



LINKEDTV



Deliverable 6.1 Scenario Descriptions

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¹

- PU = Public
- PP = Restricted to other programme participants (including the Commission Services)
- RE = Restricted to a group specified by the consortium (including the Commission Services)
- CO = Confidential, only for members of the consortium (including the Commission Services)

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1 LinkedTV: Scenarios for future linked television

This deliverable provides descriptions of the LinkedTV scenarios, which importantly serve to demonstrate the value of the LinkedTV research and development work in the context of real seed videos enriched by Web content. The LinkedTV project description of work presented ideas for three scenarios, led by the consortium partners RBB, Sound and Vision, and University of Mons respectively. Those scenarios took complementary approaches to how LinkedTV could serve future consumers, considering different domains, user types, and interaction situations. In the first year, we have focused on the RBB and Sound and Vision scenarios (in Sections 2 and 3 respectively), as the third scenario is based on providing media artists with the technology which will be developed in the project's second year. The third scenario partner, University of Mons, has concentrated in the first year on how the planned approach with the use of behavioural tracking technology could also be applied to produce more advanced versions of the other two scenarios (as reported in Section 4).

Initial work on the RBB and Sound and Vision scenarios, including textual descriptions of the scenarios based on the definitions of different personas interacting with LinkedTV in different situations, has been reported in work package 3, deliverables 3.1 and 3.2, as part of the collaborative work on mocking up the LinkedTV user interfaces. This deliverable will not repeat this content, but will summarize the state of the scenario preparations at the point of the first project milestone (month 12 of the project work), which include modelling the descriptions into illustrative storyboards for each scenario (incorporating the work on mocking up the LinkedTV UI reported in deliverable 3.3), simulating the LinkedTV process of enriching the chosen seed videos with Web content, deriving requirements from the scenarios on the project research and development work, and generating an initial overall vision for the scenarios which will be followed in the rest of the project. This is complemented by a first analysis by University of Mons on the potential integration of behavioural tracking technology into these scenarios, which acts as a basis both for the integration of this technology into the LinkedTV infrastructure (work package 4) and for their own scenario development together with media artists at the NumediaArt Institute of Media Art.

This work provides us with a strong foundation for now beginning with the realisation of the scenarios over the LinkedTV infrastructure. In the second year of the project first implementations will be undertaken using the seed video and approach described in this deliverable. The seed video provision, storyboards and enrichment process simulations have enabled us to identify and communicate clearly the scenario requirements for the video analysis (work package 1), the conceptual annotation and linkage to other content sources (work package 2), and the appropriate screen user interface and device interactions (work package 3). Furthermore, the distinct personas generated for each scenario are our starting point for providing examples of personalisation (work package 4). This first implementation will surely give us the opportunity to ascertain to what extent the requirements of the scenarios have been already adequately taken into account in the research and development work, while offering the first opportunity to evaluate LinkedTV in the domains of news,

cultural heritage and media art, and hence generate new ideas and requirements for the next iteration of research and development.

1.1 History of the document

Table 1: History of the document

Date	Version	Name	Comment
2012/08/13	V0.1	Lyndon Nixon	Created initial structure
2012/08/14	V0.2	Lyndon Nixon	Revised structure after partner feedback
2012/09/02	V0.4	Nicolas Patz, Lotte Belice Baltussen	Scenario summaries and storyboards, first draft
2012/09/07	V0.5	Lyndon Nixon	STI sections, first draft
2012/09/10	V0.6	Lyndon Nixon	Filled in and updated all sections
2012/09/10	V0.65	Lotte Belice Baltussen	Small comments and revisions
2012/09/14	V0.7	Nicolas Patz	RBB contributions completed
2012/09/18	V0.75	Matei Mancas	U MONS contribution added
2012/09/19	V0.8	Lyndon Nixon	Revised document, completed S+V description except storyboards
2012/09/26	V0.85	Lotte Belice Baltussen	Storyboards completed
2012/09/27	V0.9	Lyndon Nixon	Finalised deliverable for QA
2012/10/09	V1.0	Lyndon Nixon	Last changes post-QA

1.2 Glossary for the document

Certain terms are used with specific meanings within the LinkedTV world. As these terms are also used throughout this deliverable, we provide for the reader's convenience a short glossary.

Seed video – the video content which is the subject of annotation and enrichment in the LinkedTV infrastructure. (to distinguish from video which may be part of the enrichment itself)

Enrichment – the addition to the seed video of links to other content, which is related to topics within that video which have been identified through annotation.

Enrichment content – the media resources linked to in the enrichment, which can be browsed to from the video within the LinkedTV system.

2 RBB Scenario: My RBB Aktuell

RBB is the public broadcaster for the area of Berlin and Brandenburg in Germany.

The basic idea of RBB's scenario is to enrich the local news program according to the needs and interests of the individual viewer. In some cases this may mean to just watch the daily news show as it is, in another case the viewer may prefer certain topics in some of the news items, and he or she may want to learn more about the topic in question or inform him/herself about one specific aspect.

RBB has chosen as its seed video content a number of episodes of its daily local news program "RBB Aktuell". The show is broadcast four times a day but for the project the late broadcast (at 21:45) is the most suitable as it is enhanced with subtitles which help to improve the results of the video analysis. For the purpose of training the technical components to be developed in the video analysis and annotation work, several shows were downloaded to a project repository in three time periods: November 2011, March 2012 and August 2012.

The show described in this deliverable is that of 09 August 2012, 21:45h (first broadcast).

As a public broadcaster, RBB also has specific restrictions in line with its business regarding how RBB content should be enriched in a LinkedTV scenario. On one hand, the enrichment content sources should be trusted and in line with RBB's own content policies, which led to the creation of a RBB "white list" of accepted sources. On the other, it is RBB's wish that viewers should not be led away from RBB's own content when accessing enrichments, but that the enrichment complements the core programming of RBB which stays in the main focus of the viewer. Any respectable and trustworthy source outside the ARD family is most welcome for use in the LinkedTV service, but using ARD sources is easier to handle from various perspectives: copyright issues are easier to handle, the content needs less quality checking before linking, etc.

As a contribution to the overall project agenda, the idea is that the project's automated search and retrieval mechanisms would crawl the whitelisted content first and further more suggest any other source they can find on the web (see LinkedTV deliverable 2.3). A dedicated editor will then check the suggested link targets to avoid IPR conflicts and other content issues and occasionally add link targets the project's mechanisms may not have found.

2.1 RBB Scenario: summary

The basic idea of RBB's LinkedTV scenario is to offer a personalised, TV-based on-demand service which directly links content concepts to online sources which will be displayed in the LinkedTV service. Link targets can be videos, audio files, images, especially information graphics, and website excerpts.

2.2 RBB Scenario: storyboards

To illustrate the motivations of different individual users we chose to describe different chapters of one news show (broadcast on 09 August 2012, 21:45 on rbb's TV channel) from the different perspectives of three fictional personas.

Peter (65), is very much interested in regional politics, economy, and history. He uses the service at home and in "TV-only" mode, so he only uses the TV Remote Control (RC) to interact.

Ralph (19) is a young carpenter who is interested in things as different as architecture, sports, hiking and modern communication technologies. He watches the news on TV and navigates extra content with the RC, but when his girlfriend Cindy (18) joins him on the sofa, Ralph grabs his tablet to interact with the service so that Cindy can watch the news undisturbed.

Nina (32) is a young urban mom who is very interested in political, ecological and social aspects of what is going on. She starts using the service with her tablet on the sofa in front of her TV, but when she has to leave the house with the baby she takes her tablet with her to consume more extra information on the go.

The following chapters describe how and why they watch and interact with *My RBB aktuell* in different ways.

2.2.1 Peter



- Name and occupation: Peter, retired widower
- Age: 65
- Nationality / place of residence: German / Potsdam
- Digital literacy: early adopter; interested in every new technology
- Main interests: Brandenburg and especially Potsdam, evening events for seniors in neighborhood, economy, history, technology, television, gardening, hiking, health, medicine, travelling

Peter lives in Potsdam a small and wealthy town near Berlin. Since he retired he has plenty of time for his hobbies. He likes watching TV and listening to the radio. He is also very interested in new technology and likes to use new services via the internet. He especially appreciates how easy new technology makes staying in contact with his family living further away. He never hesitates to become acquainted with new technology and operating concepts and if he likes something he optimizes its handling. He has certain favourite TV programs and is particularly interested in the news from his region. Peter is involved in

several activities in his neighbourhood and likes to talk about his views. For example, he talks with the bakery saleswoman about the upcoming public festival in Potsdam or about regional politics. Since Peter consumes a lot of media throughout the day, it often happens that news is repeated. On the other hand, there are often topics he wants to know more about than what is included in the usual news report. In addition to regional politics and events he is also interested in economy, history, gardening, travelling, new technology trends as well as health and medical issues.

2.2.1.1 Story

Peter missed the late news yesterday. After a long day and a dinner at a family birthday he had stayed a little longer than usual for a sip of wine. Getting up the next morning, Peter wants to check yesterday's regional news (Figure 1).



Figure 1. Peter sits down to watch (linked) television

He turns on his HbbTV set, tunes in to rbb and is automatically greeted by the rbb Start Panel (Figure 2).



Figure 2. The RBB start panel in hbbTV

With the arrow key on his Remote Control (RC) Peter moves to *My RBB aktuell* and opens the service by pressing OK (Figure 3).

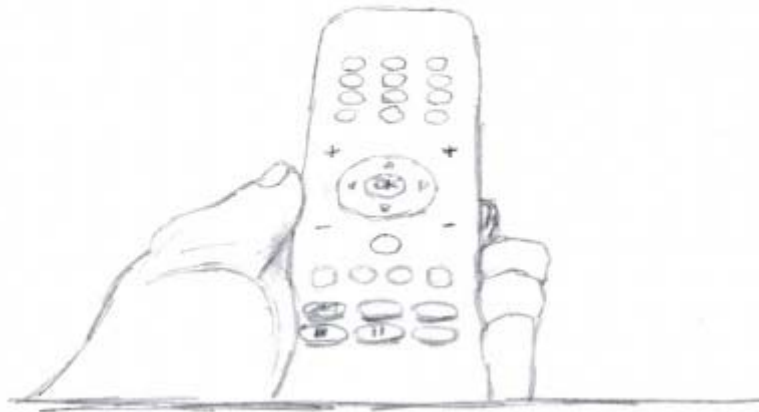


Figure 3. Starting to watch the news programme

Peter watches the introductory overview and most of the news spots. Some of the spots he skips, because he is just not interested. He is especially interested in seeing the state of the airport construction (video), checking the overview of Olympic medals for Brandenburg's sports teams (diagram and table) and reads the background information on the Potsdam Canoeing Association, because his grand-daughter's boyfriend is also training there; maybe he can find his name there, too.

The spot about the famous actor Klaus Maria Brandauer reading at an old palace nearby is a real highlight for Peter today. Peter saw many movies with him when they both were much younger and now there is a chance to see him live and get really close. What was the name of this famous movie again? Didn't he even get an OSCAR for that one? It's very nice that Peter can access content from Wikipedia and IMDB to check Brandauer's filmography and biographical background. But there will be time for that after the spot - Peter can see that the extra info for all the spots remains accessible after a spot ended.

Now they speak about the location: Brandauer reads from Bunuel's memoires at Schloss Neuhardenberg. Beautiful! He heard of that but he's never been there. Where exactly is it again? There is also a map icon among the extra links, so Peter quickly moves the focus there with the arrow keys of his RC and presses OK: the map opens in a small area at the bottom right (Figure 4).

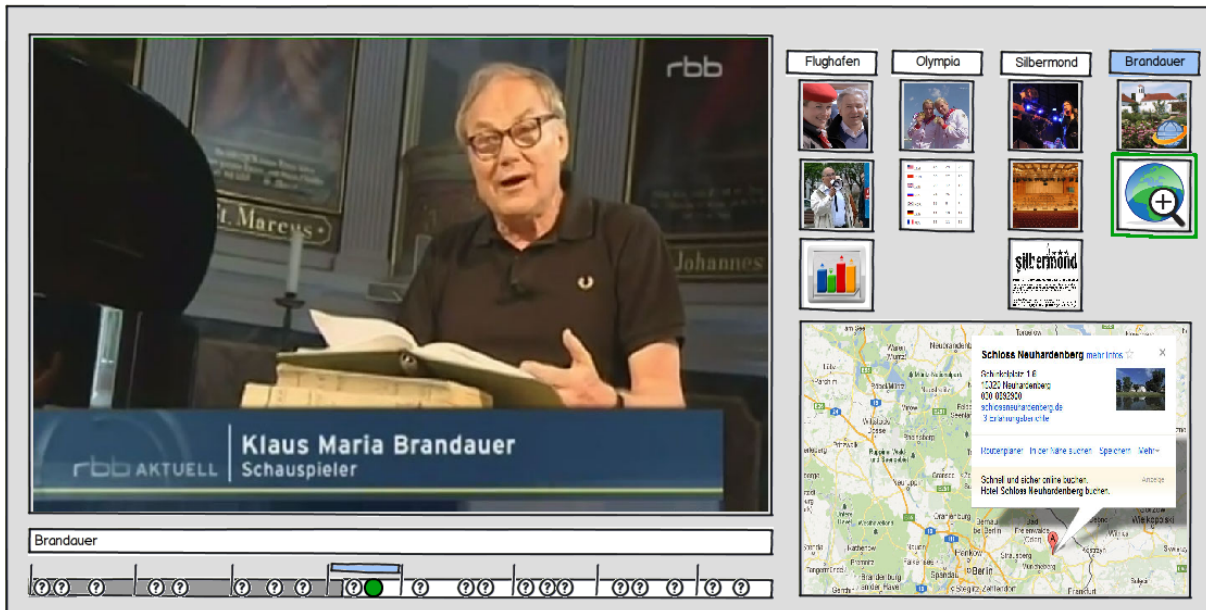


Figure 4. Additional information via the LinkedTV interface

The main news video shows Brandauer reading, so Peter can focus on listening and has time to have a closer look at the map. Peter moves the focus to the SCREEN MODE icon and presses OK to switch the windows (Figure 5).

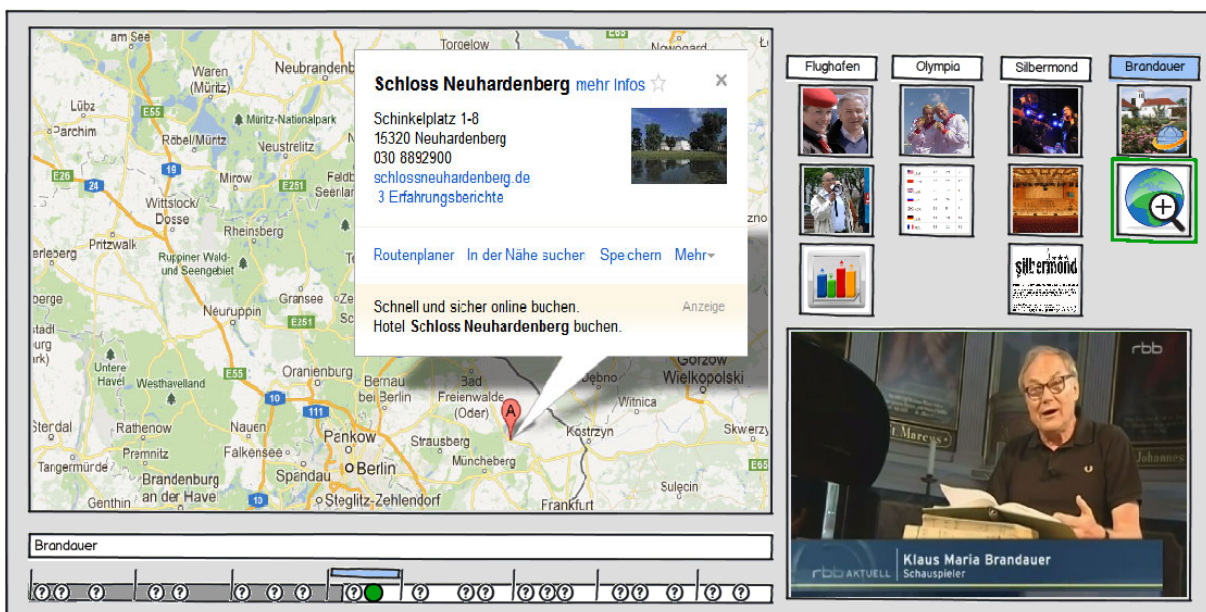


Figure 5. Screen mode switches the main TV and the additional content screens

Now the TV spot is playing in the small window (bottom right) and he can view the map in the bigger window (top left).

And what's that? There is even a recommendation for a Brandauer movie coming up on Wednesday! Lovely! So Peter sets a reminder to make sure he won't miss it! Now Peter feels secured: a few minutes before the movie is on air Peter will get a notification.

After this news spot there is only the weather forecast, but today Peter looks at the weather pictograms on the map with different eyes: now that he plans to go to the reading and knows where it is, he focuses on this part of the map to check if the weather will be fine there, too. Happy to see the sun symbol there, he turns to the extra information links as soon as the host said good bye.

With the left arrow key Peter switches back to the Brandauer spot. Once the spot's title is highlighted he uses the other arrow keys to select the Wikipedia text first, presses okay and sees it appearing in the smaller window at the bottom right. As the news show is over now, Peter decides it would be nicer to read the description in the larger window. So he uses the arrow keys again to go to the SCREEN MODE button and swaps the windows. At the end of the Wiki text Peter leaves the text window with the exit button of the RC and moves on to the IMDB information. In the end he also accesses the visitor information of Schloss Neuhardenberg to find out about ticket prices and where to get them. He notes the phone number, turns off the TV and calls the number to book two tickets for the next weekend.

2.2.2 Ralph



Ralph, 19, and his girlfriend
Cindy, 18

- Name and occupation: Ralph, carpenter
- Age: 19
- Nationality / place of residence: German / Prenzlau (Brandenburg)
- Digital literacy: digital native
- Main interests: Prenzlau and surroundings, architecture, nature, joinery, crafts, local sport clubs, boats, cars, car mechanics

Ralph has always lived in Prenzlau. After school he served an apprenticeship as carpenter in the neighbouring village Strehlow. When he turned 18, he immediately bought his own car. Since then he has been tuning and improving it every weekend. A few weeks later, he met Cindy, a high school girl. They fell in love quickly and became a couple. Soon Ralph moved into his own apartment near the lake. Ralph and Cindy, who recently turned 18, have just celebrated their first anniversary. Both spend much time together and like to go for a walk. In summer they often go swimming in the nearby lake. Then Ralph is looking at the boats too, often thinking it would be nice to have one too one day, but he will have to learn to sail first. They love nature and look forward to moving into their own house near the forest one day. For Ralph it is a great idea to work in his own house. Being a carpenter, he is very interested in materials, building fabric, constructions and architecture. On the other hand, he is very interested in all local sports clubs. He does not

care particularly for the latest technology, but as a “digital native” it is not difficult for him to adapt to new technologies and to use them.

2.2.2.1 Story

After a day of work Ralph gets home, feeling tired physically but interested to see what is going on in the world and especially in the region. He makes himself comfortable on the sofa, zapping through **My RBB aktuell** with his Remote Control (Figure 6).



Figure 6. Getting comfortable in front of the TV and RBB aktuell

The latest issue is always the first to choose, so it is only one push of a button away. While the host gives a short overview of the main news in this show, Ralph swiftly browses through all the chapters in the timeline below the main video. After a few pushes on the arrow keys of his RC, he decides to start with the spot on Brandenburg’s Olympic medallists. Ralph is very interested in sports, but rbb don’t show the sports videos in the on-demand show; the screen just shows everything blurred and reads: “Due to legal restrictions we cannot show these images on the Internet” (Figure 7).

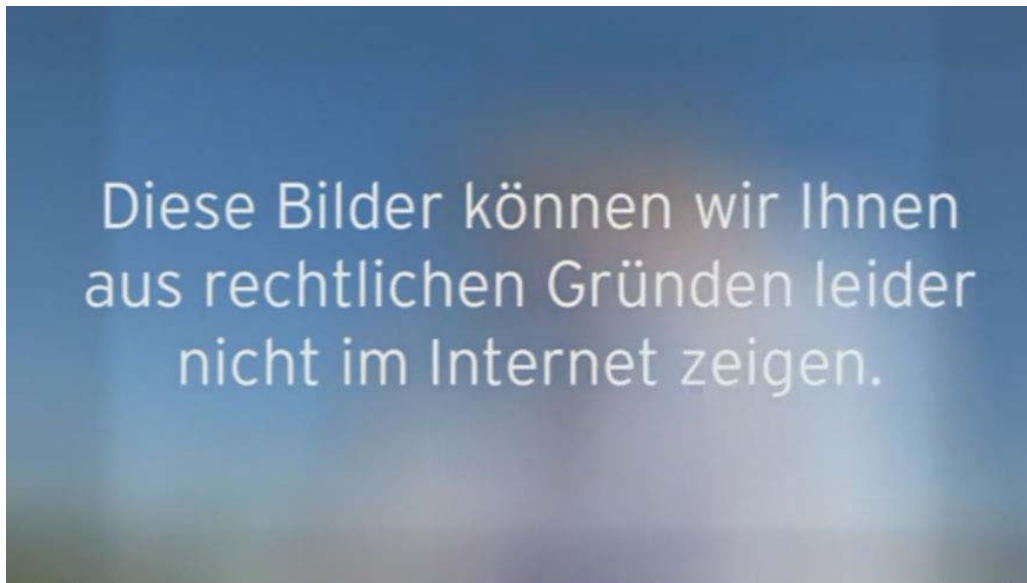


Figure 7. “Due to legal restrictions we cannot show these images on the Internet”

Fortunately, *My RBB aktuell* links to the original video plus a few more which are still in the ARD Olympia online archive. The report gives a good overview of the medals achieved by Olympic athletes from Brandenburg and Berlin. Right after this overview, Ralph pauses the news show and watches the linked videos. While Ralph is still checking the various sports reports, his girlfriend Cindy joins him on the sofa (Figure 8).



Figure 8. Ralph and Cindy start watching TV together

Cindy is not really interested in the sports stuff and generally prefers simply watching the news to interacting with the TV programme, so Ralph grabs his iPad from the table in front of him, connects with the service and bookmarks the remaining Olympia links for checking them on the tablet later (Figure 9).

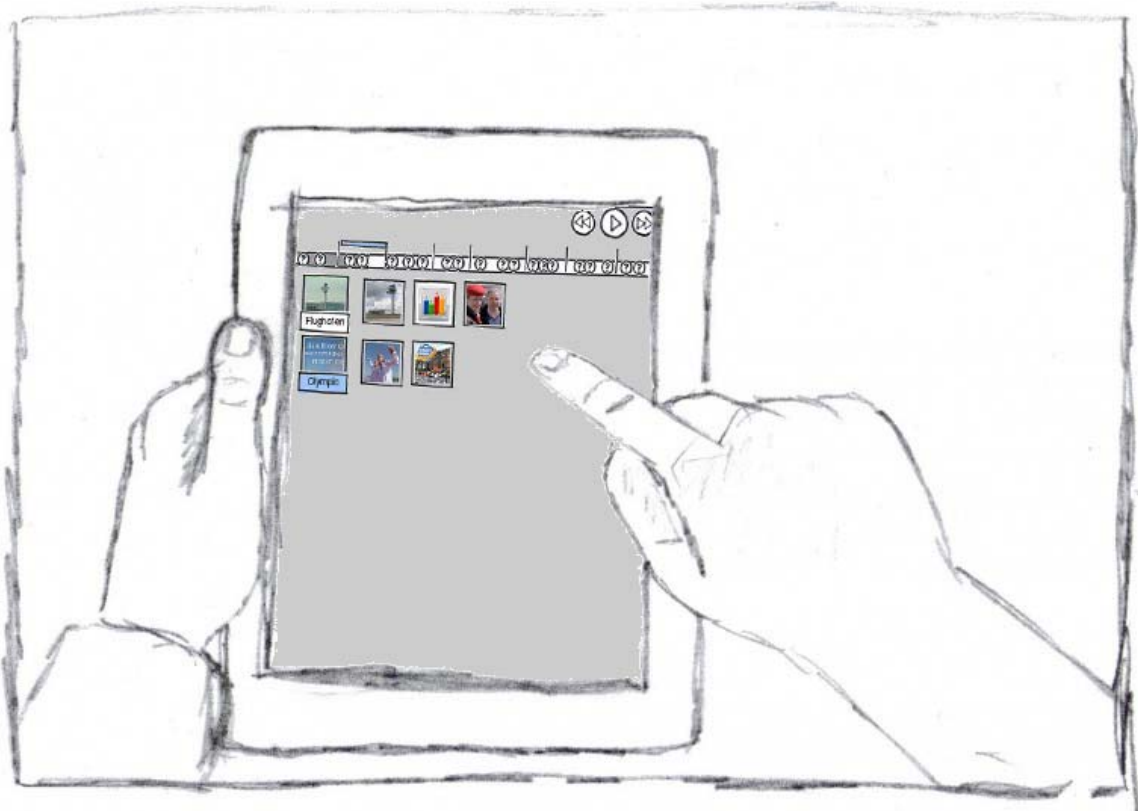


Figure 9. Enrichments on a second screen to not disrupt group viewing

Towards the end of the show there is a spot about the German rock band Silbermond who played at rbb's concert hall in Berlin. Ralph really likes their music, and would like to know much more about the band. While Cindy keeps watching on the TV, Ralph browses the photos from the live event and some texts about the band.

While Cindy watches the rest of the news, including the weather report, Ralph plugs in his earphones and watches the video takes from the live event and some interviews with the band members (Figure 10).



Figure 10. Exploring LinkedTV additional content on the second screen

Cindy already finished the show and gets up to make some coffee. Meanwhile Ralph keeps watching the video and humming to the live video. Had he only heard about the show sooner, he would have called the radio stations to win such a free ticket. He definitely has to subscribe to radio berlin's newsletter, so he won't miss such a nice opportunity again!

2.2.3 Nina



- Name and occupation: Nina, teacher on maternal leave (Mother of Luna)
- Age: 32
- Nationality / place of residence: German / Prenzlauer Berg
- Digital literacy: interested in new media and "hip" technology
- Main interests: Berlin, city life, theatre, education, politics, music, culture, food, books, Pilates, cooking

Nina, 32, hipster mom

Nina is a typical inhabitant of Berlin's hippest quarter, Prenzlauer Berg. She is a well educated and well informed young mother. She really likes discussing things. She especially likes to talk about politics and culture. Therefore, she likes to get deeper and

not just superficial information. When a subject is interesting for her, she will take the time to understand it properly. She uses media in a very organised manner and especially about watching TV she is very picky. She likes Berlin with the constant changes and she feels very much at home in her family-friendly neighbourhood. She likes to visit exhibitions and also to go to the theatre and readings. Because she is very interested in culture, she would like to be informed about the city life, current events and new galleries. She does not like it at all when things are complicated and take a long time to understand and she can get impatient very quickly, so every application or service has to be smooth and easy. Nina is not interested in technological background information on how a system works, it should just work well and adapt to her life; time-independence is also very important for her, because of her little girl: she only has time to watch infotainment programmes whenever her daughter is asleep.

2.2.3.1 Story

Nina just managed to sing Baby Luna to sleep and after a short sense of relief walks over to the living room. She didn't have a chance to see the news today and yesterday in the evening she had fallen asleep on the sofa before rbb aktuell started. So now she grabs her RC and her iPad to check what she missed (Figure 11).



Figure 11. Accessing Catch Up TV in the evening

She turns on the TV, pushes the red button, and starts the *My RBB aktuell* app from the HbbTV Start Panel.

Her iPad is always ready but secured high on a shelf where Baby Luna can't grab it. Now she uses it to control the "*My RBB aktuell*" service. The TV SCREEN shows the logo of rbb aktuell until Nina selects with her iPad which issue she wants to see.

The latest show appears on the top of the list and with a soft push on the date she gets a timeline enhanced with the titles of the news spots of this show. After skipping through all the chapters, Nina decides to start with what interests her most: the spot about the scandalous delay of the opening of Berlin's new airport (Figure 12).



Figure 12. Selecting the first news item

While the news show host introduces the video spot, Nina tries to get an overview of the background information the service offers and bookmarks some of the most interesting ones. In addition to some background dossiers there is also a longer summary of today's press conference which she would like to watch later. The most interesting offer is a set of controversial statements by people from different parties and NGOs, discussing the political consequences of the severe mismanagement in this project of political and economic importance.

As Nina expects baby Luna to require her attention again soon, she decides to bookmark these interesting links for later while the spots is showing on the TV screen. She keeps watching the other, less captivating spots and occasionally bookmarks a few other links until it is time for Nina and baby Luna to leave for a walk in the park. With fresh diapers and well-fed, Luna is very relaxed after a few rounds in her stroller. Eventually Luna starts dozing again and Nina can take out her tablet to check the bookmarked links (Figure 13).

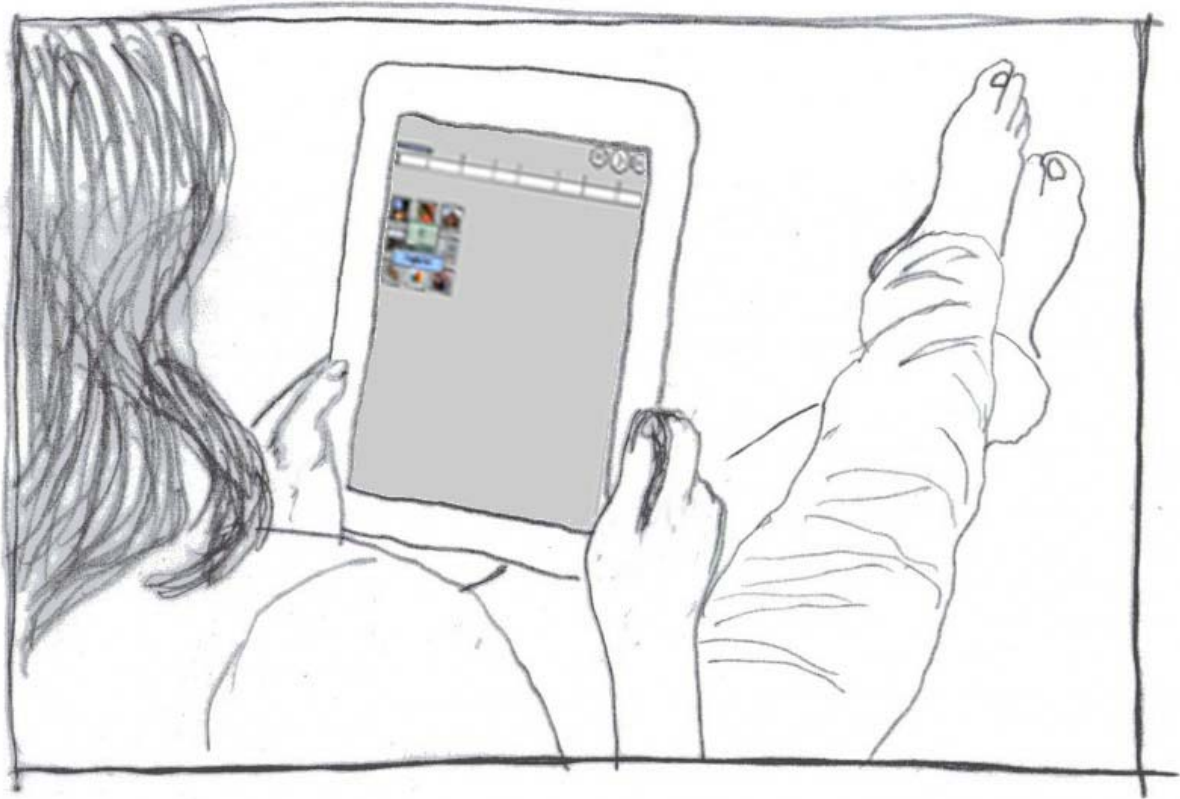


Figure 13. Exploring bookmarked content

She starts the app again and moves to the bookmark list. Here she can access her bookmarks ordered by topic and/or date. She checks her individual airport dossier and watches the bookmarked videos. Of course, she can also access all the other links suggested by the service. In the list she also finds a set of diagrams on a recent opinion poll. Nina likes this comparison of diverse opinions and starts a discussion among her friends by sharing the linked source. Before she can push the discussion on her social Web wall, baby Luna seems to get uneasy, so Nina stows away her tablet and continues the walk through the park.

2.3 RBB Scenario: process

From the storyboards we find specific moments in the seed video where the user's interest in a concept can be immediately answered via LinkedTV-enabled enrichments of the video. We simulate the enrichment of selected video frames in order to identify useable sources and requirements for both metadata vocabularies / concept identification schemes and content sources. As a result we can fill our mock-up screens with realistic enrichments and set as our goal in the scenario realisations to generate the same enrichments automatically via the LinkedTV platform. The following paragraphs illustrate the process which identifies a number of concepts that appear in the "RBB aktuell" news show of [Thu, 09. Aug 2012](#) and show

screenshots of related information sources. All linked sources are either from rbb's and ARD's online archives and websites (general rbb whitelist) or from acceptable, trustworthy sources, mainly official websites of the entities in question (airport BER, berlin.de, Silbermond band website, etc.).

2.3.1 One Concept in seed content

The following figure (Figure 14) illustrates the simplest case where there is only one concept visible on screen. The concept "Airport BER" is represented by a picture of the main hall of the new terminal. The linked sources are from different content categories, such as politics, architecture, economy, geography, and can be classified as either information or opinion.

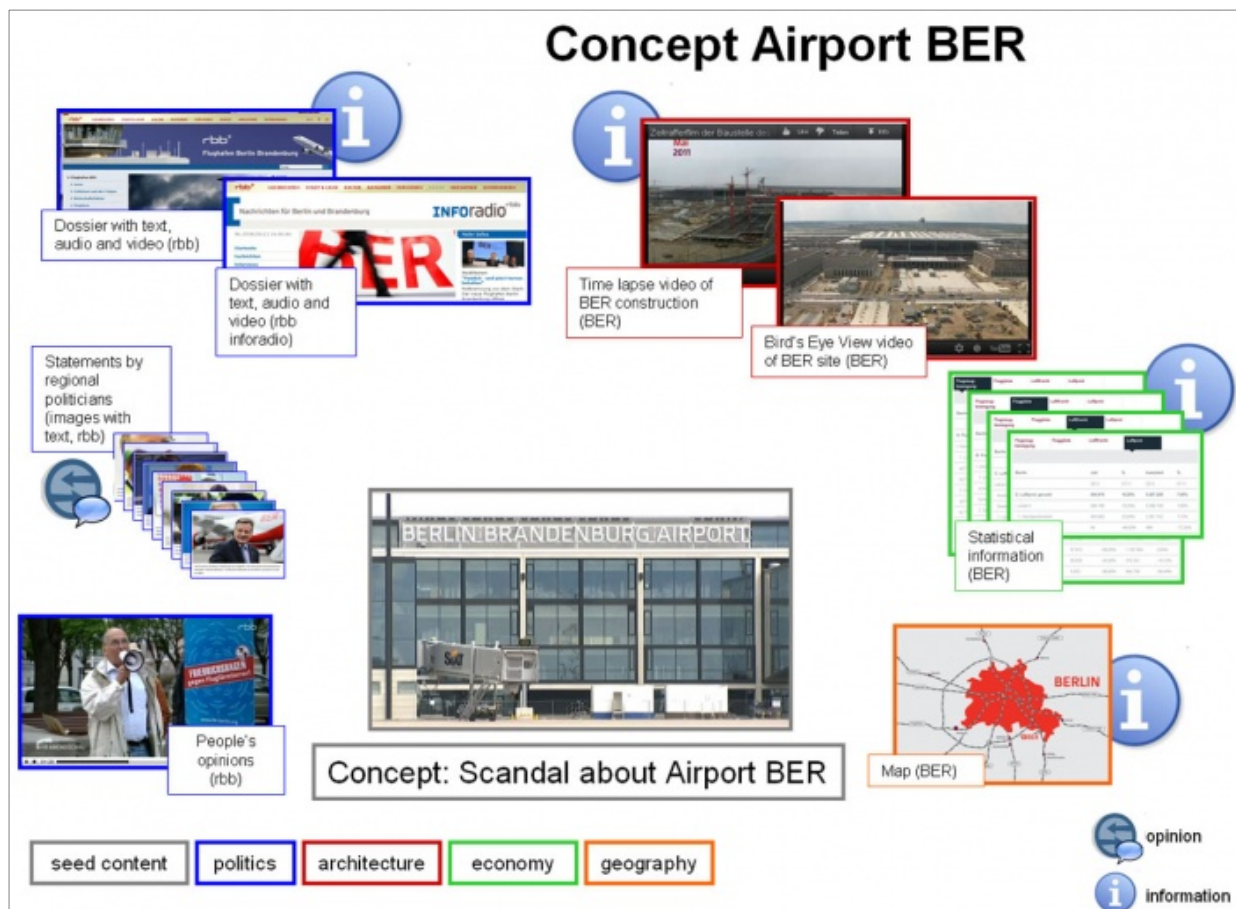


Figure 14. One concept visible on screen

The multitude of related sources requires the option to link more than one source at a time.

2.3.2 Two Concepts in Seed Content

The following figure (Figure 15) shows a case where two concepts are represented at the same time. This news spot is about the band Silbermond who staged a live show in the famous historical building “Haus des Rundfunks”, the first official radio/broadcasting building in Germany and the home of many important live recordings in a time when music on the radio was often played by a live orchestra.

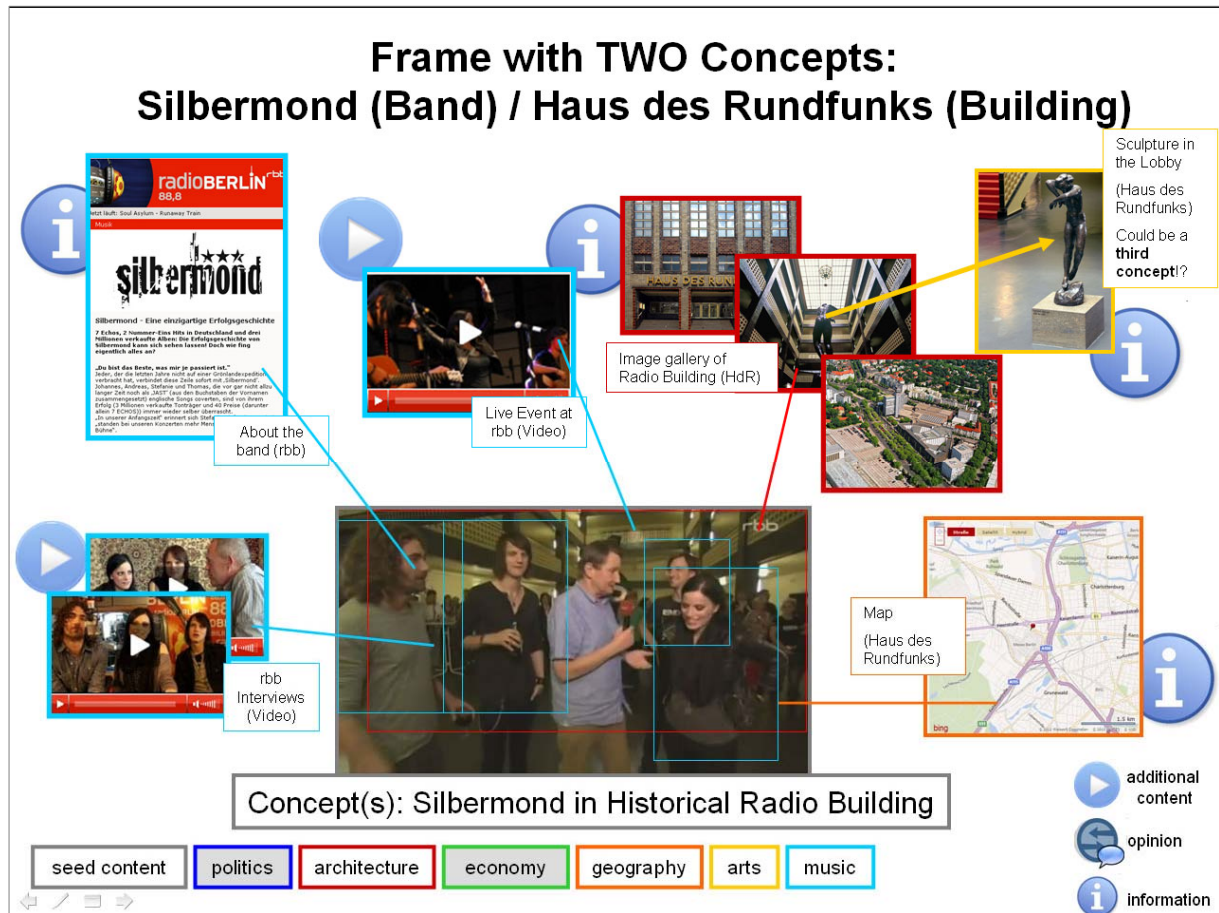


Figure 15. Two concepts visible on screen

The left part of the chart shows a number of linked sources connected with the band; the visible objects are the band members while the abstract concept “Silbermond” is only audible when the host names the band several times during the live interview. Thus, the band members are, at the same time, individuals for each of which there actually are existing websites, and members of the band which is never visually represented as a clickable object (e.g. in the form of a logo or similar visual object). As additional information about the band there are several videos available on rbb pages (live music and interviews) as well as text pages describing their career, but there would certainly be other acceptable links such as the band’s own website or the publisher’s special website for the band, etc.

The right part of the chart shows information on the historical building, including a map showing its location.

2.3.3 Three Concepts in Seed Content

The below figure (Figure 16) illustrates a very complex scene where three concepts are represented at the same time:

1. Internationally famous actor Klaus Maria Brandauer reads from
2. the memoirs of world-famous film director [Luis Buñuel](#)
3. at the historical location of Prussian palace Schloss Neuhardenberg in Brandenburg

Of course, an editor might want to decide to link only one or two concepts at a time – although all three are visible at the same time, they certainly did not appear at the same moment, so they could be introduced sequentially. However, the user might want to call for related content when it occurs to them.

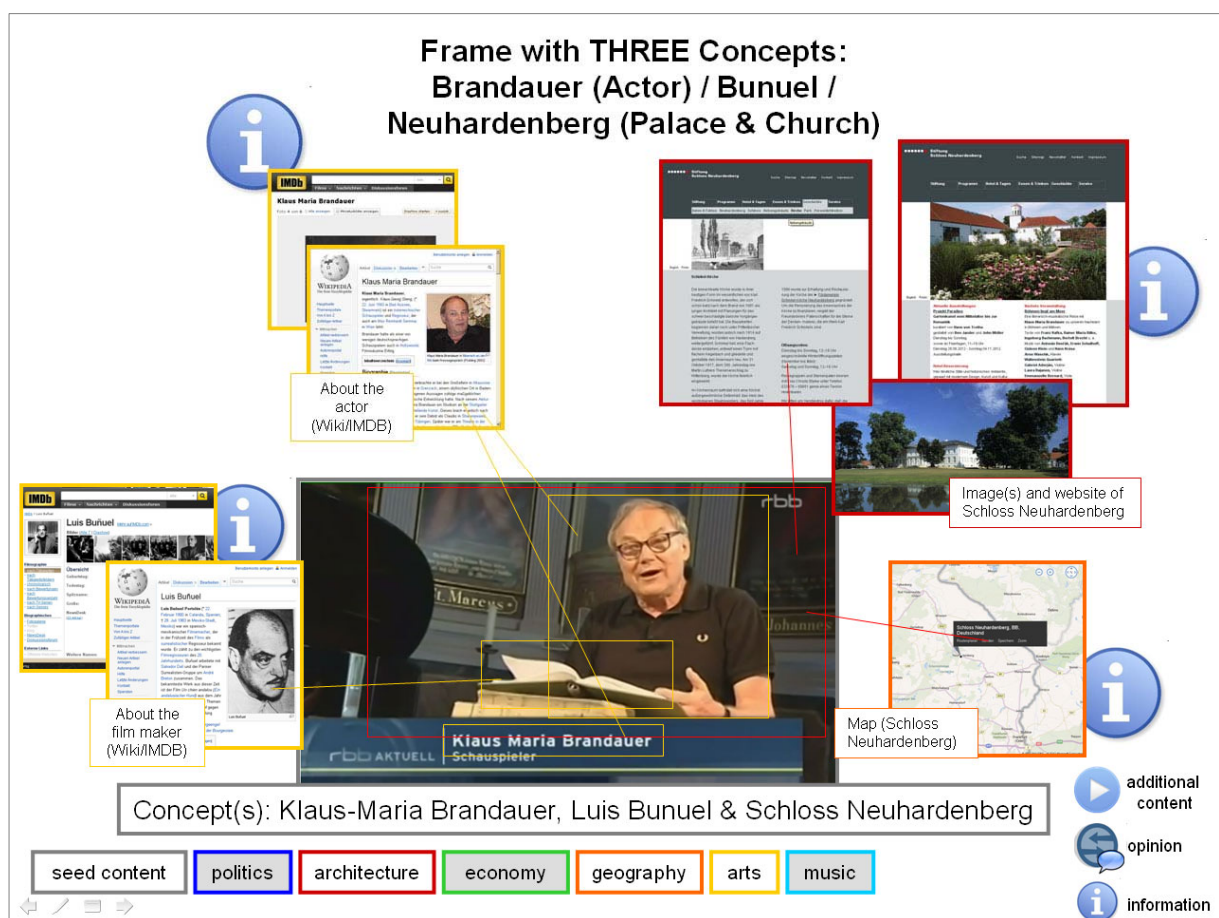


Figure 16. Three concepts visible on screen.

The linked sources include rbb sources and a content from external websites like Wikipedia and IMDB for Brandauer and Buñuel, the official website of Schloss Neuhardenberg and a map, illustrating where the reading takes place.

2.4 RBB Scenario: next steps

The RBB scenario explores the enrichment of time context-dependent video content with complementary and trusted white list content. For RBB, the R&D focus in the ongoing development of the scenario will need to cover:

- Identifying topics of interest in news items, with a focus on their temporal context (contemporary/historical) and event semantics (who did what with whom when and where);
- Using the transcripts, subtitling and in-frame text overlays in the news video to support an automated annotation process;
- Deriving links to white list content (whose sources are typically not already available in what the project calls the Linked Media layer, and hence must be pre-analysed by Web mining tools to generate the necessary content links);
- Respecting the business model and content rights issues of RBB in the scenario enrichment through an appropriate user interface and enrichment browsing approach;
- As multiple concepts can occur in the same news item, often spatially and temporally overlapping in the video, both the user interface for accessing and browsing concepts present in the video as well as the personalisation content filter for deciding which concepts should be highlighted to an individual user are very important to the RBB scenario.
- Making use of the personalisation and contextualisation components of LinkedTV to ensure content enrichments reflect the appropriate and most relevant facets of the topics of the news story to the viewer (e.g. on a church arson attack, one person is interested in the church architecture and the other on other arson attacks in the same area).

In the next year, we will focus on realising the RBB scenario over the LinkedTV platform components. Following a successful end-to-end implementation of the workflow, based on the mock-ups and storyboards reported in this deliverable, we will be able to work closely with the R&D partners of LinkedTV to extend and adapt their work to address the requirements given above for the RBB scenario.

3 S+V Scenario: Antiques Interactive

Sound and Vision is the Netherland's largest media archive.

The goal of Sound and Vision's scenario is to make access to Europe's rich diversity of cultural heritage more immediate and intuitive from a video/TV viewing experience. References to art and culture are common in European TV and video content yet the links to information and additional media from those references directly are lacking. The opportunities to do this are made easier by continued efforts to digitise Europe's cultural heritage (Europeana) and publish the metadata of cultural artifacts are not taken in the TV/video domain. The scenario explores the insertion of links from cultural references within video directly leading viewers to additional information and media about those cultural objects. The results should be greater awareness by and access to citizens of Europe's rich cultural heritage.

Sound and Vision has gained access to video of the Dutch TV program Tussen Kunst & Kitsch (Antiques Roadshow) which is a production of the public broadcaster AVRO². To start with, the scenario has chosen a single episode of the show from 8 December 2010³.

This program directly references many different cultural artifacts. To link those artifacts to information and media, Sound and Vision is able to directly make use of online metadata and media repositories for cultural heritage, such as VIAF (including mappings to ULAN, AAT, Europeana), but also local museums like the Amsterdam Museum and Rijksmuseum.

Given the good experience of collaboration to date between the LinkedTV and the public broadcaster AVRO, Sound and Vision expects to be able to access further video of Tussen Kunst & Kitsch episodes for use within the project.

3.1 S+V Scenario: summary

The Sound and Vision scenario was described in the deliverables 3.1 and 3.2. The general aim of the scenarios is to describe how the information need of the Antiques Roadshow viewers can be satisfied from both their couch and on-the-go, supporting both passive and more active needs. Linking to external information and content, such as Europeana, museum collections but also auction information has been incorporated in these scenarios.

² <http://www.avro.nl>

³ <http://cultuurgids.avro.nl/front/detailtkk.html?item=8237850>.

3.2 S+V Scenario: storyboards

3.2.1 Rita – Art lover



- Name and occupation: Rita, administrative assistant at Art History department of the University of Amsterdam
- Age: 34
- Nationality / place of residence: Dutch / Amsterdam
- Search behaviour: Explorative
- Digital literacy: Medium

Rita starts watching an episode of Antiques Roadshow. She wants more information on the location of the programme, as she sees it shown in the programme opening but it is not referenced. From one click, she sees it is the Hermitage in Amsterdam (Figure 17). She reads the Wikipedia article about the museum before continuing her viewing:



Figure 17. Getting more information about the Hermitage

Later on in the programme, Rita wants more information on a gold box someone has brought in to the Antiques Roadshow. She's specifically interested in the Chi-rho symbol depicted in the box (Figure 18) which isn't discussed in any more detail in the seed video.

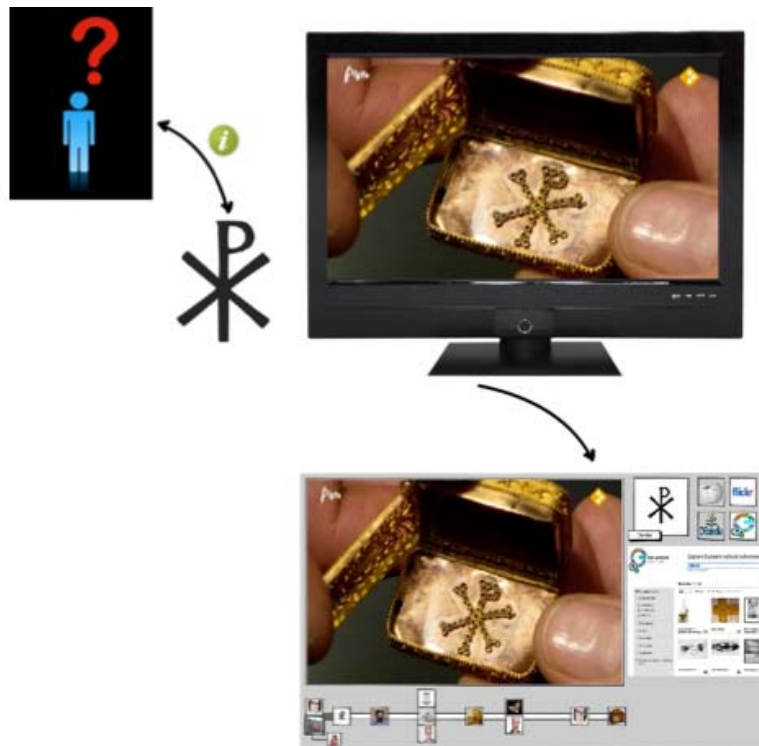


Figure 18. Accessing information about the Chi Rho symbol

Rita wants to save this information to look at more in-depth later (Figure 19).



Figure 19. Saving information for later.

Rita also wants to take part in a quiz in which she can estimate the value of an object. This could be an example of the LinkedTV system integrating a third party app to provide further functionality while not leaving the LinkedTV experience (Figure 20).

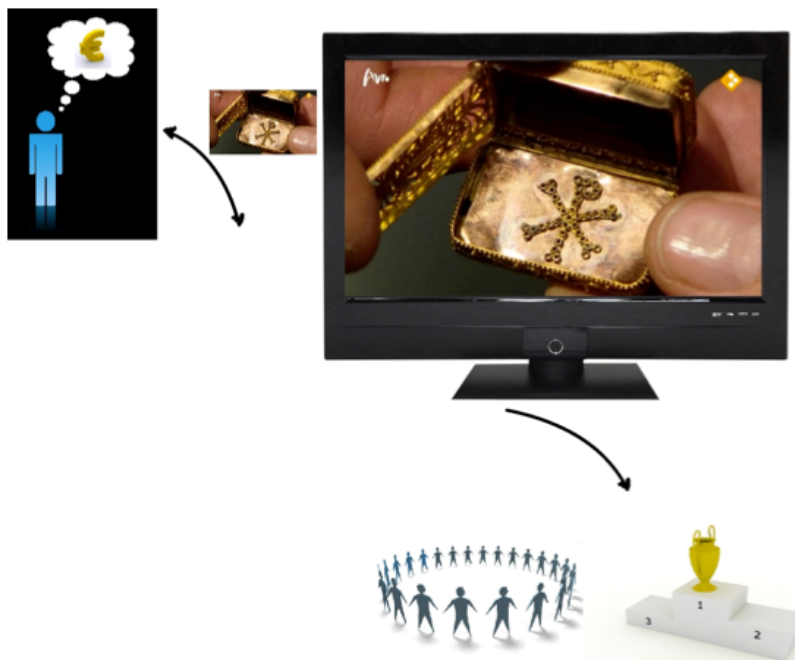


Figure 20. Accessing a quiz within the LinkedTV system

Now at a later segment, they are talking about a painter Jan Sluijters. Rita wants to learn more about the art styles he represents (Figure 21) and is soon browsing through examples of each style.

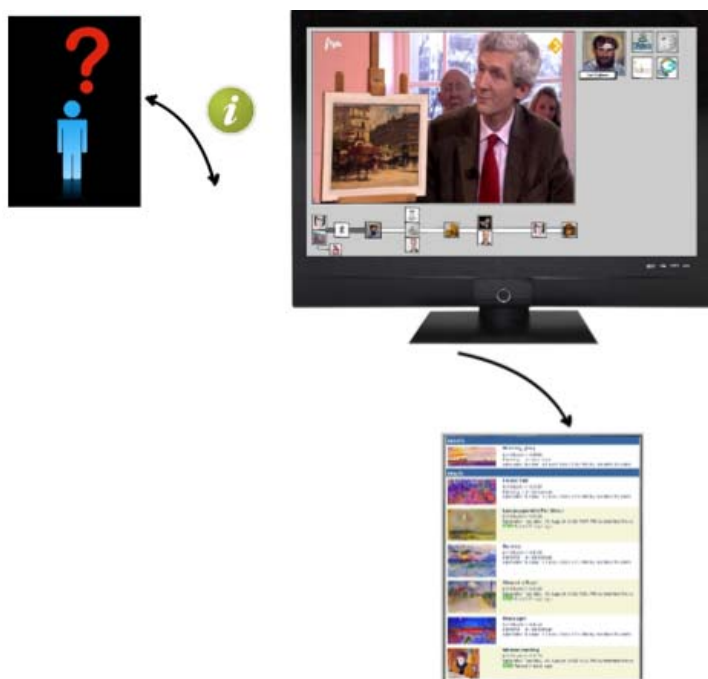


Figure 21. Accessing information about the art styles of Jan Sluijters

As the program is ending, Rita decides she wants to plan a visit to the Hermitage, together with her sister (Figure 22), as her interest was awoken from reading about it in Wikipedia. Since the SmartTV she is using also has the Skype app, she switches over to call her sister and make an appointment.

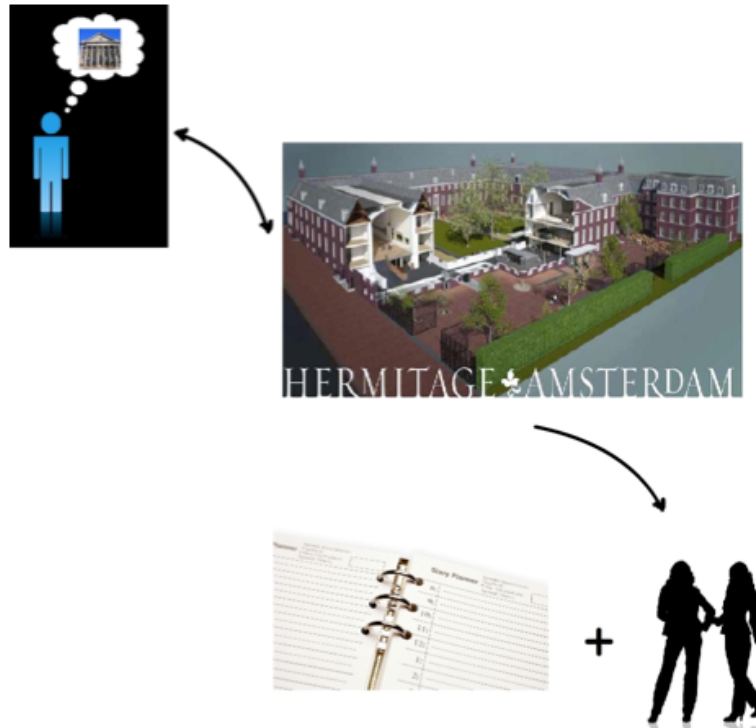


Figure 22. Concepts in LinkedTV can awake viewer interest.

The program has ended and Rita checks the resources she's added to her favourites (Figure 23).

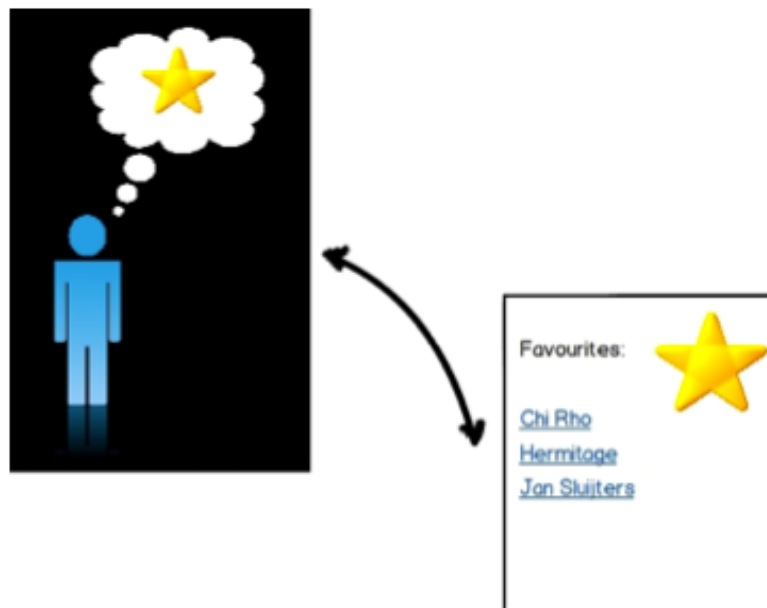


Figure 23. Bookmarks.

Rita also sends a link to all video segments with expert Emiel Aardewerk to her sister; he's their favourite expert!

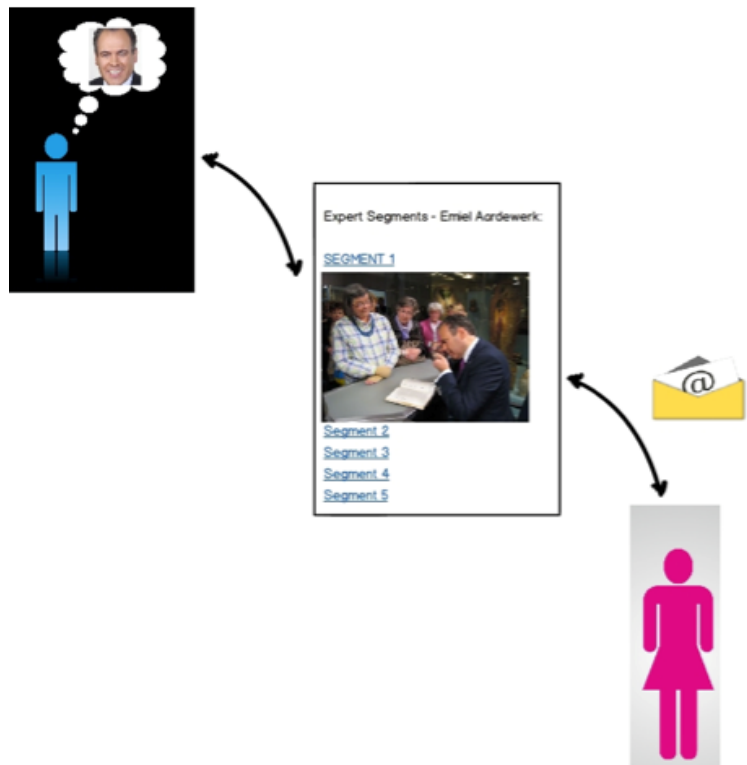


Figure 24. Sharing media contents

Rita switches off.

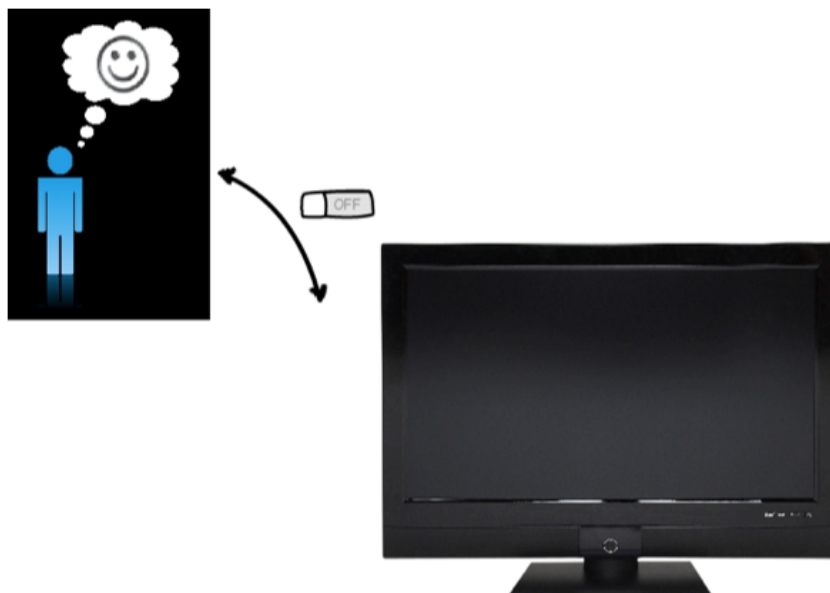


Figure 25. Switching off.

3.2.2 Bert – Antiques Dealer



- Name and occupation: Bert, antiques dealer in Leiden
- Age: 51
- Nationality / place of residence: Dutch / Leiden
- Search behaviour: Focused
- Digital literacy: High

Bert wants to know more about the wooden statuette he recently bought and wants to see if he can access more information from the Antiques Roadshow (Figure 26). Since every segment is annotated by LinkedTV, the LinkedTV system can find for him segments about similar objects.

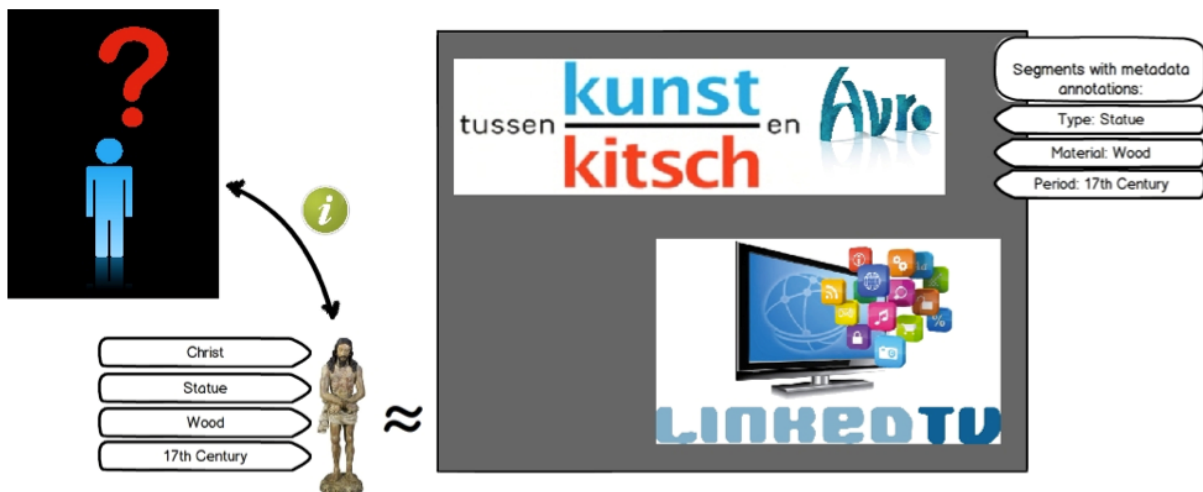


Figure 26. Video segments with similar objects.

Bert views a related segment about a statuette from the late 17th century, which is worth 12,5K € (Figure 27).



Figure 27. Viewing a video segment.

Bert adds other relevant segments to his favourites (Figure 28).

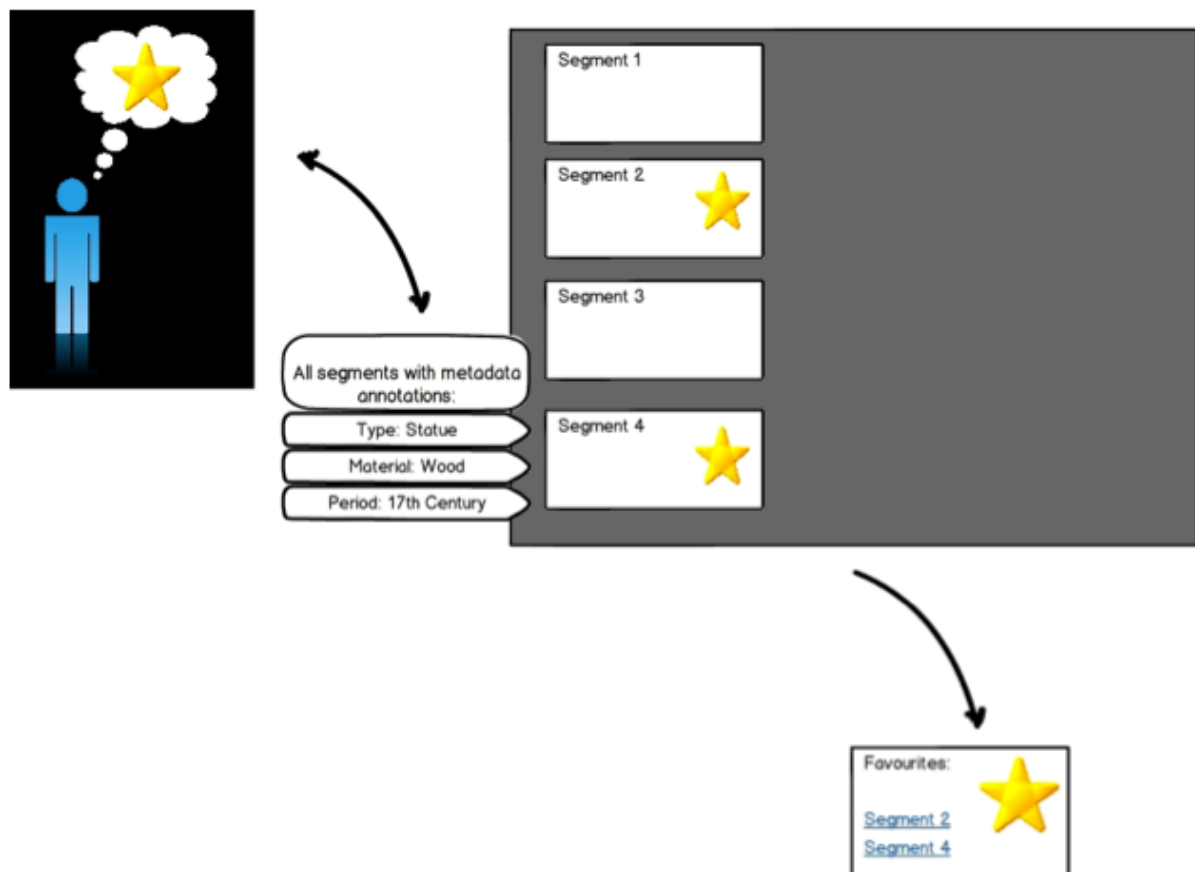


Figure 28. Adding video fragments to favourites.

Bert wants to know where he can find literature about wooden statuettes (Figure 29). Fortunately the LinkedTV system provides links to books, both online and for purchase, relevant to the wooden statuette concept as one of the supported enrichment sources.



Figure 29. Related literature as an enrichment source

Bert consults external sources with auction information (Figure 30). Again the LinkedTV system supports auction information as an enrichment source for the wooden statuette.



Figure 30. Auction information as an enrichment source

Bert finds another statuette online and buys it from within the auction source which has been integrated into the LinkedTV system (Figure 31).



Figure 31. Auction purchase within the enrichment source

Bert is happy with the results, and expects to make a nice profit (Figure 32).



Figure 32. Satisfied LinkedTV user

3.2.3 Daniel – Bargain Hunter



- Name and occupation: Daniels, Economics and Business master student
- Age: 24
- Nationality / place of residence: Dutch / Groningen
- Search behaviour: Focused
- Digital literacy: High

Daniel is at a flea market, where he spots a nice silver box. He takes a picture and uses it as a query to the LinkedTV system, which responds with video fragments from the Antiques Roadshow with similar images (Figure 33).

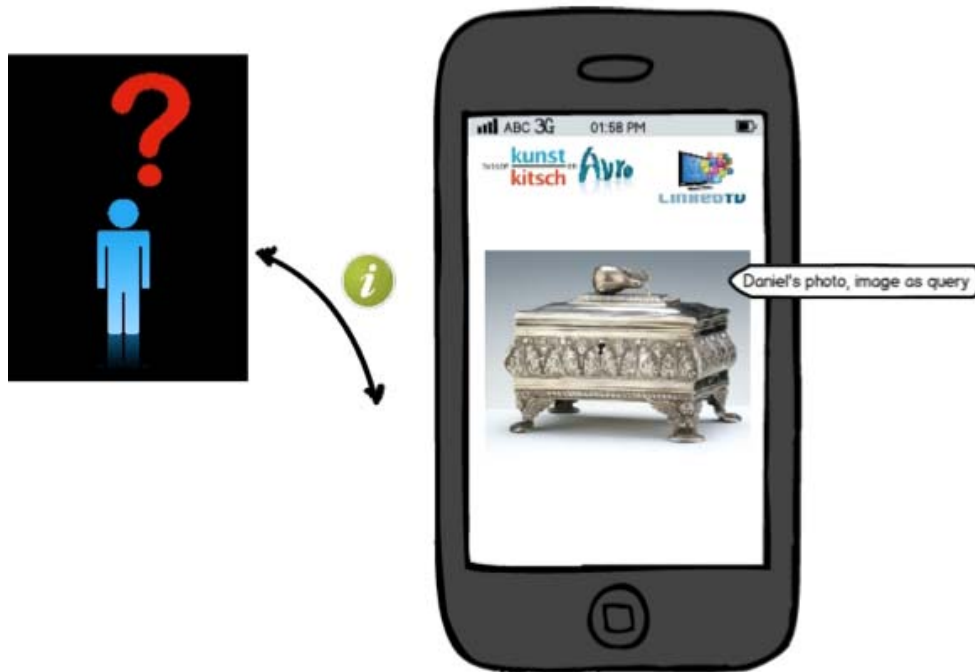


Figure 33. Search for video fragments with similar images

The website presents Daniel with similar objects from programme segments. Daniel looks through them (Figure 34).

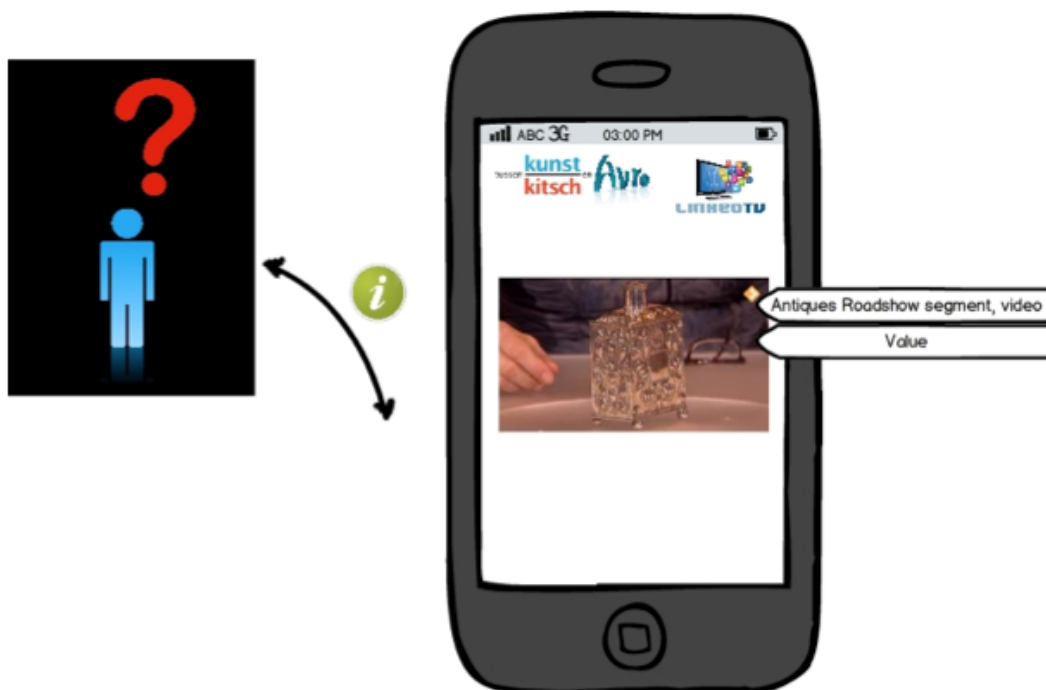


Figure 34. Browsing video fragments

One of the related items is particularly interesting, so he accesses the enrichments offered by LinkedTV. One of the enrichment sources is Europeana, which has an image which looks a lot like the box he's spotted. He saves the Europeana content to his favourites (Figure 35).

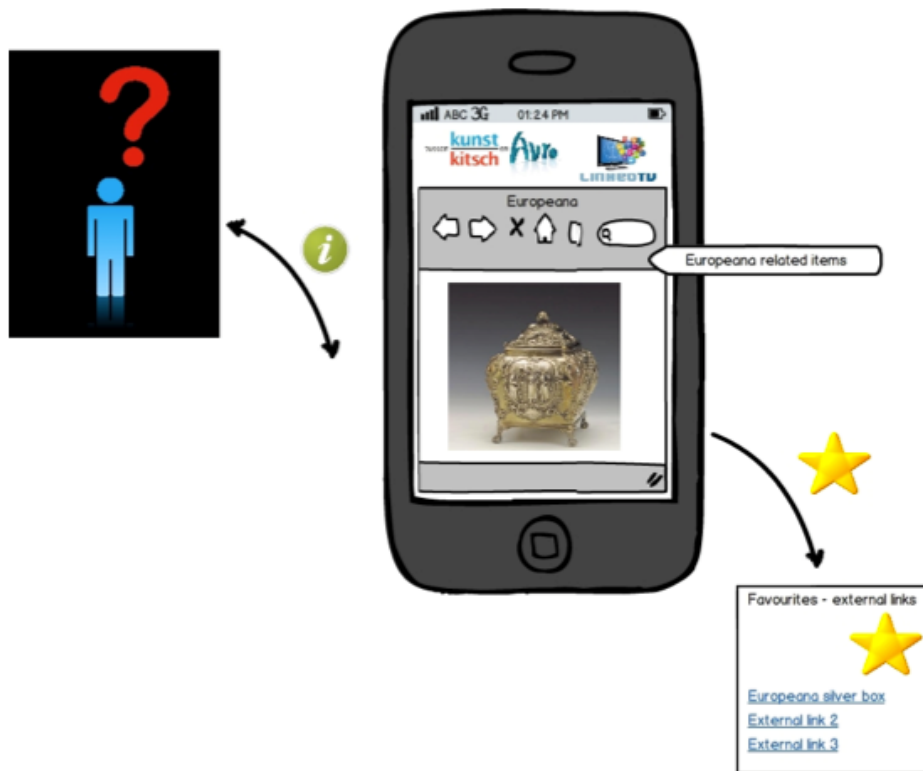


Figure 35. Add an enrichment content item to favourites

Daniel buys the box and shares his purchase on FB and Twitter (Figure 36).

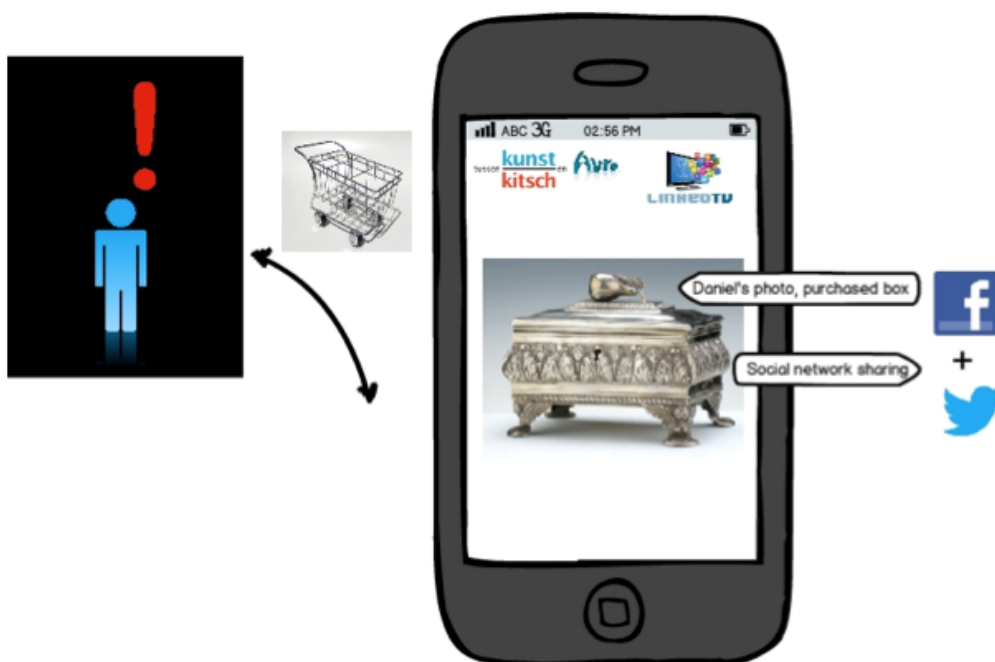


Figure 36. Social Web sharing

Daniel sees another potential treasure - a Delftware plate - and again searches for similar objects on the Antiques Roadshow website by uploading a picture. He finds a segment from the Antiques Roadshow with a similar Delftware plates, and based on this decides to buy the one at the flea market (Figure 37).

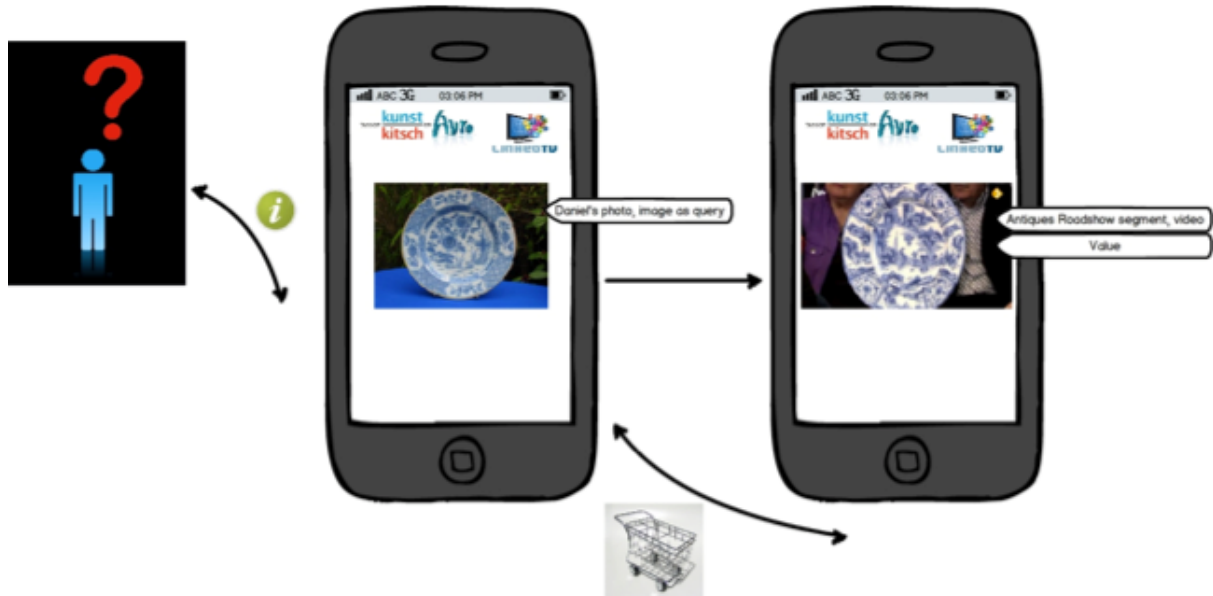


Figure 37. Using LinkedTV functionality to guide purchasing decisions

After a good day of bargain hunting, Daniel heads home (Figure 38).

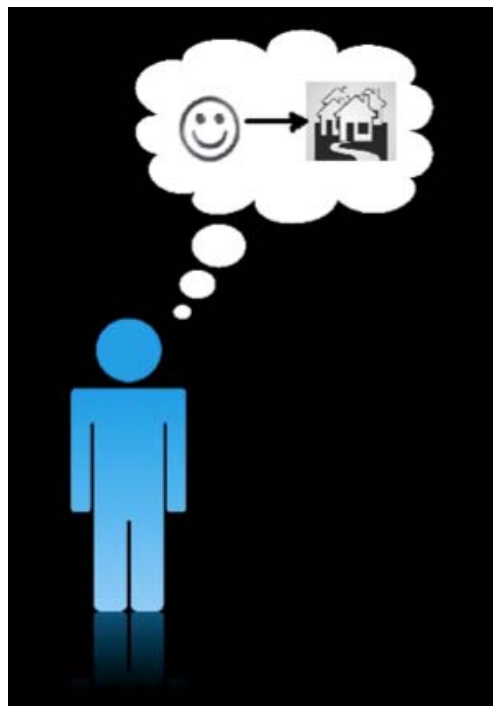


Figure 38. Another satisfied LinkedTV user

3.3 S+V Scenario: process

For the Sound and Vision scenario we selected frames from the episode where key concepts of interest to a viewer were present and mocked up the enrichment process. As a result we can fill our mock-up screens with realistic enrichments and set as our goal in the scenario realisations to generate the same enrichments automatically via the LinkedTV platform.

3.3.1 Concept: Nelleke van der Krogt - Person



In this spatial and temporal segment of the video, the Anitues Roadshow presenter Nelleke van der Krogt is both seen and mentioned in the text overlay on the video.

Nelleke is a person who is both uniquely identified in (the Dutch) Wikipedia (http://nl.wikipedia.org/wiki/Nelleke_van_der_Krogt) and in IMDB (<http://www.imdb.com/name/nm1515006/>). Both of these sources could be used as identification schemes in the video annotation, with the advantage that both directly can provide additional metadata about the person of Nelleke van der Krogt, such as:

- Full name
- Date of birth
- Place of birth
- Films she has acted in
- Soundtracks she has sung on
- TV appearances

Provided this information can be scraped from the HTML pages it is on, since neither the structured linked data version of Wikipedia (DBPedia) nor IMDB (LinkedMDB) contain currently the concept of Nelleke van der Krogt.

Based on this metadata, such contents directly associated with Nelleke can already be requested via Web APIs, such as Europeana and Wikipedia. However the linkage from her person to media (films, soundtracks, TV programs) in IMDB seems most useful to derive new queries to online media providers to access (parts of) media where Nelleke appears (e.g. YouTube has an interview with her from 2009 in the show “Pauw & Witteman”⁴). Combined with the time information in the metadata (e.g. release date), a timeline of media involving Nelleke can be provided by the LinkedTV system.



3.3.2 Concept: Chi-Rho – Symbol



The Chi-Rho symbol may be annotated in the video via ASR or visual recognition, and DBPedia presents itself as suitable for the online identifier (http://dbpedia.org/resource/Chi_Rho).

⁴ http://www.youtube.com/watch?v=dpU_CljWy6w

The metadata at DBPedia categorizes Chi Rho as an Early Christian Inscription and a Christian symbol, providing a means to associate it with other symbols from the Early Christian period such as INRI, Nomina Sacra or Pantokrator.

Content can be directly queried for Chi Rho, such as from Europeana which returns 60 audio, 36 image and 1 text object (see below right). The LinkedTV system could also offer faceted browsing along the topic of Early Christian symbology in order to equally link to content associated to the other symbols (see below left):



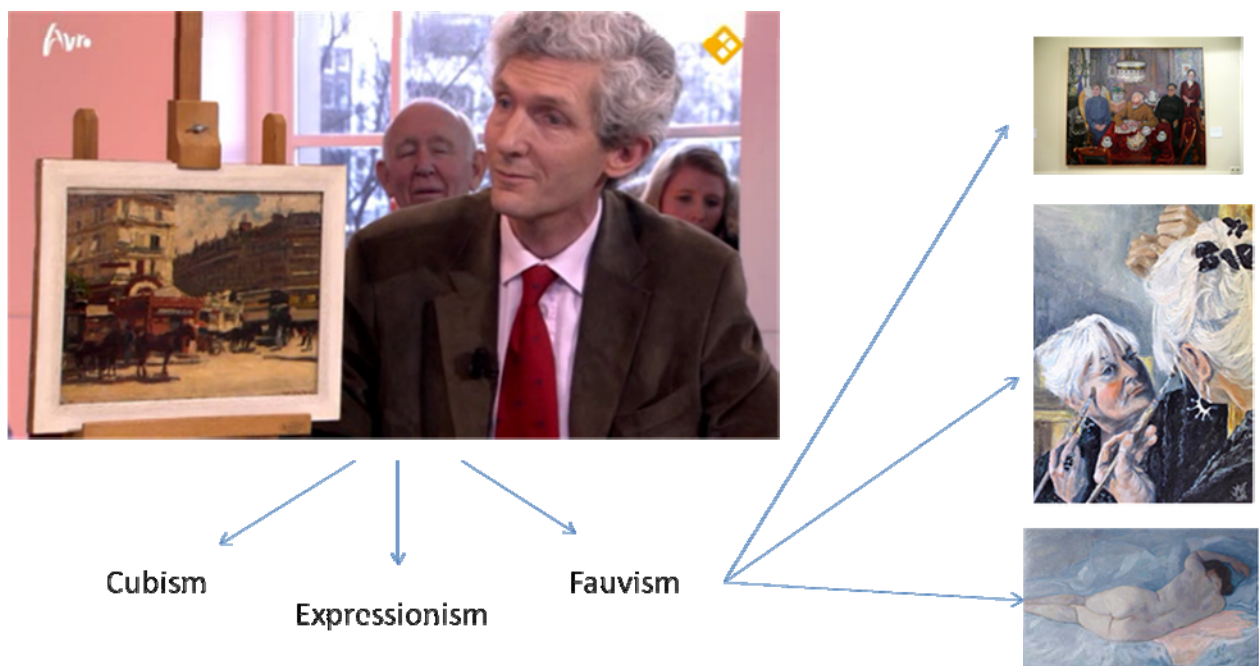
3.3.3 Concept: Jan Sluijters – Person (painter)



This frame shows an interesting example of annotating an object on screen with the associated concept, since the object itself is an instance of a painting and here we choose to annotate with the name of the painter, in order to provide directly for the enrichment more potential content.

Painters have identifiers in cultural heritage collections such as ULAN (500198457) as well as are present in DBPedia (http://dbpedia.org/resource/Jan_Sluyters). As well as metadata properties for persons such as birth and death date, the metadata sources categorise Jan Sluyters into classes such as “Dutch painters” (from which one could browse to his national contemporaries) while another dataset provides links between the painter and his styles.

For Jan Sluyters himself, a number of webpages could be mined for useful content alongside structured sources like Europeana (we have identified Artcyclopedia, and The Athenaeum has useful examples). These can provide works chronologically and link them to the museums they are present in. On top of this, based on the concept type (painter) the LinkedTV system could offer faceted browsing on qualities such as style or period:



3.3.4 Concept: Delftware – Style

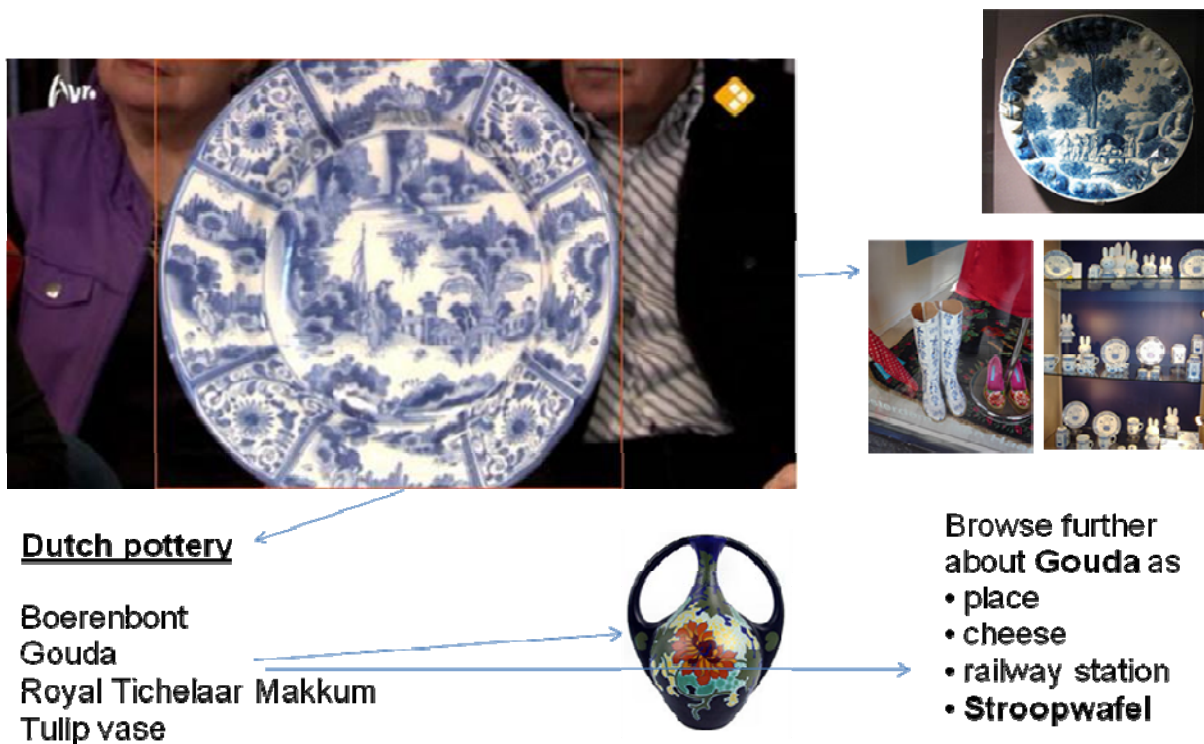


The plate visible in the video frame can be annotated with the concept Delftware which relates to the style it belongs to. This style is identifiable in DBPedia (<http://dbpedia.org/resource/Delftware>).

In the metadata, the concept is classified within the classes “Dutch pottery” and “Types of pottery decoration”.

The style can be searched for in various cultural heritage collections such as Europeana, Amsterdam Museum and Rijksmuseum as well as other open Web media collections and APIs such as Open Images and Flickrwrapper. Again, in the LinkedTV system, faceted browsing can be offered to other forms of (Dutch) pottery.

To give an interesting example of this, via DBPedia we find other concepts classified under “Dutch pottery” such as Boerenbont, Gouda, Royal Tichelaar Makkum and Tulip Vase. Our viewer is intrigued by the occurrence of Gouda since they only know the cheese, and can not only see an example of Gouda pottery in a further step of browsing associated contents (now via the DBPedia category of “Gouda”) they see that Gouda is not only a cheese and a pottery style, but also a place, a railway station and ... “Stroopwafel” (they discover it is listed since the sweet snack was invented in Gouda).



3.4 S+V Scenario: next steps

The Sound and Vision scenario explores the enrichment of video with additional information and media, particularly making use of the rich digital content being made available online in the European cultural heritage domain. Unlike the RBB scenario, here browsing away from the video into the additional information may even be welcomed and there is a wide range of possibilities for deeper exploration (from a painting to a painter to their styles to other paintings to museums with those paintings....). As a result we can also explore a different set of requirements to the RBB Scenario on the LinkedTV platform:

- Video annotation may rely more on visual objects in the frames, requiring feature detection and object tracking for supporting the annotation and playout;
- Linking video annotations to concepts will rely not only on transcripts but also on visual feature matching against media databases (e.g. to identify a painting);
- Metadata analysis and content linking can make use of existing Linked Data but also will need to create RDF wrappers around other (non-Linked Data) metadata sources and media repositories/APIs;
- Some useful cultural heritage information is still hidden inside HTML webpages which will need data mining to make the information available to LinkedTV;
- The user interface needs to support browsing along multiple facets of a concept and discovering new information and media, navigating between the seed video,

concepts, facets and enrichment contents in an intuitive manner not confusing to the user;

- Specialised user interface elements may be useful in this scenario to display contents in a e.g. chronological or geographical view;
- Personalisation and contextualisation can highlight or filter out certain facets based on user's prior activity with the system or expressed interests so that they can get more quickly and easily to the enrichment content most of interest to them.

In the next year, we will focus on realising the Sound and Vision scenario over the LinkedTV platform components. Following a successful end-to-end implementation of the workflow, based on the mock-ups and storyboards reported in this deliverable, we will be able to work closely with the R&D partners of LinkedTV to extend and adapt their work to address the requirements given above for the Sound and Vision scenario.

4 Enriching the scenarios with behavioural tracking

In the LinkedTV description of work, a third scenario is proposed by the University of Mons. The core of this scenario is related to allowing media artists the opportunity to use the LinkedTV technology and, having gained an understanding of what LinkedTV makes possible, use their “artistic license” to combine the technology with other environments (e.g. space and movement aware, as made possible by systems like Microsoft Kinect) to explore new ways to interact with video and explore content. Hence it is clear this can only be undertaken earliest in the second year of the project with the first technical implementations of the annotation tool, hyperlinking tool and LinkedTV player. For the first year, in order to begin brainstorming on the possibilities made available to LinkedTV scenarios by the Kinect technology, University of Mons has concentrated on collecting ideas for the use of movement and space awareness in LinkedTV interaction, in the context of the RBB and Sound and Vision scenario content.

The university of Mons (UMONS) focuses on user behavioural analysis. With more and more cameras embedded in the new TVs, gesture control but also user behaviour tracking are of an increasing importance in the field. To anticipate the future of cameras embedded on the TVs, UMONS partner uses a Microsoft Kinect (X BOX) sensor. This sensor provides both classical RGB images and a depth map relative to the camera. The availability of the depth map provides much more possibilities than classical RGB cameras and this kind of sensor which are cheaper and cheaper will be a standard within a few years.

A configuration that intends to be demonstrated in LinkedTV is shown below (Figure 39) where a Kinect sensor which is not embedded in the TV is located above it.

There are two main classes of interaction and behaviours which can be extracted from users using this system.

The first one, that we will call “implicit” interaction is about watching the user behaviour and guessing his interest in the content provided by the user. This first approach is not in the focus of WP6 but mainly of WP4 and thus is described in the WP4 deliverables.



Figure 39. An increasingly common sight in the living room - the Kinect camera

This image (Figure 39) shows a classical configuration which intends to be demonstrated in the LinkedTV project with a Kinect sensor watching the room above the TV.

The second class of interaction is one that we call “explicit” interaction, when a user behaves in a given way on purpose to interact with the TV as for example direct a cursor with his gestures. This class of interaction is here interesting for WP6 and will thus be described here.

A first issue is about the kind of interaction that should be available for explicit behaviour tracking. Depending on the context, it is clear that the needs are not the same and gesture should not be used as an alternative interaction to already existing means (tablets, etc...). The LinkedTV platform will be available with several second screen options:

1. Tablets (like iPads) which allow both displaying additional information on the screen and the use of convenient interaction with their sensitive and precise multi-touch touchscreens.
2. Smartphones (with different platforms) which have screens too small for content displaying but which also provide advance touchscreen allowing simple navigation. A smartphone is less convenient than a tablet, but there are much more users possessing already smartphones while tablets focus on narrower people categories.

3. No second screen (remote control only). In this case, the buttons and arrows provide only very basic navigation possibilities.

It is clear that gestures aiming in interface navigation are more relevant in the case where no second screen is available than when the user already has a tablet. Preferred interaction approaches among LinkedTV viewers will be subject of future user tests.

The UMONS partner is developing and testing two explicit interaction technologies both based on Kinect information.

The first one is a module using hand gestures to interact within an interface. This interface is HTML5 based and simulates currently a timeline with media (text, videos, ...) linked to specific moments of the timeline in a test interface. This could be further developed to allow control of the timeline component on the main screen LinkedTV UI (cf. Deliverable 3.3) in a way more intuitive than multiple button pressing on the remote control.

The gesture analysis module can be separated from this test interface and it can send information (like hand position, clicks, people in interaction area, ...) by network (UDP) to the LinkedTV interface where it can be mapped according to the scenario interactions.

Figure 40 below shows a snapshot of the analysis of the gestures. On the left side the user is selected and the interaction area automatically attached to his shoulder is shown in yellow. This interaction area is shoulder-centred and spherical in order to better fit to natural hand motion and decrease hand pain during long interactions. A video demonstrating this approach can be seen at this link : <http://vimeo.com/49277396>

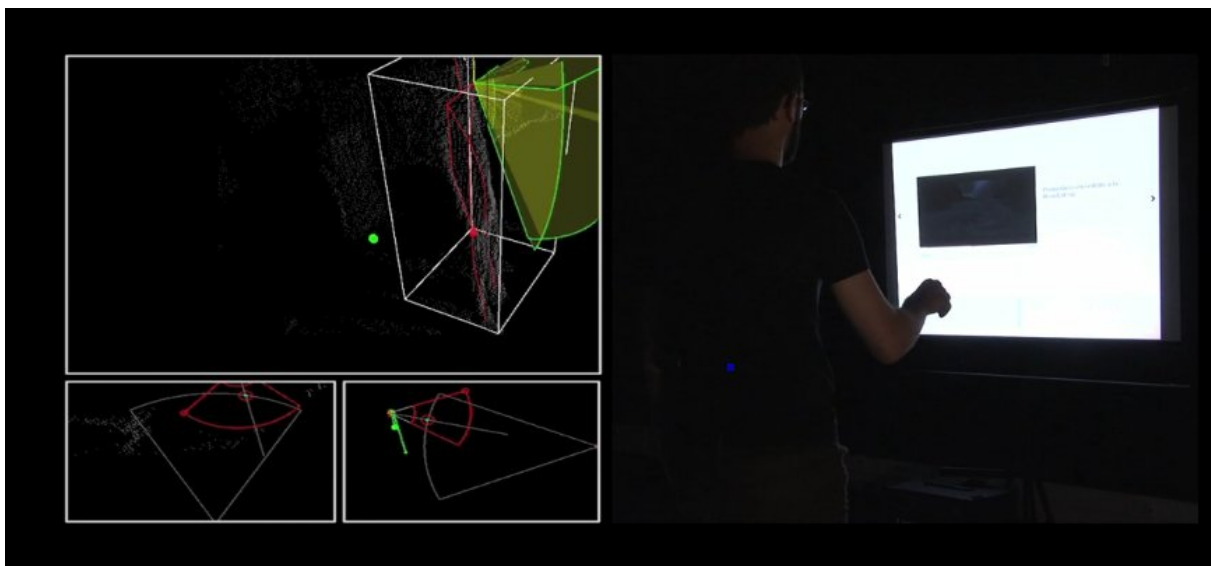


Figure 40. Computer analysis of human gestures.

The user is detected and the interaction space is attached to his shoulder in a “melon” style to optimize ergonomics and minimize hand pain during gestural interaction.

This interface can be used to extract user gestures (hand position with respect to the TV screen, clicks, ...). In the current state it only takes into account the first hand pointing towards the camera (right or left hand), but information from both hands can be retrieved. Based on evaluation results regarding the accuracy of hand position measurement, this would

also enable pointing to objects on screen and accessing the enrichments attached to them in the LinkedTV system.

The second explicit interaction technology uses real-world objects to interact with an interface (Figure 41). Those objects can be objects from real-world like in this example where a mug was used for the tests, or even better a specific LinkedTV object like a red plastic cube which could be provided with the setup box. This object can be detected and tracked on the table or on any other plane surface. The object position is known by the system and can be mapped to any command on the LinkedTV interface. Again, this data can be sent by network (UDP) to the interface.



Left image: real mug on a table. Right image: tracked mug (blue and pink dots) while it is manipulated by a hand.

Figure 41. Using inanimate objects with behavioural tracking software

At the difference to the hand-based gesture interaction previously described, here it is possible to track stable objects and this interaction is more convenient for sparse interaction. The mug location area can influence some systems parameters without changing them in real time like a cursor position. An advantage of this kind of interaction is its naturalness and ergonomics (no pain). It could best be used to control certain “global” parameters of the LinkedTV system enrichments, while allowing easy and quick correction during the program (e.g. in a politics program, cube on the left of the table – show more tweets expressing left wing political opinions, cube on the right of the table – show more tweets expressing right wing political opinions. Or in sports, show more content about the home side or the away side, respectively.)

We made some initial brainstorming to think about the interactions which are worthy to be used in the context of the RBB and S+V scenarios.

- Bookmarking

The first gesture-enabled interaction which is of high interest is bookmarking. If a scene is interesting for the user and it has a lot of enrichment linked to it (or on the contrary no enrichment but it contains interesting objects, words ...) the user might want to keep it for later consumption. In this case he needs his remote control or second screen to be very close and then the time needed to find the right button can be added to a large latency between the decision of bookmarking and the moment where the LinkedTV system receives

the information. It is not easy for it to evaluate in this circumstances which scene was really interesting for the users as the seed video content may vary considerably in time.

In this context, a precise gesture using one or two hands which is different from daily life gestures can be used to automatically bookmark the scene or shot (already segmented by WP1) playing during the bookmark gesture.

- User feedback to content editors

In the LinkedTV pipeline, WP1 and WP2 will provide content providers with semi-automatic annotations that the editors filter before providing the enrichment to the final users. In the other direction, crowd-sourcing editing is an interesting option. For example, a user bookmarks a scene by using a specific gesture because there is something interesting for him in this scene but this was not annotated by the editors. The user searches himself information on the web about the interesting object or concept and with another gestures he sends back to editors the scene he bookmarked and the link(s) he found. The editors can decide to drop this enrichment or to provide it also to other users. By using a game like “send us your enriched scenes and if selected by us you will win awards” the editors could get a lot of feedback from users and have their work optimized.

- System mode: interaction vs. watching

Another interesting point is to activate the exploration mode or not. The S+V scenario wants to keep the images in full screen and only present enrichment if the user is interested by this enrichment to avoid disturbing users from just linearly watching the show. In this case the presence of one or two hands in the interaction area can switch from linear viewing to enriched mode.

- User mood, user preferences feedback

The explicit interaction technique using real-world objects is more appropriate to less dynamic interaction and the object (e.g. mug) position on the table can provide information about the mode the LinkedTV system should have or the user mood or preferences for example. WP4 will provide the user profile stating if this one is interested more in politics, entertainment, etc depending on the context (alone, with others, with children) but this profile might not be the one the user is really expecting. If most of the time in the same configuration the user was interested by politics but today, for some other reason, he is interested in paintings, he should be able to switch the system from politics to entertainment by just moving a mug mapped on a preferences or mood plane. This explicit information can be used to optimise the user profile and the kind of enrichment which is proposed to the user.

- Enrichment exploration

Of course the hand-based gestures can be used to map the hand with any cursor in any interface, but this should be used depending on the presence of a second screen or not. If there is no second screen, much more interaction can be extracted from user gestures while if he has a tablet, only some specific gestures remain interesting. An idea is to use the hand to explore a scene enrichment. Indeed for a single scene there can be several concepts and

also several deepness levels for each level (as shown in Figure 7). In this case, by moving a sliding window on the screen, the enrichment which is closer to this window is shown first. This enrichment exploration can be easily done with hand movements.

As a conclusion, the UMONS partner develops two main explicit interaction technologies based on Kinect which can be integrated within the LinkedTV platform which can be useful within the current RBB and S+V scenarios. An important issue is to separate the functionality enabled by each kind of interaction. For example hand-based interaction is for navigation and bookmarking while object-based interaction (like the mug or a specific object) for mode, mood or preference management. In the future those interactions will be implemented and usable with the LinkedTV interface and user testing will confirm and optimize the interaction types.

5 Outlook and conclusion

Defining and fleshing out the scenarios is important to the LinkedTV project as fundamentally the rest of the research and development work will be tested on and demonstrated with the contents of those scenarios. Hence we have focused on carefully selecting appropriate seed video content, planning out the personas and their interactions with that content in the scenarios, mocking up the scenarios with storyboards and screenshots, and ensuring that the identified requirements are shared with the R&D partners of LinkedTV.

Based on the first release of the LinkedTV player and platform, the RBB and Sound and Vision scenarios will now be implemented using the available technology, while the results from the implementation experience will iteratively serve to provide new requirements or identify current limitations in the current releases. Especially the new possibilities for enriched video scenarios enabled via the explicit gesture based / object tracking interaction means described in the Chapter 4 will also be integrated into the running scenarios. LinkedTV in its second year will progress to be able to give live demos of its technology and undertake the first evaluations of the work.