



Television Linked To The Web

Building the future of television

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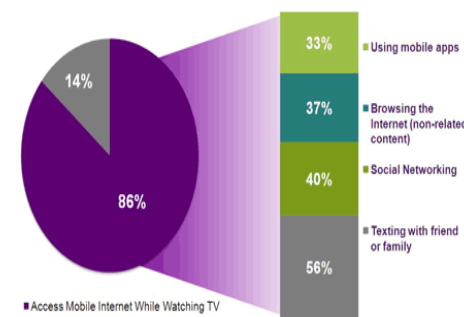
www.linkedtv.eu

The LinkedTV vision

- Less-than-Smart TV?
 - More and more devices are Internet connected and used for consuming audiovisual material from both broadcast and IP channels
 - Fragmented application markets and a separated Web browsing experience; online content is OTT and unrelated to the current A/V program
- Web and TV exist in parallel
 - 86% of TV viewers surfing the Web at the same time (Yahoo!, USA)
 - First manual efforts to link TV program to additional content (Shazam, IntoNow)
- **LinkedTV: interweaving Web and TV into a single experience**



Typical Mobile Internet Activities While Watching TV



- The innovation is to enable a (semi-)automated interweaving of the TV program and the Web content at a fine granularity (linking to specific objects and scenes in the video)
 - Lower the cost of preparing seed video for enrichment with other content
 - Leverage the Web of Data and the ubiquity of online media
 - Offer intuitive interaction modalities to browse the enrichment content
 - Personalise the enrichment according to the users interests and activity
 - Provide an online platform for the end to end LinkedTV workflow
 - Playout of enriched video on multiple devices and cross-device
- Based on open Web and common TV specifications and standards, e.g.:
 - Semantic Web / Linked Open Data (LOD). Web-based model for describing concepts. Uses RDF as data model and different vocabularies (e.g. DBPedia)
 - HTML5 for cross-device Web application development
 - HbbTV is an Europe-wide specification for hybrid broadband-broadcast services on TVs and Set Top Boxes (STBs)

Scenarios

Scenario 1: Interactive News Show

- Professional news content produced by RBB
- Seed content: local news show "rbb Aktuell"



Scenario 2: Hyperlinked Documentary

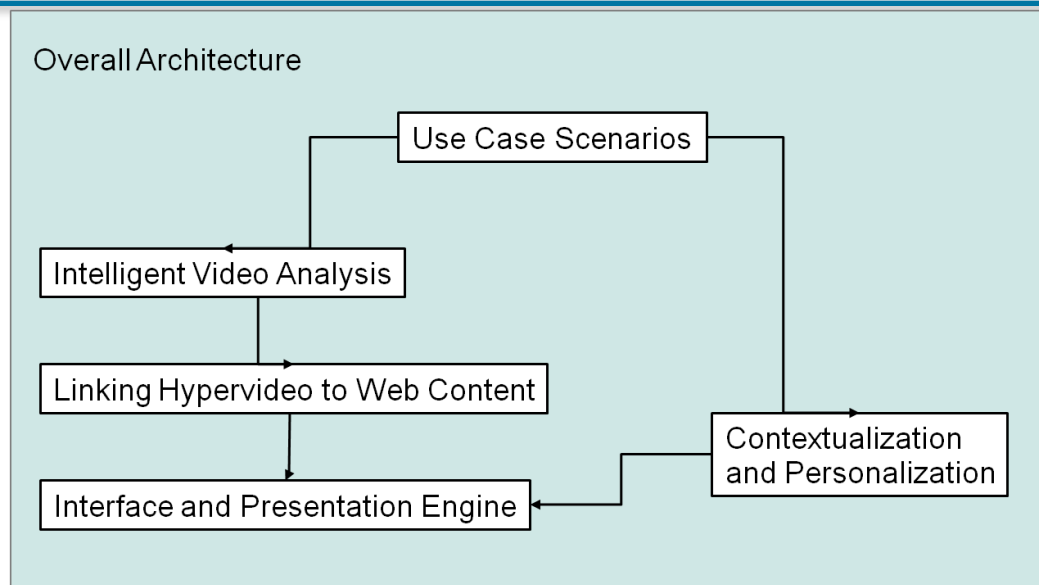
- Cultural content from S&V (1700 hours of cultural heritage AV-content under CCL)
- Seed content: "Antique Roadshow"



Scenario 3: Media Arts

- Content and Performance by NUMEDIART Institute for New Media Art Technology
- Mons: European Capital of Culture 2015.





- Analysing audiovisual content to extract fragments & concepts
- Annotating audiovisual fragments with Linked Data and (semi-) automatically linking to Web content („enrichment“)
- Providing an interactive video experience for the user to browse the enrichment of the audiovisual content
- Personalising that experience

WP1 – Intelligent Video Analysis

- Decomposing video into scenes, shots, segments
- Identifying objects of interest in video
- Classifying those objects (linking them to a type)
- Performing ASR on multiple languages
- Creating combined analysis results from different modality analysis algorithms



Pre-processed image from repository.

Concept detection

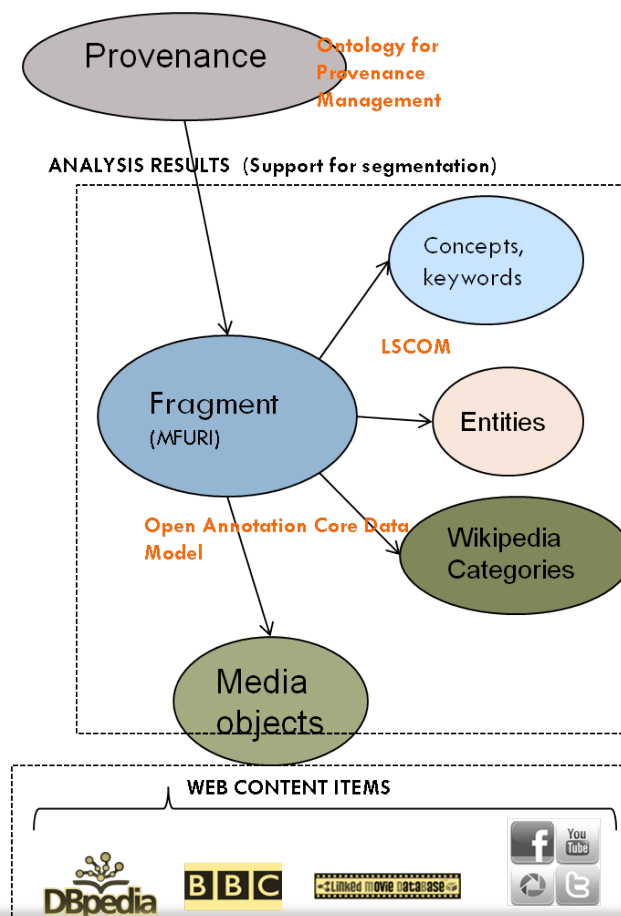
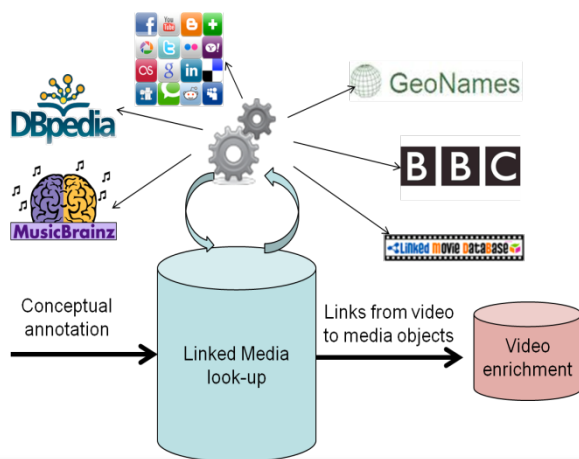
☒ Concepts semantically related to the considered events ☐ Additional concepts

☒ show top 10 ☐ show top 20 ☐ show all

Religious_Building	100%
Person	100%
Outdoor	100%
Building	100%
Furniture	100%
Body_Parts	100%
News	100%
Adult	100%
Windows	100%
Apartment_Complex	100%

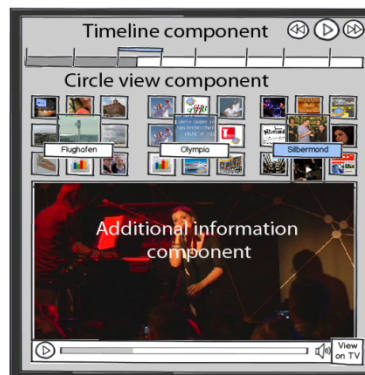
WP2 – Linking hypervideo to Web content

- Specifying how to refer to video fragments
- Specifying the semantic annotation of media resources in LinkedTV
- Defining the use of Linked Data vocabularies in the identification of concepts in the annotations
- Implementing Named Entity Recognition (NER) over video/language analysis results
- Defining a Web mining approach to generate links from video fragments to related Web content via shared conceptual annotations



WP3 – Interface and Presentation Engine

- Mock-up multiple User Interface options
- Develop proof-of-concept presentation layer in the LinkedTV player
- Specify the requirements on the first implementation of the presentation layer based on the User Interface mock-ups

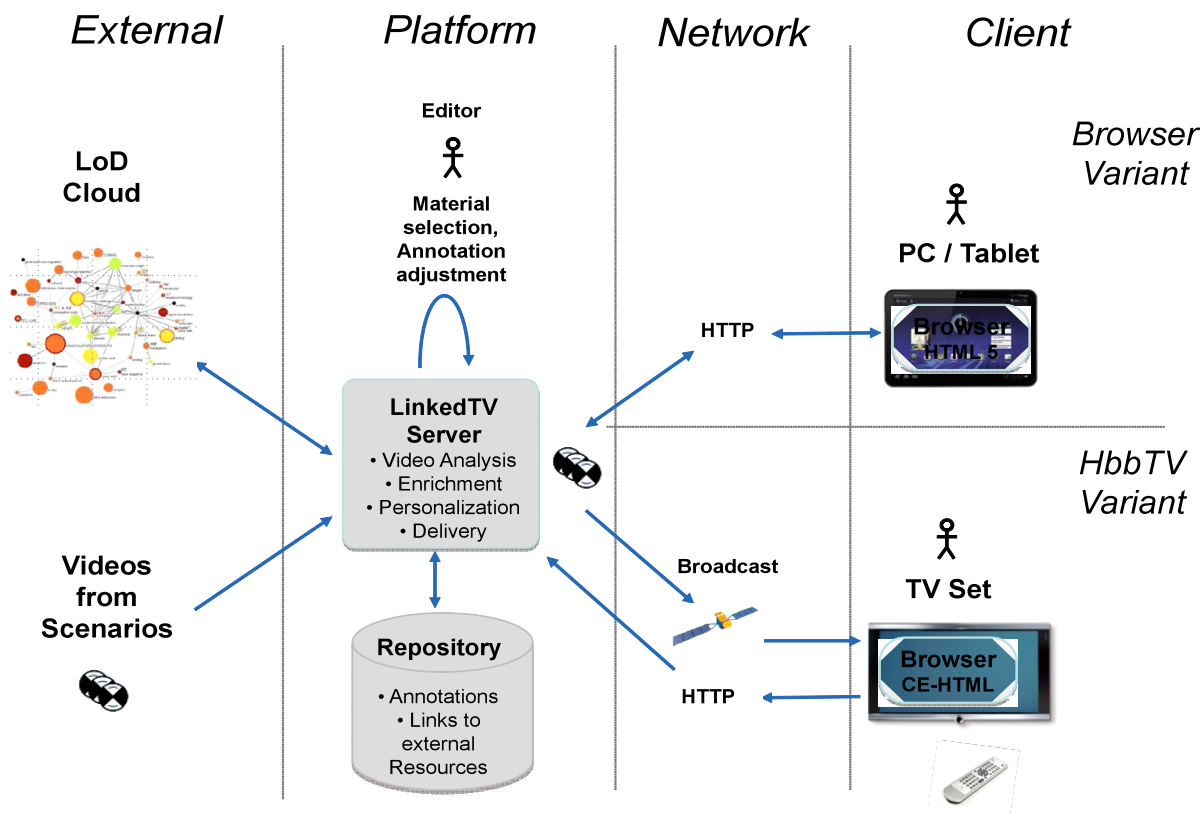


WP4 - Personalisation

- Specification of a User Model (Ontology)
- Definition of techniques to capture and evolve a user model
- Specification of the concept and content filter



WP5 – the LinkedTV platform & player



A clearly defined and modularized **platform** architecture, deployment decisions made, initial REST API

An interactive **video player** based on Web specifications (HTML5) realising intuitive interaction & enrichment layers