

# FAETHON: UNIFIED INTELLIGENT ACCESS TO HETEROGENEOUS AUDIOVISUAL CONTENT

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## ABSTRACT

In this paper, the FAETHON project is presented, whose overall objective is to develop an integrated information system that offers enhanced search and retrieval capabilities to users of heterogeneous digital audiovisual (a/v) archives. This novel system will exploit the advances in handling a/v content and related metadata, as introduced by MPEG-4 and worked out by MPEG-7, to offer advanced access services characterized by the tri-fold “*semantic phrasing of the request (query)*”, “*unified handling*” and “*personalized response*”.

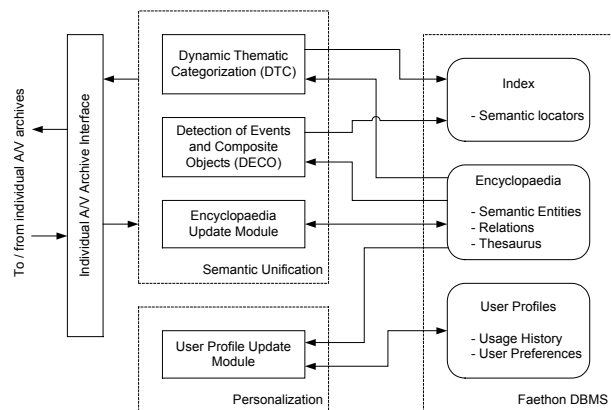
## 1. INTRODUCTION

It becomes clear among the research community dealing with content-based a/v data retrieval and new emerging related standards, such as the MPEG-7 [1], that the results to be obtained will be ineffective, unless major focus is given to the semantic information level, defining what most users desire to retrieve. Mapping, however, low level, subsymbolic descriptors of a/v archives to high level symbolic ones is in general difficult, even impossible with the current state of technology. It can, however, be tackled when dealing with specific application domains. The project is targeting the extraction of semantic information from a/v and text related data taking into account the nature of useful queries that users may issue, and the context determined by user profiles [2].

FAETHON, a European consortium consisting of Sy-ware S.A. (GR), Lambrakis Research Foundation (LRF/GR), Joanneum Research (JRS/AT), Film Archive Austria (FAA/AT), Universitat Polytechnica de Catalunya (UPC/SP), Oracle GmbH (AT), Institute of Communications and Computers Systems National Tech. Univ. of Athens (ICCS/GR) and the Hellenic Broadcasting Corp. (ERT/GR) is developing a novel platform in the framework of IST projects (IST-1999-20502). It intends to build up on the results of earlier European projects like VICAR, DiVan, AVIR and DICEMAN to offer user

friendly, highly informative access to distributed a/v archives while fully supporting the MPEG-7 multimedia description schemes [3].

The FAETHON project started in April 2001 and has a duration of 30 months. The user requirements collection and analysis procedure is complete and the project is currently in the stage of production of system specifications. When the design and implementation of the FAETHON system is over, a test bed environment will be developed, involving the a/v archives owned by FAA and ERT.

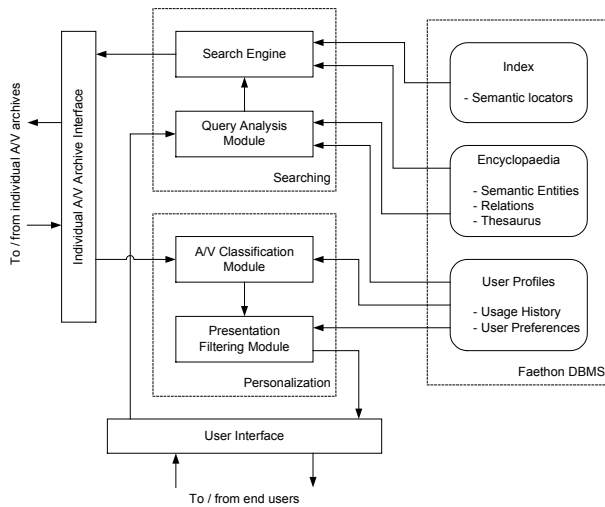


**Figure 1:** FAETHON update: Extraction of high level, unified semantic information out of existing syntactic or low level semantic data.

## 2. SYSTEM ARCHITECTURE

From a technical point of view, the proposed system will play the role of an intermediate access server residing between the end users and multiple heterogeneous audiovisual archives organized according to new MPEG standards. Various types of interfacing modules will be designed / implemented to support smooth communication of the intermediate server to the a/v archives. The major final product will be an integrated software system consisting of the two, semantic unification and personalization subsystems, together with two types of interfaces.

Namely, those between the system and the individual a/v archives and those between the system and the end-users.



**Figure 2:** FAETHON query: Semantic phrasing of the request, unified handling and personalized response.

### 3. INFORMATION MODEL

A common information model will be designed for representation of audiovisual, metadata and semantic information across the FAETHON system and for smooth communication between modules, input-output of algorithms and database access. It will consist of a set of description schemes defined in the XML Schema language and harmonized to the MPEG-7 standard, and specifically:

- *Multimedia document DS's*, fully supporting the MPEG-7 normative MDS's and providing a unified view of a/v documents from individual archives.
- *Data storage DS's*, used for the definition of data structures included in the Faethon DBMS and including *a/v archive profiles*, *user profiles* (usage history and user preferences), the *Faethon encyclopedia* (semantic entities and relations) and the *Faethon index*.
- *Query / response DS's*, used for the standardization of communication to / from end users and a/v archives.

### 4. SYSTEM OPERATION

In the *update mode* of operation, the Faethon DBMS is adapted and enriched by the *semantic unification* and the *personalization* subsystems depicted in Figure 1. The former is responsible for the construction and update of the index based on the encyclopedia and available a/v document descriptions; the *Dynamic Thematic Categorization (DTC)* and *Detection of Events and Composite Objects (DECO)* modules provide the means for extraction of high level, unified semantic information out of existing syntactic or low level semantic data in the a/v archives.

The *encyclopedia update module* updates the *thesaurus*, a set of association measures between semantic entities, while the *user profile update* module tracks user preferences based on existing usage history.

In the *query mode* of operation depicted in Figure 2, a user query is split in a *metadata* part handled by individual archives through archive interfaces and a *semantic* part handled internally by FAETHON. The semantic phrasing of the request and unified query handling is accomplished through the *query analysis* module and the *search engine* of the *searching subsystem*, based on the encyclopedia and index. Personalized response is achieved through the *a/v classification* and *presentation filtering* modules of the *personalization subsystem*.

The internal intelligent modules of FAETHON will make use of unsupervised learning techniques and hybrid intelligent methodologies, exploiting both textual, metadata and audiovisual content descriptors. Since FAETHON is not an a/v archiving system, it will not emphasize on operations like a/v content analysis, annotation, streaming and watermarking. System security is accomplished through mapping of access levels and users of individual a/v archives to unified FAETHON users.

### 5. EXPLOITATION AND TARGET MARKET

Organizations owning or operating a/v archives and holding or distributing a/v content form the most immediate segment of the market targeted by FAETHON, including TV archives, digital TV broadcasters, film / video / image repositories and internet service providers. Expected exploitable results include software entities like the semantic unification and personalization parts of the FAETHON system, as well as the developed semantic description schemes, encyclopedia and static user profiles. More information on the FAETHON project is available online at <http://www.image.ntua.gr/faethon>.

### 6. REFERENCES

- [1] ISO/IEC JTC1/SC29/WG11 N4032, "Introduction to MPEG-7", March 2001, Singapore.
- [2] A. Delopoulos, S. Kollias, Y. Avrithis, W. Haas, and K. Majeen, "Unified Intelligent Access to Heterogeneous Audiovisual Content," in *Proc. of International Workshop on Content-Based Multimedia Indexing (CBMI)*, Brescia, Italy, Sept. 2001.
- [3] ISO/IEC JTC 1/SC 29/WG 11/N3966, "Text of 15938-5 FCD Information Technology – Multimedia Content Description Interface – Part 5 Multimedia Description Schemes", March 2001, Singapore.