Get Knowledge from the Knowledge

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Abstract. The Information Society is on its way and not only by or through the Broadcast Industry! Publishing rich media means moving from a data management system controlled by humans to a collaborative production process where machines manage migration, exchange and archiving. So it is necessary to manage the data, applications for data representation and especially the knowledge base that provides the link between the data and its meaning. Worldwide, there are standardized languages (W3C) which provide a scientific basis for this important technological move!

Semantic technologies are made to ensure the enhancement of data's, manage the sustainability of the link between the data and information (a meta/data), allowing the exchange of rich models between systems!

Keywords: AV Semantic middleware, media information representation, ontology, temporal objects, linked open data, 360° publishing.

Media deserves an information management (the meaning of the data) which must be independent of any application.

A clouded knowledge exploitation requires following tools:

1 A Semantic Wrapper

The USE (Unique Semantic Entity) contains all the data and relations necessary for the operation and interpretation of the information it encapsulates. The USE is an autonomous set of semantic knowledge and it contains the resources, and the ontology to make understand the resources. The USE is the basis package, providing information instead of data, thanks to the concepts always provided with the resources.

The USE structures:

- A physical layer (support for transport of essences (or carrier stream)
- A logical layer (representing the physical layer, the segmentation,…)
- A knowledge base (ontology MediaMap+ Core)

It can be distinguished:

- A header that includes, among others, an unique ID, and a set of pointers associated with metadata files included in the file and structured by the

P. Herrero et al. (Eds.): OTM 2012 Workshops, LNCS 7567, pp. 306–311, 2012.

MediaMap+ Core ontology. It also contains elements for communications and queries management.

- The structural metadata's include everything that is around "content object", "digital resources", "temporal object", "graphical object", "textual object" …
- Administrative metadata's repeat everything about the "corporate body" as defined in the ontology
- Descriptive metadata's include everything that defines "editorial object", "annotation", "subject", "shot" ...
- Resources specify the production entity (corporate body, physical person, production management, ...). They also identify interfaces (APIs) that can form pages and view.
- References contain everything about ontology, the knowledge base installed, the linked open data (external links).
- The processes describe the production line with the material and human resources, tasks and objectives.

By each treatment of a USE, the ID will be changed to match the new version and preserve the uniqueness of the ID.

2 The Open Semantic Bus

The OSB is the of exchange system between USE and Local Operation Centre (LOC).

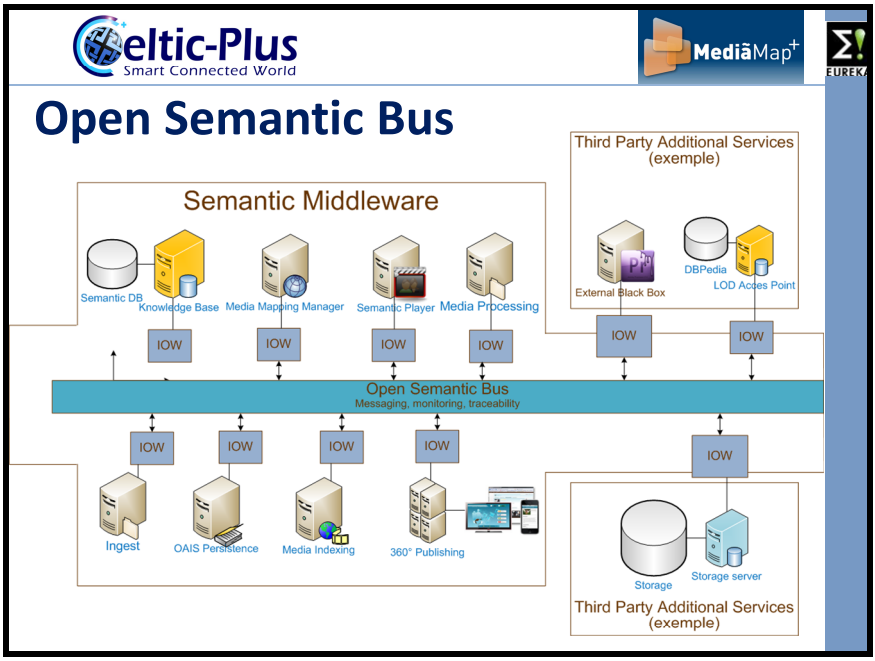

Fig. 1. Shows the OSB architecture implemented

This architecture allows:

- To integrate stakeholder type in the web production line
- To provide and enrich metadata
- To connected all the systems devices and make them interoperable
- To identify in detail the process and the involvement of different actors
- To preserve the link between metadata and the associated ontology
- To take into account the roles and skills
- To provide a specific view according to the roles and responsibilities of different actors

The OSB is based on a distributed network architecture. The spatial and temporal interoperability is provided by the Interoperability Window (IOW). Each Interoperability window uses an identified Profile (cf Profile part), and handles simply the mission to transform semantic knowledge into proprietary data, eventually execute proprietary processes and do the inverse transformation.

3 The Audiovisual Production Ontology

The Audiovisual Production Ontology is a conceptual model which can represent various audiovisual production projects in terms of tasks hierarchy, outputs, contributors, roles and rights. It enables to build custom-tailored access and view to the project information for each member of the project.

An audio visual object is all together:

- An editorial project: a communicative object created and structured in order to convey a message.
- a content : the viewing or the playing of this recording, i.e. what can be actually perceived by a human or sensed by a machine
- a recording : digital files stored in several databases.

Audiovisual is a spatio/temporal content which is reconstructed from a series of bits in a digital file. Therefore, one important feature is that one segment of content can be recreated from various recording – with different encodings for instance.

From this first description of the audiovisual object, MediaMap+ has defined a distinction between:

- its project (called *EditorialObject)*
- its prescription and/or description (called *Annotation*)
- its playing form (called *TemporalObject*)
- its recording form (called *MaterialResource*)

The MediaMap Annotation concept is generic and extensible.

The purpose is to enrich the modeling of the piece of work by binding it to other concepts with 4 relations:

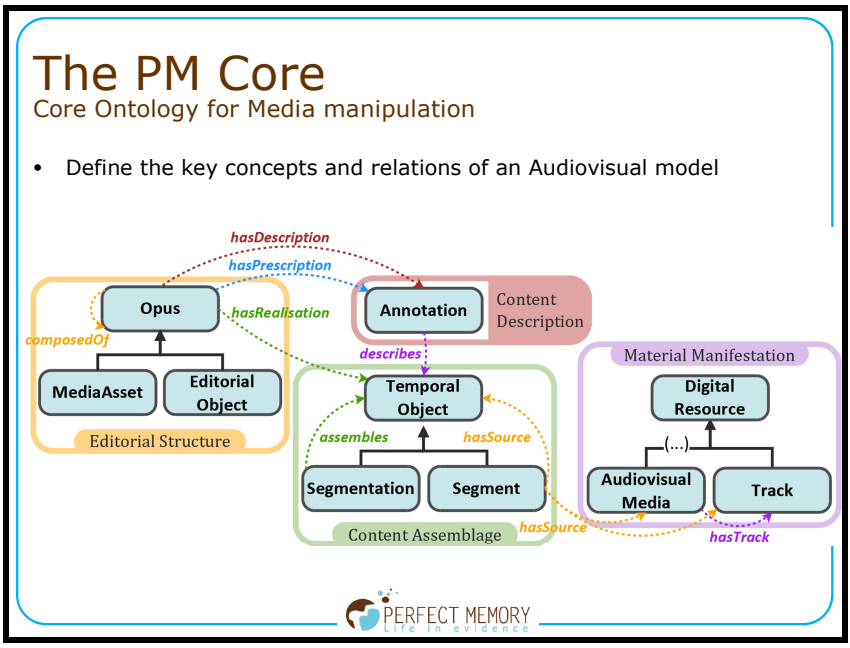

Fig. 2. Depicts the main relations between these concepts

- prescriptive annotations which reflects the editorial intentions (relation *hasPrescription* with *Annotation* as range).
- descriptive annotations which reflect the editorial choices made during production (relation *hasDescription* with *Annotation* as range).
- its potential realizations (*hasRealization*) with *TemporalObject* as range).
- a portion of video material which has either been the result of an original creation or a selection of existing content (relation *hasSource* with *MaterialObject* as range).

The *Audiovisual Annotation Ontology* is a conceptual model which provides high-level descriptors for audiovisual content. These descriptors are based on the audiovisual scripting vocabulary used by professionals in documents like the screenplay, the synopsis or the shooting script.

The annotations can be indexed by a human being or extracted by automatic analysis.

An Annotation is an element which either prescribes or describes one particular aspect of an editorial object (*hasPrescription, hasDescription* relations) and related to a specific content object (describes relation).

4 The Profile

By choosing a set of representation formats with a choice of parameters, it is possible to get the capacity to represent information for a class of application. The aim of an

ontology is to be used in order to instantiate and understand information through a process. Any process must be able to mobilize existing universal or specific information, from a Knowledge Base. We so define the Profile : the combination between a Knowledge Base and an Ontology, structuring and limiting the information of the execution of tasks through a process. For instance, for an identified domain, as the Physical media handling domain, the Profile to use is the couple "Physical media handling ontology" – "Knowledge base of known Formats and Codecs".

5 The View

Digital information involves the interpretation of the data before their exploitation. The collaborative environment requires the sharing of all information. So the database must contain all facets of information that can be known and interpreted by different actors in the audiovisual processing chain.

Each actor in the chain expresses different needs. The concept of VIEW automates part of the effort to adapt and filter information that is presented to the operating actor. The adjustment takes into account parameters such as the role, skills and the manipulated entity to produce a representation of information that conforms to the context of consultation.

The View(interfaces) are ontology based (Role, Skills, Entity) and generated for a creator (scripting), a director (indexing and enhancement), a documentalist (inference: automatic enrichment), … they offer:

- an easy segmentation in chapter, scene, shots, shot value for video and audio
- a synchronized tagging for metadata's (text, pictures and other temporal objects!)
- the enhancement and enrichment during a collaborative process through semantic inferences
- a structured collaborative enrichment through semantic tags and their linking to open semantic databases (via Linked Open Data),
- consolidated information available on the content whether centralized or distributed
- 360° publishing with a real rights management system

6 The Semantic Player

It is a tool that goes beyond the simple storage and interconnection of data repositories to provide a representation of information that is independent of any application or database. It is a tool for production/exploitation of multimedia data (video, audio, image, text) which allows the establishment of a non-sequential supply chain.

The player uses a semantic middleware that includes an ontology and a knowledge base, inference rules are implemented to provide intuitive navigation, and a semantic database.

Spatio/temporal semantic objects offer:

- synchronized visualization of metadata's (text, pictures and other temporal objects!)
- consolidated information available on the content whether centralized or distributed for explicit exploration of a set of properties (minimum FRBR, and much more with personalized profiles)
- the interpretation of the consultation contexts that present the right visualization facets to the user

In addition it allows users, who wish to become a source of data, to guarantee accessibility to their knowledge.

The properties of the USE, the distributed architecture of the network exchange (OSB), the Ontology, the Profile and the View:

- provide a highly collaborative production chain
- ensure interoperability over time (sustainability) and space (interoperability between heterogeneous systems)
- cover the dynamic aspects of interchanges
- present to users relevant information based on their roles and skills.

The objectives of this middleware, in addition to the assisted capture of rich and structured information, were the simplification of exploration, visualization and exploitation of the data all along its life cycle.