Brokerage of Intellectual Property Rights in the Semantic Web

Roberto García, Jaime Delgado
Distributed Multimedia Applications Group (DMAG)
Technology Department, Universitat Pompeu Fabra (UPF)
Pg. Circumval·lació 8, E-08003 Barcelona, Spain
{roberto.garcia, jaime.delgado}@tecn.upf.es

Abstract. New approaches in the Web environment are underway. These new methodologies try to leverage it from an information medium to a knowledgeable level, from a machine point of view. This upgrade, mainly focused on improving Web automation capabilities, can solve some of the problems derived from its widespread adoption. Among them, the necessity of a framework to manage the enormous market of digitalised multimedia and to ensure that all the intervening actors get a satisfactory experience from the Internet adventure. An application under development is described and future plans in this direction are presented. A broker component has already been implemented applying a Semantic Web layered architecture. Its mission is to mediate in a restricted community of digital video providers and distributors, benefiting also final purchasers. The intention is to use it as a test bed for this promising initiative and its application in the Intellectual Property Rights (IPR) domain.

1 Introduction

The Internet, and more concretely Web technologies, has matured, passed the promises phase and is currently firmly established in our society. Now it takes part of our daily life, it is in the appropriation phase [1]. We are trying to profit, economically or not, from it, as we did with other revolutionary ideas that arose before. Now, we can observe with greater perspective and calm what has been achieved and what can be done further. It seems like new phases must be engaged, solving the new problems that came up and, why not, making new promises.

One of the biggest problems, strongly founded on the consequences of the overall Digital Era, is the easy copy and ulterior uncontrolled distribution of multimedia creations. This motivates new approaches to intellectual property management, mechanisms by which the authors of these materials and all other implicated actors get fair revenues from their efforts. However, the management of such features in the current Web environment, decentralised and enormously dynamic, becomes almost impossible if these mechanisms are not largely automated. Therefore, the real problem is the lack of an easy automation framework in the current Web, as it also happens to other initiatives in the field, for instance thus centred on resource location.

This fundamental problem is the focus of the new Web environment initiative, the Semantic Web. The migration of the interoperability layer from the syntactic to the semantic

level is the base of this initiative. This new approach, despite less suited a priori to computer abilities, provides a more capable base for the automation of complex processes in a highly heterogeneous environment like the Web.

The Semantic Web is the core of all the work presented in this paper. It has been applied to its main objective, the use of semantics in the Web for IPR conceptual modelling. In addition the implemented business model and architecture will be shown, since there is already a developed part and in order to provide a practical context.

Work already done has been co-financed by the Catalonian Government initiative to establish a pilot infrastructure of the future Internet 2. Concretely, inside the multimedia cluster that explores the multimedia capabilities of this evolution of the current Internet, especially for video distribution. The developed application, called MARS (Multimedia Advanced brokerage and Redistribution Surveillance), deals with video IPR management for a group of video producers that also participate in the project. However, it is important to remark that despite this initial focus, it can easily upgrade to any type of intellectual property resources and to wider environments, mainly thanks to the semantic approximation choosen.

2 Approach

In this section, we depict the different facets that explain the way the described project has been considered. They have marked the development until now but have even greater influence in the future work.

2.1 Intellectual Property Rights and the Semantic Web

Since now the Web is more and more business oriented, organisations in all sectors are trying to automate its processes and relations to improve services, reduce costs and attain global markets. However, these efforts are finding great difficulties, especially when considering its implementation in the wide and open environment that the Web provides. Moreover, the multimedia creations sector is not one of the easiest to deal with.

There are many problematic issues. The products in this market are not clearly defined ones. They can have multiple independent components that involve multiple actors with different rights over this material. Consider, for instance, a sophisticated Web advertisement, with a soundtrack, some good quality photos, a synthetic animation of the product to clearly show its functionality, etc.… Related to this, there is the identification problem of all these creations and the actors involved.

Finally, there are the interoperability problems that an automated approximation to this problem will find. There exist many different vocabularies to deal with intellectual property, derived from diverse cultures, legislations, communities… This is the key issue to extract full potential from an automated platform for IPR management can provide. Understanding between parties using different vocabularies is fundamental. Therefore, there must be a supporting layer enabling such mappings, since no communication is possible if there is not a common base.

All these requirements fit pretty well in the features Semantic Web is promising. Indeed, we can now observe some initiatives in this direction, as it could be observed in the last W3C Workshop on Digital Rights Management [2]. Therefore, our intention in the underway

MARS project [3] is to develop an IPR management system that profits from Semantic Web features. It should appear completely integrated in the Web, facilitating interoperability and allowing advanced processes automation by extracting full potential from the provided semantic layer.

As an overview, detailed further, our plans involve the following Semantic Web building blocks:

- URIs as identifiers. This includes URNs when persistence is needed. They are used to identify creations and to reference digital certificates. The latter, in conjunction with digital signatures, will allow actor identification and validation of the statements they made.
- Ontologies. They define the different vocabularies used during statements construction. They are not limited to the intellectual property domain, some model more abstract levels or describe concrete multimedia types, for instance videos. Ontologies are interconnected, directly or by common upper levels, so interoperability through mappings between them is feasible.
- Metadata carrying semantic annotations. It is the framework that merges the previous pieces. Metadata fragments will talk about a resource through an URI and use ontology words and the semantics they define.

2.2 Semantic ExtraWeb

Although Semantic Web initiative has great potential, it is still at its beginnings. For the moment, as it happened to the initial Web, it is being applied to very limited and more or less closed environments, sometimes called Community Web Portals. We can also use the more general term Semantic Extrawebs, since they apply to the same scope than the well-known extranets. However, Semantic Web has openness in its foundations, inherited from its Web origins, and this establishes a great difference with other similar initiatives. In the future, it may upgrade easily to the global domain aggregating independently developed initiatives.

Therefore, for the moment, the developed system is intended to cope with the necessities of a small community of users in the multimedia environment. This is not a handicap for future wider extensions or interactions with other previously endemic communities. As has been said, interoperability is one of the main features of the Semantic Web, as can be read for instance in [4].

2.3 Business model and brokerage

Figure 1 shows the general IPR model that has been considered. It is inspired by the one defined by the Imprimatur project [5].

However, we have simplified this model considering the necessities of the community participating in our project. This allows us to facilitate implementation without losing any characteristic because the application environment does not have the entire requirements covered by the complete model. First, the number of actors has been reduced because the main participants in our project cope with the three top roles of the value chain, shown in the centre of *figure 1*.