Scenarios for HBB

– What NoTube can bring to HbbTV (and Co.) –

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Introduction

NoTube was a recently finalised research project in the area of the convergence of Web and TV [1]. The project aimed at demonstrating how Semantic Web technologies can be used to connect TV content with the Web. New types of applications could semantically annotate TV programmes and match them automatically with individual user profiles.

Obviously, NoTube shares common objectives with HbbTV, but following previous investigations a realisation of the NoTube scenarios by using HbbTV 1.1 as technical platform is somewhat limited [2]. So, the NoTube consortium would like to contribute its experiences and visions to future specifications of HbbTV and also to other projects dealing with Hybrid Broadcast Broadband (HBB) or Connected TV applications.

The NoTube usage scenarios and derived technical requirements are presented in this document. It consists of detailed descriptions of the three NoTube use cases. They are presented together with current limitations discovered in HbbTV 1.1 and provide information about used functionalities, APIs, functional requirements and related technical proposals and motivations.

About NoTube

NoTube was a three-year EU-funded research project about the future of TV based on use cases around personalisation and social networking. The project started in February 2009 and was conducted by an international consortium (see list of partners in the Annex I on p. 8). As part of the wider trend of TV and Web convergence, the project aimed to demonstrate how Semantic Web technologies can be used as a tool to connect TV content and the Web through Linked Open Data. By specifying protocols and APIs to support a variety of realistic user scenarios for experiencing future TV, NoTube offers a novel contribution to the TV media world. [1]

Semantic technologies are a field of standards and technologies which allow a machine to process and understand digital content. These functions can be used, in turn, to create more intelligent, responsive and personalised applications. In NoTube, these technologies are applied for two main purposes:

- Semantic annotation:
  In the media and television area semantic annotations can enable new types of applications which know and do anticipate what users want, so that more intelligent services can be built.

- Recommendations based on user interests from the Social Web:
  Knowledge extractable from a person's TV viewing activity and Social Web presence (on Twitter, Facebook etc.) can enable a semantic application to implicitly determine their interests, and match them to TV programmes.

The work in the project was steered by the following three use cases:

- Personalised semantic news
- Personalised TV guide with adaptive advertising
- TV and the social web

In the following the usage scenario of each use case are described in more detail including functionalities and APIs used as well as an analysis of the current limitations in HbbTV 1.1. Furthermore, technical requirements to HbbTV are listed together with technical proposals including motivations.

Personalised semantic news

This use case targets the delivery of personalised news services. Guided mainly by speech-to-text analysis, news programmes are segmented into news items and enriched by text metadata relating to names, places, topics, or generic concepts. These are matched to, and filtered by, user preferences and delivered via alerts (in the case of breaking news), via an automatically generated local news channel or by user-initiated search.

The objective of this use case is to verify the actual feasibility of a system for the creation and the delivery of a set of local personalised news services based on the repurposing and enrichment of news item material already transmitted over generic broadcast streams (including prototypes and demonstrators).

Used functionalities/APIs

- Integration of Facebook-API to
  - send/receive news item recommendations to/from Facebook contacts
  - post and comment news items on the Facebook "wall"
  - chat with Facebook contacts
- Pairing of 2nd Screen Devices with the main device using QR codes
- Connection of 2nd Screen Devices with the main device using local networks (Wi-Fi)
- Usage of several 2nd Screen Devices that are paired with the same main device to allow exchange of recommendations between the 2nd Screen Devices

Current limitations in HbbTV 1.1

Within a broadcast service, the personalisation of news could be realised with HbbTV by using cookies on the TV set or the STB. These cookies can store user profiles or user identifications. For example, an HbbTV application could suggest news items which are provided via the web pages of a programme provider, following previous selections (i.e. viewing habits) or user preferences. Nevertheless, the regular linear broadcast programme would be the entry point for such an application.

HbbTV 1.1 does not encompass a concept to share user preferences on a terminal level, but it is possible to share user IDs and preferences among cooperating service providers. What is called a broadcast related HbbTV application is always part of a broadcast service or of multiple broadcast services provided by cooperating broadcasters, but it is not a terminal application. Terminal applications may be implemented using the same browser and APIs, but this is outside of the HbbTV specification.

Another possible solution for the personalisation of broadcast content could, in principle, be realised by making use of the PVR functionalities provided by HbbTV. HbbTV allows to add a broadcast event to the terminal's timer list and to play recordings which have been initiated by the application

provider. However, a fine-grained reassembling of previously broadcasted news items to form a personalised news show as it is foreseen in NoTube is hard to realise. This is due to the fact that start and end points of a recording are usually not identified at frame level and that they depend on the PVR implementation of the device. Nevertheless, a personalisation of recordings on a coarser level, e.g. 45-mins documentaries, is imaginable.

Functional requirements to HbbTV

A functionality that allows personalisation on the terminal level would be very useful for this use case. In addition, a PVR functionality that allows fine-grained recordings of programme extracts would be useful to reduce the streaming of content from content providers via the Web.

Technical proposals and motivation

Further details (including a demo video) about this usage scenario and the prototype realised within the project can be found at [3].

Personalised TV guide with adaptive advertising

This use case focuses on personalised EPG services and advertising, adapted to context (such as time and location) and the control interface of different devices.

The objectives of this use case are:

- Design and implementation of a multilingual Personalised Programme Guide (PPG) across multiple devices (Web, mobile devices, connected TV and STB)
- Personal ad placement based on user profiling and state-of-the-art metadata classification
- Development of a clear advertisement model for personalised ads
- Support for multiple languages including translation of EPG metadata
- Providing users with multiple modes of interfacing with a system, for example, combining a visual modality (e. g. display and keyboard) with voice modality (e. g. speech for input)

Used functionalities/APIs

The libraries from iFanzy [4], which is the product used in this scenario, are only used on the back-end server and should thus not be of concern to the HbbTV specification. The iFanzy server only sends data the STB needs to display (it can even run in a simple STB browser).

For the automatic insertion of ads, additional information is needed for the placement of these ads picture-in-picture. This information can be based on an automatic sequence of interest detection as it is developed and applied in NoTube [5].

Current limitations in HbbTV 1.1

A personalised TV guide could be realised in HbbTV. Applications can store information on devices by means of cookies. The application can either store the profile information itself in the cookie or just a user identifier with the actual user profile being stored on the server side. However, some constraints apply:

- As on the Internet, cookies are always tied to an Internet domain, i.e. a personalised TV guide in HbbTV would be limited to the programme of one service provider or a cooperation

of service providers (e.g. the ARD bouquet), but would generally not work across several services of non-cooperating service providers.

- Further personalisation considering an individual personal profile is only possible using IDs that need to be exchanged between the HbbTV application on the end users' devices and the user profiles which are created and managed by the users via the provider's web application. The IDs need to be manually entered in the HbbTV application to link the application with the profile.

Personalised ads or even programme trailers could be presented to the users in commercial breaks or other programme slots of the linear programme. This can be realised using the AIT[1] information within the DVB Transport Stream to signal and start an HbbTV application with adapted ads and/or trailers during the break. At the end of the slot, the application would continue to play the linear broadcast stream and terminate itself. However, the personalisation of ads (and also trailers) would be limited to the available profile information related to one broadcast service or to the services of cooperating service providers.

Cross-service TV guides could also be provided by manufacturer portals or gateways, e.g. EPGs derived from DVB-SI data together with enriched data from the Web. However, in broadcast-only usage, HbbTV allows only access to the EIT[2] "present/following" information, so the recommendations would be limited to the present and the following programmes.

Functional requirements to HbbTV
A second tuner would be useful for being able to record a different program as the one currently being watched. In addition, support of other means to authenticate users than a textual login could be of interest to HbbTV (e.g. connecting to an RFID reader or Kinect with face recognition).

Technical proposals and motivation
Dedicated metadata would be useful for automatic insertion of advertisement spots, additional information or other textual or graphical information in a video overlay or on 2nd Screen Devices (automatically generated temporal and spatial metadata to describe "Sequences of Non-Interest", see [5]).

TV and the Social Web
This use case is about technologies that can help people interact with each other while watching TV – whether with people on the Web or in the same room. It aims to demonstrate APIs for linking the Social Web with broadcast and on-demand television by using linked data from broadcasters, audiences and across the Web, to help make social content navigation applications and active TV communities.

The main motivation behind the scenarios below is that people are already commonly using second screens (phones, tablets, laptops) to interact with others on the social web while watching TV concerning the TV shows themselves. These devices are not connected to the TV device itself, and this limits their functionality. Nevertheless, the social web has become a strong source of real-time information about TV shows in several countries, and there is a great deal of potential in allowing

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[1] Application Information Table
[2] Event Information Table

Web developers access to this data to make applications that benefit the consumer, content owners and manufacturers.

Used functionalities/APIs
- 2nd Screen API (for more information, see [6])
- Social Media API (for more information, see [7])
- Profile Management (for more information, see [8])
- "Beancounter" ("Cross Service Profile Aggregator") (for more information, see [9])
- Programme Recommendations (for more information, see [10])

Current limitations in HbbTV 1.1
HbbTV allows providing social functionalities in the sense that, for example, links are provided to web pages where programme related discussions take place. Today, broadcasters support communities of specific TV programmes (e. g. of soap operas) by providing a pertinent web portal. HbbTV provides a platform to access such portals directly from the TV, e. g. while a show is on air.

Of course, broadcast independent applications can be used to provide HbbTV versions of popular websites like Facebook, Twitter, etc on TV. However, as already mentioned, access to broadcast resources via third party applications, which are not controlled by the device manufacturer or by a broadcaster, is limited to tuning to a TV service.

Technical proposals and motivation
The following two scenarios result from BBC's work in this area:

- Allow developers to create web-based applications on secondary devices that can interact with the HbbTV device, for example by adding a simple http-API to the main functionalities of the device (play, pause, change channel, now playing), with short, simple, freely available, public documentation. An example specification for this is given in [11].
- Allow the viewer to use their preferred device to communicate on social media sites about what they are watching on TV, for example by providing a unique, discoverable, HTTP URL for any currently playing item on the HbbTV device, resolving to a human-readable page. An example specification is the BBC's Universal Control API [12] combined with TVDNS [13]. Instead of TVDNS, HTTP URLs could be provided within the EIT data.

Acknowledgements

References

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