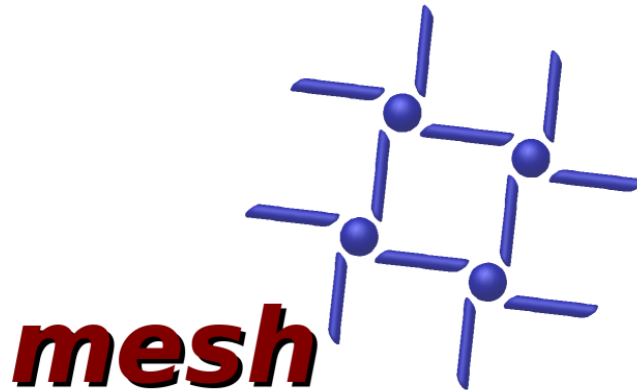


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## Multimedia Semantic Syndication for Enhanced News Services



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[www.mesh-ip.eu](http://www.mesh-ip.eu)

### Annual Report 2006

MESH is an Integrated Project from the Sixth Framework Programme whose objective is to extract, compare and combine multimedia content from multiple news sources, automatically create advanced personalised multimedia summaries, syndicate summaries and content based on the extracted semantic information, and provide end users with a personalised “multimedia mesh” news navigation system.

MESH is expected to:

- Provide a significant contribution to emerging multimedia content markets with innovative semantic technologies and new business models.
- Facilitate the discovery and exploitation of multimedia content, with special focus in the area of News, while the main technologies will be applicable to many other domains.

### Summary of Activities

The MESH project started in March 2006. This year has therefore seen the beginning of all technical activities, which are setting the ground for the development of the future MESH system. Activities that have already produced some tangible outcome are the creation of MESH scenarios and use cases, the MESH knowledge structures, the Rights Management model, and the usage statistics and personalisation modules. They are commented in the next subsections.

The project has selected the first news subdomains that will be specifically addressed within the project, as a means to enable focused research and showcasing the final results, and it is generating the knowledge structures to be used for those domains. The first one to be addressed corresponds to the IPTC top-level category “*Disasters and accidents*”, with special emphasis on natural disasters.

Preliminary activities have been performed on visual and speech analysis, definitions of multimedia formats to cover, personalization models, and models for rights

management and gathering of usage statistics. Work is also in place to establish the MESH architecture.

A number of dissemination activities have already been made, both on the scientific area (publications) as well as in the industrial/exploitation arena. A dissemination plan has been produced, and the first set of MESH multimedia test content has been produced.

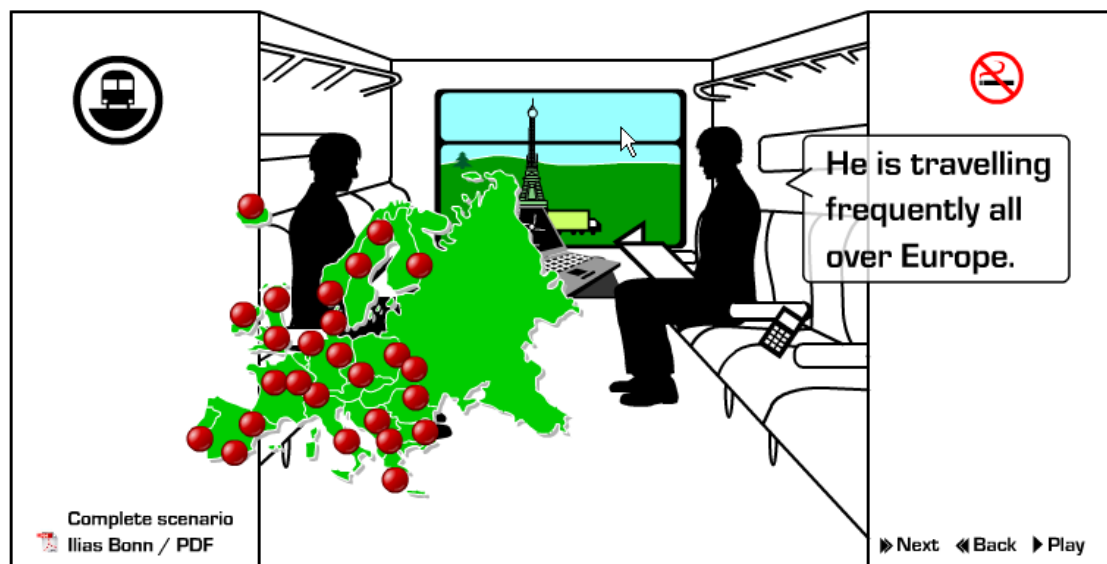
## MESH Scenarios and use cases

A basic step in the process of defining the MESH user requirements involved the authoring of a number of application scenarios, which, expressed as storylines, envision the future uses of the MESH platform.

Six prototype persons were identified in this process to represent the needs of larger groups of users, in terms of their goals and personal characteristics. They act as 'stand-ins' for real users and help guide decisions about functionality and design. Through these persons, the motivations, expectations and goals are becoming more familiar so the consortium can reach a common understanding of the targeted product and the potential users interviewed can comprehend the context in which they are questioned.

These persons were brought to life by giving them names and personalities. Even though fictitious, they are based on knowledge of real users and significant involvement of the consortium user partners ensured that they represent end users rather than the opinion of the person writing the storyline.

The following figure illustrates part of one of one of those scenarios, that of "*Ilias Bonn, the travelling journalist*". A fully animated explanation of that scenario is available from the MESH website.

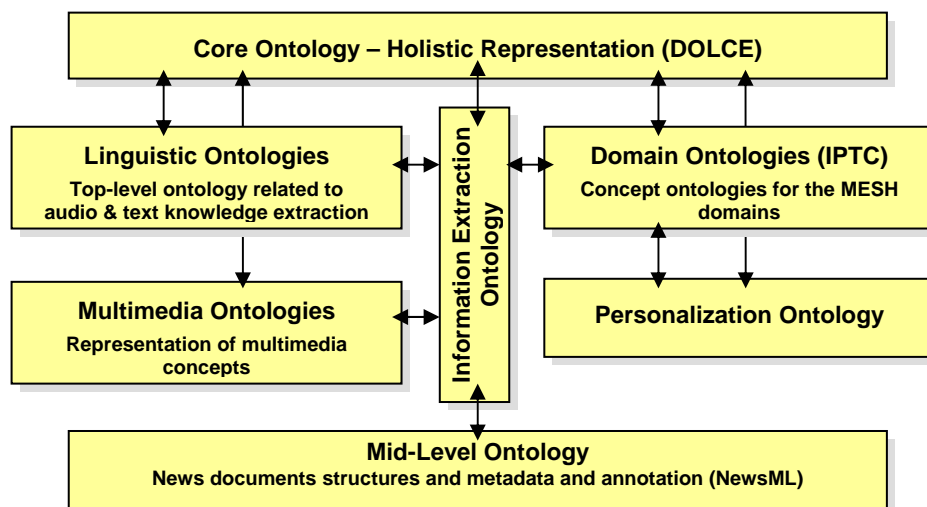


The scenarios formed the basis for the requirements recognition process. Through these stories the relevant system capabilities were identified and utilised to build questionnaires and guide group discussions in order to determine the importance of each feature, so that priorities could be set and the most important use cases could be described.

These scenarios are presented in detail within MESH public deliverable D6.1, also available from the MESH website.

## MESH knowledge structures

The role of the MESH Knowledge Structures is to support a plethora of functionalities related to the analysis and manipulation of multimedia news items. To this end, they were designed so as to provide a structured representation for the prior knowledge necessary for effectively analysing news material according to the needs of MESH application scenarios, formalize the metadata to be extracted from the multimedia content as a result of the analysis process, and constitute a unified framework for supporting and representing the learning of links between low-level audiovisual features and the nodes of the defined conceptual hierarchies. Furthermore, their design was affected by the need to address the consumption of the analysis-generated metadata in applications related to the MESH scenarios, such a personalization. The overall architecture that has been defined for the MESH Knowledge Structures is depicted in the following diagram.



The development of these knowledge structures was based on ontology definition languages and tools that represent the state-of-the-art in Semantic Web technologies or reflect the latest advances in news representation and categorization, as defined by the relevant international bodies. Semantic Web technologies upon which the MESH structures are built include the OWL ontology definition language, the DOLCE core ontology and novel Information Object design patterns. These are combined with news-specific standards such as the IPTC categorization, to provide a unified framework for supporting the semantic analysis and manipulation of multimedia news content.

## Rights Management model

The beginning of the 21<sup>st</sup> century is marked by a new digital age, whereby borders seemingly do not exist anymore. Trade of all sorts of products, using internet as a means of communication and e-commerce platforms, have made it possible to sell, auction or share a product at any given time at any given place. In the MESH context digital items, such as audio, text and video will be a central point of attention. The initial work of MESH in this area has produced a clear overview of the Rights Management issues and how to form a solid architecture to design a Rights Managements Model which will be integrated into the future MESH system.

Besides a grand overview of Digital Rights Management systems and Rights Expression Languages made available, an attempt has been made to research the secure connection

between owners of rights managed media and the rights expressed in order to have end-users receiving those media files, specially in the light of MESH foreseen advanced media management capabilities such as syndication, summarisation and personalisation of content.

It is not the intention of MESH to create a restrictive Rights Management module, whereby users feel entrapped in using such a system, even so: users should not be practically aware of a Rights Management module as such. The rights granted to specific items and the rights users obtain will create a digital environment, where a secure transaction system will be in place and content brokers can securely syndicate, license or sell content to third parties, like businesses and consumers.

## Usage statistics

This part of MESH has the aim to develop several usage statistics modules. The main goal is to improve the behaviour of the MESH system for its users over time by providing them clear statistics from raw data logs and user input on the use of the system, its users and the content that is interlinked within MESH. Depending on the role of the user this service will provide meaningful statistics, information or services based on data- and web mining to make the job easier. Research has been performed on various technologies available and choices have been made which of those will be of use to perform these tasks.

The initial model only tells us what content we watch, read or listen to it only provides very limited meta data for the statistics process (what, how long, how many times). Within the MESH project we will also like to datamine what people actually do inside and what they do with the content. We will work with the important area of extracting more information about how people use video. For example if there are clickable navigation areas inside the video we should be able to track these mouse movements and actions, also including the detection in a consistent way if the user pauses, rewinds, forwards, stops and plays again., from which geographical location are they watching etc. The MESH personalisation subsystem will take advantage of these data and be able to provide a much more fine-grained customised user experience.

## User profile modeling

One important aspect in MESH consists in providing news consumers with personalised results, either in the form of personalised multimedia summaries (pushed content) or personalised content retrieval (through queries). The overall goal of the personalisation task, in terms of the functional capabilities for the MESH system, is to provide a comprehensive framework where:

- User information is acquired and represented in user profiles explicitly through user profile interface and/or implicitly by automatic means. The latter includes both the straightforward storage of data such as usage history, or detected computing device characteristics, and the extraction of knowledge through some form of elaboration (e.g. user preferences inferred from usage history).
- User information is exploited to improve system functionalities, such as intelligent search and retrieval, browsing and navigation, and content adaptation.

A pertinent internal representation of the user model was defined based on system requirements (information need from system main functionalities). It has been formalized as an ontology into the OWL-DL representation language, and contains several elements: demographic data, user ratings (given explicitly or implicitly) for content items, a social profile (explicit social relations between the user and known people that can be used for sharing and recommendations) and a semantic representation of user preferences. Semantic interests are represented by a vector of

weighted semantic concepts. These concepts are relative to a property of context describing the possibility for a user of having different “roles” or being involved in different situations when he is using the recommendation system, such as “leisure”, “work”, etc.

## User Involvement, Promotion and Awareness

The MESH Advisory Board is one important means through which the project interacts with the outside world. It is an external independent consultation committee, whose mission is to assess that the technical progress in MESH remains innovative and forward looking, to evaluate if MESH is producing work of sufficient technical quality, to ensure that the activities in MESH are adequately tailored towards future exploitation of results, and that the project is keeping the necessary ethical standards. The Advisory Board is formed by two types of members:

- a) Appointed researchers experts in MESH fields of activity, and coming from organisations outside MESH.
- b) Potential users of MESH technologies and products, coming from organisations both inside and outside the MESH consortium.

The first section of the Advisory Board being now under constitution is the one formed by potential users. As such, some of them they have already been involved in the development of the use cases and scenarios mentioned. The project has also defined the process by means of which external assessment of project results will be performed and fed back to the consortium, and is currently developing the internal evaluation procedure for technical modules.

With respect to relationships with other projects and initiatives, MESH has been one of the initial constituting members of the **SMaRT** project cluster. This cluster, whose complete name is *Semantic Multimedia Research and Technology*, is currently formed by a group of six IST projects in the area of Semantic systems and Multimedia processing. The current members are: K-Space, MESH, aceMedia, Salero, Muscle and 3DTV.

SMaRT has participated in the IST Event 2006 in Helsinki by organizing a networking session on the topic of research in FP7 on Semantic Web, Multimedia and Signal Analysis.

Finally, on general dissemination activities, MESH has produced outcome on three fronts:

- On technical dissemination, MESH partners have presented some initial results of the project through a total of 12 articles in journals, conferences and workshops.
- On industrial and user awareness, MESH has been presented in the 59<sup>th</sup> World Newspaper Congress in Moscow (June 2006), furthermore MESH has organized a full Industry Day co-located with the SAMT Conference (1<sup>st</sup> International Conference on Semantics and Digital Media Technology), in December 2006 in Athens. The SAMT Industry Day has been created to enable media professionals, content providers, broadcasters, professional content users, and related industrial practitioners to gain first hand experience of relevant multimedia semantic analysis technologies and associated commercial applications.
- On standardization activities, MESH has been interacting with the International Press Telecommunication Council (IPTC), as one very relevant international

body for metadata standards in the news domain. MESH representatives have participated in the Annual IPTC meeting in Vienna (July) and in the Autumn meeting in October in Madrid, presenting MESH activities and purpose and getting feedback from IPTC representatives.

## Future Work

The upcoming MESH activity will produce a full definition of the MESH architecture, including the full specification of knowledge structures for cross-media analysis and annotation. It will also deliver the first implemented version of some of the key modules:

- Multimedia content analysis modules
- Multimedia content retrieval and adaptation
- Real-time multimedia summarization
- Rights management module
- Domain rules for the MESH syndication engine

The first MESH complete system is expected in September 2007.

## Further Information

The MESH consortium is formed by: **Telefónica I+D, Informatics and Telematics Institute, Athens Technology Center, Motorola, Queen Mary University of London, Institut National de l'Audiovisuel, Noterik, Universiteit Twente, Deutsche Welle, Deutsches Forschungszentrum für Künstliche Intelligenz, Universidad Autónoma de Madrid** and **DIAS Publishing**.

Additional resources can be found at:

- The MESH website, available at [www.mesh-ip.eu](http://www.mesh-ip.eu), contains additional information about the project, downloadable brochures and posters, initial documents produced and a series of MESH-related news items and events.
- Information about the MESH-sponsored SAMT Industry Day is available at <http://www.samt2006.org/industry.html>
- The EC website for Knowledge and Content Technologies contains in its list of running projects at <http://cordis.europa.eu/ist/kct/projects.htm> all the current members of the SMaRT project cluster.
- The IPTC website can be found at [www.iptc.org](http://www.iptc.org)
- Information about the DOLCE core ontology is available at <http://www.loa-cnr.it/DOLCE.html>.