

# iDYNamicTV: Web 2.0 and adaptation for a new television experience

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## ABSTRACT

A peculiarity of the DynamicTV project carried on at Telecom Italia is that exploration and discovery of contents is regarded as an entertainment activity for the user. This led to the design of new interaction paradigms and interfaces for the TV medium. iDYNamicTV is a study for implementing the same principle on the Web. iDYNamicTV is a social adaptive Web2.0 portal that supports the user activities related to the exploration, discovery and creation of contents. iDYNamicTV recommends contents in a personalized way, based on an explicitly user model and allows users to annotate, comment and rate contents. Based on that, iDYNamicTV builds different types of social networks and supports various forms of contents navigation (via taxonomies, folksonomies, social networks...), leaving space for serendipitous discovery. A user can thus entertain taking benefit of an innovative, participative and personalized approach to the fruition of television contents and can create her own personal space including networks of contents and people.

## Categories and Subject Descriptors

H.5.1 Multimedia Information Systems

H.3.5 Online Information Services

I.2.1 Artificial Intelligence Applications and Expert Systems

## General Terms

Human Factors.

## Keywords

User modeling, Web 2.0, Social Networks, Folksonomies, Personal Space, Content Navigation Support, Content Discovery, Recommender Systems.

## 1. INTRODUCTION

The combination of Web and more recently Web 2.0 applications and interactive television is an emerging paradigm and indeed several broadcasters offer solutions in this direction. The combination is very interesting for TV users as they can exploit the peculiar features provided by the different media in different ways. In particular, a Web 2.0 application can provide various ways to annotate, link, navigate and discover contents and mechanisms for creating and exploring social networks. All these mechanisms can support new user experiences in exploring and discovering television contents.

In this paper we describe iDYNamicTV which is part of a larger project by Telecom Italia (DynamicTV) for enhancing user experience in TV fruition [1][2][3]. DynamicTV introduces a new interactive paradigm, the so-called *Inter-tainment* paradigm. Exploration of contents becomes an entertainment experience *per se*. The goal of iDYNamicTV is to give further boost to the *Inter-tainment* paradigm, providing a number of other facilities to entertain when exploring and discovering contents on the web using a computer interface. The aim is to create a continuum between the two media, sharing contents, creating a personal space accessible on both media and exploiting the best of the two media to provide a wide range of entertainment functionalities to the user and to make her experience as rich as possible.

More particularly, iDYNamicTV is a Web 2.0 portal in which we are experimenting different dimensions for entertaining the user. It combines user modeling, adaptation and recommendation to the individual user, social networking, and thus the creation of both a personal space and a social space of fruition. iDYNamicTV allows users to explore, annotate, add contents, and to use multiple paradigms of navigation. It also allows a user to create a personal space of contents, and thus a personal channel to experience DynamicTV contents.

The paper is structured as follows. After a brief overview of the goals of the DynamicTV project, we describe the functionalities we are experimenting in iDYNamicTV and we discuss how it complements the TV experience.

## 2. DynamicTV

The DynamicTV project [1][2][3] is carried on at Telecom Italia and aims at implementing a new paradigm for interactive television with the goal of enhancing the user experience. It implements the *Inter-tainment* paradigm, introduced by the same research group [1] which encompasses and merges different concepts: technologies from enhanced TV, recommendation technologies for supporting the user in the navigation and serendipity.

The latter represents the strongest driver for the success of the *Inter-tainment* approach: by definition, it is the condition by which one accidentally discovers something worthy, especially while looking for something else. Applied to the Multimedia content domain, Serendipity means providing users with Search/Navigation, Visualization and Fruition strategies attracting users towards the exploration of unknown content. According to

the *Inter-tainment* paradigm, not only watching, but navigating among content previews is part of the fun. The *Inter-tainment* paradigm is defined by three basic features:

- navigation among contents can be engaged at any point of the viewing experience;
- navigation is conceived as exploring galaxies of contents and the connections among them;
- exploration, choice and consumption are not isolated actions, but a contextualized moment in the overall flow.

DynamicTV proposes a new interaction model and a novel interface design for implementing such a paradigm. A prototype has been realized and user studies demonstrated the potential of the approach. The interested reader is referred to [1][2][3] for more detail about the approach and the solutions proposed.

### 3. iDYNAMICTV: *Inter-tainment* on the Web

iDYNAMICTV is the playground in which we are experimenting a number of dimensions to enrich the user experience according to the *Inter-tainment* paradigm. The aim is to add functionalities that exploit interaction via a personal computer to the same contents of DynamicTV. iDYNAMICTV relies on the integration of a number of methodologies and can be regarded as:

- *A Web 2.0 application.* iDYNAMICTV enables users to annotate (tag), rate and comment contents, and to navigate them via taxonomies (according to a standard classification of TV contents). Navigation of contents is also possible through folksonomies, i.e., tag clouds. A tag cloud is associated with each video and is created after the users' annotations. Tags can thus link contents and thus provide a way to navigate through them, supporting a form of serendipitous discovery. Navigation can be started in different ways, for example: from a video, from a tag associated with a video, from a cloud of personal tags (the tags most commonly used by each individual user), from the cloud of the tags of most commonly used by the community of users, from tags associated with a user (see the discussion below).
- *A personalized application.* iDYNAMICTV maintains an explicit model of each user, keeping track of her interests and preferences. The model is continuously updated and possibly revised by tracking the user's behaviour (for example, the categories of contents she browsed, the tags, the annotations and the comments she added, the ratings she associated with contents, and the contents added to the personal space). A user can also define herself using a set of tags; in this way tags and folksonomies support navigation in the space of contents but also in the space of users. From these data the system can infer different types of

information about the user, such as her interests in the various categories of videos and on each specific item, her expertise, her preferences, possibly in different contexts of usage (e.g., different time of the day, different situations, different media). At any time the user can inspect her model (in a scrutable user model vision) and can also change parts of the model if she does not agree on what the system inferred about her. The user model is exploited for two purposes: recommendation and creation of social networks, as it will be discussed in the following.

- *An adaptive recommender.* Contents (categories and specific video items) are recommended in a personalized way. Personalization is based on the user model and is realized by means of an intelligent agent that relates this model to category and content selection and ranking (cognitive filtering, according to the definitions in [4]). The ranking of items (videos) also takes into account the ratings received by each video. The categories and items that are the most suitable are presented first or used as suggestions to the user, but no categories or items are excluded. This helps the user in the exploration of a vast space of contents, but does not prevent the exploration of the whole space.
- *A tool for creating contents.* Selected users can create and submit new contents. In particular, iDYNAMICTV includes (i) a mechanism for bookmarking fragments of videos and saving them for future use and (ii) a simple video editing tool for creating personal mashups. The tool searches relevant videos (short video extracted by the user or trailers of long contents) starting from a user request and proposes an editing of the clips (by defining an appropriate sequencing) that the user can modify and the upload.
- *A mean to define a personal space of contents.* A user can select contents (full contents, trailers or fragments) and add them to a personal space ("user preferences"). The personal space may also include lists of other users (see below) and thus it can be characterized as a network of users and contents. The personal space may be kept private or it may be open to friends and/or other users (see again below). The personal space is an important link between the Web and the television application. It can be accessed from both media and thus contents discovered and selected using the Web application can then be fruited on television and vice versa contents bookmarked on TV can be explored on the Web and can become a starting point for exploring and discovering new contents.
- *A social application.* iDYNAMICTV creates and manages networks of users, providing in this way alternative means to explore contents and share experiences with other users. It supports different forms of social networking. Each one of them is a way of exploring or discovering contents based on the preferences and suggestions of the users linked by the social network. A user can also exchange information (via asynchronous or synchronous messaging) with other users in the networks. We distinguish among different types of networks
  - o Network of friends: A user can create a list of friends and then navigate the network of friends exploring their preferences and suggestions. In this way the user can

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discover her friends' preferred contents and possibly discover new interesting contents.

- Network of similar users. Given the user models, the systems can computer a degree of similarity between users and determine the users that are most similar to a given user. Such user can thus explore the preferences and suggestions of the users similar to her.
- Leading users. We distinguish a number of leading roles that users can have in the portal. (i) Opinion leaders are singled out by the system by considering the users that are most active or trusted (in general or in each specific category of contents) or the user having the highest number of friends. (ii) Active users are those that introduce contents or provide actively tags annotation and comments. (iii) Trusted users are those whose contents are explored frequently and rated in a positive way. A user can then explore the suggestions of these prominent users.
- Network of on-line users. A user can discover which are the users that are connected at a given time and possibly start discussions with them (if the contacts are provided by the users). In particular, a user can discover if friends or users who are similar are connected.
- Tag-based networks. From a tag users can discover contents related to the tag but also users that adopted the tag to define themselves. Thus from a tag we can discover other users and contents by linking to these users.

Figure 1 shows a typical screen of the portal which exemplifies some of the features discussed above (the interface design is a preliminary one used in this experimental phase of the project). On the left side there is the taxonomy ("Items") for exploring contents as classified in the categories, and the list of the Social Networks ("Comunità"), linking the user to all the other ones ("tutti gli utenti") or to the most similar users ("utenti simili"), on-line users, active users, user with the highest number of friends. On the right side the folksonomies (a personal one containing the user individual tag cloud "I Miei tag" and a general one). On the top right side a tab for accessing to the personal space (her own model "Il Mio Profilo", her preferred contents "I miei preferiti", the contents she produces or uploaded, "I miei items", her community of friends "I miei amici", the tags that describe her in the social network ("I miei tag"). The central part of the window includes the recommended contents in the selected category. The user can prefer to put more emphasis on recommendation based on her profile ("Interesse") or on ratings ("voto").

All the features discussed above have the goal of supporting a rich user experience in navigating video contents in a Web application accessible on a personal computer. In particular, the possibility of combining user-modelling and adaptation with social features proved to be a very interesting opportunity for users and is a significant step forward with respect to approaches that use either one the techniques. On the one hand, in fact, iDYNAMICTV is more flexible than a pure recommender system and provide several means to explore contents based on the preferences of users in the social networks. This leaves space to serendipitous content discovery. On the other hand, the presence

of an explicit user model and the possibility of a personalized ranking of contents provide a powerful way to provide orientation tailored to each specific user and to build social networks and to explore the preferences of other users.

We made only a very preliminary evaluation supporting these claims in the specific case of iDYNAMICTV. On the other hand, we adopted the same model in other areas of application (most notably in the Icity-DSA system for accessing cultural information about the city of Torino [5]), where we performed thorough evaluation that demonstrated the advantages of the approach. A similar evaluation for iDYNAMICTV is planned for the next months.

#### 4. ROLE IN THE DynamicTV PARADIGM.

iDYNAMICTV will play a relevant role in the overall DynamicTV paradigm to support an enhanced and more personal user experience in the fruition of video contents. Thanks to iDYNAMICTV, in fact, we plan to a number of new ingredients to the *Inter-tainment* paradigm introduced by DynamicTV. Personalization is a way to let the contents that are most suitable for the user emerge, without preventing the exploration of the full space of contents. This is a stimulus to engage the user in the exploration and at any step, a way to present contents in a ranked way tailored for the individual user. Then, the Web2.0 features of iDYNAMICTV provide several ways to explore the network of contents and users. They guide the user through different exploration threads, providing orientation without constraining in any way the possibility of following a thread or switching between alternative ones. For example, the user can start from a recommended content and then following a tag exploit the folksonomy to move to another video. Then, linking to the users that are more active in the category of the video, discover other videos. Linking to users that are similar to her in the interest for the selected video she can discover the preferences and recommendation of these other user and possibly add the videos discovered in this way to her personal space. This is a simple example of entertainment experience which uses mechanisms that are complementary to those that are available when using the television medium. In this sense iDYNAMICTV can be a Web counterpart of DynamicTV

A further important role of iDYNAMICTV is the possibility of creating and maintaining a personal space, which includes network of contents and people and which can then be the starting point of a relaxing fruition experience on the television medium.

#### 5. CONCLUSIONS

iDYNAMICTV is an experiment to show how new dimensions to the *Inter-tainment* paradigm can be added by exploiting the combination of Web2.0 and user-model based adaptation. In the paper we sketched a number of these dimensions showing how they can support various forms of content navigation and discovery. It is worth noting that in this experiment we did not pay specific attention to the interaction model and the user interface which is currently an experimental one. Future work will concentrate on defining an integrated interaction model between the TV and Web application, supporting a stronger cross-media interactive TV and we will further investigate other dimensions for implementing *Inter-tainment* iniDYNAMICTV.

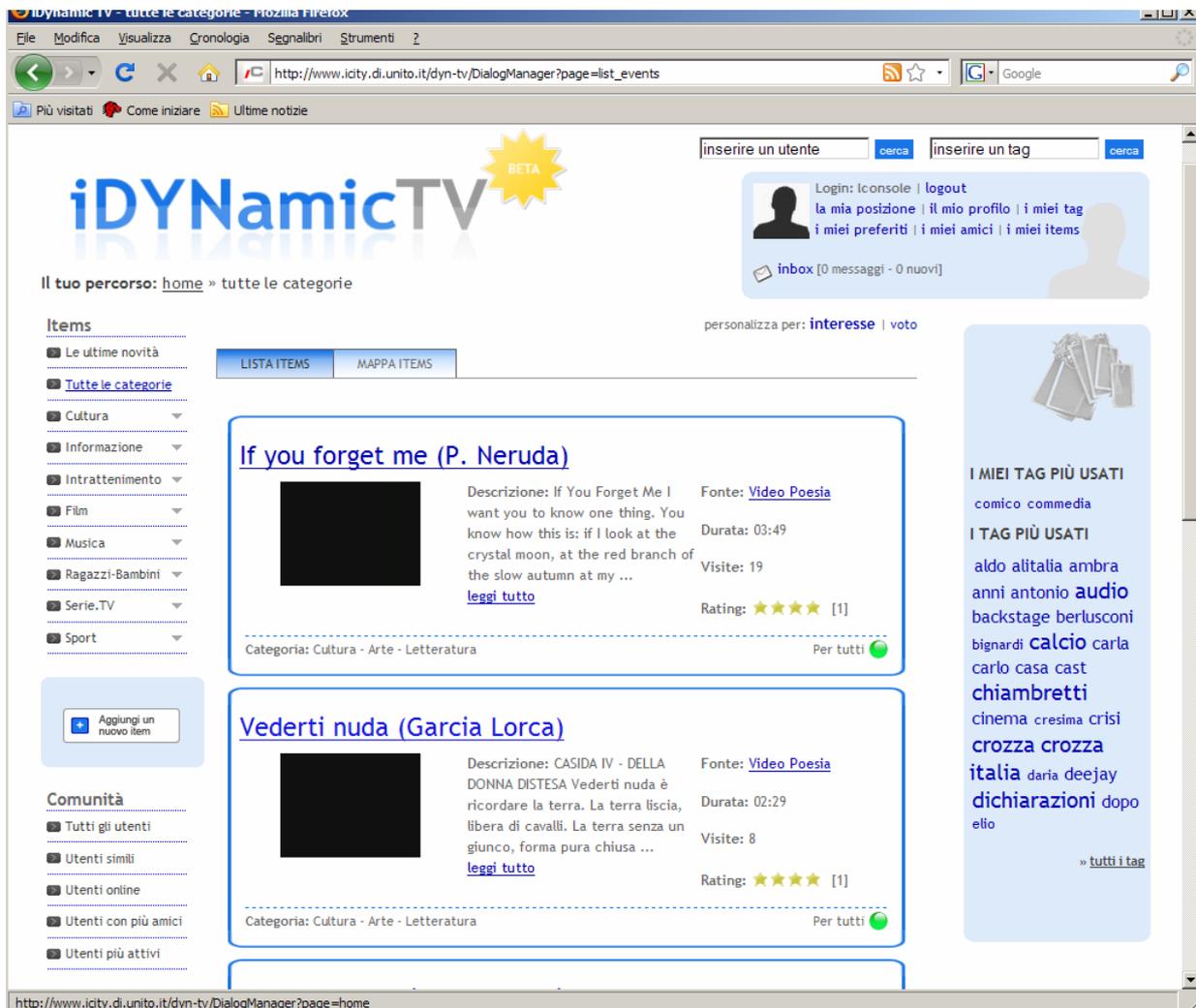


Figure 1 – Browsing iDYNamicTV.

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