

CASAM: “Computer-Aided Semantic Annotation of Multimedia”

1st Annual Report

:: This report covers the period of 1st of Jan. to 28th of Nov. 2008 ::



www.casam-project.eu

Project description

The need for annotated multimedia content is more pressing than ever before. The fully automated annotation has made recently large progress but faces limitations and unsolved issues. Thus, the machine-only annotation appears immature although presenting promising achievements. On the other hand, manual (human) annotation is very cost-prohibitive.

The CASAM project is focusing on facilitating the synergy of human and machine intelligence to significantly speed up the task of human-produced semantic annotation of multimedia content. The project is developing an annotation tool that will augment machine knowledge with human input with the target of minimizing user effort. The project research focus lies in the domains of Reasoning for Multimedia Interpretation (RMI), Knowledge-Driven Multimedia Analysis (KDMA) and Human-Computer Interaction (HCI).

The annotation tool will be able to function within the modelled domain of **news production of News Agencies and Broadcasters**. However, the methods that will be developed will not be bound to the chosen domain, but will be also applicable for the annotation of multimedia documents in a variety of contexts, ensuring generality of the system's usage.

The **expected outcomes** of the project include:

- a. A unifying representation for related knowledge.
- b. A methodology for knowledge-driven multimedia analysis.
- c. A methodology of reasoning for multimedia interpretation.
- d. Intelligent human-computer interface methodology for maximizing information gain in multimedia annotation.
- e. A toolkit for computer-aided semantic annotation of multimedia content.

Summary of activities

CASAM is in its early start (since April 2008), nevertheless all scheduled activities and research aspects have been initialized and coordinated, moving towards well organized procedures and strengthening the proper project operation.

The completion of CASAM's User Requirements and Specifications and the Definition of User Interface, Interface Intelligence and User & Domain Models are the two **major achievements** of the project so far.

In an effort to finalize the integrated system's design a first draft version for the integrated system design was produced. The system design will include a conceptual process design, a SOA modelled architecture and an overview of the technological approach for the implementation of the integration platform.

The consortium also assessed availability of content and context suitability of the candidate domains in order to select environment as CASAM's domain of application and the initial annotated Multimedia content to be used as training set was collected.

Furthermore, a document examining formalisms supporting first-order probabilistic structures in order for CASAM system to reason under uncertainty, was produced.

The important work of CASAM during the first 8 months focused mainly on research and initial system specifications.

User Requirements and Specifications



The capture of the end user requirements and vision about the CASAM usefulness has been finalized. The procedure has involved the examination of the current workflows of the end users, the creation and distribution of over 100 questionnaires in news professionals through the networks of DW, LUSA, EJC and ATC as well as the organization of focus group discussions with experts from the news world. The use case scenarios and the requirements of the CASAM system have been specified

by consolidating the input collected. The application domain selected is the 'environment', for particularizing the fields for the project proof of concept.

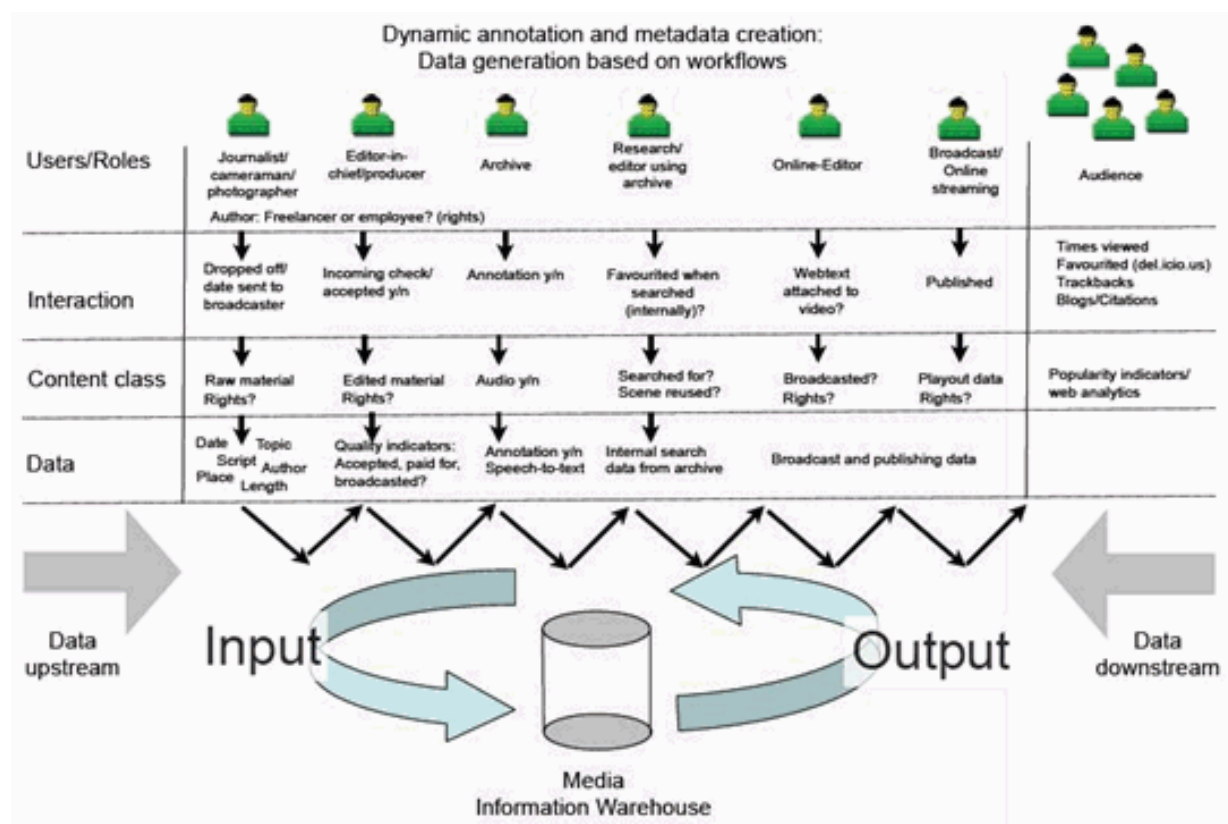


Figure 1: Future Annotation Model from the users' point of view

Considerations about the Multimedia and News Ontologies as well as the actual Content collection are in progress. The first set of content was collected and evaluated. Specifically, during this phase the Annotation and Retrieving requirements were collected, from both the end user and technical perspective, which can be identified to support the services and application development of the CASAM Annotation toolkit.

Definition of User Interface, Interface Intelligence and User & Domain Models

An extended state of the art analysis for adaptive user interfaces and user models has been performed and the first view of the user interface requirements has been finalized. Within this important area of work we reviewed existing literature and best practice in order to establish the foundation upon which the CASAM user interface will be built. The areas reviewed are:

- Existing user interfaces for multimedia annotation system
- Principles and best practice for interface design
- Techniques and experiences with adaptive user interfaces
- Classes of user and domain models, their uses and techniques for their maintenance

First prototype user interfaces were designed and a set of requirements for the CASAM user interface and its underlying components were defined.

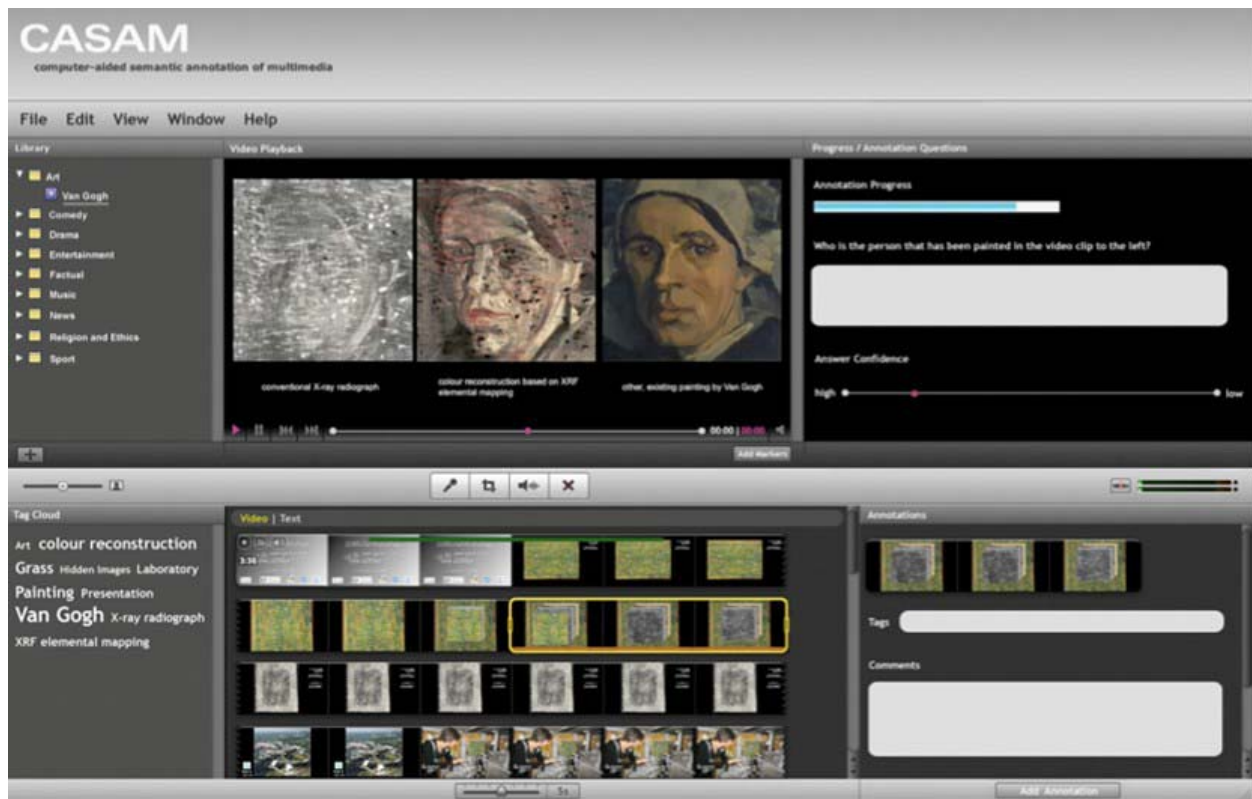


Figure 2: Screenshot of prototype used for evaluation

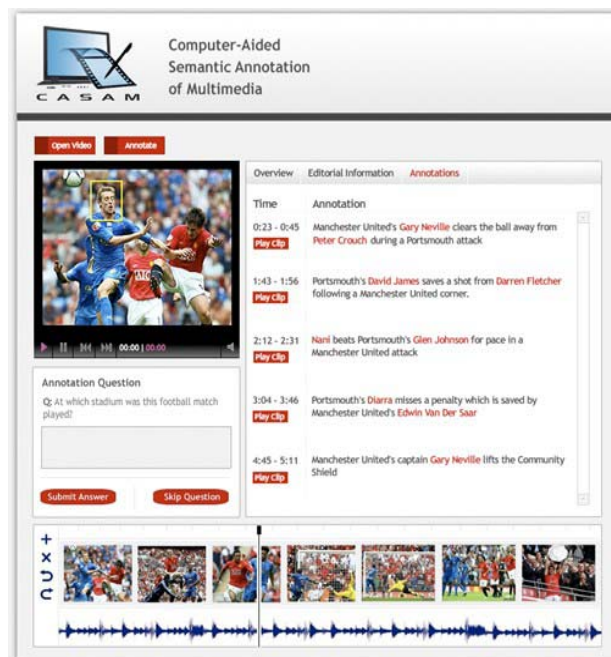


Figure 3: HCI prototype screenshot

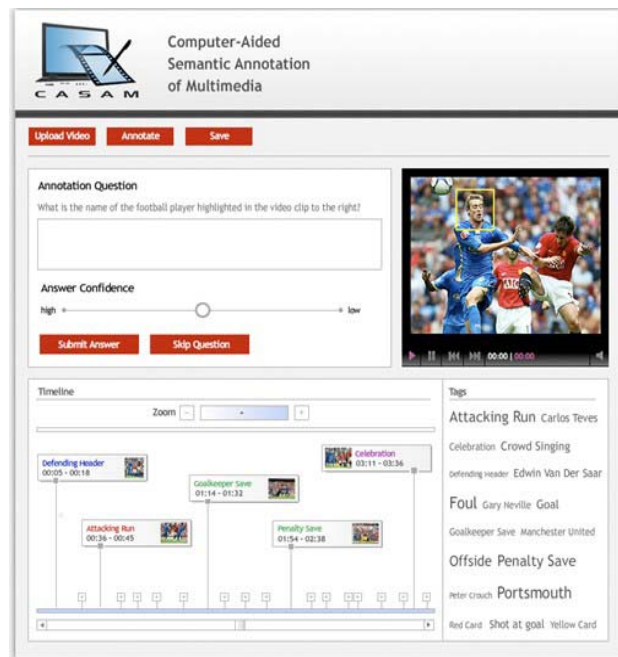


Figure 4: HCI prototype Screenshot

Technology outlook and innovative features

In the context of CASAM's system design and integration the partners proceeded in the effort to finalize the integrated system's design. A first draft version for the integrated system design has been prepared included a conceptual process design, a SOA modelled architecture and an overview of the technological approach for the implementation of the integration platform. It is very important to gain a better insight on the interactions and information flows among components and on how to provide the most efficient integration design.

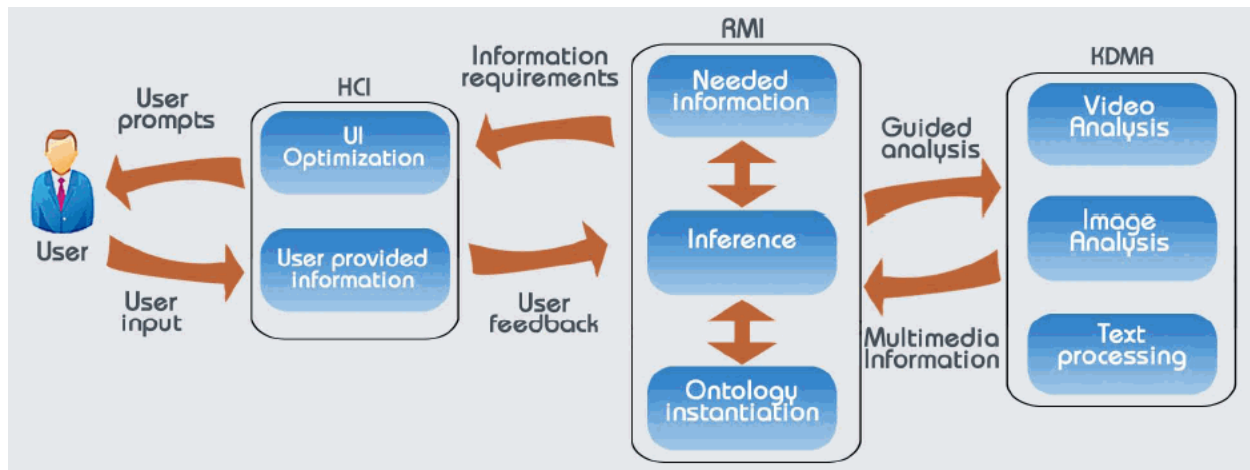


Figure 5: Information flow

All technical partners work in close collaboration in order to achieve a widely accepted architecture.

In the framework of Knowledge-driven multimedia analysis, work has started on surveying the literature on semantics extraction from multimedia content. The effort focuses on surveying methods that potentially contribute towards the main objectives of multimedia semantics extraction of CASAM, namely the adaptability of the algorithms so that they can be rendered user-driven; the potential for scalability; and finally, the ability to operate in real time. A preliminary study of the architectural aspects of the KDMA tool and its interaction with the other CASAM components is being carried out.

Regarding the CASAM knowledge representation and reasoning for multimedia interpretation, two different probabilistic models were introduced namely, Bayesian networks and Markov logic networks. The selection of the formalism influences the research direction of ontology learning in CASAM, and Markov Description Logics (MDL) has been selected as the reasoning formalism.

At the end of the second year of the project CASAM will be able to report on the demonstrator tests.

User Involvement, Promotion and Awareness

In general, the CASAM project received a lot of interest from the targeted **project users** (DW, EJC and LUSA), who acclaimed the objectives of the project. Exhaustive discussions assisted very much in further clarifying and detailing user requirements and helped “translate” between practitioners/future users on the one hand and the developing software engineers on the other hand. All participants expressed the wish to take part in the future CASAM user evaluation and in being kept apprised of the progress and eventual readiness for use of CASAM tools.

Co-operation activities in the context of CASAM are sought among projects and initiatives with similar objectives and targets as well as techniques deployed and tools created. Close cooperation can be established with most of them, while initial contacts are already in place with the most relational ones. The identified and filtered list of projects and initiatives to liaison with is the following: BOEMIE, MESH and other.

To **raise the profile and visibility** of the project even at the initial stage, the consortium has created a first version of a leaflet to be distributed through all partners to any dissemination event they participate. The leaflet is the first part of the dissemination material to be prepared during the project lifetime. The CASAM leaflet is also accessible through the official project website. Moreover, apart from the project Logo and the Presentation Template, the Project Fact Sheet has been created and published at the EC website, after cooperation with the relevant EC staff.

As a central point for dissemination purposes, the project website was created under www.casam-project.eu. It contains information regarding the project, its objectives and approach, expected results and current status, news and upcoming relevant events, as well as general info about project partners, relevant links and contact info. The site also offers a private area in which the consortium members can access all documents necessary for the management of the project. The website is being continuously updated.

Currently there are no scientific publications in conferences or journals, as the project is in its start and the progress made in each individual CASAM “product” didn’t yet led to concrete results that could be published. Thus, scientific publications will be applied to later stages of the project.

Future Work or Exploitation Prospects

The second year of CASAM project is very important as the first prototypes of the three main components and the integrated system will be developed.

A summary of the most **important future work objectives** follows:

- Conceptual architecture of the CASAM integrated system
- Basic reasoning engine (RMI)
- Report on optimization techniques for first-order probabilistic reasoning
- Report on state-of-the-art in machine learning for first-order probabilistic structures

- Methodology for Multimedia Content Analysis
- Report on single modality analysis methods
- Multimedia analysis toolkit – version 1 (KDMA)
- Basic HCI integrated prototype
- Basic Integrated CASAM system

Moreover, the **exploitation prospects** of the project will be investigated with the first version of CASAM's Business and Exploitation plan.

Further Information

Further information may be obtained directly from the official website of the project. Domains of interest include:

Project Presentation:

http://www.casam-project.eu/files/CASAM%20Project%20Presentation_June2008.pdf

Project Factsheet:

http://www.casam-project.eu/files/CASAM_Project%20Fact%20Sheet.pdf

CASAM leaflet:

http://www.casam-project.eu/files/CASAM_Leaflet_Oct2008.pdf