar view)
   c. Other (specify): ........................................
If you enter the video from the multi-camera application, the mosaic should be displayed first, but if you watch a normal video and other views are available, the content in full-screen mode should be shown directly.

4. What were the aspects that turned the mockup easy or difficult to understand?
   - Getting to know how to access the multi-camera application for the first time
   - If you already used the application, then it is easy to navigate
   - There should be a legend explaining how to use the remote control
   - The photo of camera does not represent properly the function of multi-camera. Instead, an image of mosaic could be used.
   - There should be better associations for the buttons, like: green button – enter, red button – exit.
   - Going back and forth should be through remote control, not clicking buttons on the screen.

5. List the sequence of buttons you need to use to switch the camera in multi-view:
   a. Red button
   b. Multi-camera button
   c. Choose one video from the list
   d. Multi-camera button in the left corner
   e. Choose another view by clicking the image

   **Evaluator's comments:**
   This sequence is correct.

6. How do you feel about the following statements regarding the application?

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### 9.3.2.2. SUS score calculation

**Scoring SUS**

SUS yields a single number representing a composite measure of the overall usability of the system being studied. Note that scores for individual items are not meaningful on their own. SUS scores have a range of 0 to 100. To calculate the SUS score, first sum the score contributions from each item. Each item’s score contribution will range from 0 to 4. For items 1, 3, 5, 7, and 9 the score contribution is the scale position minus 1. For items 2, 4, 6, 8, and 10, the contribution is 5 minus the scale position. SUS yields a single number representing a composite measure of the overall usability of the system being studied. Note that scores for individual items are not meaningful on their own. SUS scores have a range of 0 to 100. To calculate the SUS score, first sum the score contributions from each item. Each item’s score contribution will range from 0 to 4. For items 1, 3, 5, 7, and 9 the score contribution is the scale position minus 1. 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For items 2, 4, 6, 8, and 10, the contribution is 5 minus the scale position.
9.3.3. Third iteration of user testing

9.3.3.1. Answer sheets

Name: User 1 Date: 16/06/2014, 11:30

EVALUATION QUESTIONNAIRE OF TV-RING MULTI-CAMERA DIGITAL MOCKUP

Questions for evaluator (during the testing):
1. Which part (display) provokes more questions from the users and why?

2. Which screen provokes more confusion and why?
While watching the multi-camera content in the full screen mode, the button that switches the view should be visible at any moment and not only appear while we activate one of the buttons.

Tasks (during the testing):
1. Find the multi-camera option \(\rightarrow\) 15 seconds
2. Enter the multi-camera live content \(\rightarrow\) 15 seconds
3. Enter multi-camera on-demand content \(\rightarrow\) 10 seconds
4. Switch the view in multi-camera option \(\rightarrow\) 24 seconds

Questions for participants (after the testing):
1. Where would you put the multi-camera button?
   a. In the main menu bar
   b. I wouldn’t change it
   c. Other (specify): ………………………………………..

2. Can you name some missing functions/buttons?

3. When you start the multi-camera content you prefer:
   a. Start from default content in the full screen
   b. First choose the view from mosaic (or similar view)
   c. Other (specify): ………………………………………..

4. What were the aspects that turned the mockup easy or difficult to understand?

5. List the sequence of buttons you need to use to switch the camera in multi-view:
   f. Red button
g. Multi-camera button on the left-bottom corner
h. Click one video from the list
i. Click on the multi-camera button (mosaic button)
j. Switch the camera by clicking one of the views

Evaluator's comments:

This sequence is correct.

6. How do you feel about the following statements regarding the application?

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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
EVALUATION QUESTIONNAIRE OF TV-RING MULTI-CAMERA DIGITAL MOCKUP

Questions for evaluator (during the testing):
1. Which part (display) provokes more questions from the users and why?

2. Which screen provokes more confusion and why?

The multi-camera button in the initial page of the application is not visible enough. It should be bigger and with different color that other buttons, for example yellow, so that it will be more highlighted.

Tasks (during the testing):
1. Find the multi-camera option \( \rightarrow 5 \) seconds
2. Enter the multi-camera live content \( \rightarrow 20 \) seconds
3. Enter multi-camera on-demand content \( \rightarrow 10 \) seconds
4. Switch the view in multi-camera option \( \rightarrow 20 \) seconds

Questions for participants (after the testing):
1. Where would you put the multi-camera button?
   a. In the main menu bar
   b. I wouldn't change it
   c. Other (specify): ........................................................

2. Can you name some missing functions/buttons?
   - Add description of each view, characteristics of each camera, which will be available in the mosaic view.
   - For sports games streaming, add one more screen to the multi-camera which would provide game statistics and repetitions of highlighted moments.

3. When you start the multi-camera content you prefer:
   a. Start from default content in the full screen
   b. First choose the view from mosaic (or similar view)
   c. Other (specify): ........................................................

4. What were the aspects that turned the mockup easy or difficult to understand?
   - In the multi-camera part of the application everything is too homogeneous. There should be more differentiation between the “live” and “on-demand” part.
   - The mosaic button is not visible enough. It should be accessible all the time and not disappear if there is no action on the remote control. This way it will remind that a multi-camera option is available.
5. List the sequence of buttons you need to use to switch the camera in multi-view:
   
   k. Red button
   l. Multi-camera button on the left-bottom corner
   m. Click one video from the list
   n. Click on the multi-camera button (mosaic button)
   o. Switch the camera by clicking one of the views

   Evaluator's comments:
   
   This sequence is correct.

6. How do you feel about the following statements regarding the application?

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly disagree</th>
<th>Somewhat disagree</th>
<th>Neither agree nor disagree</th>
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</tr>
</thead>
</table>
EVALUATION QUESTIONNAIRE OF TV-RING MULTI-CAMERA DIGITAL MOCKUP

Questions for evaluator (during the testing):

1. Which part (display) provokes more questions from the users and why?

2. Which screen provokes more confusion and why?
   Once you enter the multi-camera part of the application, the main menu should disappear as it is confusing, because it does not apply to this part of the application.

Tasks (during the testing):

1. Find the multi-camera option $\rightarrow 10$ seconds
2. Enter the multi-camera live content $\rightarrow 13$ seconds
3. Enter multi-camera on-demand content $\rightarrow 10$ seconds
4. Switch the view in multi-camera option $\rightarrow 25$ seconds

Questions for participants (after the testing):

1. Where would you put the multi-camera button?
   a. In the main menu bar
   b. I wouldn’t change it
   c. Other (specify): ..............................................

   It should be more highlighted. Instead of situated on the left side, it should be in the middle and with a bigger size.

2. Can you name some missing functions/buttons?

3. When you start the multi-camera content you prefer:
   a. Start from default content in the full screen
   b. First choose the view from mosaic (or similar view)
   c. Other (specify): ..............................................

4. What were the aspects that turned the mockup easy or difficult to understand?

5. List the sequence of buttons you need to use to switch the camera in multi-view:
   p. Red button
   q. Multi-camera button on the left-bottom corner
   r. Click one video from the list
   s. Click on the multi-camera button (mosaic button)
   t. Switch the camera by clicking one of the views

Evaluator’s comments:
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EVALUATION QUESTIONNAIRE OF TV-RING MULTI-CAMERA DIGITAL MOCKUP

Questions for evaluator (during the testing):
1. Which part (display) provokes more questions from the users and why?

2. Which screen provokes more confusion and why?

Tasks (during the testing):
1. Find the multi-camera option → 15 seconds
2. Enter the multi-camera live content → 12 seconds
3. Enter multi-camera on-demand content → 12 seconds
4. Switch the view in multi-camera option → 25 seconds

Questions for participants (after the testing):
1. Where would you put the multi-camera button?
   a. In the main menu bar
   b. I wouldn’t change it
   c. Other (specify): ..............................................

   It should be bigger and distinct from other buttons like “Help” or “Exit”, for example using a different and outstanding color.

2. Can you name some missing functions/buttons?
   - Add labels for each view that explains its characteristics
   - In the main page there should be also a section about the multi-camera, similar to “highlighted videos”

3. When you start the multi-camera content you prefer:
   a. Start from default content in the full screen
   b. First choose the view from mosaic (or similar view)
   c. Other (specify): ..............................................

   If you enter from the multi-camera part of the application it makes more sense to see the mosaic first as the user is interested strictly in the multi-view option. However, you should know which of the cameras is the main one, so basic labels should be added for each camera, that would explain the characteristics and scope of each of them.

4. What were the aspects that turned the mockup easy or difficult to understand?

5. List the sequence of buttons you need to use to switch the camera in multi-view:
   u. Red button
v. Multi-camera button on the left-bottom corner
w. Click one video from the list
x. Click on the multi-camera button (mosaic button)
y. Switch the camera by clicking one of the views

Evaluator’s comments:

This sequence is correct.

6. How do you feel about the following statements regarding the application?

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9.3.3.2. SUS score calculation

Scoring SUS

SUS yields a single number representing a composite measure of the overall usability of the system being studied. Note that scores for individual items are not meaningful on their own.

SUS scores have a range of 0 to 100. To calculate the SUS score, first sum the score contributions from each item. Each item’s score contribution will range from 0 to 4. For items 1, 3, 5, 7, and 9 the score contribution is the scale position minus 1. For items 2, 4, 6, 8, and 10, the contribution is 5 minus the scale position. Multiply the sum of the scores by 2.5 to obtain the overall value.

<table>
<thead>
<tr>
<th>User ID</th>
<th>Questionnaire responses to SUS Items</th>
<th>Total score</th>
<th>SUS Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1 4 0 4 0 4 0 4 0 4 0</td>
<td>73</td>
<td>55</td>
</tr>
<tr>
<td>2</td>
<td>3 1 3 0 3 3 1 3 3 0 3</td>
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<td>62,5</td>
</tr>
<tr>
<td>3</td>
<td>3 3 1 3 0 3 1 3 3 0 3</td>
<td>80</td>
<td>60</td>
</tr>
<tr>
<td>4</td>
<td>3 0 4 0 4 0 4 0 4 0</td>
<td>88,75</td>
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<td>4</td>
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10. **Annex II - Literature review: Image Quality and Willingness-to-pay**

**10.1. Introduction**

For the DRM application scenario in the Dutch pilot, it is important to estimate how much viewers are willing to pay for image quality. After all, most of today’s television content offerings include high definition (HD) options for consumption. Therefore, we conducted a literature review on image quality (HD more specifically) and viewers willingness to pay. Information in this section is based on reports by Ericsson Consumerlab, Conviva, Screen Digest and Accenture.

**10.2. Methodology**

For the Accenture survey (Accenture, 2014), 6,021 consumers in 6 countries – Australia, Canada, India, South Africa, the UK, and the US – were polled online. Conviva analyzed 45 billion streams across customers, geographies, and devices in 2013; these streams were seen on more than 1.6 billion individual devices and on more than 400 premium media video players. Screen Digest contacted 17 leading international video service operators (such as BBC, ABC) to ask them what their experiences were of consumer reactions to different aspects of video quality. For their 2012 report, Ericsson conducted 12,000 online interviews in the US, UK, China, Spain, Sweden, Brazil, Taiwan, South Korea, Germany, Mexico, Chile, and Italy. In addition, they conducted 10 qualitative, in-home interviews in Chicago, and 4 domestic interviews in Stockholm. For their 2013 report, Ericsson conducted approximately 15,000 online interviews in Brazil, Canada, Chile, China, France, Germany, Italy, Mexico, Russia, Spain, South Korea, Sweden, Taiwan, UK, US. Respondents were aged 16-59. An additional sample with 2,300 respondents aged 60-69 was added. In addition, 30 in-depth interviews were conducted in Sao Paolo, Seoul, Stockholm, and New York.

**10.3. Results**

**10.3.1. Which factors determine video quality**

- **Sound**

The Screen Digest report ranked the most important factors in video quality. The most important factor was “well synchronized sound”. Further data revealed that 15 to 20 ms was the threshold for acceptable AV-sync delay/lead. Important to note is also the fact that people notice these differences more when the sound is intimately linked to something on the screen, such as lips moving when a character is talking.
Figure 112. The most important factors in online video quality - What matters in online video. Screen Digest.

- **Interruptions**

  The Screen Digest report indicated that the “lack of longer interruptions” was the second important factor. Consumers considered buffering gaps unacceptable: “two buffering gaps per show emerged as the threshold beyond which people start turning off fast”. The Conviva report shows that video streaming performance is gradually improving: 26.9% of the views experienced buffering in 2013 compared to 39.9% the year before. Similarly, 43.3% of the views were impacted by low resolution in 2013, compared to 63% a year earlier. The Conviva report also showed how quality impacts engagement for different genres. For the genres “movies”, “episodes”, “live sports”, “live news”, “TVE” they plotted how long viewers watched in three conditions: high buffering, low buffering (SD) and low buffering (HD). When looking at “live sports”, engagement dropped to almost zero viewing time when high buffering occurred. We can conclude from this data that it is better to reduce the video quality and avoid buffering than the other way around.

Figure 113: How Quality Impacts Engagement: Short Form video - 2014 Conviva Viewer Experience Report

- **Resolution**
In the Screen Digest ranking of important factors, screen resolution was the third factor. When asked “what resolution is required for High Quality”, more than 60% answered 720p or higher. The Conviva report indicates that the higher the resolution, the higher the engagement (time people watch a video). The 2012 Ericsson report asked how important certain TV and video services were in the years 2010, 2011, and 2012. Responses on a 7-point scale showed that excellent quality (HD) is increasingly important. In the 2013 Ericsson report, HD quality is ranked second on a list comprised of 18 factors important for TV and video services.

![Figure 114: How important are different TV and video services? - Ericsson Consumerlab 2012](image)

**Figure 114: How important are different TV and video services? - Ericsson Consumerlab 2012**

### Importance of resolution by genre

![Importance of resolution by genre](image)

**Figure 115: Importance of resolution by genre - What matters in online video. Screen Digest.**

- **Time to start**

  In one interesting result from Screen Digest, people are prepared to wait longer for a HD video to start compared to SD video quality.
• **Genre**

The genre of the content is also important for evaluating the quality of the video, as indicated by the Screen Digest report. For movies and sports, video quality is essential, while for news and content for children it matters less. The Conviva report confirmed these results: the engagement (how long viewers watch) for movies and sports for HD is larger than news for example.

![Relative importance by genre](image)

*Figure 116: Relative importance by genre - What matters in online video. Screen Digest.*

**10.3.1.1. Which factors determine adoption of online video services**

• **Willingness to pay**

The Screen Digest report indicated that 18% of consumers said that quality increased willingness to pay, and 70% said quality directly affected consumption. Furthermore, 25% of respondents said HD is a prerequisite for asking people to pay for content. The 2012 Ericsson report found that HD is essential as 41% of consumers are willing to pay for high quality video. Moreover, the content which consumers are most likely to want to pay for is on-demand TV and video content. Especially in the US, where cable subscriptions are very expensive, consumers would prefer to choose a limited number of channels and live events. And they would be willing to pay for this. Another graph shows the willingness to pay for TV and video services. HD scores very high on this graph.
Ownership

One important factor determining adoption of HD video is the ownership of HD enabled televisions (HDTVs). According to the Accenture report, 57% owns an HDTV. Furthermore, 21% plan to buy one in the next 12 months in addition to their current devices, 12% as a replacement of their current device, and 9% plan to buy and currently don’t own one. In total 41% are planning to buy a HDTV in the coming 12 months.

Legal alternatives & piracy

An interesting insight emerges from the 2012 Ericsson report. They compare the situation in the US with that of Spain. In the former there are many legal video services, whereas in the latter the legal alternatives are much more scarce. There is also much more piracy in Spain than in the US. This seems to indicate that the mere presence of legal alternatives decreases illegal downloading of content.

Usability

Somewhat related to the previous issue of piracy, the 2012 Ericsson report reports on ease-of-use. Illegal downloading is not that convenient since it requires time to find the content, a long time to download this content, file management etc. Therefore, an important success factor for online video services is the ease-of-use. This is also indicated in Figure 5 of their report where they asked how important different aspects of TV and video services are: “Usability: super simple interface” scores quite high, and its importance increased over the years 2010, 2011, and 2012. In Figure 6 of the report, where they ask whether people are willing to pay for...
these aspects, it does not score that high. This indicates ease-of-use is a prerequisite for any successful TV and video service. The 2013 Ericsson report states “consumers are looking for one simple, convenient experience that combines their TV and video content and services”. They asked people to rank 18 different factors according to their importance for TV and video services: “super simple” is ranked fourth.

Figure 119: Importance of services in TV and video experiences - Ericsson Consumerlab 2013

10.4. Review references


Cryan, Dan. Screen Digest. What matters in online video quality
