Deliverable 3.1   Specification of Functional Requirements Satisfying User Information Needs

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Work Package 3: LinkedTV interface and presentation engine

LinkedTV

Television Linked To The Web

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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 Introduction

1.1 Purpose of deliverable 3.1

The third work package is focused on the user interface design of the LinkedTV system. Before designing a user interface, it is important to investigate the user needs. This deliverable will discuss the functional requirements satisfying user information needs. The functional requirements describe the needs of a system to carry out certain tasks. These tasks or goals are extracted from scenarios that we will describe here and that will be further developed in WP6.

The functional requirements extracted from the scenarios will be used as input for D3.2. That deliverable is focused on the specification of presentation interfaces for the three scenarios. From the list of identified goals, goals will be selected for design, implementation and evaluation within the project.

1.2 Relation to other work packages

Since deliverable 3.1 is strongly related to several work packages, it is important for the LinkedTV project. The goals will relate directly to the three scenarios discussed in WP6 and take into account the information sources being made available in WP1 and WP2.

1.3 Structure of deliverable 3.1

In the next section four categories of user goals or user needs will be discussed. These categories are Information, Communication, Manipulation and Transaction. Section 3 will introduce two of the three scenarios that are used in the LinkedTV project. The fourth section will discuss specific user goals for each user goal category and their functionalities. Finally, a conclusion will be formulated.

1.4 History of deliverable 3.1

Table : History of deliverable 3.1

Date	Version	Name	Comment
20/03/2012	V0.1	Mieke Leyssen	Input to LinkedTV meeting in Mons
29/03/2012	V0.2	Mieke Leyssen	Addresses remarks from meeting in Mons
04/04/2012	V0.3	Nico de Abreu	QA
06/04/2012	V0.4	Mieke Leyssen	Final version
10/04/2012	V0.5	Martha Merzbach	Layout QA
11/0472012	V1.0	Martha Merzbach	Final

2 User goal categories

In this section we describe four categories of user goals: Information, Communication, Manipulation and Transaction. Later we will use these categories to categorize the different user goals extracted from the scenarios. By user goals we mean tasks or functions that users could expect from the LinkedTV system.

The categories of user goals discussed below are derived from a review of literature on hypermedia and interactive television. Interactive systems (including demos of systems) that are currently available on the Internet were also reviewed. After reviewing the literature and the systems, we listed all the functions and tasks that were described in the literature of interactive television or that could be performed by the systems online. We grouped this list into six categories: Entertainment, Information, Social, Manipulation, Personalization and Transaction. When reviewing these categories and the user goals included in them, we noticed that Entertainment and Personalization were not categories themselves, but that they were applicable to the other categories. For example, people can get pleasure out of getting more information on a certain topic or when they are communicating with other persons. For that reason we removed the categories Entertainment and Personalization.

By removing those two categories, four categories remained: Information, Communication (formerly Social), Manipulation and Transaction. These four categories are in agreement with the information seeking task categories that Amin et al. (2008) adapted from Kellar, Watters and Inkpen (2007) by investigating the information seeking behaviour of cultural heritage experts. The first category she proposed is Information Seeking, which we call Information. The second category she proposed is Information Maintenance, related to our category Manipulation. The third category is Information Exchange which is divided into Transaction and Communication, the other two categories that we also propose.

The literature related to hyper-video and interactive television that was reviewed for this deliverable can be structured into the four categories (see APPENDIX , section 6).

The LinkedTV project is focused on the information need of users and therefore the Information user goal category is most relevant for the project. For that reason, the other categories will be discussed in less detail than the Information category in this deliverable.

Following, we will explain the four categories in more detail together with some examples of goals and functions.

2.1 Information

The user can interact with the system to receive information.

In this category, we make a distinction between two different user goals: Users want to get additional information about a topic or they want to receive suggestions for content that is related to the content that they are currently watching.

When users want additional information, the user and/or system need to make decisions

1. on what the information is about: objects, persons, places, events or abstract concepts presented in the programme and
2. where the information comes from: e.g. Internet (Wikipedia, Europeana, etc.), programme content, provider's whitelist.

When requesting related information, the user and/or system need to make decisions

1. to what the content needs to be related: objects, persons, places, events or abstract concepts presented in the TV content and
2. where the related information comes from: e.g. Internet (Wikipedia, Europeana, etc), programme content, provider's whitelist.

The main difference between requesting additional information and requesting related information is the content that is presented to the user. In the case of getting additional information, the user explicitly asked to receive information about a certain item and the information s/he receives will specifically deal with that particular item. Viewing related information, on the other hand, deals with information that is related to a certain topic, so the information is not restricted to the item. For example, a user could ask related information about a painter and the user would not receive information that is restricted to that person (as is the case when the user asks additional information), but also information about the style of that painter and other painters from the same period or who painted in the same style.

In the literature, systems that try to satisfy this need for information in hypermedia are discussed in great depth (see APPENDIX, section 6.1). Users can actively interact with the media in order to get more information about the topic of their choice. In these cases the users click on links that are presented in the video or that surround the video player in order to get more information. It is also possible that the system proposes the information without a specific request of the user.

To date, there are several systems available on the Internet with which users can interact to receive more information about items that are presented on the screen. AttracTV[2], Clikthrough[3], Madpixel[4], Quick.tv[5], VideoClix[6] and wireWAX[7] are examples of such systems. In these existing systems an editor is responsible for annotating the objects and adding the information. The information that is presented in all the systems is text and images, not videos. Sometimes a URL is presented in order to let users browse to another website for more information.

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[2] www.attractv.com
[3] www.clikthrough.com
[4] www.madpixel.es & www.interactiveonlinevideo.com
[5] www.quick.tv
[6] www.videoclix.tv
[7] www.wirewax.com

2.2 Communication

Users can use the system to communicate with others.

Users can share information with others, e.g. by sending a link to a certain video via email. They can also discuss the content in real time with others by chatting about the topic. Since online communication has become very popular, there is a great focus on "Social Television" in the literature related to interactive television (see APPENDIX, section 6.2). In the systems that are currently online, users can send the link of a video to other people by email or posting the link on their social network. Systems like CollaboraTV[8], DailyMotion[9], Youtube[10] and Zync[11] enable users to share information with others. The focus on real-time interaction in these systems is rather limited. Another communication use of interactive television is a quiz in which the user can take part or a system that allows users to answer questions or fill in polls about certain topics. An example of a system that includes both these uses is Quick.tv[12].

2.3 Manipulation

The user can manipulate the content s/he is watching. By doing so, the user can get a feeling of involvement with the content.

A function that is often used in IPTV is browsing a video. This kind of interaction with video is discussed in depth in the literature (see APPENDIX, section 6.3.1). Systems that are currently available on the Internet and that make explicit use of this function are Coincident TV[13], FlixMaster[14], MyNews&SportsMyWay[15] and Me!Box[16]. What is useful for LinkedTV is that users can browse the content: s/he should be able to play and skip items, revisit topics, rewind and forward.

A more challenging function is that users are able to influence the content (see APPENDIX , section 6.3.2), for example the user can choose what action an actor carries out in a movie. Users can also add information that they think would be useful at some later point, for themselves or for others (see APPENDIX, section 6.3.3). AttracTV[17], FlixMaster[18], LinkTo.tv[19], Madpixel[20], Overlay.tv[21], Quick.tv[22] and wireWAX[23] currently enable users to

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[8] www.chrisharrison.net/projects/collaboratv
[9] www.dailymotion.com
[10] www.youtube.com
[11] http://messenger.yahoo.com/plugins/view/7551/
[12] www.quick.tv
[13] www.coincident.tv
[14] www.flixmaster.com
[15] www.ist-nm2.org/media_productions/new_page_my_news-flash.htm
[16] www.meboxmedia.com
[17] www.attractv.com
[18] www.flixmaster.com
[19] www.linkto.tv
[20] www.madpixel.es & www.interactiveonlinevideo.com

create their own tags. Another important function is editing videos or other content: Users can fragment the video, make summaries and even change the structure of the video and thereby also the content itself (see APPENDIX, section 6.3.4). Another interesting function is the ability of the user to choose the level of detail of the information. They can decide to only view a summary of the topic or they can really delve into the topic and let the system present a variety of available information (see APPENDIX, section 6.3.5).

2.4 Transaction

Users can buy items that are presented in the video they are currently watching.

Although these transactions are not often mentioned in the literature (see APPENDIX, section 6.4), it is often supported in the systems. CAVI[24], Clikthrough[25], Evenhere[26], LinkTo.tv[27], Overlay.tv[28], Quick.tv[29] and VideoClix[30] are all focused on selling the items that are presented in the video. In these systems, users can click on an item to get details about the item and they can directly order the item online.

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[21] www.overlay.tv
[22] www.quick.tv
[23] www.wirewax.com
[24] www.cavi.tv
[25] www.clikthrough.com
[26] www.evenhere.com
[27] www.linkto.tv
[28] www.overlay.tv
[29] www.quick.tv
[30] www.videoclix.tv

3 Scenarios

In this section, scenarios are described that further will be used to discuss the user goals and their functionality requirement. The scenario descriptions are part of WP6 and will be described in their deliverables more extensively. We discuss the scenarios here because the deliverable of WP6 which deals with the scenario description is scheduled at a later time (month 12). The scenarios are very important for the current deliverable, since the user goals and needs will be derived from the scenario descriptions.

In WP6 three sets of content will be provided by our three content partners: a news scenario, a cultural heritage scenario and a media art scenario. In this deliverable we will make use of the news scenario and the cultural heritage scenario. The media art scenario is not included in this deliverable, but it will be discussed later.

For both the news scenario and the cultural heritage scenario, three personas will be described together with their individual scenarios. We made use of personas because by doing so the target users can be described in a very detailed, personal way. Personas have also proven to be useful when working with a lot of different partners, since it leads to an understanding and agreement about the target users. The personas are written by partners that are closely involved with the scenarios and therefore they have a clear idea about the target users and their expected goals and needs. The personas vary in characteristics (e.g. age, occupation, digital literacy and general interests) to allow the project to explore the use of the LinkedTV system for different purposes.

3.1 News scenario

The daily news are among the most important and therefore most viewed broadcasts.

Regional news include all kinds of topics and often people feel they would like to know more about one or the other topic. Sometimes they missed parts of how things came about and at other points they just would like to know more. More often than not, there is much more information available. Reporters and editors usually gather much more information during their research than they can put in short news spots, but there are also other broadcasts which take the time to go into more detail than a daily news show could. There definitely is a need for making access to related content easier and more user-friendly. The approach selected is such that, once it is working in the news field, the system and underlying technology can easily be ported to other domains.

As a public broadcaster, RBB is responsible for the capital of Germany, Berlin, and the region surrounding it, Brandenburg. RBB's prior mission is to inform and entertain the people in Berlin and Brandenburg. The flagships of RBB are "*Berliner Abendschau*" (19:30) for Berlin, "*Brandenburg aktuell*" (19:30) for Brandenburg and "*rbb AKTUELL*", the daily summary of these two (21:45).

The basic idea is to enhance *rbb aktuell*'s individual news items with further information from its main sources *Berliner Abendschau* and *Brandenburg aktuell,* but also from other sources such as editorial material or news magazines available online.

3.1.1 Personas

3.1.1.1 Ralph

Name and occupation: Ralph, carpenter

Age: 19

Nationality / place of residence: German / Prenzlau (Brandenburg)

Digital literacy: digital native

Ralph has always lived in Prenzlau. After school he served an apprenticeship as carpenter in the neighbouring village Strehlow. When he was 18 he immediately bought his own car, since then he tuned and improved 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 the summer, they often go swimming in the nearby lake. At those moments, Ralph is looking at the boats too, often thinking it would be nice to have one too, 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 and architecture. On the other hand, he is very interested in all local sport clubs. He does not care particularly for the latest technology, but it is not difficult for him to adapt to new technologies and to use them.

3.1.1.2 Nina

Name and occupation: Nina, teacher on maternal leave (Mother of Lisa)

Age: 32

Nationality / place of residence: German / Prenzlauer Berg

Digital literacy: interested in new media and "hip" technology

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 likes Berlin with its 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. 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.

3.1.1.3 Peter

Name and occupation: Peter, retired widower

Age: 65

Nationality / place of residence: German / Potsdam

Digital literacy: early adopter; interested in every new technology

Peter lives in Potsdam, a small and wealthy town near Berlin. Since he retired, he has a lot of time for his hobbies. He likes watching TV and listening to the radio. He is also very interested in new technologies and likes to use new services via the internet. He especially appreciates how easily new technologies make it possible to stay in contact with his relatives who live 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. He is involved in several activities in his neighbourhood and likes to talk about his views. 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 gardening, travelling, new technology trends as well as health and medical issues.

3.1.2 Scenarios

3.1.2.1 Sports loving carpenter

Tuesday afternoon, Ralph comes home from working on a building site in Potsdam. He prepares himself a sandwich, sits down on the couch and switches on the TV set. He starts watching "rbb AKTUELL". The first spots are mainly about politics and about Berlin. After a while there is the first really interesting news for Ralph: Soccer News! It is not about sports though, actually, but about two professional kickers who admitted involvement in a series of robberies. The two former professional soccer players from third division club SV Babelsberg 03, Suleyman Koc and Guido Kocer, have to answer the Berlin District Court since Tuesday. Ralph is especially interested, because he follows this local club and one of his friends even went to school with Kocer. First Ralph checks an article with the details of the robberies – he had almost forgotten them, because they were committed more than a year ago and then he hadn't really listened. Now that he realised he (almost) knew one of the responsibles, his interest has grown immediately. After watching the spot himself, he shares it with his friend who went to school with Kocer. He sends him a recommendation to watch the next show of *Brandenburg aktuell* for which they just announced a longer interview with the club manager. Just in case, he also bookmarks it for himself, so he might watch it tonight.

One of the next spots presents a marketing campaign of hotels in Berlin: "*Experience your city".* At the beginning of next year, many hotels invite locals to enjoy a Berlin weekend from a tourist's perspective: people from the region can stay in a double room of a premium hotel for only €99,00 for a whole weekend. Ralph likes the whole idea and follows a link to the campaign's website. He thinks it would be a nice present for his girlfriend Cindy. He "likes" this news item and receives a notification that his (social network) friends Holger and Janine had also liked it. Holger is online, so Ralph starts chatting with him. They have the idea to invite some friends to book rooms for the same hotel and the same night, so they could celebrate Cindy's birthday together.

The door bell rings and his girlfriend Cindy comes in. Ralph invites her to watch the rest of the show together.

Next up is a spot about the restoration of a church at a nearby lake; as a carpenter, Ralph is always interested in the restoration of old buildings. As Cindy would not be interested, he stores a bookmark to dig in deeper when there is time and quickly skips the item.

While Ralph would love to watch the next spot on another famous church in Berlin, Cindy would prefer to browse through those spots she had missed. Rather than watching different spots side by side, Ralph skips to the weather forecast, and invites Cindy for a walk. Maybe he can find out, if she would be interested in a hotel weekend in Berlin before he confirms the booking.

3.1.2.2 Urban mom

Nina's baby has fallen asleep after feeding, so Nina switches on the TV to be informed while doing some housework. Browsing the programme she sees that yesterday's enhanced "rbb AKTUELL" evening edition is available and starts the programme. Nina watches the intro with the headlines while starting her housework session with ironing some shirts.

Watching a news spot about Berlin's Green Party leader, Volker Ratzmann, who withdrew from his office yesterday, Nina is kind of frustrated as she voted for him and feels her vote is now "used" by someone she might not have voted for. She would like to hear what other politicians and people who voted for him think about Ratzmann's decision to resign. She watches a selection of video statements of politicians and voters. What she loves most about this is that she can sort these statements according to position (professional commentary vs. street poll) or political background (Green, conservative,..).

Watching a news spot about a debate on the mandatory labelling for police officers, Nina asks herself why the labelling of policemen should be changed. Out of interest, she browses through a list of videos from the debate and chooses a speech by Benedikt Lux who seems very interesting to her. During his statement she reads some additional information about him: since when does he represent the Green party in Berlin's senate, what are his political fields of interest, etc.

Nina finally gives up the idea of ironing and prepares her stuff for a walk with the stroller and for the toddler group after that. Nina keeps watching some news items from the corner of her eye, but doesn't really pay attention anymore.

A spot about Wolf Biermann's 75th birthday sounds really interesting, so she bookmarks it. Maybe she can watch it later when the baby is sleeping.

She decides to quickly skip to the weather forecast. Oh, rainy weather in the afternoon. She grabs a raincoat, her child and the stroller, switches off the television and leaves the house.

3.1.2.3 Socially active retiree

After a long walk in the sun around the lake alone, Peter feels refreshed and thirsty for information. His favourite source is the local news magazine "rbb AKTUELL". He gets himself some coffee from the kitchen and sits down to see what happened while he was out and about.

In the main news of the day, Peter hears that Berlin's Green party leader threw in the towel yesterday. He is not particularly interested in Berlin's politics, but this guy seemed to be quite smart from what Peter understood in the short excerpt of the interview. Peter would like to know more about Ratzmann and why he decided to leave the political stage, so he switches to the longer version of this interview.

One of the next spots is about a fire at famous Café Keese in Berlin. Peter is shocked. He used to go there every once in a while, but that was years ago. He wonders how the place may have changed over the years. In the news spot, smoke and fire engines was almost all one could see, so he checks some older videos about the story of the famous location where men would call women on their table phones – hard to believe nowadays, now that everyone carries around mobile phones! Memories of these good old days make him happy and sad at the same time.

After checking these very nice clips, he returns to "rbb AKTUELL" and watches the next spot on a new Internet portal about rehabilitation centres in Berlin and Brandenburg. He knows an increasing number of people who needed such facilities. He takes a look at a map of Brandenburg showing the locations of these centres and bookmarks the linked portal website to check some more information later.

At the end of the show, he takes an interested look at the weather forecast, hoping that tomorrow would be as nice as today so he could go out again to bask in the sun.

3.2 Cultural heritage scenario

Cultural heritage is by nature strongly interlinked, e.g. thematically, historically and geographically, both within itself and to current events. In order to fully understand the events of today, knowledge about the historical background is needed. For example, the idea of the European Union is related to the history of Europe, e.g. the numerous wars and constant rivalry between the European countries and, on the other hand, as a response to global competition and policies. These scenarios aim at providing the viewer the cultural heritage

context of currently viewed events, actors (persons, organizations, etc.), places and other relevant aspects.

The television programme that will be used for the cultural heritage scenario is the programme "Tussen Kunst en Kitsch". This is the Dutch version of "The Antiques Roadshow" in which professionals evaluate the authenticity and estimate the value of items brought to them by local people. The experts give information about the historical, craft or artistic context of the antiques. This show deals with cultural elements and therefore is of interest for (art) historians.

3.2.1 Personas

3.2.1.1 Rita

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 is an administrative assistant at the Art History department of the University of Amsterdam. She didn't study art herself, but spends a lot of her free time on museum visits, creative courses and reading about art. One of her favourite programmes is "Tussen Kunst & Kitsch" (Antiques Roadshow), which she likes to watch because, on the one hand, she learns more about art history, and, on the other hand, because she thinks it's fun to guess how much the objects people bring in are worth. She's also interested in the locations where the programme is recorded, because this usually takes place in a historically interesting location.

3.2.1.2 Bert

Name and occupation: Bert, antiques dealer in Leiden.

Age: 51

Nationality / place of residence: Dutch / Leiden

Search behaviour: Focused

Digital literacy: High

Bert has an antiques shop in Leiden, which he has owned for the past 25 years. He studied Egyptology and Early Modern and Medieval Art at his alma mater, Leiden University. He visits many art fairs and auctions - both national and international - but also takes part in online auctions and actively scours the web looking for information on objects he's interested in purchasing and re-selling. Bert is an active member of many online communities in which topics related to trading antiques are discussed. He likes to gather information quickly and usually has a specific topic and goal in mind. Since "Tussen Kunst & Kitsch" has a well-

organised archive of clips that has been split into various themes and that offers a lot of background knowledge on the artworks and many other services that he needs for his work, Bert often uses it for doing research and business alike.

3.2.1.3 Daniel

Name and occupation: Daniel, Economics and Business research master student.

Age: 24

Nationality / place of residence: Dutch / Groningen

Search behaviour: Explorative

Digital literacy: High

Daniel is a student of Economics and Business, a research master at the University of Groningen in the north of the Netherlands. In his free time he likes to scour flea markets and thrift stores in search of antiques and collectibles that he can re-sell for a nice profit online. When he is looking for bargains, he always takes pictures of objects that he is interested in and looks up extra details online to check if it is indeed worth what he thinks it is and to find more background information. He also shares the pictures on various social networks and internet fora to keep his friends updated about the new bargains he has hunted and to ask others if they know more about the objects. Daniel keeps a meticulous record of his (near) purchases and has divided the pictures in various categories, periods and locations.

3.2.2 Scenarios

3.2.2.1 Art lover

Rita is watching the latest episode of Kunst & Kitsch. The show's host, Nelleke van der Krogt gives an introduction to the programme. Rita wonders how long Nelleke has been hosting the show and who were the hosts before her, since it's been on for a very long time, but Rita didn't start watching it until 2003.

Rita sees the show has been recorded in the Hermitage Museum in Amsterdam[31]. She's always wanted to visit the museum, and to find out what the link is between the Amsterdam Hermitage and the Hermitage in St. Petersburg. She sees a shot of the outside of the museum, and notices that it was originally a home for old women from the 17th century. Intriguing! Rita wants to know more about the Hermitage location's history and see images of how the building used to look.

After the show has introduced the Hermitage, a bit of its history and current and future exhibitions, the objects brought in by the participants are evaluated by the experts. One person has brought in a golden, filigree box from France in which people stored a sponge

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[31] Based on an actual episode of 8 December 2010. See
http://cultuurgids.avro.nl/front/detailtkk.html?item=8237850

with vinegar they could sniff to stay awake during long church sermons. Inside the box, the Chi Ro symbol has been incorporated. Rita has heard of it, but doesn't really know much about its provenance and history[32]. She can, however, access information about the symbol, for instance from Wikipedia and Europeana. Since she wants to go into the subject more in-depth, she decides to save the references to the information for later.

Rita thinks the box might be worth quite a bit. She sees there's a quiz where she can enter what she thinks the box is worth that all viewers can take part in. Rita puts in an estimate of €1,200. After a few minutes, the expert reveals his estimate: €1,500. That's pretty close! However, four others put in a better estimate, so she doesn't earn the top spot.

The final person on the show (a woman in her 70s) has brought in a painting that has the signature 'Jan Sluijters'[33]. This is, in fact, a famous Dutch painter, so she wants to make sure that it is indeed his. The expert - Willem de Winter[34] - confirms that it is genuine. He states that the painting depicts a street scene in Paris, and that is was made in 1906. Rita thinks the painting is beautiful, and wants to learn more about Sluijters and his work. She learns that he experimented with various styles that were typical for the era: including fauvism, cubism and expressionism. She'd like to see a general overview of the differences of these styles and the leaders of the respective movements.

At the end of the programme, she decides she definitely wants to go and visit the Hermitage and also that she wants to find out which museums have works of Jan Sluijters, so she can maybe hop around and explore his work more. She immediately accesses this information and decides to visit the Hermitage and two other museums in two weeks time and adds this to her online calendar. She also sends the information on the Hermitage and the visit she's planned to her sister, who's also an avid viewer of the programme and has a great interest in art history as well. She adds a message asking her sister to join her.

Rita checks out an overview of the sources presented during various moments of the show and adds some more to her favourites so she can read up on all the things that interested her, but that she did not have time to read and explore during the programme. Rita also sees that she can select to view all segments from each specific "Tussen Kunst & Kitsch" expert, including her and her sister's favourite: Emiel Aardewerk. She sends a link to her sister which will bring her to the overview of all segments with Emiel in them before she switches off. Rita decides to visit the application again tomorrow to learn even more!

3.2.2.2 Professional trader

Bert has recently bought a wooden statuette depicting Christ at an antiques market for €100. He suspects it is quite old (17th century) and that he could re-sell the object for a nice price in his shop. He's done quite a bit of research online already, but also would like to see if

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[32] http://en.wikipedia.org/wiki/Chi_rho
[33] http://nl.wikipedia.org/wiki/Jan_Sluijters
[34] http://cultuurgids.avro.nl/front/detailtkk.html?item=8185509

anything like it has ever appeared on "Tussen Kunst & Kitsch". He requests the system to find segments of various episodes which depict similar objects.

He browses through the segments quickly to see if they contain comparable items. He finds a segment about an oak statue of a Maria figure that was made in the late 17th century.

The expert says that the statue in the programme was originally painted and originates from the south of the Netherlands, the province of Brabant. The value is estimated at €12,500. Although the statue in the programme differs from his, since it depicts Christ and not Maria and it does not seem to have been made in the same style, he does feel that he's on the right path in finding more information.

Bert decides to start a chat with fellow art historians, art traders and art enthusiasts to get some more input on his findings. In the chat room, he shares the segments from "Tussen Kunst & Kitsch" that he has selected and pictures he has made of the statue that he has bought. His fellow experts chip in and refer him to other relevant segments from the programme and external sources where Bert can find more information on 17th century statues. He decides to store this information in his favourites to explore in-depth at a later moment.

Bert also would like to find the prices of items similar to the ones shown in the various segments of "Tussen Kunst & Kitsch". He can choose to go to an online antiques auction by official auctioneers, purchase items from an online antiques web shop and a user-based buying and selling platform. He decides to base himself on official channels and browses through the wooden religious statues from the 17th century that have been sold on the international market in the last year. He sees that many of them have gone under the (digital) hammer for around €10,000, comparable to the estimate from "Tussen Kunst & Kitsch". Bert then checks out if any similar statues are now available for purchase, since he believes it will be a good investment. He uses the same search parameters (statue, wood, 17th century) and sees that an individual seller has put a piece for sale on a user-based platform for a mere €500. It is quite worn, but Bert knows that with a little restoration work, the value is likely to increase four-fold. He purchases the statue and decides he's done enough research and business for today.

3.2.2.3 Bargain hunter

Daniel is bargain hunting at a flea market in Drachten in the north of Holland when he spots a nice silver box, which he thinks is roughly from the 18th or 19th century. He has seen this design before, but can't remember exactly where. He takes a snap of the box and uploads it to the "Tussen Kunst & Kitsch" interface, where he is given an overview of related programme segments and other information on similar objects. He is shown an overview of all programme segments that possibly contain similar or related objects. Since there is a large number of segments, he decides to filter out any objects that fall outside the scope of his search. Daniel de-selects all fragments that are about objects from the 17th century or earlier, or that are from the 20th century or later.

After refining the search results, Daniel finds a segment that is about a silver tea jar from 18th century Friesland.

It looks quite similar to the one he has found, but it is still not exactly the comparison he is looking for. Although this piece is indeed from the location he is right now, he suspects that the box he has found is from a later date and from another location. He sees that there are recommendations of similar objects from not just other "Tussen Kunst & Kitsch" segments, but also from external sources. He sees a recommended object from Europeana, a silver etrog box used for the Jewish festival of Sukkot, which was made in London in 1867[35].

Yes, this is more like it, he may have actually found a precious etrog box! He saves the image from the Europeana object for future reference. Although the silver box is still quite expensive, he suspects it's worth much more and purchases it. Daniel then also shares both the image from Europeana and the picture he just took of the silver box he's found on the flea market on his Facebook and Twitter accounts with the message: "I think I've just found another treasure".

When continuing his bargain hunt, he spots a Delftware plate that is still in quite good condition. Again, he takes a picture of it and uploads it. He sees a range of related episodes and programme segments that he quickly browses through by skipping to the next segment once he sees it does not contain the information he's looking for. After skipping through five segments he sees one in which a guest has brought in a Delftware plate made in 1670, depicting a Chinese-style scene, according to European pottery expert Robert Aronson.

Although the plate he's found is not in mint condition and has some chips, the style of the painting looks rather similar, and the pottery mark also indicates it was made in Delft. Daniel decides to also buy the plate and heads home with two new possible treasures.

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  http://www.europeana.eu/portal/record/09307/53AD9575C0AA4CDA4BAAB5C3FF924ED307BF49 B6.html

4   User goals and functional requirements

In section 2 we proposed four categories of user goals, namely Information, Communication, Manipulation and Transaction. We make use of these categories to discuss the user goals we extracted from the scenarios described in section 3. For each of these goals we mention the scenarios in which that specific user goal was present, together with a brief description of that goal in that scenario. We also describe the requirements that the system needs to satisfy the user need of each user goal for each scenario, these are called the functional requirements.

As mentioned before, the LinkedTV project is focused on the user information needs and therefore the user goals of the Information category will be discussed in more depth than the user goals of the other categories.

4.1   Information

4.1.1   Additional information

News scenario

Sports loving carpenter: Ralph checks an article with the details of the robberies discussed in the news and he visits the website of a marketing campaign of hotels in Berlin.

Urban mom: Nina checks a list of videos from the debate on the mandatory labelling of police officers and chooses a speech by Benedikt Lux. While watching this speech, she reads some additional information about him.

Socially active retiree: Peter watches some older videos about the story of Café Keese in Berlin and he takes a look at a map showing the locations of rehabilitation centres in Berlin and Brandenburg.

Cultural heritage scenario

Art lover: Rita requests information from the system about the host of the programme, the Hermitage Museum in Amsterdam, the Chi Ro symbol, Jan Sluijters and his work.

Functional requirements

Sports loving carpenter: While watching the item about two professional kickers who admitted involvement in a series of robberies, Ralph makes clear to the system that he would like to receive more information about these robberies. The items for which additional information is available should be presented to Ralph and he should be able to select his topic of interest. The system then needs to present the different available information sources to Ralph, who in his turn selects the article that he would like to read. The system should present that particular article to Ralph. When Ralph has read the article, he should make clear to the system that his information need is satisfied and the system should return to the programme.

Sports loving carpenter: Ralph watches a news item about a marketing campaign of hotels in Berlin. He would like to know more about the item. The system, again, first needs to present the different topics for which additional information is available before Ralph can choose the topic. After that, the system should list the different information sources. Here it is important that the system clearly states the campaign's website, since most information can be found on that website. After spending some time browsing the website, Ralph should be able to make clear to the system that he would like to return to the programme and the system should then resume the programme.

Urban mom: While watching a news spot about a debate on the mandatory labelling of police officers, Nina makes clear to the system that she would like to receive additional information. The system should be able to present a list with topics and items for which additional information can be requested. When Nina has selected the topic, the system should present a list of information sources about the debate on the mandatory labelling of police officers. Nina should be able to select the video of interest, which is a speech by Benedikt Lux. While watching this speech, she, again, should be able to request additional information. The system needs to provide a list of items from which Nina can select 'Benedikt Lux'. And after an overview of possible information sources, she should be able to select some written information about him that she can read while watching his speech. When her information need is satisfied, she should be able to make clear to the system that she no longer wants to read the additional information about Benedikt Lux, nor see his speech. The system then needs to return to the programme.

Socially active retiree: While seeing an item about a fire at Café Keese in Berlin, Peter should be able to request additional information. After the system has provided an overview of possible items, Peter should be able to select "Café Keese". Then the system needs to give an overview of information sources, from which Peter can select older videos about the story of the famous location. When Peter indicates he learned enough about the location, the system should resume the programme.

Socially active retiree: The request for additional information when Peter is watching a news item on a new Internet portal about rehabilitation centres in Berlin and Brandenburg is almost identical to the process discussed above.

Art lover: Rita watches the programme "Tussen Kunst en Kitsch" and during the programme she expresses the need for additional information. Before the system can deliver the additional information, it needs to know about which topic the user would like to receive more information. When Rita wanted more information about the host, the person was present on the screen. The request for additional information about the Hermitage Museum in Amsterdam and the Chi Ro symbol was also stated when the items were present on the screen. Here, the system needs to be aware of what is presented on the screen and whether there is additional information available about the items. When the system has an overview of all the items that are presented on the screen, it can present those to the user and let the user select about which item she would like to receive more information. The painter, Jan Sluijters, was not presented on the screen when Rita requested additional information. In this

case, the user should be able to specify her request when there is no direct reference available on the screen during the programme. When Rita has specified the item on which she would like to receive additional information, the system needs to collect different information sources about that particular item and give Rita the opportunity to select the information source that she would like to consult to satisfy her information need. The information is then presented to the user. In the case of the information about the Chi Ro symbol, Rita returns to the programme quickly after she received some information. However, her information need about the Hermitage Museum in Amsterdam is not that easily satisfied and she consults different information sources. This indicates that the system should enable the user to easily switch from one information source to another. When Rita's information need is satisfied for a particular item, she makes this clear to the system and she returns to the programme.

4.1.2 Related information

News scenario

Urban mom: Nina watches a selection of video statements of politicians and voters about Ratzmann's decision to resign.

Cultural heritage scenario

Professional trader: Bert requests the system to find segments of various episodes which depict objects that are similar to the wooden statuette depicting Christ he recently bought.

Bargain hunter: Daniel wants to know more about items that look like the item that he photographed. He views fragments of "Tussen Kunst en Kitsch" episodes that are related to the pictures he took (both the box and the plate). He also receives recommendations of similar objects from external sources.

Functional requirements

Urban mom: Nina would like to know what others think about the decision of Volker Ratzmann to withdraw from his office. If the system has a collection of video fragments, it should present these to Nina. Nina can then select the fragment she wants to view first. While or after viewing a video statement, she should be able to easily switch to video statements of other persons.

Professional trader: Bert makes clear to the system that he would like to find out more about a statue that he recently bought. He explicitly requests fragments of the programme "Tussen Kunst en Kitsch" that deal with wooden statuettes depicting Christ. The system then needs to search the content of different episodes of "Tussen Kunst en Kitsch". The system also needs information on the available types of relatedness. Once the system has selected multiple segments of the programme that deal with similar statues, the system presents these to Bert. It is important that the system presents the different fragments in such a way that it is easy for Bert to know how and to what degree the fragments are related to his statue and he needs to be able to select the fragments that he wants to view. The selection he makes is an indication for the system about what Bert thinks are the most important suggestions and

based on the selection, the system can update the recommendations. When watching the fragments Bert selected it should be easy for him to switch from one fragment to another.

Bargain hunter: The steps that Daniel and the system take are similar to the ones of the professional trader. The difference here is that Daniel specifies the items from which he would like to receive additional information by uploading photographs to the system. The system then needs to analyse these photographs to identify the object. The content that the system recommends is not only restricted to fragments of "Tussen Kunst en Kitsch" episodes.

4.2 Communication

4.2.1 Quiz

Cultural heritage scenario

Art lover: Rita estimates the value of a box that is presented in the programme.

Functional requirements

The user needs to receive a question, be able to provide an answer and get feedback.

4.2.2 Mail

News scenario

Sports loving carpenter: Ralph shares the spot with additional information about the robberies to his friend who went to school with Kocer.

Cultural heritage scenario

Art lover: Rita sends the information on the Hermitage and the visit she planned to her sister, together with a personal note asking if she would like to join her on her outing.

Functional requirements

The user should be able to create a personal message and to attach links, videos and fragments of video with or without annotations to the email.

4.2.3 Chat

News scenario

Sports loving carpenter: Ralph starts chatting with his friend to discuss the marketing campaign of hotels in Berlin.

Cultural heritage scenario

Professional trader: Bert shares his selection of segments from the programme and pictures he has made of the statue with fellow art historians. He asks for more input from them and he receives other relevant segments from the programme and interesting external sources.

Functional requirements

The system needs access to the contact information of other users. The user should be able to start a chat session and share information and personal messages in real-time with the other users.

4.2.4 Social network

News scenario

Sports loving carpenter: Ralph 'likes' the news item about the marketing campaign of hotels in Berlin and receives notifications of friends who also 'liked' it.

Cultural heritage scenario

Bargain hunter: Daniel shares two pictures on a social network and adds a comment.

Functional requirements

The system needs to get access to the social network system. The user should be able to see who is sharing what and be able to comment on it. S/he should be able to update and post information on her/his social network.

4.3 Manipulation

4.3.1 Adding information to external source

Cultural heritage scenario

Art lover: Rita adds an appointment to her personal online calendar.

Functional requirements

The system needs to have access to the external source. The user should be able to make adjustments to this external source.

4.3.2 Downloading content

Cultural heritage scenario

Bargain hunter: Daniel downloads a picture of an object that is similar to the object that he is purchasing.

Functional requirements

The user should specify what s/he would like to download. The system should be able to let the user download content or schedule downloads to one or more devices.

4.3.3 Uploading content

Cultural heritage scenario

Bargain hunter: Daniel uploads pictures to get more information about the objects depicted (silver box and delftware plate).

Functional requirements

System should be able to let the user upload content to the system from one or more devices.

4.3.4 Browsing

News scenario

Sports loving carpenter: Ralph skips the item about the restoration of a church and he skips to the weather forecast.

Urban mom: Nina quickly skips to the weather forecast.

Cultural heritage scenario

Professional trader: Bert quickly browses segments in search of objects that are similar to the wooden statuette he bought.

Bargain hunter: Daniel browses and skips different fragments of the programme related to Delftware plates.

Functional requirements

User should be able to carry out standard video player function (e.g. play, pause, skip, rewind and forward) on archived content.

4.3.5 Summarizing

News scenario

Socially active retiree: Peter wants to know more about Ratzmann and why he decided to leave the political stage, so he switches to a longer version of the interview.

Cultural heritage scenario

Art lover: Rita requests fragments of one particular expert.

Professional trader: Bert requests segments of various episodes which depict wooden statues of religious figures.

Functional requirements

System should be able to provide long/short versions of the same content or personalized summaries of given length.

4.3.6 Updating profile

News scenario

Sports loving carpenter: Ralph bookmarks the next show of *Brandenburg aktuell* which will include an interview with the club manager of SV Babelsberg 03. He also bookmarks the spot about the restoration of a church.

Urban mom: Nina bookmarks the spot about Wolf Biermann's 75th birthday.

Socially active retiree: Peter bookmarks the linked portal website of the rehabilitation centres.

Cultural heritage scenario

Art lover: Rita saves references to additional information about the Chi Ro symbol and she adds sources to her favourites.

Functional requirements

The user needs the possibility to formulate their interests and preferences (annotate, "like",...) and the system needs to remember the preferences and update the personal profile of the user.

4.4 Transaction

4.4.1 Look at catalogue

Cultural heritage scenario

Professional trader: Bert checks if any similar statues are now available for purchase.

Functional requirements

The system needs access to the catalogue and the user needs to be able to browse this catalogue.

4.4.2 Perform transaction

News scenario

Sports loving carpenter: Ralph books hotel rooms to celebrate his girlfriend's birthday.

Cultural heritage scenario

Professional trader: Bert purchases a wooden statue for € 500.

Functional requirements

The system needs to have access to the transaction websites. The user should be able to select an item s/he wants to purchase, specify the shipping details and make the payment.

5 Conclusion

In this deliverable we have described a list of user goals and needs using four different categories: Information, Communication, Manipulation and Transaction. Scenarios that are part of WP6 were used to identify user goals that we may wish to consider in LinkedTV. For each of these goals the functional requirements and the user goal aspects were described. The list that was described in section 4 is an effective way of organizing the information about the user goals that is extracted from the scenarios.

The list of user goals is a very broad list that could be important for interactive television. However, since the LinkedTV project is focused on the user information needs about the content they are currently watching, the Information user goal category is most relevant for the project. In this category, two user goals were described: getting additional information and viewing related information. Both goals include the presentation of information to the user. When getting additional information and when requesting related information, the user and/or system need to make decisions (1) on what the information is about or to what the content needs to be related: objects, persons, places, events or abstract concepts presented in the TV content, (2) where the information/content comes from: e.g. Internet (Wikipedia, Europeana, etc.) programme content, provider's whitelist.

We will now summarise the functional requirements of the Information category that were extracted from the scenarios. When the user is watching a programme s/he indicates that s/he wants additional information about an item that is present in the programme. The system needs an overview of all the items presented in the programme and it needs to present those to the user. The user should then be able to select about which item s/he would like to receive more information. When the user has specified the item on which s/he would like to receive additional information, the system needs to collect different information sources about that particular item and give the user the opportunity to select the information source that s/he would like to consult to satisfy her/his information need. When the user has selected an information source, the system should be able to present the information of that particular information source and enable the user to switch to other information sources. When the information need of the user is satisfied, the user should be able to indicate that s/he wants to exit the additional information sources and resume the programme. The system then needs to fulfil this request by resuming the programme.

These steps will be used to develop the user interfaces in deliverable D3.2. It is important to note that these steps are a guideline and that it is not necessary that all the steps take place in this particular order.

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