



Television Linked To The Web

CWI

Building the future of television

Lynda Hardman
Centrum Wiskunde & Informatica

www.linkedtv.eu

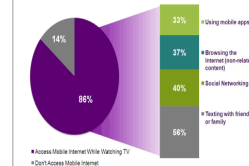
The LinkedTV vision



- Web and TV exist in parallel
 - 86% of TV viewers surf the Web at the same time (Yahoo!, USA)
 - 88% of USA consumers use mobile as second screen (Business Insider, May 2013)
 - Manual efforts to link TV program to additional content (Shazam, IntoNow)
- **LinkedTV: interweaving Web and TV into a single experience**
- Mixing lean back and lean forward
 - Want to maintain immersion while removing fourth wall illusion
 - Works only for certain genres and audiences
 - Does second screen help or hinder?



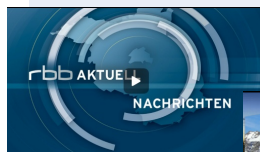
Typical Mobile Internet Activities While Watching TV



Scenarios and content

Enriched News

- Professional news content produced by RBB for general audience
- local news show *rbb Aktuell*
- People, locations and events can be linked to previous events.



Antiques Edutainment

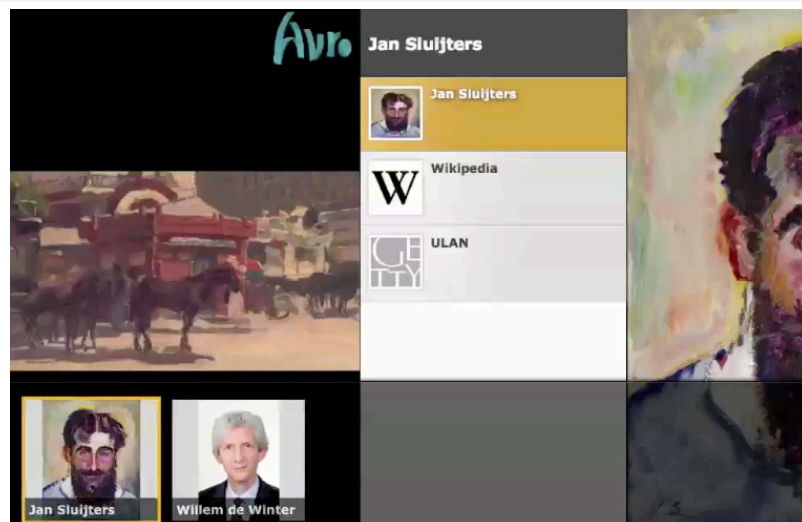
- Program watched predominantly by 50+ers
- AVRO: *Tussen Kunst en Kitsch*
- Presenters, locations and objects provide hooks to related materials.



3

linkedtv.eu

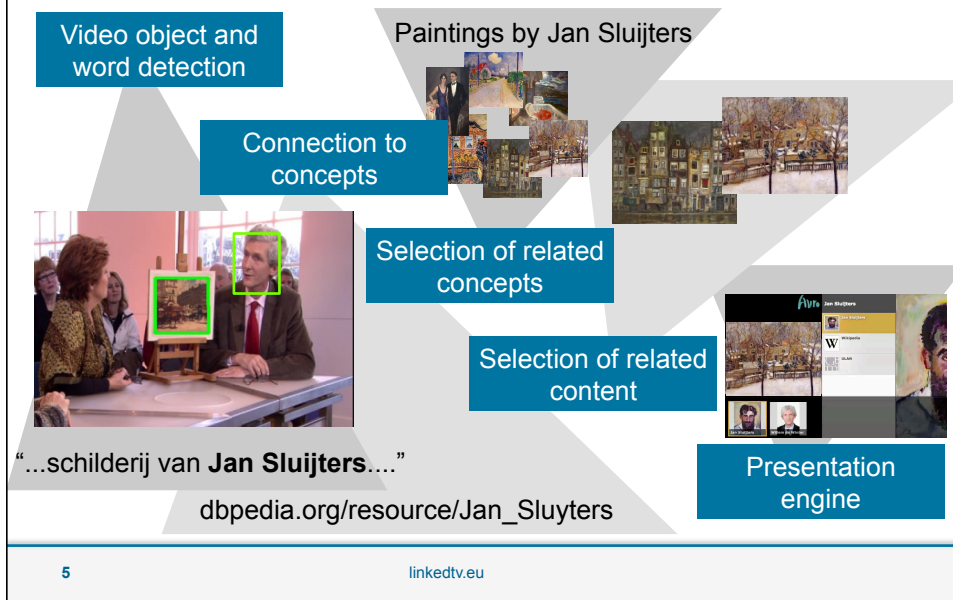
Enriched link demonstration



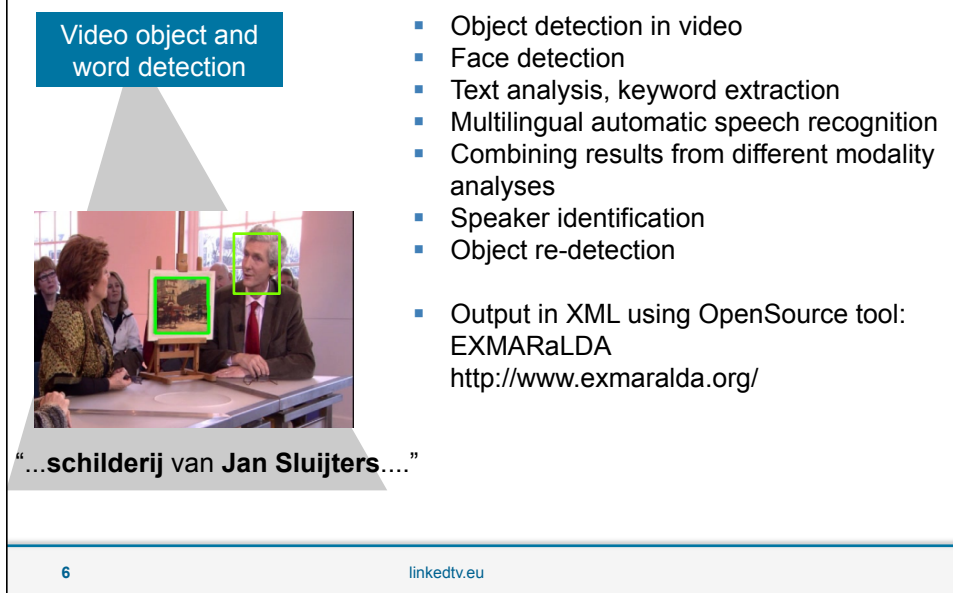
4

linkedtv.eu

How will it work?



Concept Detection



Video object and word detection

- Object detection in video
- Face detection
- Text analysis, keyword extraction
- Multilingual automatic speech recognition
- Combining results from different modality analyses
- Speaker identification
- Object re-detection
- Output in XML using OpenSource tool: EXMARaLDA
<http://www.exmaralda.org/>

“...schilderij van Jan Sluijters...”

6

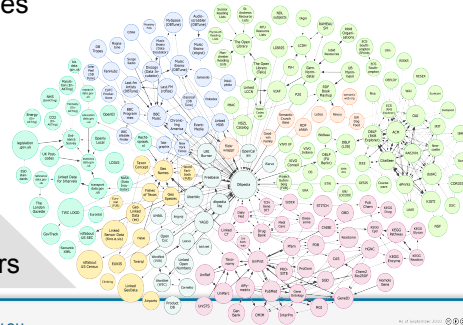
linkedtv.eu

Concept connections

Connection to
concepts

- Annotations represented in RDF stored in LinkedTV platform
- Use existing vocabularies e.g. schema.org, NERD, LSCOM, DBpedia
- Named Entity Recognition using statistical & knowledge-based approaches
- Enrichment based on textual and visual analyses

dbpedia.org/resource/Jan_Sluyters



7

linkedtv.eu

10-10-2010 10:00:00

LinkedTV metadata conversion

TV Metadata Generator

Automatic conversion of television content metadata into RDF.

<http://linkedtv.eurecom.fr/metadata/>



Instructions

- Select Video Resource
- Choose Metadata Files
- RDF Generation
- Upload Results to Triplestore
- Queries over the RDF Data

1. Introduction

Here we present the tool "TV Metadata Generator", developed by Eurecom under the scope of the European Project [LinkedTV FP7](#). In a nutshell, this application takes a video and its corresponding metadata files, available in different formats, and produces a RDF representation of the whole information. The knowledge graph obtained as result is suitable to be interlinked with other data in the Web, and allow the execution of complex queries that can bring the viewers a new way of enjoy Television.

8

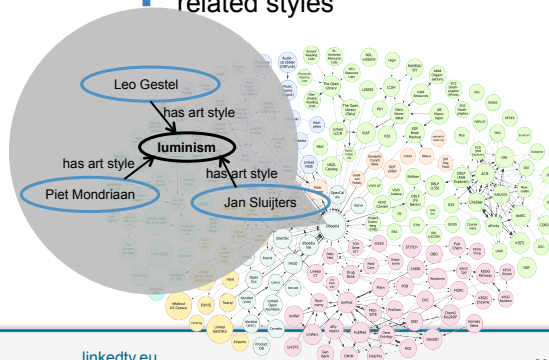
linkedtv.eu

Concept selection

Paintings by Jan Sluijters



Selection of related concepts



- Additional information, e.g.
 - biography of artist
 - style of painting
- Related information, e.g.
 - artists from same period
 - paintings in similar style
 - related styles

9

linkedtv.eu

Content selection



Selection of related content

- Selection based on context of scene, e.g. system knows which topics appear next
- User preferences, e.g. closely related information to uninteresting topic is less useful
- We need to understand user information needs (per genre), e.g. don't miss important news because of personalisation
- Broadcasters don't want users to drift away from program

10

linkedtv.eu

Example user information needs for news



- **MORE IN DEPTH SPECIFIC INFORMATION**
I was wondering just how expensive it is to make all those vaccines, you know? I was just wondering if it is a good idea to even make a lot of it or how hard it is to make.
- **LOCAL EFFECT OF GLOBAL NEWS – What is the impact in my life?**
Yes then I would look it up, what is the effect in the Netherlands... (of the bird flu virus)
- **OVERVIEW OF PAST RELATED EVENTS**
*My search would be something like "South Korea state of war ramp up" (...)
I would like to know, what happened two years ago and how they solved it...*

11

linkedtv.eu

User information needs for news



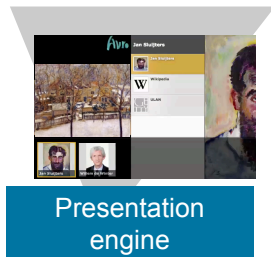
- Information about how the story ends
- Updates when important changes occur
- More information about the people involved
- Where is that location?
- Consult related publications and documentaries
- Opinions from different experts
- Access related info selected by experts and suggested by broadcasters

12

linkedtv.eu

Content display

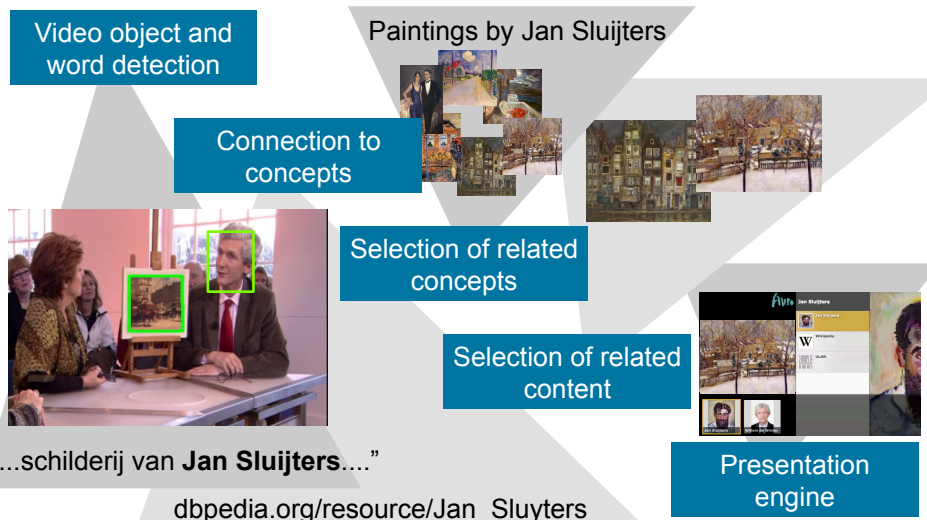
- Many users watch TV news during dinner!
- Use second screen to
 - give user more control
 - retain sense of immersion via TV screen
- Need to resolve issues of pausing when in group situation
- There is no single best solution



13

linkedtv.eu

How will it work?



14

linkedtv.eu

How can LinkedTV help you?



Consulting
&
Teaching

LinkedTV
Consulting

Application of
Results in
Teaching

Application

Applications for
Broadcasters

Application for
Content Providers
& Archives

Other
Application
Areas

Platform

LinkedTV
Platform

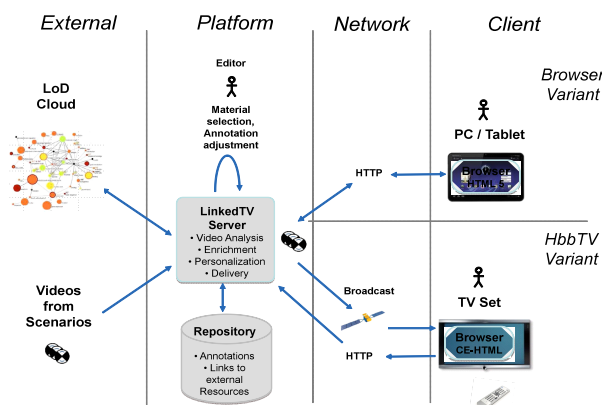


Second
Screen

15

linkedtv.eu

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

16

linkedtv.eu



LinkedTV in 2013



- Individual video analysis, annotation, hyperlinking, UI/UX design and personalisation components integrated into a LinkedTV platform with end-to-end content workflow
- Provide player for desktop, TV and second screen
- Create interactive scenarios (*rbbAktuell* and *Tussen Kunst en Kitsch*) to engage with users to further understand their interaction and information needs

