NoTube

Networks and ontologies for the transformation and unification of broadcasting and the Internet

FP7 – 231761

D7a.2 Personalized News
Platform prototype v1

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EXECUTIVE SUMMARY

This document presents the first implementation stage of the Personalized Semantic News use case and is a paper companion to the software prototype D7a.2 Personalized News Platform prototype v1.

In this deliverable all issues are faced from a technical point of view rather than from a logical point of view, leaving the last one to the deliverable D7a.1 “Personalized News Services Specifications”.

This document describes reference scenarios for the Personalized News Platform prototype making reference to parts of the sample scenarios presented in D7a.1 which are the actual use cases that have been implemented in this first release of the prototype. The technical implementation of the prototype is presented, with an overview of the integrated architecture and the description of implementation details on the main functional modules, namely Service Provider and Home Ambient (back end and front end).

The level of integration into this first prototype with services provided by other NoTube Work Packages is underlined, also making reference to the NoTube Integrated Platform described in D6.1a,b NoTube System Specifications and Architectural Design and D6.2 NoTube integrated System 1st prototype.

Some sequence diagrams referring to the current implementation in terms of software modules/actors introduces a guided walkthrough of the prototype with a step by step demo describing typical operations envisaged for the WP7.a first integrated prototype, with screenshots extracted from the running demonstrator.
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#### Abstract (for dissemination)

This document presents the first implementation stage of the Personalized Semantic News use case and is a paper companion to the software prototype D7a.2 Personalized News Platform prototype v1.

In this deliverable all issues are faced from a technical point of view rather than from a logical point of view, leaving the last one to the deliverable D7a.1 “Personalized News Services Specifications”. This document describes reference scenarios for the Personalized News Platform prototype making reference to parts of the sample scenarios presented in D7a.1 which are the actual use cases that have been implemented in this first release of the prototype. The technical implementation of the prototype is presented, with an overview of the integrated architecture and the description of implementation details on the main functional modules, namely Service Provider and Home Ambient (back end and front end). Some sequence diagrams referring to the current implementation in terms of software modules/actors introduces a guided walkthrough of the prototype with a step by step demo describing typical operations envisaged for the WP7.a first integrated prototype, with screenshots extracted from the running demonstrator.

#### Keywords

Personalized Semantic News, News Item, NIC, SOA, Rules, Integration, Beancounter
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<td>Audio Video</td>
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<td>ANTS</td>
<td>Automatic News Transcription System</td>
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<td>API</td>
<td>Application Programming Interface</td>
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<td>CRID</td>
<td>Content Reference Identifier</td>
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<td>DB</td>
<td>Data Base</td>
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<td>EBU</td>
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<td>eNIC</td>
<td>Enriched News Item Container</td>
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<td>EPG</td>
<td>Electronic Program Guide</td>
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<td>FOAF</td>
<td>Friend Of A Friend project</td>
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<td>GUI</td>
<td>Graphical User Interface</td>
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<td>HA</td>
<td>Home Ambient</td>
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<td>HMI</td>
<td>Human Machine Interface</td>
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<td>HTTPS</td>
<td>Hypertext Transfer Protocol over Secure Socket Layer</td>
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<td>lENIC</td>
<td>Locally Enriched News Item Container</td>
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<td>Main Stream Quality Content</td>
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<td>NIC</td>
<td>News Item Container</td>
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<td>On Air (program) IDentifier</td>
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<td>Windows Media Video</td>
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1. Introduction

1.1 Scope of this document

This document is a paper companion to the software prototype D7a.2 Personalized News Platform prototype v1.

The aim of this prototype is to demonstrate a system for the creation and distribution of a set of personalized news services that is able to:

- Acquire news items from generic broadcast streams
- Understand the meaning of video news items, based on criteria such as subject, location and time
- Take into account the physical context in which news items are going to be shown
- Apply criteria for matching the user profile with the available news items

The creation of personalized news services is performed in two steps:

- at service provider side, considering service provider editorial requirements and generic and not-confidential user profiling;
- at home ambient side, considering specific and personal tastes, locally defined preferences and device characteristics.

1.2 Document outline

In section 2, we briefly summarize the reference scenario for the Personalized News Platform prototype (fully described in D7a.1 Personalized News Services Definition) making reference to the actual use cases that have been implemented in this first release of the prototype.

In section 3, we present the technical implementation of the prototype: we introduce an overview of the integrated architecture, and we focus on the main functional modules, namely Service Provider, Home Ambient, and Front End. For reference purposes we also highlight the integration with services developed in other NoTube Work Packages, also making reference to the NoTube Integrated Platform described in D6.1a,b NoTube System Specifications and Architectural Design and D6.2 NoTube integrated System 1st prototype.

Section 4, is a guided walkthrough of the prototype. The reference use case is mapped onto a sequence diagram that shows the interaction of modules and services. A step by step demo is then presented.

2. Scenario and features

The scenarios considered for the first prototype are those referring to the main actors of this use case: the SP user and the HA user, where as HA user two kinds of actors are taken into account, the HA system user and the HA final user.

Regarding the SP user the exploited scenario is the one that allows a service provider operator to configure the service from the service provider point of view.

Here below is a sub-scenario extracted from the sample scenario presented in D7a.1:

“Andrea works for a well known Italian service provider, he has a lot of task to do during his working day and unfortunately many of them are quite boring.

The one he prefers, instead, is to interact with the NoTube system in order to put on it service provider’s guidelines related to services to be sent to subscribers. He can create new rules or just
Today Andrea has to set out new service provider’s requirements: his boss told him to choose the three main RAI channels as input channels for the Personalized News services, but to select only the main newscast editions from these channels.

Come on Andrea, let’s do this job! He uses his login credential to come into the NoTube world.

Starting from a number of different available broadcast streams he chooses RAI1, RAI2 and RAI3 channels to be used as initial input for the services, then among the selected broadcast streams he chooses TG1 newscasts of 1.30p.m and 8p.m, TG2 newscasts of 1p.m and 8.30p.m. and TG3 newscasts of 2.20p.m. and 7p.m. from which news items have to be extracted.

Now Andrea can logout from the NoTube platform, this job is done...but many other tasks are waiting for him!

After the service configuration is done by the operator the service creation and delivery to the final users is completely automatic”.

As to HA system user the exploited scenario is the one that allows a home ambient system operator to manage some settings about user registrations and/or preferences into a local HA.

Here below is a sub-scenario extracted from the sample scenario presented in D7a.1:

“Gabriella had configured the home environment allowing it to accept news about information technology: she used administrator login credential to come into the home environment configuration area and to make relevant settings”.

The exploited home ambient final user scenario is the one that allows a final user to enjoy the personalized My News Agency service. Referring to D7a.1 the target sub-scenario is the one in which the user is connected as Registered to a logical home ambient which "logically contains" the physical home ambient the user is operating in; the user is working in Immersed modality. As to the connection mode, the logon action is managed in manual way: the user executes an explicit login to the desired home ambient. Only one home ambient is available for this prototype.

Here below is a modified sub-scenario derived from the sample scenario presented in D7a.1:

“The day is so long when you have three children...all the family have dinner together and then quietness comes back, children are going to bed!

Mauro, exhausted, can relax on the sofa watching the personalized news program created specifically for him by the NoTube platform”.

3. Architecture

3.1 Overview

The first prototype (M13) implementation of the Personalized News Platform Use Case adheres to the high-level architecture design sketched in D6.1b, both for the SP (Service Provider) and the HA (Home Ambient).

For this reason it may be helpful in this overview section to refer to the planned SP architecture in order to better understand the real implementation in the first stage:
Fig. 1 – Service Provider general architecture

The SP is responsible of triggering the HA for incoming/scheduled Newscasts and packaging News Items in terms of metadata. The term “packaging” comprises input-oriented functionalities and item-oriented functionalities, and refers to different phases such as:

- Ingestion and Item Detection
- SP Item Enrichment.

Different sources are envisaged in the scenario: Web, broadcast and legacy (i.e.: proprietary broadcaster’s archives).

Moreover a service-oriented phase is then responsible of choosing News contents to be published (pre-filtering).

Similarly, the following picture recalls the HA architecture:
Reflecting the SP idea, we envisage here different functionality-phases:

- **Input Management Functionalities** – Deals with the ingestion management of audiovisual contents (HA Ingestion), including digital devices aimed at recording broadcast streams, as well as metadata. The input buffer in the figure above act as local cache.

- **Item Management Functionalities** - It’s related to the further processing of the acquired Newscast, extraction, sorting and organization of News Items and storage within the local repository.

- **Service Management Functionalities** – Deals with the “Item and Content Selection” which could be seen as the creation of the personalized newscast playlist, composed by the most interesting News for the active user, followed by the delivery of such contents to potentially different devices. Moreover it provides connections to the Home Ambient client component to enable end-user interactions.

- **User & Context Management Functionalities** – Deals with the management of user features and behaviors and the management of device and environment characteristics.

With reference to D6.2, the third phase requires the integration of user-related services for user management, metadata oriented services for News recommendation and semantic brokering for smart content delivery with respect to the context (device, resolution, available content quality, etc.)

On the other hand, to better depict the overall data flow, with reference to D7.1a, the following diagram provides a higher level snapshot of the main involved modules together with the contact points between SP and HA, provided that an additional low-level details will be given in the following sections of this chapter.

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**Fig. 2 – Home Ambient general architecture**
The M13 status of the prototype sees the development of a subset of the overall planned components. At the same time great effort has been put in order to implement the complete skeleton of the internal architecture to easily accommodate in the forthcoming phase, additional services and improved functionalities.

In parallel, a subset of the NoTube services, described in D6.2 in detail, have been integrated as well, with particular emphasis on user profile management that covers a crucial role in the personalized News context.

### 3.2 Service Provider

As to Service Provider side, functionalities developed in the M13 prototype can be divided into two main areas: the **Rules** area which covers functionalities related to the management of service provider requirements (restricted for this prototype to input selection requirements) and the **Item and Service** area which covers functionalities related to the item ingestion and management and to the service creation and delivery.

#### 3.2.1 Rules area

In this section the M13 prototype implementation issues related to SP input rules management are discussed.

**3.2.1.1 Functional context (see Fig. 4)**

The **SP Input Rules Editor** allows a service provider operator to create and modify specific files of rules expressed in a format exploitable by the **SP Input Rules Processor**.

Using the created rules file and the *scheduling information* derived from EPG instances accessed through the **EPG Access** module, the **SP Input Rules Processor** creates a list of scheduled objects to process (list of twosomes \{OAID, Channel\} where the OAID is the object identifier internal to the selected EPG and the Channel is the identifier of the channel on which the object is transmitted).

The created *list of entries to process* is used either at the Service Provider side and at the Home Ambient side to estimate the real physical position of multimedia objects to acquire into the on air main streams.
The list of entries to process is delivered to the Home Ambient by means of a RSS feed (A/V Feed). The EPG Access module makes use of EPG brokering services provided by WP5 and the retrieved EPG instances are made available also to the Item and Service Area.

3.2.1.2 Data Formats

Three different file formats are involved in the above depicted flow of operations.

The first one is the SP Input Rules file which contains the list of instruction to be followed by the SP Input Rules Processor to identify the entries to process. In the M13 prototype this file contains only a simple list of programs to be processed, each one identified by means of information like the **foreseen date on transmission**, the **channel** and some kind of unique identifier shared with EPGs. The file format is adherent to the schema showed in Fig. 5.
Going into detail: the file contains for each selected date (<Date> tag and id attribute) a list of chosen channel (<Channel> tag) uniquely identified by id attribute and for each channel a list of selected programs (<Program> tag). Each program contains the OAID (id attribute), which is the unique identifier for an On Air TV program and the name of the program (in the inner text of the <Program> tag).

The second one is the file published on the RSS Feed. It contains the list of programs to be acquired by the HA Ingestion Module; this file adheres to the RSS 2.0 specification (http://www.rssboard.org/rss-2-0). The information to be exchanged for each program is the couple {OAID, Channel}.

Each program corresponds to an <item> in the RSS2.0 schema. In each <item>, the <title> tag contains the program OAID and the <description> tag contains the channel identifier related to the program itself.

The third one is the EPG Instance. In this first prototype this file contains EPG information provided by WP5 services. The WP5 file format is preserved.

3.2.2 Item and Service area

In this section SP implementation issues related to news item ingestion and management for the M13 prototype are discussed together with SP issues related to service creation and delivery.

3.2.2.1 Functional context (see Fig. 6)

The following picture provides a detailed vision of the software components developed within the Item and Service area of the Service Provider in the M13 prototype as well as the connection between different modules.
The above schema covers some points of the general architecture presented in Fig. 1: the blocks on the upper left deal with the broadcast stream access and general ingestion functionalities, the modules in the middle deal with the item detection, item enrichment and item/content persistence functionalities, while the blocks on the right deal with the service building and delivery functionalities.

The Ingestion Manager module controls the ingestion operations from broadcast feeds. Using the List of entries to process and the EPG Instance information, this module estimates the physical position of multimedia objects to acquire into the on air main streams and then receives the actual position of the happened acquisition.

The ANTS environment [1] [2] is a set of RAI internal systems used in the NoTube project to acquire newscast programs from main streams, to locate news item and to enrich them with transcription, transcoded contents and other semantic enrichment information. As main feature, this environment gives in output, according to the Ingestion Manager directives, a metadata file containing the audio transcription of a newscast program in the PRESTOSPACE format and a medium quality (WMV at about 400Kbps) A/V file. In the same file information describing the newscast in terms of news item elements are present. The NIC Agent uses these information to create the NIC. The ANTS environment extracts and makes available also a set of information derived from the transcribed text as contained named entities, related external links, related DBpedia URIs and related named concepts operating in the Italian language. All these information are accessible at news item level. In the M13 prototype all these information are accessed directly by the NIC Agent in order to enrich NICs and they are saved into Content and NIC Repositories. The use of ANTS in the semantic enrichment phase in the M13 prototype is due to its real availability and to its Italian language oriented capabilities. In next prototypes the semantic enrichment services provided by WP4 will be integrated.
The Live Ingestion module acts like a controlled video recorder: it is a proprietary module that exposes an interface (currently available via Web Services or, for administrative purposes, through a GUI) and it is used to schedule local recordings under the control of Ingestion Manager. Such recordings are saved in the Content Repository as MSQCs (Main Stream Quality Content).

The Nic Agent creates and enriches NICs starting from information and contents provided by the ANTS Environment. The created NIC contains also references to the ingested MSQC and it is saved in the NIC Repository which, in the M13 prototype, is organized as a SQL Database.

The Service Agent analyzes each new NIC inserted into the NIC Repository DB in order to build the service provider service: if the NIC is suitable for the service, its header is given to the Publication and Delivery Module which inserts it in the RSS meta feed delivered to the Home Ambient (see section 3.2.2.3). At the same time a copy of the selected NIC in xml format is stored into the Service Buffer in order to be available on demand for the involved Home Ambients: in the M13 prototype a dummy version of the xml NIC will be used (see below), allowing the system to correctly run with the right data workflow; the real one is under development by the WP2. The integration with the activities of WP2 is done as infrastructure so that the communication interfaces between the use case and the format management is the final one for the Service Provider side. Services not yet exposed by WP2 are now internally solved.

The Publication and Delivery Module is also responsible for the publication and the on demand delivery of the MSQC.

3.2.2.2 Dummy version of NIC
The dummy xml NIC contains a set of information related to the news, the list below shows each field carried out by the NIC:

- **ObjectID**
  The ObjectID is the unique identifier of a certain News Item in the system

- **Publication date**
  The publication Date contains the date of the publication of the News Item

- **Publication Info**
  Publication Info gives information about the publication of the newscast program in which the News Item was included during the on air transmission (e.g. TG2 - Edizione 13:00)

- **Genre**
  It contains the Genre of the news, it is compliant to the EBU genre classification (e.g. Detective/Police/Crime, Economy/Market/Financial/Business, Society/Show business/Gossip) [3]

- **Content Reference**
  The content reference is a pointer to an A/V file stored in the streaming server. This related file is the A/V file of the whole newscast program encoded in WMV format. In the first prototype this is the only reference to the available physical file of the News Item.

- **Time Code Start / duration**
  This field contains the time code of the News Item related to the entire newscast program and the duration of the news (e.g. T00:02:05:17F25, 116 seconds)

- **Speech to text**
  This is the automatic generated speech to text of the news (e.g. “offensiva americana nel sud dell’afghanistan scattata ieri stamattina violenti combattimenti dei marines con i talebani in un’altra zona i para’ italiani catturano alcuni insulti giovani battista bruno - da alcuni dei quattromila marines dell’operazione colpo di spada sono impegnati in violenti combattimenti con jerry herman la roccaforte dei talebani di epicentro mondiale della produzione di oppio dunque strategica per questa nuova fase della lotta agli insorti - l’ avanzata dei marines procede a fatica si e’ scoppiata una battaglia infernale secondo le parole del generale nicholson quando le truppe americane
hanno attaccato la città chiave di gand si procede invece la avanzata in altre zone dove non c’è stata una resistenza militare simili - cattiva nella più grande offensiva dai tempi del vietnam finora umani ne è rimasto ucciso e altri sono rimasti feriti l’obiettivo dell’operazione spiegano i vertici militari non c’è catturare gli indici di espugnare la roccaforte taleban a per restarci strappare agli insorti questa - regione a sud del paese prima delle elezioni presidenziali del venti agosto nelle stesse ore ma in un’altra zona del paese nella valle di mossa a trenta chilometri da kabul se c’- cento otto cento ottantaseiesimo regimento folgore i militari afghani hanno catturato un gruppo di insorti considerati responsabili di diverse imboscate articolo di attacchi avvenuti proprio in quella zona negli ultimi quarantacinque giorni ai danni dei nostri militari - operazione congiunta appena conclusa ha portato anche al sequestro di armi -

-  

• **Named entities**

This field contains the automatically generated named entities on the speech to text with classification 
(e.g. insorti;mp7:OrganizationType, sud dell'afrghanistan;mp7:SemanticPlaceType)

• **Related external links**

This information gives a set of related content in the web as external links
(e.g. http://www.lastampa.it/redazione/cmsSezioni/estieri/200907articoli/45146girata.asp)

• **Tag cloud**

The Tag cloud contains named concepts related to the news without classification
(e.g. Afghanistan, france, garmsir, helmand, Nicholson, presse)

• **Related DBpedia URIs**

This field contains a set of DBpedia URIs related to the news item, the URIs are derived directly from the speech to text or from the named entities
(e.g.

- AMERICANA http://dbpedia.org/resource/Americana_%28disambiguation%29
- SUD http://dbpedia.org/resource/South
- AFGHANISTAN http://dbpedia.org/resource/Afghanistan
- TALEBANI http://dbpedia.org/resource/Taliban
- ITALIANI http://dbpedia.org/resource/Italian
- BRUNO http://dbpedia.org/resource/Bruno
- OPERAZIONE http://dbpedia.org/resource/Operation
- COLPO http://dbpedia.org/resource/Colpo
- SPADA http://dbpedia.org/resource/Spada
- HERMAN http://dbpedia.org/resource/Herman
- EPICENTRO http://dbpedia.org/resource/Epicenter
- PRODUZIONE http://dbpedia.org/resource/Production%2C_costs%2C_and_pricing
- OPPIO http://dbpedia.org/resource/Opium

...) 

3.2.2.3 NIC availability feed

In M13 prototype an RSS mechanism is developed in order to communicate the availability of new NICs to the Home Ambient (**RSS Meta feed**).

The file published on the RSS Feed contains the list of headers of each NIC available for the service; this file adheres to the RSS 2.0 specification ([http://www.rssboard.org/rss-2.0](http://www.rssboard.org/rss-2.0)). In M13 prototype the information to be exchanged for each NIC is limited to the ObjectID.

An `<item>` in the RSS2.0 schema corresponds to each available NIC. In each `<item>`, the `<title>` tag contains the NIC’s ObjectID. The Home ambient uses this information to build the query to access to a particular NIC using the Publication and Delivery Module. As in any RSS file, the `<pubDate>` is useful to manage the RSS service.

Below a sample of the **RSS Meta feed** file.
3.2.2.4 NIC access
All available NICs are exposed in a RAI DMZ area, for the M13 prototype the ObjectID will allow the Home Ambient sub-system to access directly to the NIC using the HTTPS protocol, the access to the NIC is performed concatenating directly the ObjectID to the RAI HTTPS server address.

3.3 Home Ambient
In the next sections the Home Ambient is presented in terms of software components.

In particular, the Home Ambient is divided in a back end part which is the one containing all software components referring to item management and those propaedeutic to the physical creation of final services and a front end part which is the one dealing with software components that are strictly related to the physical creation of final services.

3.3.1 Home Ambient – Back-end
The following picture provides a detailed vision of the software components developed within the Home Ambient Back End in the M13 prototype as well as the connection between different modules:
Fig. 7 – Home Ambient Back End: M13 prototype software modules

The overall schema maps the general vision presented in D6.1a,b (see Fig. 2): the block on the left deals with ingestion (input functionalities), on the middle deals with News Items management and filtering (item-oriented functionalities), on the right deals with connections with the front-end and content delivery (service-oriented functionalities).

On the left side two modules for the communication with the SP server are located. The Ingestion Manager is responsible of monitoring the RSS feeds activities, published by the SP, concerning both the Newscast broadcasts (A/V) and the metadata availability (Meta). This module is connected to the HA API that is responsible of retrieving contents from the SP Server. The current demonstrator focuses on the metadata retrieval, in particular News Items metadata related to already broadcasted Newscasts. In the forthcoming phases of the project this internal API will be responsible of retrieving also audiovisual contents (i.e.: individual News Items) leveraging on the concept of CRID, as part of the TV-Anytime format described in WP2.

Going back to the Ingestion Trigger, it is also connected to the Live Ingestion module. The latter acts like a PVR (Personal Video Recorder): it is a proprietary module that exposes an interface (currently available via Web Services or, for administrative purposes, through a GUI) and could be used to schedule local recordings of future Newscasts of interest. Such recordings, once occurred, are cached (RAW A/V database) waiting for the availability of the related metadata provided by the SP server.

Once metadata are retrieved, they are cached locally as well (within the Meta-Data database) then the News Organiser Agent will be responsible of connecting the past recorded complete A/V broadcast with the related metadata. Thanks to the internal video processing module, individual A/V News Items are extracted from the complete Newscast accordingly to the metadata descriptors. Individual News metadata are created as well and both the audiovisual contents and the metadata contents for each News Item are stored in the News A/V and News Metadata (NIC) databases. The locally stored NIC will be enriched with the CRID corresponding to the extracted audiovisual content thus, in the end, they may include multiple alternative A/V references in order for the delivery module to choose the best one in light of the context and the chosen device.
Proceeding to the right of the above diagram we can see a box containing “n” User Agents. These components have been implemented as concurrent threads, one for each registered user that, working on the locally stored News Items integrate external services related to user activities management as well as recommendation services. The idea is that such agents constantly monitor the local database for updated News Items metadata. These metadata are submitted to the recommendation News ranking service envisaged in WP3 in order to get back a score indicating how suitable is the considered News for the active user (thus considering his/her profile in terms of habits). The ranking will then be processed locally by the HA server in order to sort out the playlist useful to produce the personalized Newscast. The playlist carries with it all the individual News Items metadata, allowing further enrichment and content harvesting (i.e.: by the Semantic Broker) through the Asset Access API.

At this stage of development enrichment services and the Content Access API are not ready thus the prototype includes just the software containers that will be populated later on during the project. On the other hand the recommendation services from WP3 are in progress, at the time of reporting, and will be hopefully integrated in the first prototype.

The last component, at the right of the diagram is the HMI API (connected to the Ambient Intelligence). This internal API purpose is the integration with the front-end components, directly interacting with the user. Such components are envisaged to run on different devices (i.e.: PDA, STB and PC). In the first prototype a Web-based front-end have been developed to demonstrate the complete data flow with focus on user profile creation/management and consumption of a personalized Newscast.

In the next phase of the project the aim is to make use of the user interaction (i.e.: the user skips a News) with the HMI in order to reflect the behavior into the dynamic profile. Moreover, through the Semantic Broker, a smart selection of the most suitable audiovisual contents (in terms of resolution, bandwidth, etc.) in light of the chosen device will empower the delivery of the A/V contents. At the current stage of prototyping, the individual News Items audiovisuals URI are resolved

Concerning the user profiles, the actual implementation foresees their storage within the Home Ambient Server for what concerning static information (i.e.: name, surname, sex, age, etc.). On the other hand, each profile has an associated one into the Beancounter (WP3) that manages the user identity, decoupling personal details for privacy protection, and monitors the user behavior including NoTube platform usage as well as Social Network activities. The two profiles are connected by the HA back-end at run-time, and exploited in order to perform smart filtering of News metadata that will be the basis for the construction of the personalized Newscast for the active user, as mentioned before.

### 3.3.2 Home Ambient - Front end

The following picture provides a detailed vision of the software components developed within the Home Ambient Front End in the M13 prototype as well as the connection between different modules:
In the M13 prototype the final user can access the services using a personal computer with a web browser. So the front end area is oriented to the building of a web application as service. The web application is built exploiting the SOA approach used by the NoTube platform. The user interface calls the functionalities exposed by the system in order to obtain a set of results.

As to the **Home Ambient Client Side**, the only software module present is the *device browser*, an http classical PC browser, which includes a multimedia player (Windows Media Player). It receives HTML pages and multimedia contents from the **Home Ambient Server Side** and returns user and device information. The device type for the M13 prototype is hardcoded (the automatic device detection is not part of this prototype).

The **Delivery Module** manages the input from the client (user name, device type and so on) and delivers the output HTML pages to the device browser. The multimedia contents required by these HTML pages are also delivered by this module. It exchanges user information with the **Home Ambient Back-End** in order to manage user login procedures, new user insertions or user deletions.

The **Service Builder Module** builds the HTML service pages taking into account user preferences and the device type. As to user preferences, it uses the user related *NIC list* previously created by the **Home Ambient Back-End**, while as to device adaptation it uses services exposed by the **Device Adaptation Module** to identify contents to insert into the HTML pages. This last module extracts from a NIC the reference to the more suitable NIC’s content for a particular device.

### 3.4 Integration with other WPs

As stated in the previous sections, the Personalized News Platform prototype consumes services that are developed in other Work Packages and wrapped in the NoTube Integrated Platform (WP6). For reference purposes we summarize here below the categories of services that have contact points within the first release of the prototype:

- Recommendation models (WP1)
- Metadata formats (WP2)
- Metadata manipulation services (WP2)
More in detail below is presented the actual list of the integrated services for both the Service Provider and the Home Ambient side.

The first prototype integration for the SP focuses mainly on the WP5 brokering services dealing with the retrieval of EPG information.

As to metadata formats and metadata manipulation services, at the time of reporting they are part of WP2 work-in-progress activities. In order to proceed in the integration phase, however, all the required interfaces have been invoked relying on a rough internal implementation. With this approach, once these services will be ready, it will be just a matter of transparently replacing the implementation with the updated one.

On the other hand, concerning the HA, the integration focused on WP3 services, namely: dynamic user profile management (Beancounter) and recommendation services. Please note that recommendation services are part of the WP3 work-in-progress activities. In order to continue the integration phase, however, all the methods invocations have been developed strictly following the services interfaces detailed in D6.2. Waiting for the recommendation services to be ready, a temporary rough internal implementation has been produced. With this approach, similarly to what mentioned for WP2 services in SP, it will be just a matter of transparently updating the end-points with the available one.

With reference to D6.2 (chapter 2.4.1) the list of integrated services is thus mainly related the user-oriented group, in particular the set of services aimed at creating and managing profiles on the Beancounter in order to trigger the dynamic profile of the user that will reflect on the recommendation services output. Besides that, on the ingestion side, the integration of “EPG through goal” service (WP5) is then useful to retrieve the latest TV-programs entry table in order to correctly schedule the broadcast to be recorded. Indeed, as mentioned before, the same external service is used (integrated) on the Service Provider to publish RSS-based triggers. The benefit of this approach is twofold: on one side it allows to transparently obtain the very latest EPG by just providing as input the target country, on the other side it enables the Service Provider and the Home Ambient to run independently while maintaining a perfect sync for the TV-programs scheduling.

4. Guided walkthrough

4.1 Summary
In order to understand how the presented components are connected in the first integrated prototype, we describe below a set of significant sub-scenarios, namely:

1. Service Provider Input rules management
2. A typical Service Provider ingestion phase
3. Service Provider service creation phase
4. A typical Home Ambient ingestion phase (A/V + metadata)
5. The registration of a new user
6. A typical registered-user session (login in, playlist generation)
7. A typical user service play-out
To do that we’ve created some sequence diagrams referring to the current implementation of the prototype in terms of software modules/actors in order to formalize the description keeping the documentation agile, at the same time.

The following diagram describes a typical Service Provider Input rules management phase.

![Sequence Diagram](image)

**Fig. 9 – Service Provider Input rules management**
The following diagram describes a typical Service Provider ingestion phase.

![Diagram](image)

Fig. 10 – A typical Service Provider ingestion phase
The following diagram describes the Service Provider service creation phase.

Fig. 11 – Service Provider service creation phase
The following diagram describes a typical Home Ambient ingestion phase, including input-related and item-related functionalities. In particular the ingestion of a broadcasted News show, followed by the ingestion of available metadata coming from the Service Provider server. Then the organization of the cached data, sorting and extraction of News Items and storage within the HA local data structure.

![Diagram of Home Ambient ingestion phase]

**Fig. 12 – Typical Home Ambient ingestion phase**
Below the sequence diagram concerning to the registration of a new user, involving the creation of a local static profile as well as remotely integrating WP3 services for the creation of the related dynamic profile of the new user.

![Sequence Diagram](sequence_diagram.png)

**Fig. 13 - Registration of a new user**

The next diagram is about a typical registered-user session: he/she logs into the system through the front-end and then requires NoTube to playback the Newscast personalized on his/her profile.

![Sequence Diagram](sequence_diagram2.png)

**Fig. 14 – Typical registered-user session**
While the above picture details the interactions between the front-end and the HA back-end components, the following one further details the «Metadata Monitoring» step, highlighting the integration of recommendation services developed by WP3 in an early stage.

![Fig. 15 – News Item ranking for the active profile](image)

The last diagram is about a typical user service play-out.

![Fig. 16 – A typical user service play-out](image)
4.2 Step by step guide

The following paragraph describes typical operations envisaged for the WP7.a first integrated prototype, with screenshots extracted from the running demonstrator at the time of reporting. It includes:

- SP rules management operations
- User registration and profile creation through HA manager interface
- User log-in through HA manager interface
- SP notification of incoming Newscasts to be recorded
- Ingestion of scheduled News show (air broadcast)
- SP notification of available metadata
- Metadata retrieving and processing, extraction of individual News Items for both the audiovisual contents and the metadata (News Items Containers)
- Preparation of the personalized Newscast
- Generation of the playlist for the front-end
- User log-in through final user interface
- User management through final user interface
- My News Agency Service fruition
### 4.2.1 SP Input Rules Editor

<table>
<thead>
<tr>
<th>#</th>
<th>Description</th>
<th>Screenshots</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A SP user accesses the NoTube system, he/she needs to create new SP rules following SP requirements.</td>
<td><img src="image_url" alt="Screenshot" /></td>
</tr>
</tbody>
</table>
He/She chooses channels as initial input for the services (pushing the Get Channels button and checking Channels to select into the list).
He/She chooses Programs from which news items have to be extracted among newscast only programs starting from an internal daily EPG (pushing the Get EPG button, checking the Newscast only checkbox and checking programs to select into the lists).
After he/she has selected Channels and Programs, a file of rules is created (pushing the Create SP Rules button).

The picture shows also an example of such file of rules.
<?xml version="1.0" ?>
  - <SPrules>
    - <Date id="2009-12-11">
      - <Channel id="10028">
        <Program id="260007">TG 2 - Giorno</Program>
        <Program id="261128">TG 2</Program>
      </Channel>
      - <Channel id="10029">
        <Program id="259595">TG 3</Program>
        <Program id="259606">TG 3</Program>
      </Channel>
      - <Channel id="10027">
        <Program id="260250">Telegiornale</Program>
        <Program id="260430">Telegiornale</Program>
      </Channel>
    </Date>
  </SPrules>
The file of rules is saved into the system (pushing the **Save Rules** button and choosing the correct path).
A SP user accessing the NoTube system can apply already created file of rules in order to create a list of entries to send to HAs (pushing the *Create List of Entries* button and choosing which file of rules he wants to apply) matching information about selected programs into the file of rules with EPG information coming from external services (WP5).

The RSS with the list of entries is displayed in the Output textbox.

The picture shows also an example of such RSS.
After the RSS with the list of entries has been created, it is send to HA ingestion system so that it can manage the scheduling for recording in HA by the Ingestion Module included in the HA back-end (pushing the Send RSS to HA ingestion system button).
4.2.2 HA Server Side Editor

<table>
<thead>
<tr>
<th>#</th>
<th>Description</th>
<th>Screenshots</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A new user accesses the NoTube system, he/she needs to register his/her profile into the system and fill the fields in the registration form. These data include preferences and social network subscribed and will be used to create correctly custom playlist. The screenshots is purely indicative and is subject to be revised the final GUI.</td>
<td><img src="image-url" alt="Screenshots" /></td>
</tr>
</tbody>
</table>
The HA locally stores all these data applying privacy criteria (encryption), triggering at the same time external services (WP3) aimed at user identity and activity management. This approach enforces once again the privacy protection by decoupling personal preferences/details and user habits. The picture shows the HA Server local DB entries, populated at the time of user creation.

<table>
<thead>
<tr>
<th>user id</th>
<th>bean counter id</th>
<th>username</th>
<th>password</th>
<th>name</th>
<th>surname</th>
<th>gender</th>
<th>address</th>
<th>email</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1071</td>
<td>Fulvio</td>
<td>dGVzdA==</td>
<td>Fulvio</td>
<td>Negro</td>
<td>Male</td>
<td>Via Colombona 7</td>
<td><a href="mailto:f.negro@tut.it">f.negro@tut.it</a></td>
</tr>
<tr>
<td>8</td>
<td>1110</td>
<td>FreVolo</td>
<td>d2Yr29zb25pYw==</td>
<td>Francesco</td>
<td>Volonterio</td>
<td>Male</td>
<td>via frigia 2?</td>
<td><a href="mailto:francesco.volonterio@tut.it">francesco.volonterio@tut.it</a></td>
</tr>
<tr>
<td>11</td>
<td>1120</td>
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<td>dGVzdA==</td>
<td>Luca</td>
<td>Vignaroli</td>
<td>Male</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>1123</td>
<td>michele</td>
<td>dGVzdA==</td>
<td>michele</td>
<td>sesana</td>
<td>Male</td>
<td>via frigia 2?</td>
<td><a href="mailto:m.wis@tut.it">m.wis@tut.it</a></td>
</tr>
<tr>
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<td>1141</td>
<td>Roberto</td>
<td>dGVzdA==</td>
<td>Roberto</td>
<td>Del Pero</td>
<td>Male</td>
<td>Corso San Tomaso 8, Torino</td>
<td><a href="mailto:del.pero@tut.it">del.pero@tut.it</a></td>
</tr>
<tr>
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<td>ZGF22Q==</td>
<td>davide</td>
<td>ponti</td>
<td>Male</td>
<td>Via Frigia 2?</td>
<td><a href="mailto:davide.ponti@tut.it">davide.ponti@tut.it</a></td>
</tr>
</tbody>
</table>

The user login the system using his/her username and password. The user is also enabled to update/erase his/her profile. The picture is once again indicative.
The Service Provider notifies via RSS an incoming Newscast on public broadcast TV channels. This is done providing a pointer to today's EPG called OAID (On Air ID). The OAID identifies univocally the TV program that should be scheduled for recording in HA by the Ingestion Module included in the HA back-end. The picture shows an example of such RSS.
The HA monitors the TV-program RSS, resolves the OAID in the EPG table retrieving all the information needed for the scheduling (start/end time, channel and duration) and sets up the Ingestion Module accordingly. The picture shows the Ingestion Module administrative interface presenting the list of scheduled Newscasts.
The Ingestion Module waits for the incoming scheduled program then starts recording for the correspondent duration. Once the recording is complete the video is cached locally waiting for the Service Provider to provide related metadata. The picture shows the HA back-end administrative interface logging ingestion activities.
The Service Provider publishes Newscast metadata through a second RSS feed, for a specific OAID. The picture shows a sample metadata-oriented RSS feed. News-related metadata will contain a CRID (Content Related Identifier – using TV-Anytime format) that univocally identifies a content that can be retrieved by different sources (as well as formats, resolution, etc.) resolving it with the proper service.

```
<rss version="2.0">
  <channel>
    <title>NoTube Semantic News</title>
    <link>http://www.rai.it</link>
    <description>Rai Radiotelevisione Italiana - Centro Ricerche</description>
    <language>it</language>
    <copyright>Rai Radiotelevisione Italiana</copyright>
    <pubDate>Thu, 20 May 2004 21:00:00 GMT</pubDate>
    <lastBuildDate>Wed, 09 Feb 2005 23:30:00 GMT</lastBuildDate>
    <docs>http://www.notube.tv</docs>
    <item>
      <title>ANTS_1246709973.16part0</title>
      <pubDate>Thu, 10 Sep 2009 17:36:16 GMT</pubDate>
    </item>
    <item>
      <title>ANTS_1246709973.16part1</title>
      <pubDate>Thu, 10 Sep 2009 17:36:16 GMT</pubDate>
    </item>
    <item>
      <title>ANTS_1246709973.16part10</title>
      <pubDate>Thu, 10 Sep 2009 17:36:16 GMT</pubDate>
    </item>
    <item>
      <title>ANTS_1246709973.16part11</title>
      <pubDate>Thu, 10 Sep 2009 17:36:16 GMT</pubDate>
    </item>
    <item>
      <title>ANTS_1246709973.16part12</title>
      <pubDate>Thu, 10 Sep 2009 17:36:16 GMT</pubDate>
    </item>
    <item>
      <title>ANTS_1246709973.16part13</title>
      <pubDate>Thu, 10 Sep 2009 17:36:16 GMT</pubDate>
    </item>
  </channel>
</rss>
```

The Home Ambient monitors the metadata RSS feed, thus fetches incoming metadata for a specific Newscast. Consequently, the acquired metadata are associated to the corresponding ingested audiovisual Newscast (CRID resolution) which is further processed in order to extract
| 9 | The Home Ambient internally implements a resident module called “User Agent” that is in charge of monitoring and updating user’s playlists. The system notifies this module when a new News Item is present and stored locally according to its metadata so the agent is always up to date with all the contents. The “User Agent” module periodically selects all the News Items and all the Users updating their playlist according to preferences and activities. To do that the HA exploits some services provided by WP3 that are able to read metadata and match user preferences (stored in the beacounter) with them, returning a relevance value. All the News Items that better satisfies user profile are added to the playlist. |

Individual News Items in terms of audio/video and metadata. The obtained News Items are stored locally and then the additional CRID will be created and injected within each individual News Item metadata. The local CRID table is updated accordingly so that the HA CRID resolution service will point, for the newly created contents, to the local News Items. Indeed, the extracted News Items are published under the local Streaming server, so the video can be accessed remotely.
Once the user is logged into the NoTube system he/she can request for a customized playlist.
11 The HA returns the requested playlist and the frontend resolves all the video URLs showing clips one by one as a common TV-show.
### 4.2.3 Home Ambient client side editor

<table>
<thead>
<tr>
<th>#</th>
<th>Description</th>
<th>Screenshots</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The user login the system using his/her username and password.</td>
<td><img src="image" alt="Screenshot" /></td>
</tr>
</tbody>
</table>
2. He/She can perform some operations of user management local to Home Ambient or he/she can choose to enjoy final services.

3. In particular, permitted user management operations are the Add User to the local Home Ambient and the Delete User from the local Home Ambient.
4. Within the Add User operation he/she can add personal information about the user to add, information about social network subscriptions which will be useful for user profile updating made by the beancounter and information about privileges for the new user. The new user is added to the local Home Ambient.

<table>
<thead>
<tr>
<th>Username</th>
<th>Social Network 1</th>
<th>Social Network 2</th>
<th>Social Network 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Password</td>
<td>Site</td>
<td>Site</td>
<td>Site</td>
</tr>
<tr>
<td>Name</td>
<td>Site</td>
<td>Site</td>
<td>Site</td>
</tr>
<tr>
<td>Surname</td>
<td>Username</td>
<td>Username</td>
<td>Username</td>
</tr>
<tr>
<td>Gender</td>
<td>Username</td>
<td>Username</td>
<td>Username</td>
</tr>
<tr>
<td>Address</td>
<td>Password</td>
<td>Password</td>
<td>Password</td>
</tr>
<tr>
<td>E-mail</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. Within the Delete User operation he/she can delete a user which is present into the local Home Ambient inserting the username to delete.
If the inserted username is correct and the user really exists, he/she is asked once again if he/she really wants to complete the operation.

Instead, if he/she chooses to enjoy “My News Agency” service the requested playlist returned by the HA is resolved into URLs showing personalized clips one by one as a common TV-show.

Table 3 – Step by step guide HA client side
5. Conclusions

In this document the first implementation stage of the Personalized Semantic News use case has been presented. This is a paper companion to the software prototype D7a.2 Personalized News Platform prototype v1.

In this deliverable all issues has been faced from a technical point of view rather than from a logical point of view, leaving the last one to the deliverable D7a.1 “Personalized News Services Specifications”.

The level of integration with services provided by other NoTube Work Packages has been underlined, making reference to the NoTube Integrated Platform described in D6.1a,b NoTube System Specifications and Architectural Design and D6.2 NoTube integrated System 1st prototype. The level of integration with the RAI ANTS environment external to the NoTube project has been also described: it is foreseen that some functionalities now provided by this external environment will be given by NoTube WP4 services in the next prototypes.

Furthermore typical operations envisaged for the WP7.a first integrated prototype has been described, with screenshots extracted from the running demonstrator at the time of reporting.

6. References


Annex - WP3 integration details

Main aim of this annex is to briefly describe how to accomplish a first and initial version of the 7a envisioned scenario making use of the services developed within the WP3. Even if this document will not present technical diagrams (like UML) it is intended to be read by developers in order to give them a clear idea of the main components and interactions.

WP3 Services overview

In the following a list of definitions follows:

- **The Beancounter** - is the main component responsible to gather the users’ raw data (crawling from the various social applications they're registered to), represent them in RDF (according a set of predefined ontologies, mainly FOAF, MusicOntology, ActivityStreamOntology) and store them in a SPARQL-accessible quad-store. The Beancounter, please refer to the NoTube deliverable *D3.1 User and Context model Specification* for further details, provides two kind of access to the stored data: using the SPARQL Endpoint directly, or asking using the OpenSocial URI-extended REST endpoint. Using this endpoint a specific user profile could be obtained in a format totally compliant to the OpenSocial specification.

- **Content Relevance Engine Mockup** - since the NoTube recommendation engine is not available at the M13 prototype implementation time, a simple mockup has been designed jointly by the WP3/WP7a. Main responsibility of this component is that to provide a relevance measurement of a content given a certain user. The relevance has to be intended as measurement of the suitability of that content to the user.

- **The RAI Personalized News Web Application** - is an application that fully delegates the users identities to the Beancounter. In this sense, that application will be accessible only by users that already own their NoTube account proving it to log on. According the most recent news provided by the content owner (in this case RAI) the application will ask to the Content Relevance Engine Mockup for a relevance degree in order to build on-the-fly a personalized newscast that could be seen on the Web.
The following picture depicts this architecture:

**Main scenario: interaction flow**

As an immediate consequence of this, the Personalized News Application needs to authenticate the user performing a call to The Beancounter the user belongs to. Simply performing the following HTTP GET:

HTTP GET on http://profiles.notube.tv/usermanager/2625

If the user is registered on the Beancounter the response should be:

```xml
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<user>
  <ID>2625</ID>
  <name>Davide</name>
  <surname>Palmisano</surname>
</user>
```

If everything went fine, the RAI Personalized Application must call the Content Relevance proving it with the user ID (in this case http://profiles.notube.tv/DavidePalmisano/2625) and a NIC as the following picture depicts:
Calling the Content Relevance Engine, could achieve simply with an HTTP POST call, like:


In order to reply to this call, providing a relevance measurement, the Content Relevance Engine must obtain a valid user profile of the user passed as input. This could be achieved simply calling the OpenSocial REST APIs of the Beancounter:

```
/people/2625/@self?fields=interests
```

that will reply with a compliant XML (but even JSON is possible) like the cut following:

```
<interests><http://dbpedia.org/resource/Post-Rock></interests>
<interests><http://dbpedia.org/resource/Category:Post-Rock></interests>
<interests><http://dbpedia.org/resource/Mogwai></interests>
<interests><http://dbpedia.org/resource/Explosions_in_the_sky></interests>
<interests><http://dbpedia.org/resource/Italy></interests>
```

as the following picture summarizes:
At this stage, the Content Relevance has all it needs to evaluate the relevance of a NIC against a user profile (that is no covered here) and giving back the result:

```xml
<relevance>
  <value scale="1.0">0.7843</value>
</relevance>
```

as depicted finally here: