Linking the Semantic Web to ODR: the Ontomedia project

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Abstract. Despite the conceptual vagueness of definitions, both Web 2.0 and Web 3.0 are opening up for ever-growing communities of users new forms of online interaction and customization of information. In this article we explore some of the critical features of Web 2.0 and 3.0 developments applied to different conflict domains, and then present some of the basic components of the Ontomedia platform. The Ontomedia project aims to provide mediation experts and users with a semantically enriched mediation platform where they are able to interact, mediate, and retrieve useful information on related cases in an effective and friendly way.

Keywords: Online Dispute Resolution (ODR), Semantic Web, Web 3.0, Web 2.0, ontologies.

1. Introduction

Nearly at the end of the second decade of the Web, the boundaries delimiting the notions of Web 2.0, Web 3.0, and the Semantic Web are not clearly drawn. To some people, Web 2.0 and 3.0 are buzzwords, blanket terms or marketing concepts [1, 2]. To some others, they are shortcuts to refer to the second and third decades of the Web, respectively [3]. And to many, Web 2.0 is equivalent to the Social Web, since a crucial aspect of its present development is about users (or prosumers, to use another trendy word) creating and sharing contents within social networks. As regards Web 3.0, there is no similar consensus yet on what is it all about, although the notion already resonates with openness (of protocols, standards, data, etc.), intelligent applications, or semantically enriched contents. Spivack forecasts that "the focus of this decade is going to be about enriching the structure of the Web and transforming the Web from something that today is very much like a file server into something that is more like a database" [3]. To MacManus, "Web 3.0 is about open and more structured data, which essentially makes the Web more 'intelligent'" [4].

And, then, the Semantic Web comes into play as a distinctive set of technologies and languages whose functionalities are perceived in different senses: adding structure to Web 2.0 as to make it evolve to Web 3.0 [5,6,7], letting machines to get the meaning of information to transform, organize or synthesize data intelligently [2], or, more generally transforming the Web into a Giant Global Graph [8].

Now, how ODR services may benefit from the advancements and opportunities of Web 2.0, Web 3.0, and the Semantic Web? For fifteen years now, ODR services

have evolved in parallel to the extension of the Web. In 2006, Colin Rule predicted that "ODR will be one of the biggest beneficiaries of these new technologies, because they are squarely aimed at ODR's core functionality areas: communication, collaboration, and interactivity" [9]. Yet, experts have also warned that ODR services may be lagging behind the curve of both Web 2.0 and Semantic Web recent developments [9,10]. In the pages that follow we will try to offer some answers by providing some recent examples and describing our particular contribution to the field, the Ontomedia project.

2. New approaches to ODR

For roughly two years now, new horizons and opportunities for ODR have incredibly expanded with the emergence of new web tools and services focusing on conflict prevention, conflict tracking, debate, or negotiation. For the sake of clarity, we will distinguish here two different sets of tools: open source platforms and mashups. Even though different in nature and purpose, they all have in common featured aspects of state-of-the-art Web 2.0: open source software, free access, multiplatform facilities, and crowdsourced data.

2.1 Open source platforms

− *Ushahidi*—"testimony" in Swahili—is a free, open source platform that allows its users to gather distributed data via SMS, email or web and visualize it on a map or timeline.[1] Through Ushahidi people report real time information of events such as political disruption or natural disasters and the platform aggregates this incoming information for use in a crisis response. The website was created at the beginning of 2008 as a simple mashup, using user-generated reports and Google Maps to map reports of violence in Kenya after the post-election fallout. Ushahidi has recently released the open Beta version of its platform and has been used in different projects in India, Congo, and South Africa.
− *Swift* is a free and open source toolset for crowdsourced situational awareness.[2] The first use of Swift has been as a complement to Ushahidi to monitor the Indian 2009 Elections. Swift embraces Semantic Web open standards "such as FOAF, iCal, Dublin Core, as well as open publishing endpoints such as Freebase" to add structure to crisis data and make them shareable.
− *RapidSMS* is an open source web-based platform for data collection, logistics coordination, and communication developed by the Innovations and Development team of UNICEF.[3] With the RapidSMS web interface, multiple users can simultaneously access the system to view incoming data as it arrives, export new data-sets, and send text messages to users (UNICEF Innovation, 2009).
− *Debategraph* is a web-based, Creative Commons project that has developed a wiki visualization tool to participate in already existing debates or create new ones. The

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[1] http://www.ushahidi.com/
[2] http://swiftapp.org/
[3] http://www.unicefinnovation.org/mobile-and-sms.php

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tool includes editing options to raise new points or rating others' arguments and proposals, and RSS feeds to share, monitor or reuse the debate maps. The first featured debate in Debategraph is "Peace in the Middle East", which evaluates the contentious issues and potential paths to long-term, sustainable peace in the Middle East.

Fig. 1. Explorer view of a debate in Debategraph

2.2 Mashups

– *Vikalpa* is a Sri Lanka citizen journalism initiative that in May 2008 launched a micro-site on Twitter with short reports on election related violence and malpractices. Reports were generated by the citizen journalist network in the Eastern Province of the country.[4] The micro-blogging initiative was complemented with a Google Maps based solution for the Centre for Monitoring Election Violence (CMEV) to locate election related incidents on a map [11].

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[4] http://www.vikalpa.org/archives/category/languages/english/

- *WarViews: Visualizing and Animating Geographic Data on Conflict.* WarViews is a project of The Swiss Federal Institute of Technology that has developed an interface for the exploration of GIS data on conflict. WarViews is offered in two different versions: a static version that runs in a web browser and allows the user to switch between different data sets, and a dynamic version based on Google Earth that can time-animate geographic data such that the development over time can be monitored [12]. WarViews targets both researchers and practitioners in the conflict management and resolution domains.
- *WikiCrimes* is an initiative at the University of Fortaleza (Brazil) that allows posting and accessing criminal occurrences in a Google map.
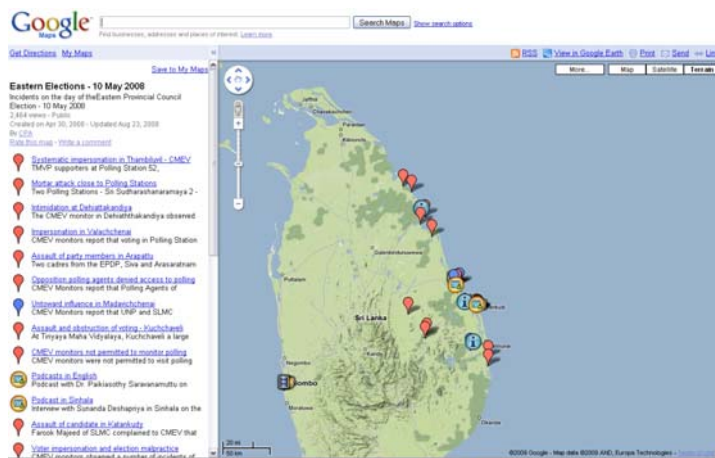
Fig. 2. Map of election violence in Sri Lanka (10th May 2008)

3. The Ontomedia project

According to Spivack, "there is in fact a natural and very beneficial fit between the technologies of the Semantic Web and what Tim O'Reilly defines Web 2.0 to be about (essentially collective intelligence)" [13]. From these cross-roads between Web 2.0 and the Semantic Web emerges what is currently known as Web 3.0. Web 3.0, therefore, is about bringing the "connective intelligence" against the already established "collective intelligence" brought by the Web 2.0 [14]. Or, to put in Spivack's words, "about connecting data, concepts, applications and ultimately people" [13]. The use of semantic technologies allows the connectivity through devices, multimedia elements, text and any other Web resource by means of the hyperdata.[5] The Semantic Web is a collective effort led by the W3C in which an evolved Web describes data in a shared and formal format as to be useful for people and machines alike, allowing data to be shared and reused across applications, enterprises, and community boundaries.

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[5] Hyperdata is about data that links to other data, as opposed to hypertext which is text linking to other text.

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The Ontomedia project combines some of these trends and technologies to provide a set of functionalities to a broad community of both professionals of the mediation domain and end-users of mediation services.

From the Ontomedia standpoint, we believe that Web 3.0 technologies can make significant advances into the ODR field, helping professionals in gathering valuable resources relevant to the mediation services they are providing, and helping users as well to share and contribute to harness the connective intelligence about ODR that can be found on the Web.

To some extent, ODR is to ADR what blogs are to newspapers. In that sense, we are talking not only about texts but mainly about videos (mobile or webcam taken), speech, images and pictures. As Web 2.0 implied the massive contribution of content from people, in Web 3.0 people will still be contributing with content, but this content will be automatically annotated to its further use by software agents, connecting one resource to another as the expression of a relationship described in a formal model, known as ontology.
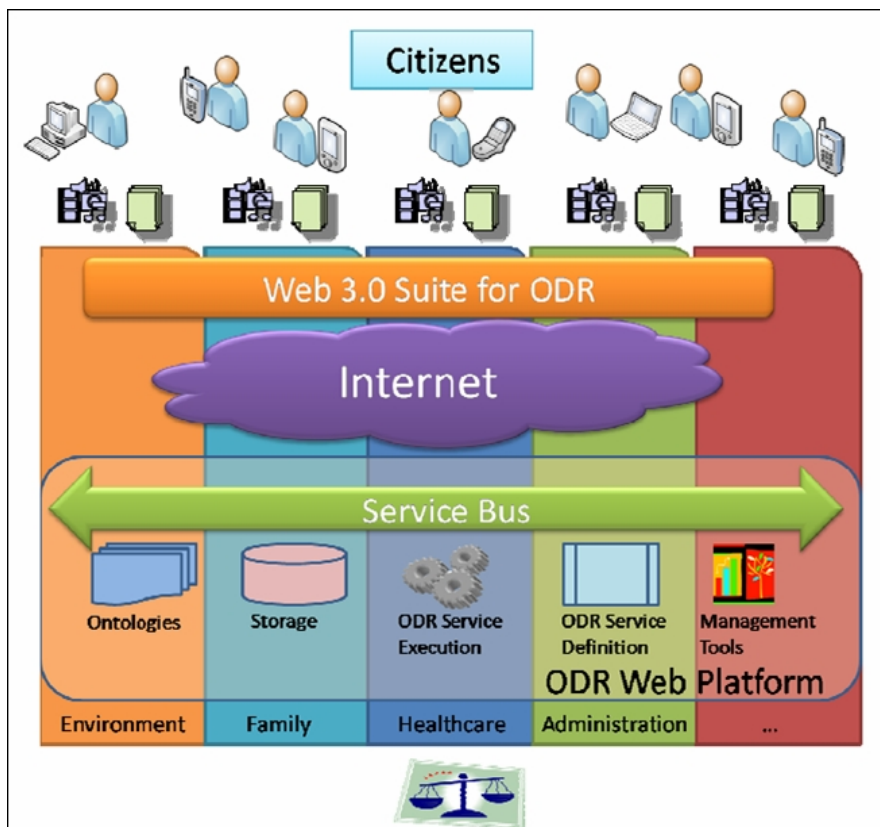

Fig. 3. Conceptual Architecture of Ontomedia

In a nutshell, Ontomedia will allow users and professionals to meet in a community-driven Web portal where contents are provided by users and annotated by the ODR Web Platform. The ODR Web platform is generic, and can be tailored to be effective in several domains such as family, health care, labour, environment, etc.

Citizens (both professionals and users of mediation services) can use any kind of devices to access the portal (computers, mobiles), and in any format suitable to their purposes (text, speech, video, pictures). Users will therefore be able to participate in online mediation services as they do in a face-to-face basis, but with the advantages of distributed and even remote access.

In Ontomedia we also foresee the application of mediation services as tasks within a mediation process that will be formally described by means of both process ontologies and mediation ontologies [15]. These services will be described, stored and made accessible through a service bus that will ensure end to end communication between consumers and providers, as well as a semantic execution engine that takes care of the execution of semantically enhanced mediation processes.

Ontologies will be used to annotate all kind of contents and also to help analyze multimedia content (see Fig. 5). The multimedia analysis is devoted to enhancing the information a mediator possess during a mediation session, capturing mood changes of the parties and any other psychological information inputs that can be useful for mediators, just as if they were in a room with the users of the mediation service. All types of metadata will be automatically extracted and stored to be further used within the mediation process.
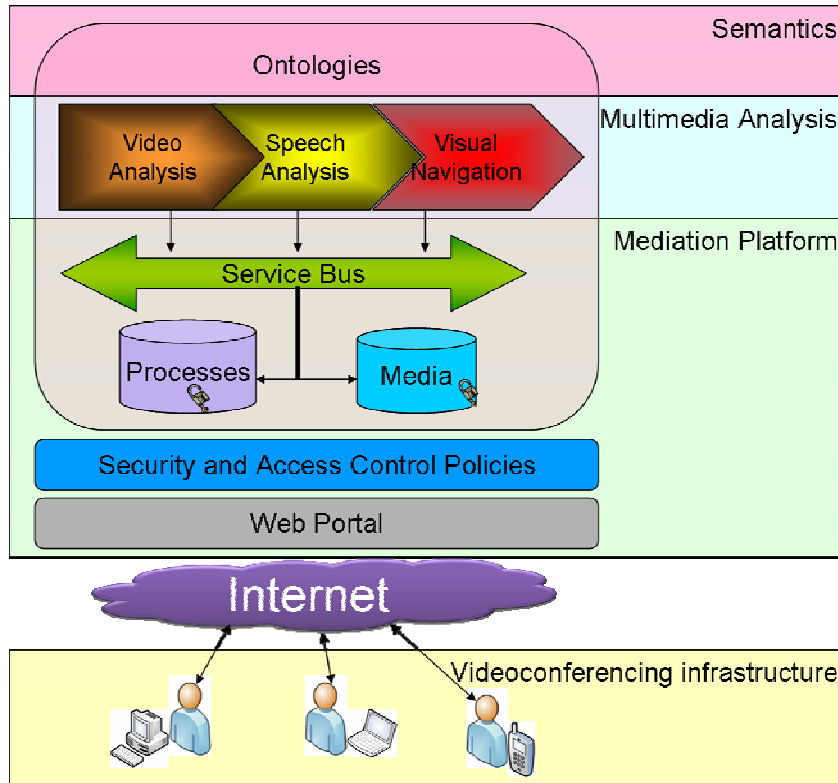
Fig. 4. Layered Diagram of Ontomedia Mediation Platform

The access to the portal will be secured and private, and contents will be shown only to profiles of users holding required authorizations. However, if content is authorised to be made available, both users and professionals will have a huge case repository where obtains valuable information concerning a similar case.

Ontomedia will also develop tools to encourage users to exploit the advantages of sharing information and experiences with others. In this way, users will be able to tag and store content that are useful or interesting to them, and to find similar cases. In doing so, they will be able to create social communities of people with common interests.

Related with those initiatives mentioned earlier, Ontomedia will provide a mashable suite of features that will allow users to find in a map similar cases to theirs. The semantic geoposition of those cases and its representation in a map is a trivial feature. What seems more interesting from the user perspective is the posibility to have tag clouds of concepts related with each case and a timeline of concepts against a case.

The set of Web 3.0 features that will be enabled and accesible to users of the Ontomedia platform can be summarised here:

- Annotation of all types of contents. With this feature, a user can easily know if another case has some conceptual similarity with hers. Given a case, a

useful visualization feature is the representation of those concepts more relevant in a case as a tag cloud. Just clicking in one concept or other in the tag cloud will show you a set of cases that also are related to that concept.

- Jointly with the annotation, some metadata extraction is automatically conducted, including geoposition of cases, time location and named entity recognition.

  o With geoposition, users can see in a map cases similar to theirs, given the set of concepts related to the issues. The tagcloud will always show the concepts that are relevant to cases appearing in the map. Categorization and segmentation will be possible by means of several icons and with just a glimpse the user of the platform will have a powerful tool for visualization and conceptual identification.

  o With time location, users will have a timeline. Timelines can show the location of cases against time with respect a particular concept (the aparition of a case related to a concept in a particular time). With this feature, users will be able to see the evolution of the frequency of cases where a concept is concerned.

  o Where NER (Named Entity Recognition) is concerned, the platform will be able to detect where well-known entities are mentioned. In Ontomedia, well-known entities are concepts that trascend domain Ontologies like person names, organizations, dates, places, figures and some others. The power behind this feature is that doing so, we will be able to connect well-know entities with well-know facts as those defined with the LOD (Linked Open Data) principles [16]. Where the name of a person is mentioned, if it exists, we will retrieve her FOAF[6] profile. Where a place is mentioned, we will extract the GeoName[7] information available, and so on. This information can be used within Ontomedia to add formal restrictions and reason over it.

- Each concept, each piece of information, each resource is susceptible to have a comment from any user. Users are encouraged to participate within the platform and to build it jointly with other users.

5   Conclusions and future work

Despite the conceptual vagueness of the definitions, both Web 2.0 and Web 3.0 developments offer new forms to interact with the Web that are most relevant to ODR. To be sure, some of their critical features—openness, standardization, free access, connectedness, crowdsourcing effects, etc.—make it possible to enrich ODR services in a wider perspective. The Ontomedia project attempts to learn from these innovations so as to provide an easy-to-use web platform for both mediation domain experts and end-users. A distinctive aspect of Ontomedia, nevertheless, is the

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[6] FOAF. Friend of a Friend. http://www.foaf-project.org/
[7] Geonames. http://www.geonames.org/about.html

application of Semantic Web technologies to enhance online mediation processes. On the one hand, Ontomedia will use ontologies to annotate any kind of content (either textual or multimedia) to help users to participate in the process and search any useful information on related cases. On the other, a semantic execution engine will take care of the execution of the semantically enhanced mediation processes. At the present moment we are developing a mediation core ontology [15] and mediation domain ontologies. Future work also includes semantic geoposition of cases and Named Entity Recognition.

6. Acknowledgments

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