

## 2. Publishable summary

NoTube  
Making Television More Personal

*An EU project focusing on TV content as a medium for personalized interaction*

IP 231761

Information: <http://www.notube.tv>



### Objectives

The ultimate goal of NoTube is to develop an adaptive end-to-end architecture, based on semantic technologies, for personalized creation, distribution and consumption of TV content. The project takes a user-centric approach to investigate fundamental aspects of consumers' content-customization needs, interaction requirements and entertainment wishes, which will shape the future of the "TV" in all its new forms.

Salient features of NoTube are:

- NoTube demonstrates a new generation of Web services for context dependent and personalized selection and presentation of TV content.
- NoTube shifts digital entertainment from a single-TV viewer activity to a community-based experience by sharing preferences.
- NoTube realizes distributed personalization in an interactive and multi-device environment, enabling anywhere and anytime TV entertainment with the ubiquitous Web.

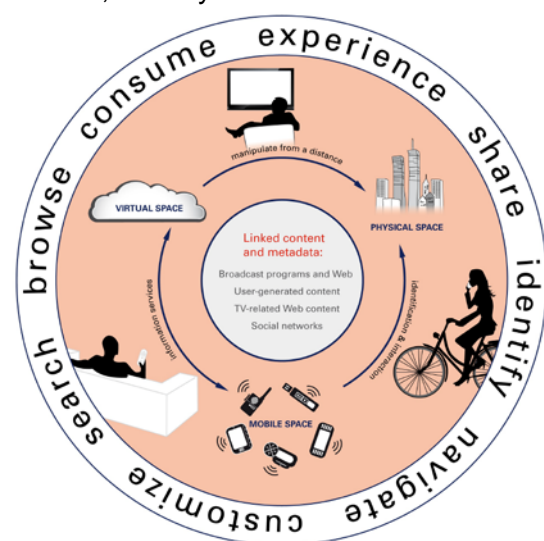
The work in the project is steered by three visionary use cases, namely:

1. Personalized semantic news
2. Personalized TV guide with adaptive advertising;
3. Internet TV in the Social Web.

The NoTube platform will be a Semantic Web infrastructure providing integrated content from broadcast, Web channels and social networks, as well as integrated functionality for Web service-based metadata exchange, user and context modeling, and personalized presentation generation

NoTube is targeted at three user groups:

1. *viewers* - to gain control over TV entertainment where classical mass media broadcasting techniques change through users' Social Web engagement



2. *content providers* – to provide novel information integration in a combined TV-Internet environment for personalized content delivery
3. *advertisers* – to provide contextualized and personalized television-based narrowcasting

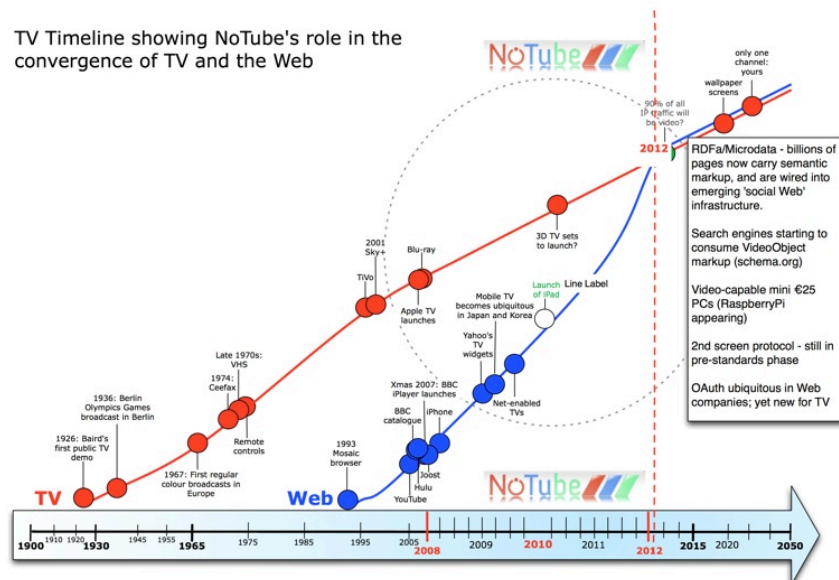
### Progress in Year 3

The project has gone in year 3 through its third (of three) cycles of demonstrator development. Particular foci of this third cycle were:

- Improving the double screen experience in use cases
- Develop web services based on the results of the projects, thus ensuring sustainability
- Working on use-case independence and sustainability

### NoTube and the TV World

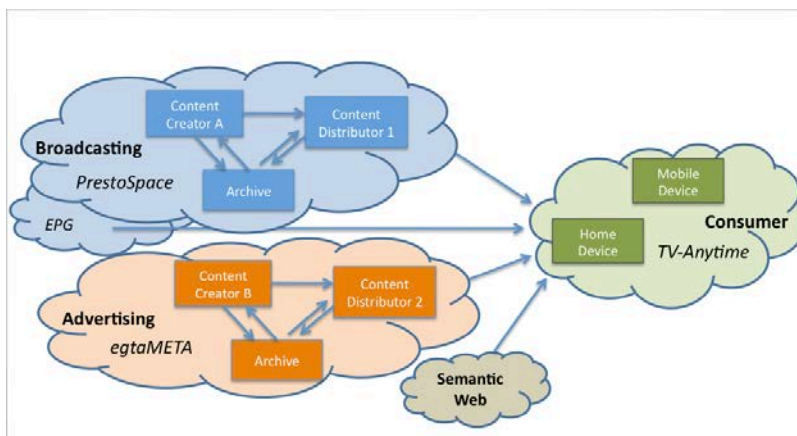
NoTube was visionary in the TV world. The diagram below shows convergence of Web and TV in the lifetime of NoTube. The project adequately predicted this development and developed the services to support it.



### TV metadata

The project selected TV-Anytime<sup>1</sup> as the baseline format for TV metadata. Broadcasters use in practice many different formats and TV-Anytime appears to provide the best format for partial alignment of metadata. Services are developed to enable this. This makes joint presentation of metadata from different channels possible in NoTube demonstrators.

<sup>1</sup> <http://www.tv-anytime.org/>



We also developed services for real-time gathering of TV metadata from various sources, such as published listings<sup>2</sup>. The services can deliver output in JSON and RDF format. With these services the demonstrators can access metadata of hundreds of channels in a variety of languages.

### **Metadata semantics**

NoTube provides several services interpreting TV metadata:

- Relevant *vocabularies* have been identified and made available through a standard web service in a Linked Open Data fashion. These vocabularies include WordNets in different languages (English, French, Dutch, soon also Korean), a range of TV-program genre typologies, DBpedia, Freebase, the BBC Programme Ontology<sup>3</sup> and geographical vocabularies.
- *Vocabulary alignments* have been identified and, where needed, developed, between key vocabularies. For genre typologies (e.g. BBC, IMDB, DVB-SI, Dutch, Turkish, Korean) have been aligned with the TV-Anytime genre typology. Alignments between WordNets are used to make multilingualism possible. Most of these alignments were already available, but, where needed by the demonstrators, we also constructed some within the project (e.g. the genre alignments), with the intention to make this also available as linked open data for outsiders to use.
- *Metadata enrichment* services have been developed to enrich TV metadata with web links (URLs) of concepts in one of the vocabularies. An example of such a service is LUPEDIA<sup>4</sup>, which extracts terms that can be linked to DBpPedia concepts. We also provide services for enriching TV video data with advertisements.

### **User profiling and recommendation**

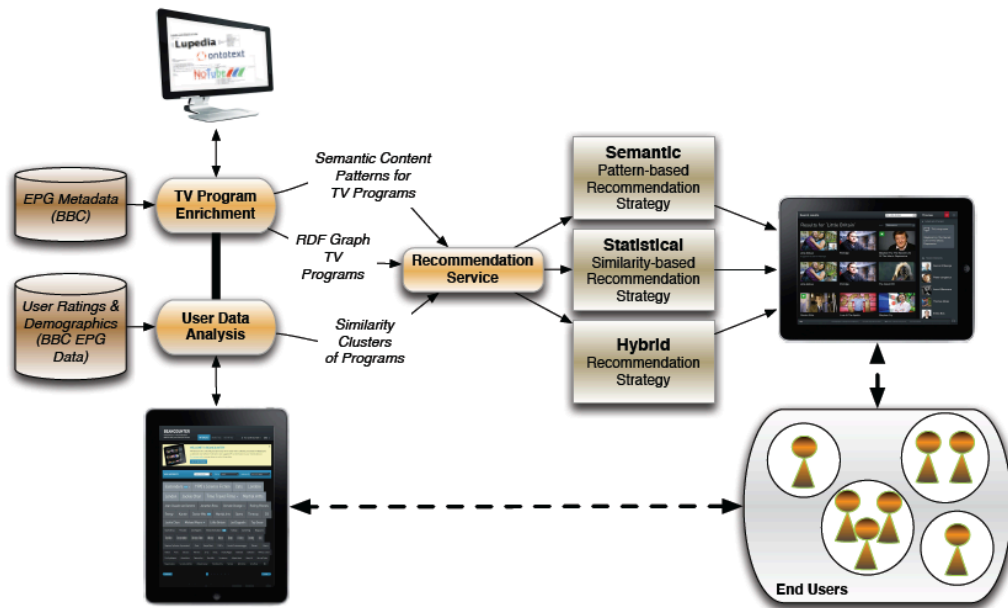
User profiling and recommendation services lie at the heart of NoTube. These services use the metadata and the semantics to interpret user activity data (e.g. viewing of TV programs, rating programs). Within this work we have adopted an activity stream schema based on existing proposals<sup>5</sup>. The main service developed during the first year was the “Beancounter” which reads activity data and produces user preferences in terms of the concepts from the vocabularies. During the second we developed methods to use these user data (and the enriched metadata) to provide several types of recommendations, both “regular” and serendipitous recommendations.

<sup>2</sup> <http://services.notube.tv/epg/datawarehouse.php>

<sup>3</sup> <http://www.bbc.co.uk/ontologies/programmes/>

<sup>4</sup> <http://lupedia.ontotext.com/>

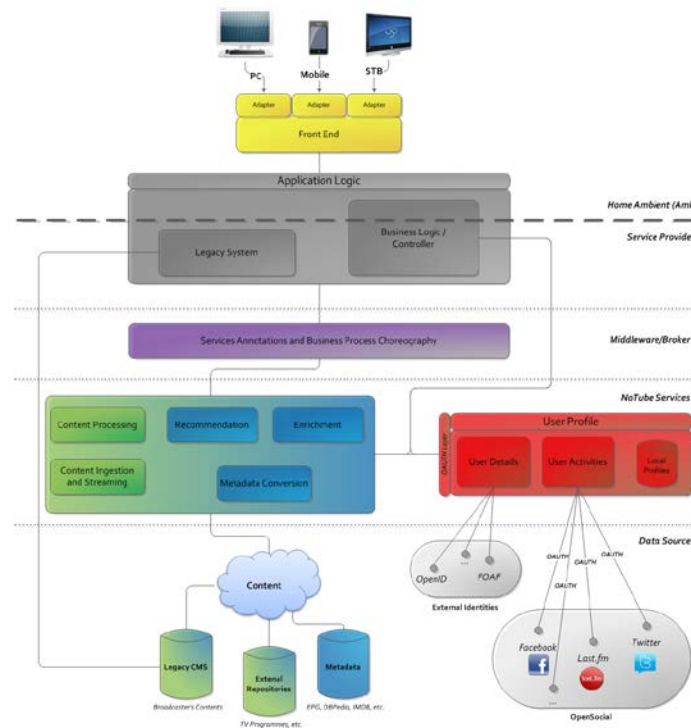
<sup>5</sup> <http://wiki.activystrea.ms/>



This work takes also into account the integration of user data from a social network (with the required trusted access policies). The NoTube user model is based on FOAF<sup>6</sup> and takes developments in the area of the OpenSocial API<sup>7</sup> into account.

### Service architecture

An open architecture based on (Web) services is the core of NoTube. The repository of NoTube services has been mature in the third year. The figure below gives an overview of the NoTube service architecture.



NoTube service architecture

<sup>6</sup> <http://www.foaf-project.org/>

<sup>7</sup> <http://wiki.opensocial.org/>

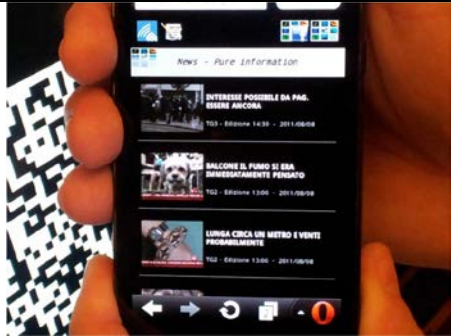

Major features in the NoTube service architecture are:

- *User, Metadata and Content oriented services:* the complete content selection, adaptation and delivery process from content provider to home ambient is supported.
- *Service brokering:* Automated configuration of services based on explicit semantic descriptions of the services, which are gathered in the repository.
- *Multiple devices:* Functionality of NoTube should not be limited to single devices. The demonstrators run on a TV with a setup box, on computers and on mobile devices, as well as combinations of these (e.g. mobile device as remote control showing recommendations). For example, the SocialTV demonstrator (see further) contains now a second-screen demonstrator.
- *Specific video/audio services:* The project developed some specific video and audio services that were deemed important in the NoTube context. The screenshot below shows the Thomson ad-insertion service. This service was extensively evaluated in year 3 of the project. Also, IRT has developed a loudness-harmonization service to cope with problems in an environment where media are collected from heterogeneous sources.



### NoTube Demonstrators

The table below contains screen shots of the third stage of demonstrator development, with a short commentary.

<p><i>Personalized News</i></p> <p>This demonstrator shows how news programs can be enriched with concepts (people, places, themes) that allow easy browsing to additional information.</p>	
<p><i>IFanzy - Personalized TV Guide</i></p> <p>The IFanzy demonstrator enables a user to build in a simple fashion a profile that can be used to make recommendations. IFanzy is shown here with the Turkish front end</p>	

### TV and the Social Web

This demonstrator aims to show how TV can be linked to your own or you friend's social-web data, such as bookmarks and Facebook profiles.

