Personalized Newscasts and Social Networks: A Prototype built over a Flexible Integration Model

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ABSTRACT

The way we watch television is changing with the introduction of attractive Web activities that move users away from TV to other media. The integration of the cultures of TV and Web is still an open issue. How can we make TV more open? How can we enable a possible collaboration of these two different worlds? TV-Web convergence is much more than placing a Web browser into a TV set or putting TV content into a Web media player.

The NoTube project, funded by the European Community, is demonstrating how an open and general set of tools adaptable to a number of possible scenarios and allowing a designer to implement the targeted final service with ease can be introduced. A prototype based on the NoTube model in which the Smartphone is used as secondary screen is presented. The video demonstration [11] is available at http://youtu.be/dMM7MH9CZY8.

Categories and Subject Descriptors

Computer Applications J.7 [COMPUTERS IN OTHER SYSTEMS]: Publishing, Consumer Applications.

General Terms

Design, Experimentation.

Keywords

Television, News, Social, Home Ambient, Service Provider, Enrichment, Recommendation, User Experience.

1. INTRODUCTION

The TV industry landscape is developing into a highly-interactive and distributed environment wherein end users interact with multiple devices such as portable devices and home equipment, as well as with a multiplicity of applications. More than ever, users become early adopters of innovative technology.

The Web and all surrounding emerging technologies are steadily transforming this state of the TV industry. New methods to enjoy TV content via the Web and to interact with TV and Web

content on set-top boxes are arising, and global players are massively introducing these kinds of services (e.g. Apple TV [1] and Google TV [2]).

The ultimate goal of the NoTube project [3] is to develop a flexible and adaptive end-to-end architecture, based on semantic technologies for personalised creation, distribution and consumption of TV content. The project follows a user-centric approach to investigate fundamental aspects of consumers' needs for content-customisation, for interaction requirements and for entertainment wishes that will shape the future of the "TV" in all its new forms [4].

2. THE PERSONALISED NEWSCAST SCENARIO

Among the wide range of possible television material useful to build a service for the end-user, we choose news content based services as our target scenario due to the presence of a number of already existing tools working on such materials.

This Personalised Newscast scenario focuses on the design and development of a system for the creation and the delivery of a set of local Personalised News services. This system will be able to:

- acquire news items from generic broadcast streams
- understand the meaning of video news items
- understand the physical context in which news items are going to be shown
- apply criteria for matching the user profile with the available news items.

At the same time the scenario allows the user to interact with social network tools such as Facebook which is integrated in the final user application [5].

The environment where all the personalisation operations, the delivery functions and the final service fruition are performed is defined as Home Ambient (HA) and is actualised by a Home Ambient Server. The personalisation and the delivery operations made in individual Home Ambient environments allow both cutting the total service provider throughput and ensuring a more reliable control of the user privacy. From our point of view, in the future there will be seamless continuity between devices and television production will be no more targeted at linear broadcasts on TV displays only. The "smart device" used as remote control is just the beginning of new features (e.g. Apple TV[1]).

Taking a look to the trends in user behaviour and in consumer technology, it is difficult to foresee how exactly the possible

collaboration between television and Web will be realised within the next years. But what we can do is building an open and general set of tools adaptable to a number of possible scenarios. This set of tools would allow a designer to easily implement the target final service.

For these reasons we have studied a specific object which allows the system to store and carry the multimedia object throughout the platform: A News Item Container (NIC) including all metadata and content references which are required to select and use the right content inside the service was designed [6].

The typical lifecycle of the NIC starts with the creation of a news item followed by a number of enrichment steps (metadata enrichment, content enrichment). Then this item is delivered and can be finally used inside the Home Ambient (i.e. displayed, stored, shared and locally enriched again). Basically the NIC is structured to contain references to many connected physical contents and related metadata (natively or added in a particular enrichment phase). Particular sets of metadata can be used as so-called "Attractors" which are useful to help the searching and filtering of news items performed by dedicated agents.

The key idea of the NIC is that the structure can evolve during the lifetime of the multimedia item. It can be seen as the aggregation element between television and web-based contents.

The flexible structure of the NIC allows dedicated agents to automatically perform both the user personalisation and the device adaptation. The user personalisation is mainly based on the analysis of semantic metadata inside the NIC and the user preferences and characteristics. The device adaptation is performed selecting the right physical content for a particular target device using technical metadata inside the NIC.

In particular, in the prototype, the user preferences and characteristics (i.e. user profile) are inferred from the behaviour of the user inside the social network while the content personalisation is done by a NIC and a user profile cross-analysis. The profile's inference is dynamically managed by a recommendation system [8] based on the analysis of the activity streams reflecting the user interactions in various social environments [10].

3. THE ARCHITECTURE

The system architecture is designed to be modular, flexible and interoperable supporting the different prototypes, applying a bottom-up approach that starts from the individual requirements coming from real-world scenarios, like personalised news [3].

For the high-level requirements the main actors appear clearly to be the Service Provider (SP), typically a broadcaster, and the users in the Home Ambient where they consume the content.
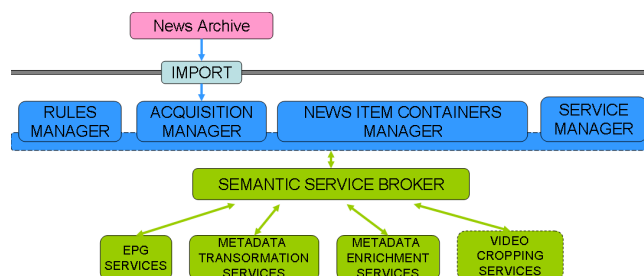

Figure 1. The Service Provider side architecture

Considering the complete flow of operations (see Figure 1), the process foresees the SP to extract content items and a set of related metadata from a set of available newscasts. Each extracted news item can be enriched with additional metadata and internal resources automatically generated by specific tools or external ones following predefined rules. The Remote Service Provider builds one or more services according to its own editorial rules, taking into account the behaviour of user groups (privacy preserving) and using semantic filtering (stereotype filtering and service filtering).
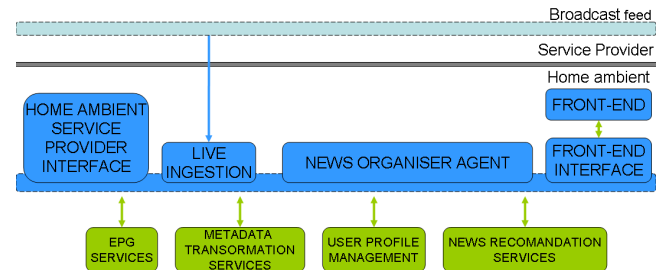

Figure 2. The Home Ambient side architecture

Obtained services are made available for users following specific business models. Each service is a potential input for the various Home Ambient environments. The orchestration of the internal services is performed by a semantic engine referred to as the "Semantic Service Broker", capable of achieving specific goals by leveraging on existing, annotated services providing REST-based end points, making them transparent to the SP logic [7].

The HA component workflow (see Figure 2) implements the ingestion of newscasts (or individual news items, if required) from both the IP channel and the standard over-the-air broadcast (live ingestion). The same component acts as a standalone PVR, supporting also industry standards like MPEG-2 TS. This approach guarantees better integration with third-party video processing services, if needed.

A News Organiser Agent then aims at managing, extracting and re-sorting the ingested audiovisual contents together with the acquired metadata, when made available by the SP, in order to locally cache a set of single news items. Moreover, at this stage, the user profile and recommendation services are adopted by running background threads responsible for dynamically building up playlists for the individual Personalised Newscasts in the respective HA.

4. THE PROTOTYPE

The front-end application is designed to run on a Smartphone used as secondary screen. The user can access to the service with his Smartphone using the authentication integrated with the ambient intelligence inside the Home Ambient using the QR Code identifying the TV set.

The user, handling his Smartphone, catches the HA and the TV set ID and is automatically connected to the ambient and automatically identified by it using a device/user fixed association (Fig. 3).

When the user enters into the NoTube ambient a welcome message is displayed for few seconds, then the user receives his personalised news list that has been automatically edited following his own preferences; these can be dynamically extracted following the behaviour of the user on the social

networks or can be fixed by the user himself through the selection of its favourite genres. The personalised list of news is presented organised by genre and each one is achievable scrolling to the left and to the right. Each genre list is top-down scrollable and a genre banner is always visible on the screen as showed in Fig. 4.
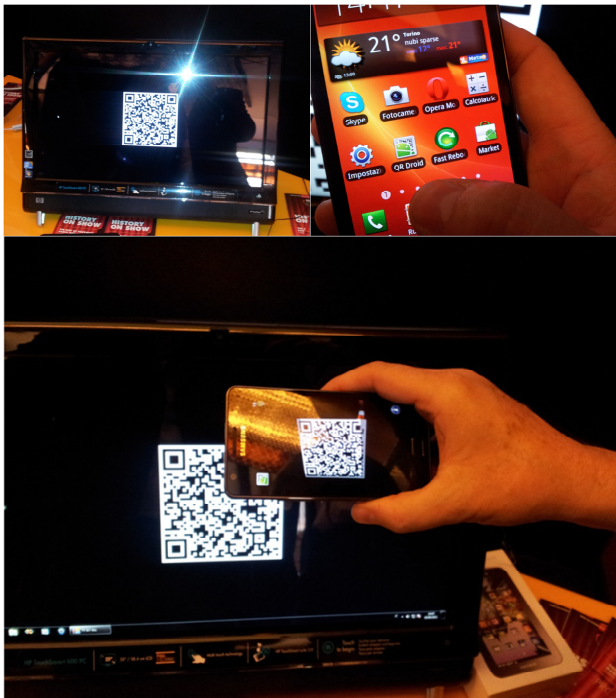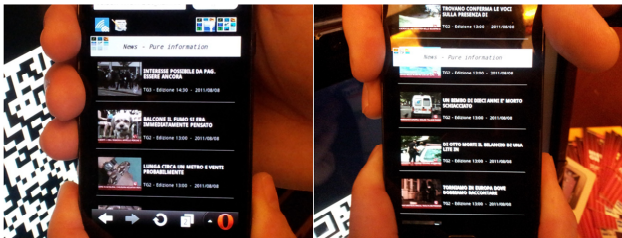

Figure 3. Integrated login using the QR Code.

Figure 4. The personalised list of news

Tapping on a particular news item the first page containing general information is presented as shown in Fig. 5.
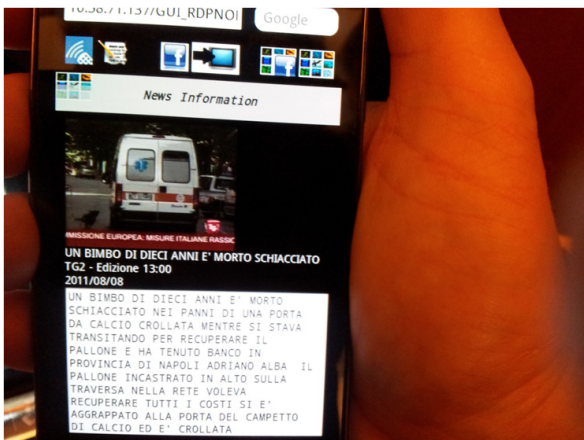

Figure. 5 - General info for a particular News Item

Scrolling horizontally the prototype allows the viewing of a second information inner page where concepts that are considered significant inside the news, extracted by the Lupedia service[3], are presented as a list; clicking on one item the relevant DBpedia page will be displayed on the screen[9].
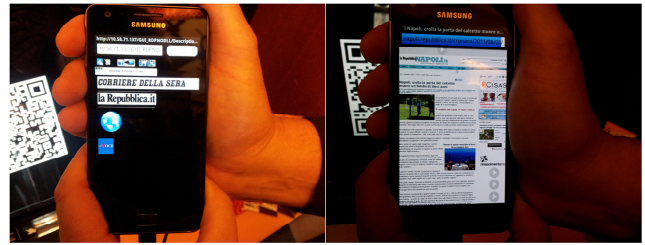

Figure 6. The browsing for external related links

Figure 7. The main video on the TV screen

The NIC structure allows the presence of external related links that can be presented into the prototype in a third inner information page, where a set of URL related to a particular news item is available for the navigation in web sites of other media companies that expose information about the same news.

The user can navigate through the related external links and touching an item from the list the browser reaches the relevant URL showing the related news (Fig. 6).

The prototype allows the final user to see the main video on the TV screen. Into each of the three information pages there is a button used to play the news related main video on the TV set. At the same time on the Smartphone a remote control is presented so that the user can remotely control the play (Fig. 7).

Inside the prototype the user is able to share a particular News Item with friends in Facebook (Fig. 8 - Fig. 9).

Figure 8. Sharing news items with friends – the message in Facebook

A search service is also added to allow the user to perform searching of news inside the personalised list or inside all news available in the Home ambient.

The application allows different users authenticated on the same HA and TV screen to get the played NIC. Using this feature it is possible to share news items between two or more users watching

the same TV set. This means that different users with different devices may acquire the control and all news information of a news item played on a TV set by a user.

Figure 9. Receiving suggested news items

The video reframing functionality based on ROI technology is integrated in the Personalized Semantic News use case. In particular, the reframed video of News items is used for the play out of a particular news on the Smartphone display (Fig. 10). When the final user selects a particular news he can choose if playing it on the TV screen or to watch it directly on the Smartphone screen.
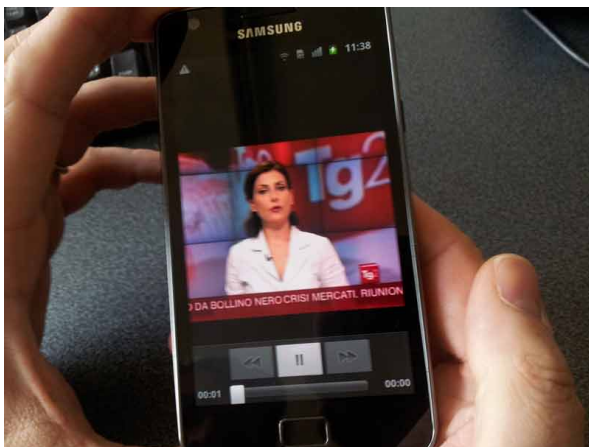

Figure 10. Reframed video play out on mobile device

5. CONCLUSION

Infrastructures and modern devices are more and more addressed to the convergence of the TV and the Web world. The prototype and the architecture presented in this paper give the possibility to easily manage multimedia contents facilitating new ways of creating TV services for end users and to reuse material from a service provider's point of view. Our studies in these directions,

the developed final model and the prototype highlight the feasibility of such services.

Opinions that have been gathered so far show that people are really enthusiastic about the idea to have these kinds of services at home but specific user tests still have to be performed in order to obtain objective feedback about the users' experiences.

Due to the speed in which social networks change user habits, it is mandatory to follow people's interests and wishes to be able to integrate new appealing user centric features in the final service.

6. ACKNOWLEDGMENTS

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