NoTube

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

FP7 – 231761

D7a.1 Personalized News Services Specifications

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Quality Controller: Lyndon Nixon

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EXECUTIVE SUMMARY

This deliverable is dedicated to provide an overview of the first of the three use cases presented in the NoTube project: the Personalized Semantic News use case.

Due to the fact that this is the only deliverable of specification for the use case, all related issues are faced from a logical point of view rather than from a technical point of view, leaving the last one to deliverables related to different versions of the prototype, namely: D7a.2 Personalized News Platform prototype, v.1 due M13, D7a.3 Personalized News Platform prototype, v.2 due M23 and D7a.4 Personalized News Platform prototype, v.3 due M33.

This document describes the global vision that has led to the definition of the whole use case, taking into account the stakeholders interested in the realization of such scenarios and the advantages for them. Examples of final scenarios are given and used as a starting point to describe which are the operating contexts and the three foreseen final services for this use case: My News Agency, News Find Engine and Alerting News.

These services are deeply analyzed from the users (service provider and final user) point of view and the expected UI is showed and explained.

In the vision is also presented the high level description of backend functionalities, seen as a flow of operations to do in order to create and deliver to the final user the above mentioned services. Main functionalities are analyzed in details and examples of use are given to make all the logic more clear.

In the last part of the document an overview of functional requirements is presented and the importance of some main shared requirements is underlined, also due to the fact that some of them, namely the News Item Container, the Semantic Enrichment and the Content Enrichment, are definitely big added values for the whole project.
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Keywords: Specification, requirements, Use case, scenario, News Item.
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<td>A/V</td>
<td>Audio Video</td>
</tr>
<tr>
<td>AVI</td>
<td>Audio Video Interleave</td>
</tr>
<tr>
<td>CRID</td>
<td>Content Reference Identifier</td>
</tr>
<tr>
<td>eNIC</td>
<td>Enriched News Item Container</td>
</tr>
<tr>
<td>EPG</td>
<td>Electronic Program Guide</td>
</tr>
<tr>
<td>HA</td>
<td>Home Ambient</td>
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<tr>
<td>IP</td>
<td>Internet Protocol</td>
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<tr>
<td>LAN</td>
<td>Local Area Network</td>
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<td>leNIC</td>
<td>Locally Enriched News Item Container</td>
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<td>MSQC</td>
<td>Main Stream Quality Content</td>
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<td>Named Entity Recognition</td>
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<td>Personal Digital Assistant</td>
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<td>PVR</td>
<td>Personal Video Recorder</td>
</tr>
<tr>
<td>SP</td>
<td>Service Provider</td>
</tr>
<tr>
<td>UI</td>
<td>User Interface</td>
</tr>
<tr>
<td>URI</td>
<td>Universal Resource Identifier</td>
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<tr>
<td>WMV</td>
<td>Windows Media Video</td>
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1. Introduction

The NoTube WP7a Personalized Semantic News use case focuses on the design and development of a system for the creation and the delivery of a set of local personalized news services. This system will be able to acquire news items from generic broadcast streams, to understand the meaning of video news items, to understand the physical context in which news items are going to be shown and to apply criteria for matching the user profile with the available news items.

This use case foresees the creation of three main services: the first one is the “My News Agency”, the second one will be the “Alerting News” service and finally there will be a “News Find Engine” service [1].

1.1 Scope of the document

This document describes the Personalized Semantic News use case that is one of the three use cases involved in the NoTube project. The main goal of the document is to give the specification of the use case at different levels of abstraction. This is intended for a top down approach to the specification: beginning from the vision of the use case down to the detailed logical decomposition and the description of all system functionalities.

1.2 Document outline

This document contains the specifications of the “Personalized Semantic News” use case. It is divided in an introductory chapter (Introduction) and two main chapters (Vision and Functional Requirements Overview).

The chapter 1. is the document introduction.

The chapter 2. is about the use case vision. In this chapter the use case is described from the final users’ point of view and a brief description of who the stakeholders are is provided. Some samples of user scenarios are then proposed in order to explain what users can do with the NoTube platform using the Personalized Semantic News use features. The definition of different users operating contexts where they work in and a description of the functionalities to be implemented into the system in order to obtain the wished final services is also given in this section.

The chapter 3. contains an overview of functional requirements. System's topics are analyzed and guidelines about requirements on them are given in the first part. Afterwards an overview of functional requirements for each single element of the system is presented.

2. Vision

Personalized Semantic News use case focuses on the design and development of a system for the creation and the delivery of a set of locally personalized news services. This system will be able to acquire news items from generic broadcast streams, to understand the meaning of video news items, to understand the physical context in which news items are going to be shown and to apply criteria for matching the user profile with the available news items. Foreseen services are:

- Alerting News service which allows the final user to be alerted for incoming news of his own interest in his home environment.
- My News Agency service which provides the user with an automatically generated local news multimedia channel, personalized on his/her preferences and device characteristics.
- News Find Engine service which allows the final user to access news responding to search criteria provided by the user himself and already available in his home environment.
2.1 Stakeholders

This section analyzes the main stakeholders which can be interested in the realization of such scenario and which are the advantages for them.

2.1.1 The broadcaster

Since in the Personalized News service already broadcasted contents are customized, adapted to preferences and characteristics of single users or groups of users and provided again to them, the broadcaster can exploit at best “long tail” phenomena relevant to its own news contents.

From this viewpoint the broadcaster has the opportunity to reuse materials already exploited by services formerly provided to users, maximizing business logics for these contents that otherwise would be exploitable just in the short term.

2.1.2 Service Provider

Using the Personalized News Services the Service Provider will be able to build new business cases exploiting user access to the delivered and published services, also taking in to account hybrid user connection scenarios.

The Service provider will be able to provide new pay services starting from already broadcasted content enforced with a big variety of related content also coming from other media.

2.1.3 The final user

The final user by means of Personalized News Services is able to interact with news multimedia material of his own interest in a user suitable format and in time independent and context aware modality.

The main added value granted by this kind of service is to give to the user the possibility to get in his home environment programs segments of his own interest represented not only by audio-video, but also by audio-only or text-only or by other metadata. The user can consume these contents when he prefers by means of these multi-modal, user adapted and locally created services.

2.2 Sample Scenarios

In this chapter some sample scenarios are provided in order to explain from the users’ point of view what they can do with the NoTube platform using the Personalized Semantic News use features.

The service provider scenarios give an example of the operations made by a service provider operator to configure the service from the service provider point of view.

The final user scenarios give some examples of the home ambient configuration and services fruition activities carried out by the final users.

2.2.1 Service Provider

<table>
<thead>
<tr>
<th>Andrea.</th>
<th>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 update old ones or better the system can use already given rules and in the last case...one task less for him!</th>
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Andrea receives service provider’s requirements. 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 and to add "La Repubblica" newspaper’s feed as further external content source. What else? Oh yes, he has to remember that the boss wants to build a new sport pay service, so he has to exclude all sport news from the free services.

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

Andrea sets the newscast programs. 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.

Andrea sets the external sources. The next step for Andrea is to add “La Repubblica” newspaper’s feed as external source from where selecting contents to enrich extracted news. After this, all he has to do is to define not to send sport news as a rule for the creation of the free services to be delivered.

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

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

Tab. 1 – The Service Provider sample use case

2.2.2 The final user

The Verdi family. The Verdi family lives in Turin a very nice city located in the north-west of Italy at the foot of the Alps.

The Verdi family counts 5 persons: dad Mauro, his wife Gabriella, the first son Sabino 16 years old, Paola 6 years old and Marco, the last arrived, 6 months old.

Mauro works in a big Italian car industry, he travels a lot for work and he has few time to watch television because of a lot of children around. He thinks that some news could be not appropriate for young people.

Gabriella is a computer science PhD currently in maternity for the Marco’s birthday, she works for a software house in Turin.

Sabino attends the high school, he is a fan of online games. Usually he prefers to use the computer instead of watching television.

Paola attends the first year of the primary school, she spends a lot a time in the afternoon in front of the television to see cartoons.

Marco is the last arrived, he is the noisy element of the family, he
needs a lot of attentions from the parents, when Marco is not
sleeping (sometimes also during the night!) Mauro and Gabriella
must be focused on him and so their spare time is very short.

The Verdi home is located in the city centre, the environment in
which they live is NoTube compliant: their home is able to know
how each person is moving inside the different rooms of the house
and which devices people are using. Mauro, Gabriella and Sabino
also use integrate PDAs to communicate.

<table>
<thead>
<tr>
<th><strong>Mauro is driving.</strong></th>
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<tr>
<td>This morning Mauro is very late, he has no time to see the</td>
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<td>morning news program. He uses the car to go to work and during</td>
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<tr>
<td>the driving time he listens to his personal news agency in audio</td>
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<tr>
<td>only mode, the service also allows him to set a bookmark on news</td>
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<tr>
<td>he finds particularly interesting. When he arrives at work he starts</td>
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<td>to see the video of a previously booked news, but his boss is</td>
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<td>coming so he decides to see the others later.</td>
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<table>
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<tr>
<th><strong>In the doctor’s waiting room.</strong></th>
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<tr>
<td>Before lunch, Gabriella phones to her husband telling that Marco</td>
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<tr>
<td>is sick and she has to bring him to the pediatrician, so someone has</td>
</tr>
<tr>
<td>to go and get Paola from school...and who's going to do that?</td>
</tr>
<tr>
<td>Daddy, of course!!!</td>
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| **Doctor's waiting rooms are always full of people, there is enough** |
| **time to see the “My News Agency” service, and Gabriella is** |
| **really interested in what happens in the world. There are a lot of** |
| **news today, and maybe some should interest to Mauro too, so she** |
| **recommends a couple of them to her husband.** |

| **How much boring is waiting the doctor! Some Newspaper? No,** |
| **the Doctor's waiting room is a NoTube ambient compliant,** |
| **Gabriella connects herself to the new ambient as guest, she’s able** |
| **to see the news arranged from this ambient mainly focused on** |
| **pediatric and gossip issues.** |

<table>
<thead>
<tr>
<th><strong>The Mauro's “My News Agency” service.</strong></th>
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<tr>
<td>In the meantime Mauro has gotten his sweet daughter from</td>
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<tr>
<td>school, they have lunch together and sit on the sofa watching the</td>
</tr>
<tr>
<td>television... nothing better than have some news after lunch! The</td>
</tr>
<tr>
<td>Mauro's “My News Agency” service offers news recommended</td>
</tr>
<tr>
<td>by Gabriella, and other ones after, but only news which are</td>
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<tr>
<td>suitable for children, there's a young girl near daddy!</td>
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<tr>
<th><strong>Sabino with his (NoTube-) PDA.</strong></th>
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<td>Sabino is not at home today, after school he goes to have lunch to</td>
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<td>a friend, they have a lot of work to do in the afternoon because the</td>
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<tr>
<td>teacher gave them a research on earthquakes as homework; they</td>
</tr>
<tr>
<td>want to gather some information about recent earthquake in Italy,</td>
</tr>
<tr>
<td>unfortunately Sabino's friend hasn't got a web connection into the</td>
</tr>
<tr>
<td>PC. No problem! Sabino with his (NoTube-) PDA uses the “News</td>
</tr>
<tr>
<td>Find Engine” service to find all news about earthquake in Italy</td>
</tr>
<tr>
<td>and related contents, using the Bluetooth connection they</td>
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| download information to the PC.
Gabriella and Marco come back home.

Finally Gabriella and Marco come back home, keep quiet!, daddy is sleeping on the sofa while Paola... oh no, she has stained the whole table with paints... while mom is cleaning the table the “alerting news” service on the television advise for an incoming news about the new Linux OS, she’s really interested about it and she watches this news just pushing a button on her remote control.

Actually two days before she 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 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!

Gabriella and Mauro, exhausted, can relax on the sofa watching the personalized news program created specifically for them (together) by the NoTube platform, the morning booked news and all interesting news-related contents.

Tab. 2 – The final users sample use case

2.3 Users operating contexts

In the following sections is presented a detailed description of operating contexts in which service provider operators and final users work.

2.3.1 Service Provider

The Service provider operations are strictly related to a particular environment defined as Service Provider Side. All the Service Provider operations are made by an operator logged to this environment. Several levels of login rights should be considered. A single Service Provider Side can feed many different user environments.

2.3.2 Final User

The user environment where all the personalization operations, the delivery functions and the final service fruition are made is defined as Home Ambient and is actualized by a Home Ambient Side. The personalization and the delivery operations made in separate Home Ambient environments allow cutting the total Service Provider Side throughput and at the same time ensuring a more reliable control of the user privacy.

The Home Ambient can be depicted using two different linked layers:

1. Physical layer: the physical home ambient is a portion of space characterized by the presence of a sensor network and served by a LAN (real or virtual). Inside the home ambient the user can access to personalized services on the base of information given by the sensors and distributed through the LAN. Each physical home ambient is contained in at least one logic home ambient;

2. Logic layer: the logic home ambient is the virtual space in which: a semantic is known and defined, a set of contents and services are available for the users which are identified and profiled and, finally, a set of operational rules are specified.

The generic User which exists in the home ambient can be defined:

1. Related to the physical Ambient (physical mode) as
a. Immersed user – which is physically inside a physical Home Ambient
b. External user – which is outside from any physical Home Ambient

2. Related to the logical ambient (logical mode) as
   c. Not connected – the user is not connected to any logical home ambient
d. Connected as guest – the user is connected to a particular logical home ambient but the user is not known by it
e. Connected as registered user – the user is connected with a logical home ambient and it’s also known by it

In Tab. 3 some possible sub-scenarios are detected.

<table>
<thead>
<tr>
<th>Logical Mode</th>
<th>connected as guest</th>
<th>connected as registered user</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Mode</td>
<td></td>
<td></td>
</tr>
<tr>
<td>immersed</td>
<td>to the logical Home Ambient which contains the physical Home Ambient where the user is immersed</td>
<td>to any other logical Home Ambient</td>
</tr>
<tr>
<td>external</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

*Tab. 3 – Final users sub scenarios*

**Scenario A**
The user is connected as *guest* to a logical home ambient which "logically contains" the physical home ambient the user is operating in; the user is working in Immersed modality.

E.g. I'm in the doctor's waiting room and I'm connected to the doctor consulting room logical home ambient.

**Scenario B**
The user is connected as *guest* to a logical home ambient which "logically doesn't contain" the physical home ambient the user is operating in; the user is working in Immersed modality.

E.g. I'm in my sitting room and I'm connected to the doctor consulting room logical home ambient.

**Scenario C**
The user is connected as *registered user* to a logical home ambient which "logically contains" the physical home ambient the user is operating in; the user is working in Immersed modality.

E.g. I'm in my sitting room and I'm connected to my home logical home ambient.

**Scenario D**
The user is connected as *registered user* to a logical home ambient which "logically doesn't contain" the physical home ambient the user is operating in; the user is working in Immersed modality.

E.g. I'm in the doctor's waiting room and I'm connected to my home logical home ambient.

**Scenario E**
The user is connected as *guest* to a logical home ambient but it's not physically inside a physical home ambient (External physical modality).

E.g. I'm in my car and I'm connected to the doctor consulting room logical home ambient.

**Scenario F**
The user is connected as *registered user* to a logical home ambient but it's not physically inside a physical home ambient (External physical modality).

E.g. I'm in my car and I'm connected to my home logical home ambient.
Connection Modes

When the final user accesses to a given logic ambient (as guest or as registered user) this connection can involve only the user or the user and his device; for example, if the user comes into a physical ambient where a device is already present, the user will be connected to a logic ambient able to give services through that device; otherwise, if the user comes into a physical ambient bringing a mobile device than both the user and the device will be connected to a logical ambient able to give services to that user through that device.

When the user is an immersed user, the connection phase to a logical ambient is automatically started and the logon action can be managed in manual or automatic way: in the manual mode the user can choose to connect himself to the preferred ambient, while in the automatic mode the logon is automatically done when the user/device comes into the ambient, as guest if the user is unknown by the ambient or as registered user if he is known. The manual mode allows the user to connect himself to a logical ambient different from the logical ambient containing the physical one in witch the user is immersed (see B and D scenarios above).

When the user is not immersed in a particular physical ambient (see E and F scenarios above), the connection phase to a logical ambient will be done only by a voluntary action performed by the user and the consequent logon could be automatic or manual.

The logon action is always defined by the couple {user, device} because a given user is always connected to a logical ambient via a given device and the final service will be always provided to the user through this device.
2.4 Service Description

This chapter describes the personalized news services from the users (service provider and final user) point of view.

2.4.1 Service Provider

At the Service Provider side, by means of specific user interfaces, the service provider can manage all operations relevant to the ingestion of contents into this part of the system, select sources to enrich service provider contents and give requirements related to the creation of service provider’s services.

In particular, starting from a number of different available broadcast streams the service provider chooses the ones to be used as initial input for the service, among the selected broadcast streams he chooses programs from which news items have to be detected. Furthermore he chooses external sources to be used to detect contents to enrich news items that are already present into this part of the system and he defines rules for the creation of the service to be delivered to home environments, following defined requirements established by the service provider himself.

2.4.2 Final User

2.4.2.1 My News Agency service

The My News Agency service allows the user to enjoy a personalized newscast program compliant with his own preferences directly given by the user himself (e.g. personal rating, language preferences) and gathered from his behavior (e.g. from social network activities), and compliant with used device characteristics.

The My News Agency service will show a sequence of news each one including a main A/V content and related enrichments which are chosen according to service provider requirements at service provider side and following home ambient requirements at home ambient side.

The main goal is to provide the final user with a service different from the classical broadcasted one, a service which allows seeing the classical A/V content or an equivalent one and, at the same time, accessing to additional information coming from non broadcaster environments and using social web tools. Examples could be to provide active links to DBPedia contents corresponding to specific keywords extracted from the main news by means of semantic tools, related news coming from selected web sites and integrated user interfaces to social web sites.

In this way the final user can interact with its news sequence, he can choose to deeply investigate a particular news item or to skip another one and all these actions can be used as a feedback for refining his own profile. Accordingly, a rating mechanism could be foreseen for each news item.

Basically the player will be arranged with the main video content in the centre of the screen, with the possibility to play it, to go to the next news item or to go back to the previous one. Around the main video player the semantic information and the related contents will be shown: active tag cloud or named entities relevant to the news that is played, related contents coming from broadcasters and from other external sources.

All the additional information around the video will be related to the showed news item and they will change when the news item changes. They are all active contents, the final user can interact with them and when he activates one of these objects the area around the video will show the content of the object (e.g. the explanation given by DBPedia of a certain concept, an extract of a web page of a certain media and so on).

A specific area of the screen will be used for the social interactions; by using this area the final user can perform the normal interactions with his contacts and also any specific NoTube action like sharing the news item or suggesting the relevant content to friends.
This service is available when the user is connected to the NoTube environment. In Fig. 1, an example of enriched news item play out for the television set (or also for PC) is shown.

![Example of enriched news item play out on the TV screen](image1.png)

**Fig. 1 – Example of enriched news item play out on the TV screen**

The user interface will be also provided for different mobile device such as advanced mobile phones. In this case the viewing space could be quite limited, a cropped or transcoded *equivalent content* will be shown instead of the high quality one, but the service perception by the user will remain the same, only the navigation will be different from the television set application (see Fig. 2).

![Example of enriched news item play out on the mobile device](image2.png)

**Fig. 2 – Example of enriched news item play out on the mobile device**

In general, *equivalent contents* management will allow publishing on a number of different devices, also not graphical or powerful devices could be addressed by the right equivalent contents (e.g. textual and audio only content, as in Fig. 3).
2.4.2.2 News Find Engine service

The News Find Engine (see Fig. 4) service allows searching of news items already present in the home environment. The result of a search operation is a single news or a set of news that may be shown as a sequence of news using the same interface provided by the My News Agency service.

The input of the search operation could be keywords or other more sophisticated features.

This service is available when the user is connected to the NoTube environment.
2.4.2.3 Alerting News service

The Alerting News (see Fig. 5) service allows the final user to be alerted when an important news enters in his home ambient. The level of importance of a news could be defined according to a levels scale as the following one:

- high general worldwide level (Breaking News)
- very high match with the user profile level
- friends recommended news level

In these cases a popup will be shown into the application user interface and the related news item will be shown or added to the sequence of news provided by the My News Agency service.

This service is available when the user is connected to the NoTube environment.

2.5 Backend functionalities

In the previous sections the personalized news use case has been analyzed from the point of view of the stakeholders and the foreseen services have been presented from a final user scenario perspective. In next sections, the system perspective is taken into account, giving a description of the functionalities to be implemented into the system in order to obtain the wished final services. These functionalities are presented starting from a high level point of view and going more in depth step by step, so that it is possible to better understand which is the use case workflow, which actions are supposed to be done by the system at every step and which are the involved entities going through the workflow.

2.5.1 General

The Personalized Semantic News use case focuses on the design and development of a system for the creation of a set of local personalized news services based on the repurposing and enrichment of news item material already transmitted over generic broadcast streams.

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The creation of personalized services based on news item repurposing takes place in two different environments:

- at service provider side, where service provider editorial requirements and generic and not-confidential user profiles are taken into account to create and deliver one or more broad feeding services;
- at home ambient side, where specific and personal user tastes, locally defined preferences and device and context characteristics are taken into account to create and deliver user specific services based on broad ones received by the service provider.

To do this, the general workflow must include the following high level operations:

- news item acquisition and semantic understanding;
- news item enrichment;
- news item selection using matching criteria based on service provider editorial requirements and dynamically updated user profiles;
- content adaptation founded on the physical context in which selected news items are going to be delivered;
- service delivery.

In Fig. 6, previously detected operations are shown in a more detailed way for each side.

**Fig. 6 – Service Provider Side and Home Ambient Side operations**

### 2.5.1.1 Service Provider Side

The Service Provider extracts from a selected subset of available on-air main streams all audio-video segments semantically detected as “news item”. This activity can be done just by the Service Provider, because the user typically can’t access at the same time all the useful on-air main streams.

Each extracted news item is automatically enriched with descriptive and semantic metadata, with correlated resources/contents locally generated, or already in the system, and whit external ones retrieved from predefined web sites. Web sites to access in this phase are detected following specific service provider preferences.

The Service Provider builds one or more services using enriched news items. The items inserted in each service are selected according to service provider editorial requirements and taking into account the behavior of chosen users groups so as to preserve single user privacy. The selection operations are
mainly based on semantic information regarding either news items or editorial requirements or user behaviors.

At this side there is no content selection for context adaptation issues.

Obtained broad services are delivered and made available to connected home ambient environments following specific service provider business models. Each delivered service is a potential input for each connected Home Ambient side.

2.5.1.2 Home Ambient Side

Only news items matching home ambient input requirements are taken from SP delivered services and stored in the home ambient environment. The matching analysis is mainly based on semantic information regarding both news items and input requirements. Each news item stored in the home environment can have an expiration time defined at provider side or at user side.

Each stored news item can be locally enriched with resources locally generated or automatically retrieved from local repository or from predefined web sites. Web sites to access in this phase are detected following home ambient requirements.

Locally enriched news item are selected to automatically create personalized news services. The automatic creation is based on the interaction of the user with the ambient, following personalization aspects and performing a semantic matching based on user preferences. Among other things, the user preferences are dynamically updated also following the user behavior in the Social Web.

A further dynamic device and linguistic content adaptation is made at this point. The correct content to be delivered is selected following user linguistic preferences, fruition device features and environment characteristics (physical context profile).

At last, the final personalized service in delivered and the suitable contents are provided to the user.

2.5.2 Detailed functionalities

2.5.2.1 Functional decomposition

In Fig. 7 Service Provider side and Home Ambient side main high level functionalities are depicted.

At the Service Provider side the item detection and enrichment functionalities allow the service provider to acquire news items from on air programs broadcasted on selected main streams, to understand the meaning of these news items and to enrich themselves with alternative contents selected by the Service Provider, contents which are physically or logically related to the main one. Once these operations are made the Service Provider service building and delivery functionalities allow the service provider to build one or more broad services according to its own editorial rules and taking into account the behavior of generic worldwide users groups and distribute them to all engaged Home Ambient Sides.

The side interaction functionalities cover all interoperability issues between the Service Provider Side and the Home Ambient Sides.

At the Home Ambient side the service access and item enrichment functionalities allow the home environment to receive items and enrich them with alternative contents selected following Home Ambient preferences. Once these operations are made the personalized service building and delivery functionalities allow the home environment to build the final service according to user preferences and to characteristics of fruition context and to deliver the service itself to the final user.

These functionalities are deeply analyzed in the next paragraphs.
2.5.2.2 Service Provider Side

2.5.2.2.1 Item detection and enrichment functionalities

In Fig. 8 the item detection and enrichment functionalities are analyzed as sequence of operations.

The first step of the sequence of operations, *Ingestion and Item Detection*, covers both the ingestion of a complete TV program from main streams present on selected (by service provider) broadcast feeds and the detection of internal news items. This second operation is made in order to locate each existent news item and to extract for each one the content at main stream quality (MSQC) and other legacy metadata: for example, when the “TG1” newscast of 1p.m. is broadcasted on the RAI1 channel main stream, the system shall be able to acquire the related audio-video content into a file, to detect each single news inside the whole newscast and to add corresponding legacy metadata. The service provider must be able to choose which are the programs to ingest and must be able to make a schedule for the ingestion operations, following external official EPG information: for example, the service provider decides that today the system has to acquire only newscasts broadcasted on RAI1 and RAI2 channels and he uses the corresponding EPG to create the right schedule.

From a logical point of view all the information and contents related to a detected news item can be figured as components of a virtual container called News Item (or Enriched News Item after the Item Enrichment phase).
The second step of the sequence of operations, Item Enrichment, covers the enrichment of the detected news items and can be split in three different phases:

- in the first one a Basic Content Enrichment is carried out. Equivalent contents are created from available contents using automatic transcoding operations (e.g. format conversions, frame rate reduction), transmoding operations (e.g. speech to text transformation, audio-video to audio-only transformation) or summarization operations (e.g. key frame extraction);

- in the second one a Semantic Enrichment is carried out. By means of “semantic tools/engines” the system detects useful information about the selected news item starting from metadata and contents already present in the News Item and exploits this information to get, from the Semantic Cloud, further information semantically significant with regard to the news item itself. For example, named entities are extracted from the text obtained from a speech-to-text transformation and, using them, the system can interact with the Semantic Cloud to obtain some other information about the object of the named entity itself; these info are definitely an enrichment for the news item, so if in the text a notable person is mentioned, the Named Entity Recognition (NER) tool can identify it and the system enriches the news item with info/URI linked to that person coming from the Semantic Cloud;

- in the third one an Enhanced Content Enrichment is carried out. Further equivalent or related contents are added to the News Item virtual container. These contents, which can come also from external sources, are chosen (e.g. retrieved from a predefined web site or from an internal repository) or generated (e.g. a reframed copy created according to known information) taking into account semantic information and metadata already present in the News Item. For example, if from the semantic information of a news item it is deduced that the news is about sport and in particular about a football match, it is possible to access to many external sources in order to add to the News Item other additional info/video/contents related to the same football match.

2.5.2.2.2 SP service building and delivery functionalities

In Fig. 9 the SP service building and delivery functionalities are analyzed as a sequence of operations.

![Fig. 9 – SP service building and delivery functionalities](image)

These functionalities are driven by Service Provider Requirements defined by the service provider according to its own editorial requirements and by Groups Profiles which take into account the tastes of groups of peoples; for example, the service provider wants to create a free of charge service with no sport news which are instead used to create a pay service according to observed interests of group of peoples.

Following Group Profiles and Service Provider Requirements, the service provider does an automatic selection of Enriched News Items that are suitable for the service to be created. This selection is done
taking into account the semantic information and the legacy metadata related to each Enriched News Item. For example, in order to filter sport news for the pay service, semantic information and legacy metadata of each Enriched News Item are analyzed and one of them is selected for the service only if it is about sport or if it has some relationship with sport subjects.

The Service Building and Delivery step in the sequence of operations covers the creation and the delivery of service provider services. The output services are composed by a set of Enriched News Item. The chosen Enriched News Items are picked out and delivered to Home Ambient environments on a non broadcast channel.

### 2.5.2.3 Home Ambient side

#### 2.5.2.3.1 Service access and item enrichment functionalities

In Fig. 10 the Service access and item enrichment functionalities are analyzed as a sequence of operations.

![Fig. 10 – Service access and item enrichment functionalities](image)

The first step in the sequence of operations, Home Ambient Service Input, covers the input operations needed to access to all the Enriched News Items that compose the service delivered by the service provider and to select which of them are suitable for the Home environment.

The input service is available on the non-broadcast channel but it is also possible to access to the only MSQC directly from the broadcast channel when it is on air. Of course the two ingestion operations must be synchronized and the scheduling information on the programs to be recorded has to be shared by both the service provider environment and the home ambient environment; for example, when the “TG!” newscast of 1p.m. is on air it is possible to acquire the same audio-video file both at the Service Provider side and at the Home Ambient side in parallel only if the same scheduling information are shared between sides. This parallel and direct ingestion of MSQC from the broadcast channel gives to the system two alternative ways to manage the MSQC at Home Ambient side: the first one is to directly use the MSQC already ingested through the Broadcast channel, the second one is to get it on demand, when needed, from the Service Provider side through the non-broadcast channel and then use it (see section 2.5.2.4 for more details).

The second step in the operations sequence, item enrichment, covers the local enrichment of the received and selected news items and can be split in two different phases:
in the first one a further step of Basic Content Enrichment is carried out starting from the MSQC or from other available contents to obtain equivalent contents by means of locally executed transcoding and transmoding operations, taking into account, for example, which are the most used devices and consequently the most useful content formats in every single home ambient environment (e.g. if the MSQC is a MPEG2TS, it can be locally converted into AVI format or WMV format to be played on a particular handled device or on a internet browser if the i-phone or the PC are often used in the ambient); in fact for the service provider is not profitable to make all the possible format conversions a priori, while it is useful to have in every home ambient environment the formats that are usually the most used in that specific environment.

*In the second one, Enrichment, turns into account the possibility for the users of a home ambient to choose new external sources to get enrichments for News Items and get new related contents from these. For example, if users of a particular home ambient are interested to news given by the “La Repubblica” newspaper’s site and this external source is not included in those used by the service provider during the SP item enrichment step, this source can be added and semantic information and metadata already present in the News Items are used to select contents coming from that external source and to further enrich the News Items with this selected contents. Another possibility for users is to add local tags in order to have a description of every News Item from the point of view of a local familiar vocabulary; for example, if the Rossi family use to give to the Italian prime minister Silvio Berlusconi the nickname “Mister-B” and dad add the local tag “Mister-B” to a news about him, all the people logged on the Rossi’s Home Ambient will be able to find this news also searching for “Mister-B”. This “familiar” enrichment can be very useful to retrieve news in the system using the News Find Engine service.*

### 2.5.2.3.2 Personalized service building and delivery functionalities

In Fig. 11 the *Personalized service building and delivery functionalities* are analyzed as a sequence of operations.

![Diagram](image331x793 to 571x824)

**Fig. 11 – Personalized service building and delivery functionalities**

These functionalities are driven by *User Profile* and by *Physical Context Profile*.

Following *User Profile*, the Home Ambient does an automatic selection of available Enriched News Items that are suitable for the particular user which will enjoy the service. This selection is done taking into account the semantic information, the legacy metadata and the local tags related to each Enriched News Item. The *User Profile*'s parts taken into account are those that describe the interests of that particular user. The user information used to create them can be derived from the user behavior.
in the Social WEB, from user behavior when he is enjoying services in his home ambient and from an explicit profile provided by the user himself.

Following User Profile and Physical Context Profile, the Home Ambient does an automatic selection of contents that are suitable for the particular user which will enjoy the service and for the fruition context (user device and environment). This selection is done taking into account the physical information and the adaptation information related to each content present in each selected Enriched News Item. The User Profile’s parts taken into account are those that describe the characteristics of that particular user in terms of fruition requirements (e.g. the user speaks only Italian, the user is blind). The user information used to create them can be derived from an explicit profile provided by the user himself. The Physical Context Profile describes the particular context in which the user will enjoy the service, in terms of device physical characteristics and in terms of physical environment (e.g. the device is an audio and text capable device and the person is cooking in the kitchen). The environment information can be provided by ambient sensors and the device information can be provided by the device itself.

The Personalized Service Building and Delivery step in the sequence of operations covers the creation of the personalized services. An output service is composed by a set of contents. The chosen contents are picked out from selected Enriched News Item and then delivered to user device on a HA local channel.

2.5.2.4 Sides interaction

In Fig. 12 information and contents exchanged between the two main sides are depicted.

![Diagram of information and contents exchanged between sides](image)

**Fig. 12 – Information and contents exchanged between sides**

The information and contents exchange can take place over two different channels: a Broadcast feed channel, which is a typical unidirectional push channel, and a Non-Broadcast channel which is, on the contrary, a bidirectional push or pull channel, for example Internet. The first one is the same channel where programs distributed over many main streams are transmitted by the broadcasters. The scheduling of these transmissions is described in worldwide available EPGs. In general, each news item detected by a server provider is part of an on air program, usually a newscast.

For each News Item to be delivered from Service Provider side to Home Ambient sides several kinds of entities are exchanged: the MSQC which is the content at the same quality as the broadcasted one and is referred as main content, the alternative item contents which are contents physically or logically related to the main one, for example equivalent converted contents or semantically related
contents, and finally the *item related information* which are all the data for the item general management.

Let’s tackle the issue of how to transfer all these contents and data to the Home Ambient side and answer to many considerable questions such as: is the material pushed from the Service Provider to the Home Ambient? Or is it the Home Ambient that is going to ask for the material? And are all the contents and data transferred through the non broadcast channel?

Indeed there are different ways to solve these issues, and hereafter some solutions are presented in order to give a wider vision of how the Personalized News use case can manage these particular operations.

* Dedicated feed mode (see Fig. 13).
  The Service Provider broadcasts a dedicated *SP Service feed* which includes all the stuffs composing the service. This is a not viable solution.

  ![Fig. 13 – Dedicated feed mode](image)

* IP only mode (see Fig. 14).
  All stuffs are transferred via the non broadcast channel, which is a bidirectional channel, so contents can be either pushed by the Service Provider to the Home Ambient for every news item or asked on demand by the Home Ambient. This modality has some problems related to the transferring of the MSQC, it could be really weighty in terms of band exploitation and furthermore it could add to much delay in the fruition phase.
### MSQC Stream only mode (see Fig. 15).

This kind of solution foresees to transfer through the non-broadcast channel the *alternative item contents* and the *item related information* with a new kind of data, the identification information derived by EPG, about the main stream program containing the news item, *MSQC on air container identification*. The MSQC is no more carried by the non-broadcast channel. At the Home Ambient side the *MSQC on air container identification* is matched with EPG info in order to acquire the correct program directly from the main stream and then extract the wanted MSQC. This solution can solve previous band exploitation problems, but if the Home Ambient is not able to acquire the identified program from the main stream there is no way for the end user to see the MSQC in the final service.

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**Fig. 14 – IP only mode**

**Fig. 15 – MSQC Stream only mode**
**MSQC Mixed mode (see Fig. 16).**
This is a mix of the **IP only** mode and the **MSQC Stream only** mode. All operations are done as in the **MSQC Stream only** mode, but in case of missing stream acquisition it is possible to transfer the **MSQC** on demand from the Service Provider side through the non broadcast channel as in the **IP only** mode.

![Diagram](image)

**Fig. 16 – MSQC Mixed mode**
3. Functional Requirements Overview

In this chapter some important system's topics are analyzed and guidelines about requirements on them are given in the first part (see section 3.1). Afterwards an overview of functional requirements for each single part of the system and each foreseen functionality is presented (see sections 3.2, 3.3 and 3.4).

3.1 Shared requirements

3.1.1 News item container

From a logical point of view all info and contents related to a particular item can be imagined to be part of a virtual container called News Item. From a physical point of view this virtual container needs to be implemented by means of a real container called News Item Container (NIC). The next two sections describe NIC’s general requirements in detail and provide a deeper analysis about the content referencing used by the NIC itself.

3.1.1.1 Container general requirements

Each News Item should be managed by an unambiguously identified container (NIC). The NIC is the real object which goes through the system and it is enriched along the workflow as shown in 2.5.2. General requirements related to the NIC are depicted in the next bullets:

- the physical management of contents inside the NIC should be as light as possible in order to avoid any system overload during workflow operations (i.e. the access to content should occur only when needed and the NIC should be delivered without moving all associated contents). To enable this, two content management modes should be used inside the NIC:
  - Reference mode: the container holds just a reference to the real physical content. This method should be used for all non-textual contents.
  - Direct mode: the content is really present inside the container. This method should be used only for textual contents.
- two levels of service personalization are foreseen, the interest level, where the News Item is chosen following end user topic preferences and the adaptation level, where, inside the chosen News Item, the useful content is selected following end user fruition preferences and environment/device characteristics. The NIC should make easy these operations (see Fig. 17):
  - keeping all News Item information useful for the selection at interest level by means of attractors;
  - keeping all information useful for the selection of the proper physical content among available contents by means of suitable content descriptions and structures (Content Features and Structures).
as to Content Features, every real or referred content included into a NIC should be described through its physical intrinsic characteristics and therefore (see Fig. 18):

- the container should hold all available physical characteristics about every single content;
- the description of content should be a description of how the content is physically made, not a description of how it could be used or from what it is derived;

as to Content Structures, every real or referred content included into a NIC should be contextualized from three different points of view:

- from a “physical” point of view (physical logic, see Fig. 19)
  - the content should be inserted in a content structure which highlights relationships with other contents into the same container following physical derivation criteria. Transcoding, transmoding, summarization, and translation are the general physical derivation categories which should be managed by the NIC.
from an “equivalence of use” point of view (shape logic see Fig. 20)

- the content should be inserted in one or more content structures which highlight relationships of equivalence with other contents into the same container, according to “equivalence of use” criteria. Each of these relationships is defined as content shape and every single content structure as shape structure;

- a certain content could have different relationships of equivalence with other contents in NIC when used in different contexts, so each content structure should represent the set of relationships related to a particular context of use (for example, a certain image is the equivalent shape “thumbnail” when used in the context A, shape structure A, but could be the equivalent shape “fullResolutionImage” when used in another context B, shape structure B).

from a “use instead of” point of view (representation logic see Fig. 21)

- the content should be inserted in one or more content structures which highlight relationships with other contents into the same container, according
to “representativeness” criteria. Each of these relationships is defined as representation and every single content structure as representation structure;

- a certain content could have different relationships of representativeness with other contents in NIC when used in different contexts, so each content structure should represent the set of relationships related to a particular context of use.

![Fig. 21 – Representation Content Structure](image)

- in each NIC a main content must be present representing, with its equivalent and representative contents, the central entity of the service. The NIC attractors are valid for the main and equivalent contents and define the “equivalence” criteria (only contents which are congruent with attractors can be defined as equivalent to the main content);

- in each NIC other main related contents could be present representing, with their equivalent and representative contents, other entities related to the central one.
  - for those contents NIC attractors are meaningless and they don’t define the “equivalence” criteria;
  - every main related content should be contextualized from a “facet” point of view (facet logic see Fig. 22);
    - each main related content should be inserted in one or more content structures which aggregate them following criteria (facets) derived from the main content. The who, when, where, what, why and how of the Main content are examples of aggregation criteria which could be managed by the NIC (for example, if one of the “main content’s who” is “Barack Obama” a possible aggregation is “all main related contents where who is “Barack Obama”, so the facet is who with the value Barack Obama).
Ultimately every single NIC should contain:

- an univocal identifier;
- a set of attractors managed as a configurable set of specific information about the internal main content set, useful for all selection operations at item level. Possible specific information are:
  - legacy information detected during the ingestion and item detection phase;
  - semantic information added during the enrichment phases;
  - User Generated Information (TAG) added during the fruition of the content by final users.
- a set of contents managed in reference or direct mode and described following their physical characteristics. In particular the NIC should contain:
  - one main content;
  - many main related contents fully contextualized in term of facet logic;
  - many secondary contents fully contextualized (according to physical, shape and representation logics).

### 3.1.1.2 Content referencing analysis

The content referencing is one of the two contents management modes inside the NIC.

In the NoTube environments (Service Provider side and Home Ambient side) there are Entities (NIC in NoTube sense) which have associated Content and Information as showed in Fig. 23.
Fig. 23 – Entities which have associated Content and Information

The content referencing mode allows the system to manage an entity from the information point of view separately with respect to the management of the associated content as depicted in Fig. 24.

Fig. 24 – Content referencing mode

Some requirements are raised by this kind of management:

- It must be possible to make the entity independent from the physical location of the content (if the content is moved it is not mandatory to modify the entity);
- It must be possible to get a content that is a fragment of a wider content, which is the visible object (see Fig. 25);

Fig. 25 – Content that is a fragment of a wider content

- In case of interoperability of many different environments, every single ambient can access to content even if it is physically located in another ambient. Anyway location information must be under the control and management of an authority that is responsible for the ambient in
which the content is physically located. The identification between the ambients must be univocal.

- It must be possible to manage several copies of the same content each located in its own ambient, inside the entity copies have to be identified by the same identifier and each has to be under the control of the authority of that definite ambient; there is a master authority which is the one that produced the unique identifier inside the entity and several secondary authority responsible for other ambients in which content copies are located (see Fig. 26);

![Fig. 26 – Management of several copies of the same content](image)

- Each ambient should be independent from the others (it can decide if sharing contents with other ambients or not).

### 3.1.2 Content Access

This section is about reasoning on modalities to access to contents by the clients of services, about possible solutions on where it would be better to put the content servers that carry out the delivery towards fruition clients, so it is also about where to have contents that are ready to be delivered and, in case, about when this contents have to be moved from the Service Provider side to the Home Ambient side. In the following discussion the Home Ambient Side in split in two different areas: the Home Ambient Server Side which covers all the server oriented functionalities and the Home Ambient Client Side which covers the client oriented functionalities (see sections 3.3 and 3.4).

#### 3.1.2.1 Contents access reasoning

There are two different contents fruition modes:

1. streaming-like mode: the fruition client is into the Logical Home Ambient (i.e. Home Ambient Server Side accessible);
2. download mode: the fruition client is isolated from the Logical Home Ambient (i.e. Home Ambient Server Side not accessible).

The system functionality foresees that between the Service Provider Side and the Home Ambient Server Side there is always a physical transfer of NICs. During the phase of creation of services, these are used to physically build the service to provide to the fruition client.

In this perspective, we can identify different types of content according to the modes of management within these NIC:

1. contents physically present inside NIC:
   a. text: textual content managed internally to the NIC, it doesn’t exist as physical object outside of NIC;
2. contents referenced by NIC:
a. Web Content: the content is on the WEB (therefore it is accessible via http protocol at the specified URL) and, in general, it’s a complex structure of pages created dynamically (i.e. a WEB site). Hence:
   i. It is not serviceable to manage a full copy inside the NIC;
   ii. at NIC Physical Content level the URL string which points to the real WEB content is managed as Real Content;

b. file (in wide sense): contents exist as stand alone objects (generally in the form of file) and it must be possible to manage the information into the NIC in a separated way compared to the management of such objects. Hence:
   i. files are handled inside the NIC by means of references.

Several contents can originate whether inside the Service Provider Side or directly inside the Home Ambient Server Side (Home Ambient Content Enrichment). In the last case the content is already present into the Home Ambient and there is not a copy inside the Service Provider Side, therefore the delivery of content towards the fruition client has to be done by a content server living in the Home Ambient Server Side following the modalities foreseen by the service.

3.1.2.1.1 Streaming-like mode fruition

Text

The content, materially present into the NIC, is directly loaded in the Home Ambient Server Side together with the NIC itself. In case of Home Ambient Content Enrichment, the new content is physically inserted into the NIC which already exists in the Home Ambient Server Side. The delivery of content towards the fruition client has to be done by a content server living in the Home Ambient Server Side following the modalities foreseen by the service (see Fig. 27).

![Fig. 27 – Text content fruition](image)

WEB content

The content, referenced by a URL into the NIC, is not loaded into the Home Ambient Server Side. The reference URL reaches the Home Ambient together with the NIC. In case of Home Ambient Content Enrichment, the new URL is physically inserted into the NIC which already exists in the Home Ambient Server Side. The fruition client, by means of the URL, is able to access to relevant contents following the modalities foreseen by the service (see Fig. 28).
For such kind of content we can identify three different strategies for the loading into the Home Ambient and for the access by the fruition client.

### 3.1.2.2 Strategy 1 (“cache memory”)

Using references inside the NIC, contents are loaded on demand into the Home Ambient Server Side which acts as a *cache memory*. MSQC contents can also be already present in the Home Ambient Server Side because they can be directly acquired from the on-air main stream. All contents are transferred in this *cache* before being sent to the fruition client. The delivery of contents is performed exclusively by the *content server* living in the Home Ambient Server Side (see Fig. 29) following the modalities foreseen by the service (directly or upon request of the client to which the reference to cache contents has been sent). Such modality is exploitable also for contents derived from *Home Ambient Content Enrichment*: in this case cache memory and master memory coincide.
3.1.2.3 Strategy 2 ("direct access")
Contents are never stored into the Home Ambient Server Side, they just live at the Service Provider Side. The delivery of contents is performed exclusively by the content server living in the Service Provider Side (see Fig. 30) following the modalities foreseen by the service (directly or upon request of the client to which the reference to such contents has been sent). Of course, such modality is not exploitable for contents derived from Home Ambient Content Enrichment.

Fig. 30 – Direct access file content fruition

3.1.2.4 Strategy 3 ("mixed access")
It is a mix of the two previous approaches: according to the typology of the content and to the local availability (and to other evaluation parameters) one strategy or the other is applied.

3.1.2.4.1 Download mode fruition
In download mode fruition all the contents which are present only in the Home Ambient Server side have to be downloaded on the device before it is disconnected from the server ambient. As to other contents, they are always accessible through the non broadcast channel.

3.1.2.5 Issues on time of loading in “cache memory” mode
From the point of view of timing of operations into the Home Ambient, it is possible to use the time of input in the following primary conditions (relating to Newscast, NIC, Content) in order to represent temporal moments of interest in this ambit:

T1. Newscast OnAir: it is the moment in which a particular program that has to be acquired is on air and is acquired (if foreseen) by the Home Ambient;

T2. NIC Ingested: it is the moment in which a particular NIC, provided by the Service Provider, is uploaded into the Home Ambient;

T3. NIC Approved: it is the moment in which a particular NIC, coming into the Home Ambient and coherent with respect to the Ambient rules, is made persistent in the Home Ambient itself;

T4. NIC Selected: it is the moment in which a particular NIC, stored into the Home Ambient, is selected as a component of a service because it meets semantic requirements of that service (interest level);

T5. Content Selected: it is the moment in which, stated a NIC as component of a particular service, the content meeting the desired physical service requirements is identified and selected among all possible equivalent contents into the same NIC (adaptation level);

T6. Content Exploited: it is the moment in which a definite selected content is effectively used. Of course the presence of contents has to be guaranteed, where the fruition client is expecting
for them, within this time. In general it would be better to have at disposal contents as soon as possible.

MSQC contents that are not loaded on demand get into the Home Ambient Server Side always at time \( T1 \).

All on demand contents can enter into the system just starting from time \( T2 \) (in fact only from this time on the Home Ambient has got references to contents that are into the Service Provider Side, transmitted through the NIC). In detail:

1. **Loading between \( T2 \) and \( T3 \):**
   i. full preemptive mode A: all contents related to all NIC available in input are loaded in the Home Ambient Server Side. This operation is heavy and useless because a) it is not sure that all NIC will be admitted by the Home Ambient and b) it is not sure, even if admitted, that all equivalent contents will be exploitable by that Home Ambient. This solution could be helpful only for the temporal distance from the time of use.

2. **Loading between \( T3 \) and \( T4 \):**
   i. full preemptive mode B: all contents related to all approved NIC are loaded in the Home Ambient Server Side. This solution partially solves overload issues seen at 1.i but in this way there is still the load of contents that potentially are never used for personalized services provided by the ambient under consideration;
   ii. adaptive preemptive mode B: as in 2.i but only contents with a higher chance to be used are loaded. You can keep track of service physical requirements normally used into the ambient under consideration in order to load in preemptive mode only contents respecting them. This operation could be potentially useful because there is the chance to load contents related to NIC that anyhow are searchable in the Home Ambient (News Find Engine service, all the news accepted in the Home Ambient are searchable) even if not necessarily these NIC contribute to create a personalized service (Alerting News service – My News Agency service). It is again a heavy operation.

3. **Loading between \( T4 \) and \( T5 \):**
   i. full preemptive mode C: all contents related to all NIC foreseen for a particular service are loaded in the Home Ambient Server Side. This solution solves NIC overload issues seen at point 2, but in this way there is still the load of contents that potentially are never used for personalized services provided by the ambient under consideration;
   ii. adaptive preemptive mode C: as in 3.i but only contents with a higher chance to be used are loaded. You can keep track of service physical requirements normally used into the ambient under consideration in order to load in preemptive mode only contents respecting them. With respect to point 2, this solution is slightly better from the load point of view but is unsuccessful from the research services point of view.

4. **Loading after \( T5 \):**
   i. preemptive mode: only contents that will be used in the fruition phase are loaded. This is the best solution for the load but is really near to the fruition phase then it may introduce some delay in the fruition of content itself. Same problems as in point 3 with respect to research services.

5. **Loading at \( T6 \):**
i. direct load mode: contents are loaded when they are going to be used. This solution introduces delay problems for the first fruition, these problems are no more present from the second fruition on.

In case of Home Ambient Content Enrichment, the enrichment normally takes place between time T3 and T4: all and only approved NIC are locally enriched regardless of whether they will be used or not in order to create a personalized service.

3.1.3 Semantic Enrichment

The semantic enrichment is the process enabling the acquisition of knowledge about the contents which is the base for the personalization of services. This process can be seen as a layered process in which additional knowledge is added and coded step by step.

As to Personalized Semantic News Use Case, the considered semantic enrichment is based on:

- the analysis of texts collected into the News Item both as attractors or equivalent and related contents (for example, the text content automatically transcribed from the speech);
- the enrichment of the set of legacy categories to which each News Item can be associated (for example, P/Meta categories).

In Fig. 31 the semantic enrichment stack related to text analysis is showed.

Fig. 31 – Layered process for semantic enrichment (1)

At level 0 in the stack, textual units and language expressions generated by a natural language processing analysis are used as representative keywords.

At level 1, not contextualized Named Entities are included. They contain the previous textual units categorized according to predefined ontologies (for example, category city and textual unit Rome).

At level 2, generically contextualized Named Entities are included. This generic contextualization is based on one or more predefined knowledge bases (for example, the city Rome is contextualized with the related DBPedia URI).
At level 3 the Named Entities are contextualized in the document space, defined in terms of the classical “Six Ws” journalistic rules (Who, When, Where, What, Why and How). For example, a particular Named Entity is categorized as *Who* if it coincides with the subject involved in the event, as *Where* if it coincides with the place in which the event happened and so on (e.g. *city Rome* is *Where* the fact happened).

In the Fig. 32 the semantic enrichment stack related to categories enrichment is showed. P/Meta Genres are suggested as legacy categories.

![Fig. 32 – Layered process for semantic enrichment (2)](image)

At level 0, categories belonging to predefined domains are added to the News Item exploiting shared categories taxonomies or ontologies (for example wikipedia categories).

At level 1, individual categories are added to the News Item. They are defined by the final user and they are valid only in his particular home environment.

### 3.1.4 Content Enrichment

The content enrichment is the process related to all operations which add new contents to the NIC.

Any stuff which can be used to build the final service (i.e. which can be an element of the final UI) has to be managed as a content in the NIC; so if a NIC’s attractor is used also as content in the final UI it must be present both as a NIC’s attractor and as NIC’s content. For example, the text content automatically transcribed from the speech is an attractor (it is used for search and selection purposes) but it could be also exploited as an alternative content to be displayed on text-only devices, so it has to be managed even as NIC’s content. This approach allows taking advantage of the structures for the equivalent and representative contents (for example, a translation of the previous speech_to_text text can be managed as an equivalent content, while only the original text is managed as attractor).

As to the content enrichment, there are two different situations, where the discriminating thing is the type of relationship, physical or logical, with the NIC.

**Physical relationship**

In the physical relationship type the new content is physically derived from a content already present in the NIC (or from an existent NIC’s attractor). The basic concept is “let’s create a new content from NIC’s content”. The derivation operations (and therefore the relationships) can be classified as depicted in the Tab. 4.
### Type of Relationship

<table>
<thead>
<tr>
<th>Type of Relationship</th>
<th>Text</th>
<th>Image</th>
<th>Video</th>
<th>Audio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transcoding</td>
<td>- format conversion</td>
<td>- data size reduction</td>
<td>- frame rate reduction</td>
<td>- audio stereo-to-mono conversion</td>
</tr>
<tr>
<td></td>
<td>- …..</td>
<td>- dimension reduction</td>
<td>- reframing</td>
<td>- format conversion</td>
</tr>
<tr>
<td></td>
<td>- …..</td>
<td>- color reduction</td>
<td>- spatial resolution reduction</td>
<td>- …..</td>
</tr>
<tr>
<td></td>
<td>- …..</td>
<td>- color-to-grey scale transformation</td>
<td>- color-depth reduction</td>
<td>- …..</td>
</tr>
<tr>
<td></td>
<td>- …..</td>
<td>- format conversion</td>
<td>- format conversion</td>
<td>- …..</td>
</tr>
<tr>
<td>Transmoding</td>
<td>- text-to-audio transformation</td>
<td>- image to text</td>
<td>- video-to-image transformation</td>
<td>- audio-to-text transformation</td>
</tr>
<tr>
<td></td>
<td>- …..</td>
<td>- …..</td>
<td>- video-to-text transformation</td>
<td>- …..</td>
</tr>
<tr>
<td></td>
<td>- …..</td>
<td>- …..</td>
<td>- video-to-audio transformation</td>
<td>- …..</td>
</tr>
<tr>
<td>Summarization</td>
<td>- text summarization</td>
<td></td>
<td>- key frame extraction</td>
<td>- audio highlight</td>
</tr>
<tr>
<td></td>
<td>- …..</td>
<td></td>
<td>- …..</td>
<td>- …..</td>
</tr>
<tr>
<td>Translation</td>
<td>- language translation</td>
<td></td>
<td>- language translation</td>
<td>- language translation</td>
</tr>
<tr>
<td></td>
<td>- …..</td>
<td></td>
<td>- …..</td>
<td>- …..</td>
</tr>
</tbody>
</table>

#### Tab. 4 – Physical relationship types vs. Media types [2]

All new contents of this type must be inserted in the NIC’s *physical content structure* which describes the physical relationships between contents and can be inserted in one or more NIC’s *shape content structures* or in one or more NIC’s *representation content structures*.

Between the derivation operations the reframing one is deeply analyzed in the section 3.1.4.1.

**Logical relationship**

In the logical relationship type the new content is not physically derived from contents or attractors which are already in the NIC, but it is chosen from outside because it is in some relation with the NIC matter. The basic concept is “let’s find and retrieve a new content which is related to the NIC”.

All new contents of this type can be only inserted in one or more *facet content structure* or in one or more *representation content structure* of the NIC.

#### 3.1.4.1 Automatic video Reframing

**3.1.4.1.1 Automatic video reframing algorithm based on Regions of Interest (RoI)**

The technology context is automatic video reframing. The goal of this technology is to automatically repurpose the video content, i.e. to adapt the image size to the screen size in a specific way, in order to provide a better viewing comfort.

The detailed description of the algorithm is given in D4.3 deliverable. It explains the different algorithms developed to address the problem.
3.1.4.1.2 Configuration of Automatic video reframing with web services

To better understand the automatic video reframing on the platform, the followings steps have been described:

- Definition of the automatic video reframing workflow which is based on the different basic workflows like MPEG2FileInput
- Instantiation of this workflow with a job creation

For an easier management of the platform, the automatic video reframing workflow is already created on the platform and the user needs only to create a job on this workflow thanks to web services.

After preliminary definitions in paragraph a), the automatic video reframing workflow is presented in paragraph b). This presentation is then followed by a description of the web services to be called after the workflow configuration of the platform.
a. Preliminary definitions

A **Workflow** is a model that describes a processing like reframing.

A **Job** is an instantiation of a workflow. It corresponds to a user request. (For example, "reframe the news video for a mobile device"). The workflowIdRef indicates the referenced workflow.

![Diagram of Preliminary definitions](image-url)
b. Automatic video reframing workflow definition and instantiation

The Fig. 34 describes the Automatic video reframing workflow.

The automatic video reframing workflow is based on 7 basic workflows which are detailed below. Then, the automatic video reframing workflow is described, followed by its instantiation.

- **Basic workflows**

**Description of Mpeg2 File Input Workflow**

```
<WORKFLOW name="Mpeg2FileInput" >
  <PARAM name="FileMode" type="String" />
  <PARAM name="FileName" type="String" />
  <PARAM name="FilePath" type="String" />
  <PARAM name="IPAddress" type="String" />
  <PARAM name="Login" type="String" />
  <PARAM name="Password" type="String" />
  <OUTPUTS>
    <OUTPUTDEF type="CompressedVideo" name="Video" />
    <OUTPUTDEF type="CompressedAudio" name="Audio" />
  </OUTPUTS>
</WORKFLOW>
```

**Description of Video Decoder Workflow**

```
<WORKFLOW name="Video Decoder" >
  <INPUTS>
    <INPUTDEF type="CompressedVideo" name="DecoderInput" />
  </INPUTS>
  <OUTPUTS>
    <OUTPUTDEF type="UncompressedVideo" name="DecoderOutput" />
  </OUTPUTS>
</WORKFLOW>
```

**Description of Audio Decoder Workflow**

```
<WORKFLOW name="Audio Decoder" >
  <INPUTS>
    <INPUTDEF type="CompressedAudio" name="DecoderInput" />
  </INPUTS>
  <OUTPUTS>
    <OUTPUTDEF type="UncompressedAudio" name="DecoderOutput" />
  </OUTPUTS>
</WORKFLOW>
```
Description of Cropping Workflow

```xml
<WORKFLOW name="Cropping">
  <PARAM name="DestinationAspectRatio" type="String" />
  <PARAM name="Cropping mode" type="String" />
  <PARAM name="MinimumCoverageRatio" type="UInt32" />
  <INPUTS>
    <INPUTDEF type="UncompressedVideo" name="VideoReframedInput" />
  </INPUTS>
  <OUTPUTS>
    <OUTPUTDEF type="UncompressedVideo" name="VideoReframedOutput" />
  </OUTPUTS>
</WORKFLOW>
```

Description of H264 video encoder Workflow

```xml
<WORKFLOW name="H264Encoder">
  <PARAM name="Bitrate" type="UInt32" default="1000000">
    <RESTRICTION><RANGE min="100000" max="2000000" /></RESTRICTION>
  </INPUTS>
  <INPUTS>
    <INPUTDEF type="UncompressedVideo" name="EncoderInput" />
  </INPUTS>
  <OUTPUTS>
    <OUTPUTDEF type="CompressedVideo" name="EncoderOutput" />
  </OUTPUTS>
</WORKFLOW>
```

Description of AAC-LC audio encoder Workflow

```xml
<WORKFLOW name="AAC-LC Encoder">
  <PARAM name="Bitrate" type="UInt32" default="480000" unit="bps" />
  <RESTRICTION><RANGE min="4750" max="512000" /></RESTRICTION>
  <INPUTS>
    <INPUTDEF type="UncompressedAudio" name="AudioEncoderInput" />
  </INPUTS>
  <OUTPUTS>
    <OUTPUTDEF type="CompressedAudio" name="AudioEncoderOutput" />
  </OUTPUTS>
</WORKFLOW>
```

Description of RTSP output Workflow

```xml
<WORKFLOW name="RSTP output">
  <PARAM name="IP address" type="UInt32" />
  <PARAM name="UDP port" type="UInt32" />
  <PARAM name="TTL" type="UInt32" />
  <PARAM name="SDP file name" type="String" />
  <PARAM name="Session name" type="String" />
  <INPUTS>
    <INPUTDEF type="CompressedVideo" name="RTSPVideoInput" />
    <INPUTDEF type="CompressedAudio" name="RTSPAudioInput" />
  </INPUTS>
  <OUTPUTS>
    <OUTPUTDEF type="RTSPOutput" name="RTSPOutput" />
  </OUTPUTS>
</WORKFLOW>
```
• **Description of Automatic video reframing workflow**

```xml
<WORKFLOW name="AutoVideoReframing" type="offline" priority="0.50" Id="AutoVideoReframing ">
  <TASKS>
    <WORKFLOWREF id="100" workflowIdRef="Mpeg2FileInput">
      <PARAM name="FileName" visibility="public" label="Input Video File"/>
      <PARAM name="FilePath" visibility="public" label="Input Video File Path"/>
      <PARAM name="Address" visibility="protected" value="ftp.notube.com"/>
      <PARAM name="Password" visibility="protected" value="NoTube"/>
      <OUTPUTREF>
        <OUTPUTREF name="Video" id="1"/>
        <OUTPUTREF name="Audio" id="2"/>
      </OUTPUTREF>
    </WORKFLOWREF>

    <WORKFLOWREF id="101" workflowIdRef="VideoDecoder">
      <INPUTREF name="DecoderInput" id="3"/>
      <OUTPUTREF name="DecoderOutput" id="4"/>
    </WORKFLOWREF>

    <WORKFLOWREF id="102" workflowIdRef="AudioDecoder">
      <INPUTREF name="DecoderInput" id="5"/>
      <OUTPUTREF name="DecoderOutput" id="6"/>
    </WORKFLOWREF>

    <WORKFLOWREF id="103" workflowIdRef="Cropping">
      <PARAM name="DestinationAspectRatio" visibility="public" label="Destination aspect ratio"/>
      <PARAM name="Cropping" visibility="private" label="Automatic content adaptation"/>
      <PARAM name="MinimumCoverageRatio" visibility="private" value="53"/>
      <INPUTREF name="VideoReframedInput" id="7"/>
      <OUTPUTREF name="VideoReframedOutput" id="8"/>
    </WORKFLOWREF>

    <WORKFLOWREF id="104" workflowIdRef="H264Encoder">
      <PARAM name="Bitrate" visibility="public" label="Video bitrate">
        <RESTRICTION>RANGE min="100000" max="200000000"/></RESTRICTION>
      <INPUTREF name="EncoderInput" id="9"/>
      <OUTPUTREF name="EncoderOutput" id="10"/>
    </WORKFLOWREF>

    <WORKFLOWREF id="105" workflowIdRef="AAC-LC Encoder">
      <PARAM name="Bitrate" visibility="public" label="Audio bitrate" default="100000"/>
      <INPUTREF name="AudioEncoderInput" id="11"/>
      <OUTPUTREF name="AudioEncoderOutput" id="12"/>
    </WORKFLOWREF>

    <WORKFLOWREF id="106" workflowIdRef="RTSPOutput">
      <PARAM name="IP address" visibility="private" value="230.1.1.5"/>
      <PARAM name="UDP port" visibility="private" value="4000"/>
      <PARAM name="TTL" visibility="private" value="3"/>
      <PARAM name="SDP file name" visibility="private" values="NoTube.sdp"/>
      <INPUTREF name="RTSPAudioInput" id="13"/>
      <INPUTREF name="RTSPVideoInput" id="14"/>
      <OUTPUTREF name="RTSPOutput" id="15"/>
    </WORKFLOWREF>
  </TASKS>
</WORKFLOW>
```
• **Instantiation of the workflow**

For the job configuration, the user receives the public description of the workflow. The public description of reframing workflow is the following:

```xml
<WORKFLOW name="Auto Video Reframing" type="offline" priority="0...50" Id="AutoVideoReframing">
   <PARAM name="Input video File" type="String" />
   <PARAM name="Input video File Path" type="String" />
   <PARAM name="Video bitrate" type="UInt32" />
      <RESTRICTION><RANGE min="100000" max="20000000"/></RESTRICTION>
   <PARAM name="Audio bitrate" type="UInt32" default="100000" />
   <PARAM name="Destination aspect ratio" type="String" />
</WORKFLOW>
```

A job example that instantiates the previous workflow can be:

```xml
<JOB name="Automatic video reframing" workflowIdRef="AutoVideoReframing" priority="1">
   <PARAMDESC name="Input video File" value="news.ts" />
   <PARAMDESC name="Input Video Path File" value="FTP/" />
   <PARAMDESC name="Video bitrate" value="150000" />
   <PARAMDESC name="Audio bitrate" value="32000" />
   <PARAMDESC name="Destination aspect ratio" value="QVGA" />
</JOB>
```
c. Automatic video reframing web services

The user will use the following web services for the Reframing functionality. Each web service is described with a table which synthesizes the parameters and with a XSD schema for more details.

- **Workflow get list**

  This web service operation is used to know the different configured workflows and get back the workflow id and workflow name.

<table>
<thead>
<tr>
<th>Workflow get list request parameters</th>
<th>Workflow get list answer possibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>Number of items</td>
</tr>
<tr>
<td></td>
<td>For each workflow</td>
</tr>
<tr>
<td></td>
<td>o Workflow name</td>
</tr>
<tr>
<td></td>
<td>o Workflow id</td>
</tr>
<tr>
<td></td>
<td>o Workflow brief description</td>
</tr>
<tr>
<td></td>
<td>o Web service “instantiability” flag</td>
</tr>
<tr>
<td></td>
<td>o Creator (User, system release)</td>
</tr>
<tr>
<td></td>
<td>o Type</td>
</tr>
</tbody>
</table>

![Workflow get list XSD schema](image)
- **Job create**

  This web service operation is used to create a job corresponding to a workflow (for example, to create the job “reframing” and start this job).

<table>
<thead>
<tr>
<th>Job create request parameters</th>
<th>Job create answer possibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job name</td>
<td>Job Id</td>
</tr>
<tr>
<td>WorkflowIdRef</td>
<td>Bad rights</td>
</tr>
<tr>
<td>Priority</td>
<td>Coherency problem with its report</td>
</tr>
<tr>
<td>Job parameters (defined previously in b)</td>
<td>Workflow not found</td>
</tr>
</tbody>
</table>

Fig. 36 – Job create XSD schema
• **Job modify**

This web service operation is used to modify an existing job.

<table>
<thead>
<tr>
<th>Job modify request parameters</th>
<th>Job modify answer possibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job name</td>
<td>OK</td>
</tr>
<tr>
<td>WorkflowIdRef</td>
<td>Bad rights</td>
</tr>
<tr>
<td>Job parameters (defined previously in b)</td>
<td>Coherency problem with its report</td>
</tr>
<tr>
<td></td>
<td>Job not found</td>
</tr>
</tbody>
</table>

![Job modify XSD schema](image)

**Fig. 37 – Job modify XSD schema**
3.2 Service Provider side functional requirements

3.2.1 Input Management functionalities
This is the set of functionalities internal to the Service Provider side which allow accessing to external sources in order to find required contents and information and to put them into the service provider environment.

Archive Access
It is the functionality that allows accessing to legacy archives in order to find and retrieve archived contents for content enrichment.

Scheduling Info Access
It is the functionality that allows accessing to scheduling information given by external EPG providers. This information is related to available broadcast streams.

Broadcast Stream Access
It is the functionality that allows accessing to selected broadcast channels in order to find and retrieve the main contents.

Semantic Cloud Access
It is the functionality that allows accessing to the Semantic Cloud in order to find and retrieve semantic enrichment information.

Web Access
It is the functionality that allows accessing to selected parts of the Web for content enrichment issues.

Ingestion & Item Detection
It is the functionality which covers all the issues related to the ingestion of main contents and related metadata for each news item. This functionality creates NICs under the control of SP Input Rules and using Scheduling Info.

SP Input Rules Management
It is the functionality that allows the service provider to create/modify the SP Input Rules to be used to control the creation of the NIC.
3.2.2 Item Management functionalities
This is the set of functionalities internal to the Service Provider side which allow managing and store NIC.

Service Provider Item Enrichment
It is the functionality that allows enriching each NIC with additional info and contents: in particular this functionality can be split in Basic Content Enrichment, Semantic Enrichment and Enhanced Content Enrichment (see section 2.5.2.2.1 ). Among these a peculiar function is the reframing one (see section 3.1.4.1 ).

Service Provider Item Repository
It is the functionality that provides the persistence of all NICs internally to the service provider environment.

3.2.3 Service Management functionalities
This is the set of functionalities internal to the Service Provider side which allows creating and managing service provider services based on NICs.

Service Buffer
It is the functionality that provides the persistence of the created services.

Service Building
It is the functionality that builds a service as a sequence of compliant NICs under the control of SP Service Rules.

Item selection
It is the functionality that estimates for each NIC the level of compliance with the expected service under the control of SP Service Rules.

SP Service Rules Management
It is the functionality that allows the service provider to create/modify the SP Service Rules to be used to control the creation of the service provider services and the NIC selection. These rules take also into account the tastes of groups of peoples originated from the Social Web.

Content Publication
It is the functionality that makes internal contents available for the delivery outside the service provider environment.

Synch Info Delivery
It is the functionality for the delivery of synchronization information between Service Provider side and Home Ambient side.

Service Delivery
It is the functionality which covers all the issues related to the delivery of service provider services in term of sequence of NICs.

Content Delivery
It is the functionality which covers all the issues related to the delivery of contents referred by delivered NICs.

Group of Users Info access
It is the functionality that allows accessing from the Social Web to information which takes into account the tastes of groups of peoples.
3.3 Home Ambient Server side functional requirements

3.3.1 Input Management functionalities
This is the set of functionalities internal to the Home Ambient Server side which allows accessing to service provider services and to many external sources in order to find required contents and information and to put them into the home ambient environment.

Broadcast Stream Access
It is the functionality that allows accessing to selected broadcast channels in order to find and retrieve the main contents.

Position Info Access
It is the functionality that allows accessing to external information about scheduling and synchronization.

Content Access
It is the functionality which covers all the issues related to the access to remote contents referred by received NICs.

Service Access
It is the functionality for the access to the services delivered by the service provider.

Web Access
It is the functionality that allows accessing to selected parts of the Web for local content enrichment issues.

HA Input Rules Management
It is the functionality that allows creating/modifying the HA Input Rules to be used to control the main content ingestion, the NIC approval and enrichment.

HA Ingestion
It is the functionality which covers all the issues related to the ingestion of main contents for the home ambient environment. This functionality operates under the control of HA Input Rules and using Scheduling and Synch Info.

Input Buffer
It is the functionality that provides buffering capabilities for all Home Ambient inputs.
3.3.2 Item Management functionalities
This is the set of functionalities internal to the Home Ambient Server side which allow managing and store local NIC.

User Generated Info Management
It is the functionality for the management of user generated info, as tags, related to each NIC present in the home ambient.

Item Approval
It is the functionality that estimates for each NIC the level of compliance with the expected home ambient requirements under the control of HA Input Rules. Not compliant NICs are discarded.

HA Item Enrichment
It is the functionality that allows enriching each approved NIC with additional info and contents: in particular this functionality can be split in Basic Content Enrichment and Enrichment (see section 2.5.2.3.1).

Home Ambient Item Repository
It is the functionality that provides the persistence of all NICs internally to the home ambient.

3.3.3 Service Management functionalities
This is the set of functionalities internal to the Home Ambient Server side which allow creating and managing personalized services based on NICs.

Search Criteria Management
It is the functionality that allows defining the Search Criteria to be used in search operations.

HA Service Rules Management
It is the functionality that allows the Home Ambient user to create/modify the HA Service Rules to be used to control the creation of the personalized services and the NIC and content selection.

Item Selection
It is the functionality that estimates for each NIC the level of interest related to a given user under the control of User&Context Rules and estimate for each NIC the level of compliance with the expected service under the control of HA Service Rules. Compliant NICs are selected for the personalized service.

Content Selection
It is the functionality that estimates for each selected NIC the level of compliance of each internal content with the given context under the control of User&Context Rules and the compliance with the expected service under the control of HA Service Rules. Compliant contents are selected as component of the personalized service.

Personalized Service Building
It is the functionality that builds a service as a sequence of compliant content under the control of HA Service Rules.

Service Buffer
It is the functionality that provides the persistence of the created personalized services.

Personalized Service Delivery
It is the functionality which covers all the issues related to the delivery of personalized services in term of sequence of contents.

3.3.4 User and Context Management functionalities
This is the set of functionalities internal to the Home Ambient Server side which allow accessing and managing:
- information provided by the user
- information about the user behavior derived from his behavior in the Social WEB, from his behavior when he is enjoying services in his home ambient and from explicit profiles
- information about context in which the user is enjoying the service

**User & Context Management**
It is the functionality for the management of users and context information.

**User Generated Info Access**
It is the functionality that allows accessing to information provided by the user, as tags related to a particular NIC.

**Context & User Info Access**
It is the functionality that allows accessing to context and users information taken from the social WEB and from the Home Ambient network.

### 3.4 Home Ambient Client side functional requirements

![Home Ambient Client side functional requirements schema](image-url)

Fig. 40 – Home Ambient Client side functional requirements schema
3.4.1 Service Execution functionalities
This is the set of functionalities internal to the Home Ambient Client side which allow managing the personalized service and all contents composing it.

Personalized Service Access
It is the functionality that allows accessing to the personalized service.

Remote Content Access
It is the functionality that allows accessing to remote contents referred into the personalized service.

Web Content Access
It is the functionality that allows accessing to remote WEB contents referred into the personalized service.

Personalized Service Play
It is the functionality that allows playing the personalized service.

3.4.2 User and Context Management functionalities
This is the set of functionalities internal to the Home Ambient Client side which allow managing the interactions with the Home Ambient Server side, giving feedbacks with info about the user and the fruition context.

Context & User Info Delivery
It is the functionality for the delivery of info about context and users.

User generated Info delivery
It is the functionality for the delivery of info generated by the final user during the fruition of the final service.

Device Features Catching
It is the functionality that allows catching info about the final device.

Environment Features Catching
It is the functionality that allows catching info about the environment in which the personalized service will be played.

User Behavior Catching
It is the functionality that allows catching info about the behavior of the final user during the fruition of the personalized service.

User Features Catching
It is the functionality that allows catching user static personal info filled by the user itself.

4. Conclusions
In this deliverable an overview of the NoTube “Personalized Semantic News” use case has been provided.

The global vision that has led to the definition of the whole use case has been presented, taking into account the stakeholders interested in the realization of such scenarios and the advantages for them. Examples of final scenarios has been given and used as a starting point to describe which are the operating contexts and the three foreseen final services for this use case: My News Agency, News Find Engine and Alerting News.

In particular, being this document a deliverable of specification for the use case, all related issues have been faced from a logical point of view rather than from a technical point of view, leaving the last one to deliverables related to different versions of the prototype, namely the D7a.2 Personalized

5. References
