



D2.1

SCENARIO, FUNCTIONAL AND TECHNICAL SPECIFICATIONS - RELEASE 1

March 2014

ABSTRACT

This document is an updated version of the initial release submitted in September 2013.

This document describes the Social Connected TV scenarios in FI-CONTENT 2 including high level functional and technical requirements. The basis for the scenarios was the work completed in FI-CONTENT, Content Area B Professional Content. Using a standard template, each Social Connected TV scenario has been described including high level descriptions of the functional requirements and candidate enablers, information on its level of maturity and experimentation plans.

Deliverable 2.2 provides detailed technical descriptions of the implemented scenarios. User testing will identify technology gaps and missing functionalities.

Where new functionalities are required, a scenario description of the new functionality will be created using the template in this document.

This document is a deliverable of the FI-CONTENT 2 integrated project supported by the European Commission under its FP7 research funding programme, and contributes to the FI-PPP (Future Internet Public Private Partnership) initiative.

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EXECUTIVE SUMMARY

This document describes the Social Connected TV scenarios in FI-CONTENT 2 including high level functional and technical requirements. The basis for the scenarios was the work completed in FI-CONTENT, Content Area B Professional Content. Using a standard template, each Social Connected TV scenario has been described including high level descriptions of the functional requirements and candidate enablers, information on its level of maturity and experimentation plans.

Deliverable 2.2 provides detailed technical descriptions of the implemented scenarios described here. User testing will identify technology gaps and missing functionalities. Where new functionalities are required, a scenario description of the new functionality will be created using the template in this document.

The following scenarios are described in this document:

- Scenario 1: Rich Content
- Scenario 2: Multi-Screen Experience
- Scenario 3: Search and Discovery
- Scenario 4: Personalised Media

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ABBREVIATIONS

CMS	Content Management System
DVB-T	Digital Video Broadcasting — Terrestrial
EPG	Electronic Programme Guide
GE	Generic Enabler
IPTV	Internet Protocol Television
SCG	Smart City Guide
SCTV	Social Connected TV
SE	Specific Enabler
TAL	TV Application Layer
VoD	Video on Demand

1 - INTRODUCTION – PURPOSE OF THIS DOCUMENT

1.1 - Overview

This document describes the Social Connected TV scenarios in FI-CONTENT 2 including high level functional and technical requirements. The basis for the scenarios was the work completed in FI-CONTENT, Content Area B Professional Content where scenarios were drawn up and improved through an iterative process of development and user testing. In FI-CONTENT 2 the Social Connected TV partners have continued to refine the scenarios in preparation for larger scale experimentations.

Using a standard template, each Social Connected TV scenario has been described including high level descriptions of the functional requirements and candidate enablers, information on its level of maturity and experimentation plans. Structuring the descriptions in this manner allowed us to identify possible technology gaps at an early stage, with a view to including these in open calls. Deliverable 2.2 provides detailed technical descriptions of the implemented scenarios.

The scenarios will continue to evolve as the project progresses and we receive feedback from the experimentations sites and from developers and SMEs. All feedback will be evaluated and analysed. Where new functionalities are required, a scenario description of the new functionality will be created using the template below.

1.2 - The Agile Development Process

All three platforms within FI-CONTENT 2 have decided to follow a harmonized methodology to design and develop applications and services for each specific platform. These methodologies adopt user-centred design and agile development methods. For the social TV platform we embrace an iterative agile approach that ensures regular feedback from users and testing groups through all phases of the project.

The Social TV platform is a collection of different tools, each with its own development cycle. ULANC, in developing the Personalised Media scenario, adopted an agile methodology which depended on incremental development and frequent verification. Requirements were drawn from initial user experience storylines drafted in liaison with the BBC. This was then enhanced through creating wireframes to visualise user interactions and developing prototypes. The incremental prototype versions would go through rapid cycles of validation within the internal ULANC team and by the BBC, followed by a wider cycles of verification through interfacing with the users via user surveys, focus groups, and workshops. The feedback helps the prototypes expand both horizontally and vertically, within the bounds of the scenario requirements.

TRDF followed a very similar process to develop the Search & Discovery scenario. Requirements were drawn from initial user experience storylines drafted in liaison with TRDF Program manager and Product owner. This was then enhanced through creating wireframes to visualise user interactions and developing prototypes. The incremental prototype versions continued go through rapid cycles of validation within TRDF with people both within and outside the development team (between June to October 2013), followed by a wider cycles of verification through interfacing with the TRDF users outside the development team, and beta tests with the prototype (in November 2013).

IRT hosted interoperability workshops, attended by up to 20 different connected TV manufacturers including those with the highest market share, plus a plenty of application developers. IRT uses these workshops during the whole development phase to evaluate technology decisions.

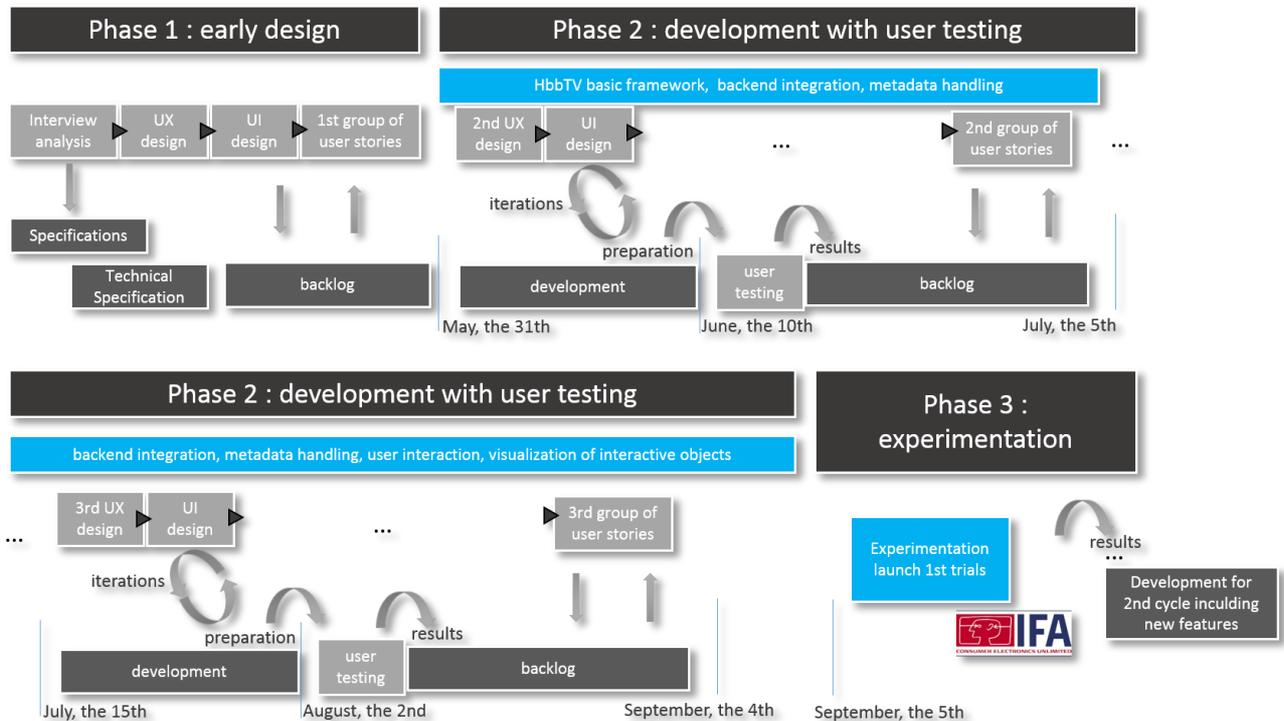


Figure 1 Overview of the user-centred design process

This approach is divided into three phases covering the early design phase, the development phase and finally the experimentation phase. The following sections describe the methods applied to design and develop Social Connected TV applications utilizing the SCVT platform. Figure 1 shows an exemplary overview of the user-centred design process.

1.2.1 - The early design phase

During the early design phase we worked on the concepts and technical foundations, user interaction designs and the data interfaces and their representations. Therefore we created the basic vision of the applications we were planning to develop for the user experimentations on top of the platform enablers and deployed infrastructure. Inputs were created through discussions with experts and student groups at the different experimentation sites conducting experiments for SCTV.

The collected functional requirements were taken into account afterwards when we started the first design phase. The design was split into user interaction (UX) design and the subsequent user interface design (UI). Both parts reflected the functional parameters and the technical requirements derived from the platform enablers. First rapid user testing was based on wireframes as a result of the initial UX drafts. Feedback was gathered and tied into the ongoing UX and UI design process. The result was a first vision of the application features and their representation to the user as starting point for the development phase.

1.2.2 - The development phase

The developments of social connected TV applications started at the end of May 2013. As described above, SCTV developments were based on agile and iterative methods. Thus feedback from interim testing and ongoing work was included during the development phase when possible. To achieve this, the approach was to organize the development in sections (so-called sprints) having an ongoing, parallel exchange between UX/UI designers, developers and technical experts in charge of the SCTV platform deployment. This

ensured a maximum of interaction and agility to fine-tune and adjust the scope and functions of the experimental applications of WP2.

This phase started on May 31st 2013, after we had finished the first iteration of UX/UI design and scenario work. Interim user testing had the following scope:

- Tangibility of the use case the app should fulfil
- Ease of use of specific functions the tester has to fulfil
- Gathering general feedback from testers (usefulness, perception, technical complexity, ...)

Having such feedback from testers in parallel to the development process helped to define gaps and crucial improvements in terms of new or aligned functions for both the application itself as well as underlying technical issues concerning platform capabilities.

- For FOKUS experimentation site, interim user testing was performed with domain experts and students in FOKUS Lab facilities.
- For Brittany experimentation site, interim user testing was performed with internal Technicolor employees not part of the development team.
- IRT hosted quarterly interoperability workshops to test the successful operation of the Second-Screen Framework SE.
- ULANC held user focus groups (8 focus groups of 5 participants each over 2 days in June 2013; fortnightly iterations of incremental prototype versions within the internal ULANC team and the BBC, user questionnaires in November 2013, full-day workshops in December 2013 and April 2014, and online feedback forms.

1.2.3 - The experimentation phase

The experimentation of the developed Social Connected TV scenarios, applications and service took place at the appropriate experimentation sites as follows:

Table 1 Experimentation of the SCTV applications

Period:	Site:	Scenario:	Conducted by:
June 2013	Berlin	Multi-Screen Experience	RBB
September 2013	Berlin	Rich Content	FOK
October-December 2013	Lancaster	Personalised Media	ULANC
November 2013	Berlin	Multi-Screen Experience	RBB
December 2013–Feb 2014	Brittany	Search and Discovery	TRDF
January–March 2014	Lancaster	Personalised Media	ULANC
January–March 2014	Berlin	Multi-Screen Experience	RBB
April 2014	Berlin	Rich Content	FOK

Overview of tests by partner:

FOK/Rich Content: User experiments based on the Content Enrichment HbbTV application started in early September 2013 as Lab trials at FOKUS hybrid TV lab facilities and in parallel to the IFA trade fair in Berlin. The application was tested by 15 users running a qualitative interview approach. The testers were able to use the application on HbbTV-enabled TV sets by its own while being moderated by an expert guiding through the scenario. Feedback was collected during these interviews directly to gain maximum tester awareness. The collected information on e.g. usability, technical complexity of the scenario, attractiveness and usefulness of features has already been used to improve future application releases and underlying

enabler capabilities. To give an example, the use of interactive content as provided by Content Enrichment specific enabler across multiple-screens or devices was requested. As we already planned to integrate and implement these scenarios, we received confirmation from our tests that this meets user requirements and is therefore useful for SMEs and 3rd parties interested in using the Social Connected TV platform.

RBB/Multi-Screen Experience: The first experimentations conducted by the partners of the Social Connected TV platform started in June 2013 with the first lab trial at RBB ('Expert Tests') to validate the use of second-screen devices to interact with content and applications on connected TVs.

Expert tests were conducted in June 2013 with a small group of RBB testers and were dedicated to HbbTV services to prepare for the trials planned for early 2014. The *rbbtext* application was tested for usability issues in advance for the forthcoming field trials planned for February 2014.

Usability Tests were conducted by RBB in November 2013, with a small group of users, and were aimed at validation of existing HbbTV applications *rbbtext* and the ARD Electronic Programme Guide (ARD EPG) in conjunction with Second Screen functionalities, in advance of the planned field tests.

Field Tests began in late January 2014. Sub-contractor Youse conducted these tests on behalf of RBB. 20 test users, augmented by 8 test users from RBB, participated in a three-week long test series which required them to carry out a series of tasks and to record the results and their impressions in an online questionnaire. The field tests were followed by a focus group held in March 2014. Test results are documented in Deliverable D2.3.2 Results and Feedback Analysis Release 2.

TRDF/Search and Discovery: User experiments based on "Search & Discovery" applications began on December 16th 2013 at the Brittany experimentation site. Eighteen users participated in the experimentation. They were located in the Rennes area and were selected by ImaginLab. TV sets and tablets required to run the tests (with restrictive technical characteristics for the 1st experiment) were provided by users (and ImaginLab when necessary). The purpose of the testing was to investigate the use of second screen applications to provide new experience for VOD consumers, especially in the area of search and discovery of new content. In-depth analyses of user behaviour was conducted in February and March 2014 through questionnaires, interviews and user action logs analysis.

ULANC/Personalised Media: The Resume-Play feature developed by ULANC allows users to view their IPTV viewing activity data as a means to help them manage their cross-device media consumption. Testing and evaluation was carried out during Phase 1 in two stages using a combination of qualitative and quantitative research. Stage 1 was carried out between October and December 2013, and was focused on the use of the Resume-Play feature through the web interface, which is targeted at desktop, laptop, tablet, and smartphone users. Stage 2 took place between mid-January and end of March 2014, and it studied the use of the Resume-Play feature across converged platforms like game consoles (PlayStation 3+) and smart TVs. The qualitative research involved interviews and focus groups carried out in liaison with the BBC partners. The quantitative research, on the other hand, involved the analysis of usage data gathered by the IPTV system and analysing them to obtain representative statistics.

1.3 - Terminology

Enabler: Software module or web service providing well-specified functionalities, accessible and usable by application developers through clearly-described APIs (Application Programming Interfaces).

Generic Enabler (GE): An enabler realized by the FI-WARE project or its follow-up sustainability project.

Specific Enabler (SE): An enabler realized by the FI-CONTENT 2 project. Specific Enablers may be layered on top of, or otherwise make use of, Generic Enablers. Please refer to the definition of a FI-CONTENT 2 SE from Deliverable D6.1 Architecture specification.

Platform: A comprehensive combination of technology infrastructure and Generic and Specific Enablers capable of hosting and supporting development of application software.

Application or Application software: Software layered on top of one or several platforms for realizing tasks for end-users.

Scenario: Description of foreseeable interactions of users with one or several applications.

Experiment or Experimentation: Concrete test with actual users of one scenario in one of the experimentation sites within a given time frame.

Functional requirement: Either calculations, technical details, data manipulation, processing or other specific functionality that define what a system is intended to accomplish.

1.4 - Cooperation with other FI-CONTENT platforms

Both WP2 Social Connected TV Platform and WP3 Smart City Services use the common enabler Content Enrichment SE, provided by FOK (Release 09/13). The Second Screen Framework SE, developed by IRT in WP2 is being used in the WP3 Second Screen scenario for the Smart City Guide (SCG).

RBB will use the HbbTV App Toolkit used as the basis for testing and demonstrating functionalities of the Cross-Screen Toolbox (Multi-Screen Experience Scenario) in November 2014. WP2 and WP3 are jointly exploring the possibility of also testing WP3 scenarios as part of the Toolkit experimentation.

WP3 and WP2 Social Connected TV will also cooperate in the On Site Visit scenario. This cooperation sees WP3 integrate the WP2 Second Screen Framework enabler into the SCG app and is detailed in D3.1.

In conjunction with WPs 3, 4 and 6, WP2 elaborated performance requirements for all WP2 scenarios. To ensure consistency of terminology and documentation, joint documentation produced by platforms WPs 2, 3 and 4 is cross-checked by the responsible editors from the parallel platforms.

2 - PLATFORM SCENARIOS

2.1 - Scenarios

The FI-CONTENT 2 consortium introduced a common terminology to be used across the project's documents. A number of changes to various documents were implemented in order to align their contents with this new terminology. Certain changes were introduced in response to the fact that the new terminology differentiates between applications and scenarios.

An application is a piece of software for realising tasks for end-users whereas a scenario is a description of foreseeable interactions of users with one or several applications. A number of scenarios in the former version of D2.1 fall under the scope of the definition of application. These former scenarios have been combined and new scenarios have been introduced. Moreover some of the former scenarios had a functional overlap – where this was the case, the former scenarios have been merged: for example (former) scenarios *rbbtext* and ARD-EPG are now defined as applications used for testing the scenario Multi-Screen Experience.

Scenarios have been also renamed to better indicate their functionality from the user perspective. The overlap between the previous use of the terms 'scenario' and 'user story' is thus clarified. Figure 2 gives a detailed overview on how the original scenarios were merged into four new scenarios described in this Deliverable.

- **Scenario 1 Rich Content** is based upon the three original scenarios Content Enrichment for HbbTV, State and Quote on Social TV, and Connected Encyclopaedia.
- **Scenario 2 Multi-Screen Experience** is based upon the three original scenarios Cross-Screen Toolbox, Content Linking Across Devices and Using Second-Screen Devices.
- **Scenario 3 Search and Discovery** is based upon the former scenarios Search and Discovery and Audio/Video SEO.
- **Scenario 4 Personalised Media** is based upon the Activity Data scenario.

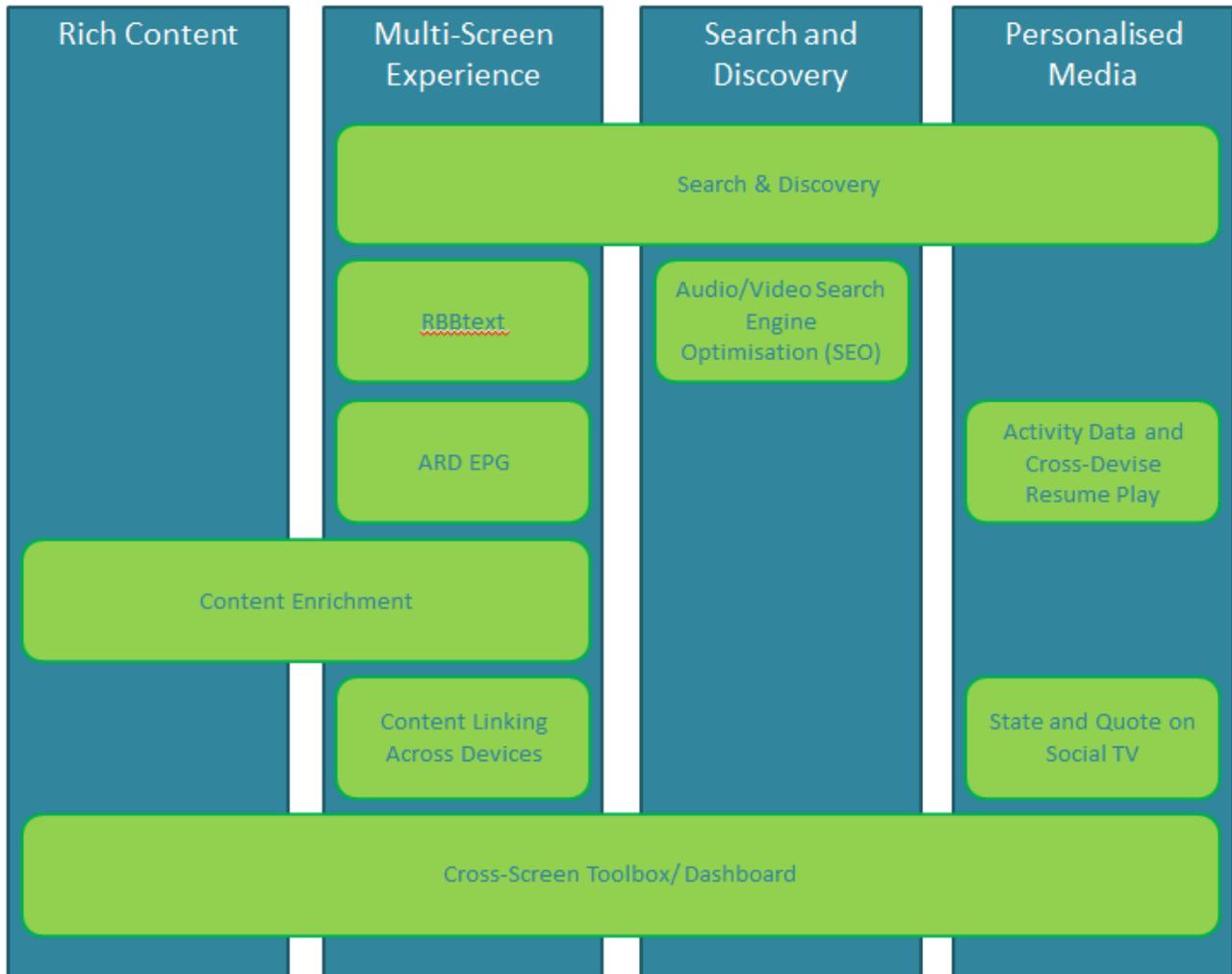


Figure 2 Scenario overview showing relationship between former and current scenarios

2.1.1 - Scenario 1: Rich Content

Scenario	Rich Content
Category/topic/context	Interactive content, content creation, content annotation, linkage of supplemental media
Owner(s)/contacts	Robert Seeliger (FOKUS), Chris Krauss (FOKUS), Annette Wilson (FOKUS), Sebastian Kirch (IAIS)
Abstract	Rich content describes the creation and usage of interactive content for social connected TV (HbbTV / SmartTVs) on the TV and via multi-screen applications.
Detailed description	This scenario describes the consumption, annotation and sharing of interactive TV content and additional available media related to it. The user will be able to connect a second screen device to their main TV screen and watch and interact with the content on the screen best suited to the purpose and context. For example, while watching the main high resolution video on the large TV screen the user may choose to use a tablet to consume additional information or enrich the video, as this type of interaction is easier on a touch screen device rather than a TV.

	<p>Video content can be enriched by the content providers or by end-users. Enrichment covers annotations, linking other content such as video, audio, images, text, pdf, mail details, etc.</p> <p>Annotations can be added to objects in the video. These annotations can be automatically enriched using Linked Open Data sources like Wikipedia/DBpedia. Additionally, annotations can be created fully automatically based on keywords identified in an automatically created audio transcript.</p> <p>The content, presented on the second screen, correlates to the topic shown on the television screen and transforms the habit of passively watching into an active process of interaction. For example, the user is watching a broadcast which includes an HbbTV application. After pushing the Red Button on the remote control a QR-Code appears. Scanning the QR code with the second device enables the connection between the devices. Once the connection is established, the second screen offers additional information like recommendations, comments, related video content and more. The user can then share this additional content with friends.</p> <p>The presentation of this information on the second screen is subject to the presence of the content on the television screen. Imagine the scene shows a car; as long as the car is visible on the TV, the application will provide further information on the second screen. When the car disappears from the TV screen, the related content on the connected device also disappears. Furthermore, the application enables the user to make annotations, add additional video content and share it all with others. To aide this process the user could search within the automatically created audio transcript for interesting quotes and share segments of the video on social media platforms like Twitter or Facebook.</p>	
Justification for inclusion of scenario	Audience/cultural criteria	<ul style="list-style-type: none"> • Provides the user with more immersive TV experience by offering additional information about the content on TV • Links TV content with web content (Linked Open Data) that can be accessed and explored by the user in an interactive and very convenient way • Paralleled experience – the user can still enjoy watching TV while discovering more details and content-related information in parallel.
	Academic criteria	<ul style="list-style-type: none"> • The technical concept of content and object related supplemental information that are directly available to the user in addition to the video content is of interest • Framework to enable interactive video which is based on open web technologies open up multiple application scenarios • We are looking for open architectures and open systems to develop interactive video services • Syncing video content with web content • Research on how users will interact with video content using their main screen as well as starting with a multi-screen service experience • Which content parts should be displayed where? • How to present the content? • Interaction paradigms?

		<ul style="list-style-type: none"> • Metadata formats, content formats • Integration and harmonisation of additional content from disperse sources. • Which information is likely to be shared by the user to create follow-up communication. This analysis will be based on user tests, not by analysing social media platforms like Twitter or Facebook or by performing sentiment analysis.
	Commercial criteria	<ul style="list-style-type: none"> • Creates new business models for content providers, service providers and creative industries • Interactive video is open for any web content that might be of interest for the user • Second screen and multi-screen applications will allow parallel content consumption • User interaction is measurable • Personalized content can be presented to the user (interactive ads, content related to documentaries, etc.) • Social media functions help service and content providers to spread and market their offers to their target audience. • Increase of follow-up communication by allowing to share content
Planned experimentation		
Experimentation site	Berlin	
Estimated schedule	1 st and 2 nd experimentation cycle	
Maturity of implementation	Lab tests in first experimentation cycle. Further lab tests and possibly field trials in 2 nd experimentation cycle.	
Content, provider, availability	Demonstration content provided by FOKUS and RBB	

Functional requirements and their candidate enablers		
Functional requirement	Candidate enabler	GE/SE/Gap
Device discovery Is needed in the process of connecting devices.	Second Screen Framework The Second Screen Framework provides a discovery mechanism.	SE
Content augmentation Is needed to identify related content and allow the user to add content.	Content Enrichment This enabler adds an additional layer of information on top of video content.	SE
Application to application communication Is needed to exchange information between applications running on different devices.	Second Screen Framework The enabler provides functionalities for the information exchange between different web applications running in the browser of certain connected devices. The exchange is realized by a server.	SE
Create audio transcript Make spoken content machine-readable and accessible for search.	Audio Mining This enabler allows users to segment video content by identifying speech/non-speech segments and to perform speech-to-text transformation.	SE
Find and link relevant entities Perform named entity recognition on automatically generated audio transcripts. Link automatically detected and manually annotated entities to linked open data objects.	Semantic Annotation Content Optimisation Both enablers provide functionalities to perform named entity recognition and linking.	GE SE
Object database and storage Is needed to deal with the large amount of data.	Object Storage This enabler allows users to store large data collections.	GE

Performance requirements	
Type	Requirements
Hardware	<p>To enable the scenario described above, the SEs should be deployed on state of the art server machines with at least quadcore CPUs (2GHz) and 8GB of RAM. This will serve as a minimum system that can provide the performance to e.g.</p> <ul style="list-style-type: none"> analyse up to 8h of speech data per core per day with speech recognition and keyword extraction using the Audio Mining SE. perform a named entity recognition (NER) for up to 3.000 documents per hour while serving 25 parallel users (response time < 1sec/request) using the Content Optimisation SE <p>For large scale deployments the use of fast and scalable CDN caches and SSD storage is recommended.</p>

Software	<p>Video Quality Depending on which device content is being viewed varying video quality is required. The video on the TV screen should be HD while the videos on the mobile device do not require such a high resolution or should be delivered by use of adaptive bitrate streaming formats to adapt to available bandwidth.</p> <p>Multimedia Indexing Quality To support the desired use cases it is not necessary to perform a multimedia indexing that is 100% accurate as this would require a manual post-correction of the automatically generated results. An accuracy of 60-90% is sufficient for e.g. speech recognition (Audio Mining SE) since the generated transcript is only used for searching and linking and is not displayed to the user. However, it might be necessary to perform additional training of the speech recognition engine to produce the desired results. This will be evaluated during the project.</p>
Miscellaneous	<p>Presentation of objects on TV Screen In the rich content scenario it is important that users can easily recognize which objects on the main screen are interactive this needs to happen in a manner that is non-intrusive, intuitive and allows the user sufficient time to react. The requirements are:</p> <ul style="list-style-type: none"> • presentation of interactive elements on the screen: The objects should be highlighted directly by means of a tag positioned close to the object or as a list at the edge of the screen. Ideally users should be able to choose which representation they prefer. • number of objects highlighted at any one time. Our experience is that no more than four objects should be linked at any one time. More is too challenging for the user but also the hardware can satisfactorily handle up to four objects simultaneously, more creates delays. • duration of the information on the screen. Information on a linked object needs to be displayed long enough for the user to acknowledge the addition information or the opportunity to interact with the content and decide whether to do this or not while following what is happening on the main screen <p>Navigation The navigation of the app on the TV needs to be possible with a remote control and via a second screen application.</p> <p>Individual vs Group Viewing Situation The apps have to be able to respond the varying requirements of individual and group viewing situations. In group viewing situations, not everyone in the room will be interested in interacting with the content. This should then happen on a second screen app, thus not disturbing the overall viewing experience of the others in the room.</p>

2.1.2 - Scenario 2: Multi-Screen Experience

Scenario	Multi-Screen Experience
Category/topic/context	Multi-screen, second screen, connected TV, hybrid TV, additional content, device discovery, context discovery, app-to-app communication
Owner(s)/contacts	Christoph Ziegler (IRT), Oliver Pidancet, Martin Gordon (RBB), Sebastian Kirch, Michael Eble (IAIS)
Abstract	We test/experiment with TV-content-accompanying second-screen applications which allow users to easily obtain additional information on a TV programme. Furthermore we investigate possibilities for interaction with the programmed content on the second screen.
Detailed description	<p>This scenario aims to test TV-content-accompanying second-screen applications that <i>automatically sync with the TV content</i> and which provide viewers with additional information that fits the context.</p> <p>Moreover users of connected TVs can <i>couple their TV with their second screen</i>. (Hybrid) TV applications can <i>remotely controlled start companion applications</i> on a coupled second screen. TV applications and their companion application on the second screen are able to <i>exchange information</i>.</p> <p>The scenario encompasses a number of use-cases we are going to test, e.g.:</p> <ul style="list-style-type: none"> • <i>Synchronised navigation</i> users navigate through an application on the TV or on the connected second-screen device. The application on the connected device automatically follows. This can be used by the user to remote control the application on the TV with the help of his tablet. • <i>Remote view control</i> users can use the second screen to control which part of the application should be visible on the TV. For example the user can decide to hide the whole application on the TV screen in order to go on watching the currently broadcast TV show. Or they can hide and show certain parts of the application as an overlay over current broadcast TV show, e.g. statistics of a TV show. • <i>Remotely-control the TV's video player</i> • <i>Subscription of (personalised) information</i> • <i>Audio-based synchronization of first and second screen</i> first screen devices are not always connected to the internet which can hinder convenient synchronization mechanisms between first and second screen. In this scenario we will explore additional ways of synchronizing first and second screen using audio fingerprinting. The integration of this technology into mobile applications offers developers and users a robust and fast way to synchronize first and second screen device. This link can then be used to display additional content on the second screen device.

Justification for inclusion of scenario	Audience/cultural criteria	Enhanced TV experience for end-users.
	Academic criteria	Recent studies have shown that there is an untapped potential for the usage of second-screen devices to offer user TV programme accompanying content (cf. Red Bee Media Ltd.). This scenario will stimulate the research in this area and foster the development of crucial technologies to realise a seamless multi-screen experience. Moreover we will gain findings on what content is desirable to be consumed by the users on which screen and how interaction concept should be design to allow user intuitively accessing the content on the different devices. Foremost we hope to be able gather findings on how content should be prepared by editors and producers to build a value for the end-users.
	Commercial criteria	<p>Broadcaster can engage their viewer's loyalty by having new conceptual and technical means for enhancing their services.</p> <p>New business opportunities due to new possibilities for advertisement, like pushing ads on the second screen or novel formats for interactive advertisement.</p>
Planned experimentation		
Experimentation site	Berlin	
Estimated schedule	<p>Expert tests June 2013, Usability Tests Nov 2013, Field Tests Jan-Feb 2014</p> <p>HbbTV App Toolkit testing will take place during the 2nd testing cycle, in conjunction with an RBB broadcast scheduled for November 2014.</p>	
Maturity of implementation	Experts tests (5 users) concluded June 2013, Usability tests (5 users) concluded Dec 2013, Field tests (30 users) concluded March 2014.	
Content, provider, availability	Video content is provided by RBB, the <i>rbbtext</i> application uses RBB text content.	

Functional requirements and their candidate enablers		
Functional requirement	Candidate enabler	GE/SE/Gap
Device discovery Is needed in the process of connecting devices. Before being able to actually assign devices to one another, they need to be aware of each other. This is accomplished by device discovery mechanism.	Second-Screen Framework The Second Screen Framework provides a discovery mechanism which solves the issue by means of a QR-Code which the user scans with his second screen device.	SE
	An enabler that provides automatic discovery of devices based on standard web technologies	Gap
Persistent cross-service inter-device connection Is needed to have a permanent knowledge of which devices belong to each other. This knowledge should be to all services trusted by the user.	Second-Screen Framework	SE
App-to-app communication Applications running on different devices need a facility to exchange information.	Second-Screen Framework	SE
Automatic application launch TV applications should be able to remotely-controlled start applications on the second screen.	Second-Screen Framework	SE
Context discovery The application on the second screen should be able to recognise what the viewer is currently watching on the TV in order to supply the user with additional content that goes along with the content on the TV.	Second-Screen Framework & HbbTV APIs By means of HbbTV broadcasters can link content from the web to broadcast content. Since the Second-Screen Framework is compliant with this standard it can be integrated to HbbTV applications. HbbTV applications can use facilities of the SE for communication with second-screen applications in order to keep them in contextual sync with the broadcast programme.	SE
	Audio Fingerprinting Allows applications to automatically recognise content by analysing its audio signal.	SE

Performance requirements	
Type	Requirements
Hardware	<p>To support the scenario described above, the Audio Fingerprinting SE requires at least a system with a Single-Core CPU (1.6 GHz) and 1 GB RAM. This will serve as a minimum system supporting a fingerprint database of about 10-15h serving approximately 200 users with response times between 130-500ms. Fingerprint nodes can be replicated and load-balanced (vertical scaling) to increase the number of supported parallel requests. Additionally, CPU frequency and memory can be increased (horizontal scaling) to lower the processing time of each node.</p> <p>In order to realize app-to-app communication, device discovery and app launch on the basis of the Second-Screen Framework it is crucial that the devices to be connected (TV and second screen) have a connection to the internet. There is no lower boundary known regarding the performance of CPU, RAM, HD etc. of the TV and second-screen devices. In general every device that is able to run an off-the-shelf web browser should be able to work with the Second-Screen Framework. Moreover Second-Screen Framework has no specific demands regarding the bandwidth of the internet connection. The communication channel of the framework is usually used to exchange small pieces of plain text. For the QoE it should be ensured that ping times between clients and the framework server are low in order to have a low latency between a user action on the one device and the appropriate reaction on the coupled device.</p>
Software	
Miscellaneous	

2.1.3 - Scenario 3: Search and Discovery

Scenario	Search and Discovery	
Category/topic/context	Search, Discovery, VOD, Content, Content-to-Content recommendation	
Owner(s)/contacts	Nathalie Cabel, Thierry Filoche (TRDF)	
Abstract	We evaluate applications helping users to discover new content in innovative ways	
Detailed description	<p>Today, searching for interesting content to watch is time-consuming for the majority of commercial VoD offers. This scenario intends to explore several ways to explore, search and discover new interesting content for users. This scenario includes the following applications running on a tablet:</p> <ul style="list-style-type: none"> • an advanced search, with auto-completion • a discovery function based on similarity. Starting from a movie a user likes, he is able to navigate inside a graph to discover other movies with common aspects, such as same actors, same director, or similar movies proposed by a content to content recommendation engine • a discovery function enabling movie selection by indicating multiple criteria such as genres, people, countries, production years • a discovery function based on the combination of genres. A predefined list of cocktails are proposed to the user. User is also invited to create his/her own cocktail by combining its favorite genres. • a discovery function based on screenshot: five list of screenshots are proposed to the user without any additional information. Each list proposes screenshot of a single movie. When the user selects a list he/she gets the movie detail page and discovers which movie was behind these screenshots. 	
Justification for inclusion of scenario	Audience/cultural criteria	<ul style="list-style-type: none"> • As more and more people are using or are eager to use a tablet as a second screen, this scenario addresses a large part of the population • users can explore the VoD catalogue in many different ways • users can easily interact with the application thanks to the tactile screen • users can use application without disturbing other people watching TV screen • users should have some interest in the offer as the proposed VoD catalogue(s) is (are) commercial VoD catalogue
	Academic criteria	<p>This scenario proposes innovative ways to discover new content thanks to original user interface concepts to collect request from the user, and thanks to an algorithm establishing correlation between movies on basis of weighted genres.</p> <p>The added value/innovation on this scenario derives from two aspects: on one hand we improve the user experience by proposing new user interface concept. We facilitate the navigation</p>

		<p>thanks to a graph of relation between metadata (a form of knowledge graph) that enables user to discover more and more related contents.</p> <p>With the "cooking search" we enable user to enter easily such a complex request as "I want an adventure movie with Brad Pitt, but without Robert Redford", or "a movie release in 2012 with a duration of less than 2 hours; with the "cocktail search", we cluster movies on the basis of movies having approximately the same weighted genre on several genres (for instance "60% drama and 40% romance"), and thus enable users to compose their own requests.</p> <p>On the other hand, we have developed an innovative algorithm able to compute the weighted genre of all movies in a provider database. Thanks to these results, we can propose related movies in an innovative way.</p> <p>It will be interesting to:</p> <ul style="list-style-type: none"> • evaluate which discover application(s) is (are) the more accepted, and relevance of each discovery application regarding the available content • collect user feedback on the algorithm results, and potential expectations from users regarding movie discover <p>Evaluate the mechanism to pair tablet and TV</p>
	<p>Commercial criteria</p>	<p>Due to the large target group of users and the innovative and easy ways to discover new content, this scenario should improve VoD consumption. Indeed, the current commercial VoD technology offers lists of movies with basic search capabilities and limited ways to filter content, such as criteria to access latest releases, using the classification by genres or the most viewed. The Applications proposed in FI-CONTENT 2 offers new ways to consume VoD. The experimentation using commercial VoD offer will give us valuable information on business interest of proposed applications.</p>

Planned experimentation	
Experimentation site	On Brittany experimentation Site: Rennes and Lannion, for 1st and 2nd experimentation cycle.
Estimated schedule	1st experimentation cycle (December 2013 - March 2014) 2nd experimentation cycle (November - December 2014)
Maturity of implementation	Medium scale. 18 users use the prototype at home
Content, provider, availability	For the first experimentation, we use commercial VOD catalogues from French VOD providers, Imineo and Univers Cine.

Functional requirements and their candidate enablers		
Functional requirement	Candidate enabler	GE/SE/Gap
Content To Content Recommendation From content, proposition of other related content on the basis of metadata	Content Similarity The goal of this SE is to compute a weighted genre list for each movie thanks to content provider catalogues' descriptive metadata and deduce a similar movie list for each movie of content provider catalogue.	SE
Content classification	Content Atmosphere The Content Atmosphere SE allows discovery new content thanks to ambient movie's mood.	SE
Device Management The service needs to associate a TV with a tablet in order to select the content on the tablet and play it on the TV.	Devices Manager framework This framework provides a way to associate user's tablet with user's TV and to ensure that selected content will be played on the target device.	Application
User Authentication In order to guaranty privacy for the experimentation, user will log thanks to a user identifier provided by the experimentation site owner. The social connected TV platform has no knowledge of the true identity of the user, but will ensure the secure connection.	Identity Manager framework This framework provides a way to authenticate users on the backend and to guaranty token management for VOD purchase	Application
	Identity Manager – One IDM Different authentication mechanisms are offered by the Identity Generic Enabler. It supports standardized interfaces as well as proprietary once.	GE

TV application hosting on internet User needs to install a TV application on its TV in order to watch the VOD he selected on the tablet. File of this application should be online and accessible for a TV connected to internet.	FI-Ware Cloud	GE
Performance requirements		
<i>Type</i>	<i>Requirements</i>	
Hardware	<p>For the front-end part, the solution is designed to run on a tablet and on TV. For the tablet, solution is compliant with :</p> <ul style="list-style-type: none"> • iPad (from the iPad2) • or Android tablet with a resolution higher than 1024*768, with a recommended size of 10". <p>For the TV, solution is compliant with Samsung and LG Smart TV released in 2011, 2012 and 2013.</p> <p>For the back-end part, solution is designed to be deployed on a virtual infrastructure. Following requirements are recommended for the VM: Dual Core CPU and 16 GB of RAM.</p>	
Software	<p>For the front-end part :</p> <p>For iPad, solution is compliant with iOS7. For Android, solution is compliant from Android 2.2. For TV, solution is compliant with SDK of Samsung and LG Smart TV released in 2011, 2012 and 2013.</p> <p>The application running on tablet is an HTML5 web application. The application running on TV is an HTML CE/javascript application.</p> <p>For the back-end part, the OS for the VM is Ubuntu 12.04 (or higher). Service that runs on top of that includes software such as Apache server, Couch DB and kibana.</p>	
Miscellaneous	<p>On the backend, solution is designed to support at least 100 concurrent user sessions. On the front-end side, user should have an internet access with a bandwidth higher than 4 MBits.</p>	

2.1.4 - Scenario 4: Personalised Media

Scenario	Personalised Media	
Category/topic/context	IPTV, live online TV, video on demand, personalised user dashboard, cross-device media consumption, user-centric interaction features	
Owner(s)/contacts	Nicholas Race (Lancaster), Mu Mu (Lancaster), Yehia Elkhatib (Lancaster), Theo Jones (BBC), Libby Miller (BBC)	
Abstract	<p>An application that provides access to a number of live TV streams as well as a large library of on-demand content items. Users are able to tailor their experience around themselves. For instance, they could save certain items to their library, pause an item to resume at a later time from the same or another device, and interact with other users around media items. Global and specific user consumption and behaviour are used to provide a personalised user experience.</p>	
Detailed description	<p>IPTV has changed a lot over the years. It has moved from merely being an alternative channel for broadcasting media to being a reactive service that can be tailored by users to meet their specific needs and usage. Our goal in this scenario is to explore some of the different possible added values of personalised media in the context of an interactive IPTV service. We plan to introduce a series of features that allows users to manage their usage via different devices, and also to combine their consumption with that of others.</p> <p>For the first experimentation phase, we plan to focus on presenting activity data to users in a meaningful manner. Our research has shown that users' own activity data does not interest them in itself: we evaluated activity data visualisation with users in FI-Content 1 and the results were that people saw no particular benefit in visualising it and editing it. Therefore our follow-up research question in FI-Content 2 is: can we abstract away from the detail of the data and use it to present something useful back to users?</p> <p>The initial application we have chosen is a cross-device feature of the University of Lancaster Vision IPTV system which allows users to view their history of watching TV programmes on multiple devices, and to resume play from the point they stopped watching. Although we plan to implement it on this system, the research will be applicable to other systems.</p> <p>The envisioned scenario is that users may be able to watch only part of a programme on their laptop or desktop computer at home, and may want to resume play later on a different device, for example in periods of dead time while queuing or waiting.</p> <p>Users can log in to the IPTV system on desktop, laptop, smart phone or tablet and view their TV [and radio] history including any programmes part-watched [and flagged for resume viewing], regardless of which device they last watched on. They can then resume play from the point at which they stopped viewing, or from any other point. Suitable metadata will be made available to the user about programmes displayed in this way so they can quickly identify what to watch [or listen to]. The users will also be able to delete items from their history.</p>	
Justification for inclusion of scenario	Audience/cultural criteria	Audiences now have several devices on which they are able consume content; whether they are at home or on the move. Allowing users to manage their viewing in this way is an interesting starting

		point on the way to other more personalized viewing and planning. features
	Academic criteria	The current media landscape is fragmented where users have an increasing number of content sources from which they could consume as well as a range of devices on which to consume. Allowing users to manage their viewing in this way is an interesting starting point on the way to other more personalized viewing and planning features.
	Commercial criteria	Broadcasters are collecting large amounts of user activity data from across their services. Understanding how to make use of this in a way that is appealing to users is important. Whilst there is potentially not (strong) commercial exploitation potential in this as a standalone feature, it does address a defined need identified by end users and media providers. It is likely that any commercial exploitation would be part of a larger personalized and interactive service offering, allowing broadcasters to maximise the value of the interactions they have with their audiences..

Planned experimentation

Experimentation site	Lancaster
Estimated schedule	1 st experimentation cycle (Oct 2013 – Mar 2014); and 2 nd experimentation cycle (Apr 2014 – Dec 2014)
Maturity of implementation	Field trial within Lancaster University Campus (circa 6k student + staff population).
Content, provider, availability	Existing streaming platform and VoD catalogue, main free-to-air UK TV channels.

Functional requirements and their candidate enablers		
Functional requirement	Candidate enabler	GE/SE/Gap
VoD Library Allows users to access a catalogue of on-demand content items.	Content Metadata Store This enabler contains the descriptive content metadata. It allows users to discover available TV and radio programmes.	Application
Content Streaming Allows users to view live streamed TV and radio, and on-demand content, with media encoded appropriately to be compatible with client devices.	N/A	Application
Viewing History Allows users to view a history of TV and radio content they have consumed.	N/A	Application
Cross-Device History Allows users to access their content and viewing history through any of their devices.	TV Application Layer (TAL) TAL, an open source library, will allow Vision to reach more platforms, including connected TV devices.	SE
Cross-Device Resume Play Allows users to resume playback of media content on a different device to the one on which they started playback. Also allow users to manage the distribution of their session information to media broadcasters.	Data Center Resource Management (DCRM) A DCRM-based infrastructure will host user session activity data as well as related application logic to enable seamless cross-device, and potentially cross-broadcaster, functionality.	GE
Sign-On Allows users to register and sign in, link their devices, and access data such as a list of items to view in a playlist.	N/A	Application
Note: Due to content licensing and copyright restrictions, the content must be hosted on either ULANC or BBC infrastructure. Furthermore, any personal data used by the system will be held within a DCRM deployment we control.		

Performance requirements	
Type	Requirements
Hardware	The IPTV system is designed to be deployed on a virtual infrastructure. The service requires a number of virtual machines (VMs) to be running at any point in time, in order to capture, record, transcode, annotate, and stream the media. There are also VMs to collect user statistics, run the front-end, and manage the deployment environment using balance loading techniques. From our initial deployment, the requirements were for around 40 VMs to be running for the above tasks, and for 7TB for data storage. This allows us to cater to at least 100 concurrent user sessions, and a content lifecycle of more than 3 weeks spanning 30 TV and 20 radio channels.
Software	Content is recorded as MPEG2 TS, which is then transcoded into H.264/AAC format. The common platform for the VMs is Ubuntu Server 13.04. The services that run on top of that include software such as Apache server, MySQL DBMS, Neo4j graph database, and WOWZA as well as a number of bespoke tools built in-house. The front-end is a responsive HTML5 interface that hosts an instance of JWPlayer for video playback, which renders the content at resolution 720x576. Playback of both live and VoD content through this interface is instant, with users expecting no more than 2 seconds before playback commences.
Miscellaneous	The system should provide universally easy access to users regardless of their device or locality (as long as it is within the boundaries of licensed content). For this, the web is to be used as a unified service delivery platform. The web interface is of a responsive design that inherently adapts to different device capabilities. Other state of the art web technologies will also be employed to ensure an engaging user experience; i.e. the system should be competing in terms of engaging with its user base as much as production grade systems. In other words, the system should be enjoyable to the user, with unquestionable added value.

3 - CONTENT SOURCES

This paragraph indicates the various sources content used for the testing of the WP2 scenarios.

- Scenario 1: Rich Content
 - FOK uses audio/video content supplied by RBB.
 - IAIS uses audio/video content supplied by RBB.

- Scenario 2: Multi-Screen Experience
 - IRT/RBB uses audio/video content supplied by RBB.
 - IAIS uses audio/video content supplied by RBB.

- Scenario 3: Search and Discovery
 - TRDF uses commercial VOD catalogues from French VOD providers, Imineo and Univers Cine.

- Scenario 4: Personalised Media
 - BBC/ULANC uses audio/video content supplied by UK broadcasters under the terms of the Education Recording Agency (ERA) license.

4 - CONCLUSION

The above scenarios will be tested at various experimentations sites as outlined in the descriptions. The scenarios will continue to evolve, based on feedback from the various experimentation sites in WP7 and from external expert feedback gathered in WP5. New User Stories generated by user feedback will be incorporated into relevant existing scenarios and will be included in the second testing cycle in FI-CONTENT 2.

REFERENCES

- [1] Wikipedia, "Functional requirement," [Online]. Available:
http://en.wikipedia.org/wiki/Functional_requirement. [Accessed 22 07 2013].

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