Chapter 42
Ontological Dimensions of Semantic Mobile Web 2.0: First Principles

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ABSTRACT

In this chapter, we advance, from the point of view of Knowledge Representation and Reasoning, an analysis of which ontological dimensions are needed to develop Mobile Web 2.0 on top of Semantic Web. This analysis will be particularly focused on social networks and it will try to make an outlook about the new knowledge challenges on this field. Some of these new challenges will be linked to Semantic Web context, while others will be inherent to Semantic Mobile Web 2.0.

INTRODUCTION

Mobile Web 2.0 (MW2.0) can be considered the next revolution in both social networks and digital convergence. Roughly speaking, Mobile Web provides the web experience with ubiquity and agent mobility. These features determine significant differences between Web 2.0 (W2.0) and MW2.0, because users are able to generate content with explicit spatial (geographical), temporal, contextual or personal characteristics, as well as to create or use metadata. This last one is the basic tool used for building the Semantic Web as an envisioned project which consists in a Web where information turns into Knowledge by means of ontologies and data which are trustworthy machine-readable.

In Semantic Mobile Web 2.0 (SMW2.0) frameworks such as Web Engineering, the Semantic Web and W2.0, are joined to create a new paradigm. Novel techniques must add to this new paradigm innovative (formal) knowledge representation methods, e.g. to relate spatial reasoning and context awareness. The new paradigms should solve new problems, as the smart generation of metadata, contextual query/reasoning, geospatial reasoning and different ontological dimensions related to the new SMW2.0. According to Morfeo Ubiquitous Web Applications project (http://uwa.morfeo-project.org/lng/en), two semantic-related

DOI: 10.4018/978-1-60960-042-6.ch042

tasks to develop are: the design of advanced policies and formalisms (including those based on semantics) that enable adaptation to context, and the achievement of tools for rich device descriptions (based on ontologies) and the meaning of exposing this to Web applications.

This chapter focuses on challenges that emerge from SMW2.0, which are closely related to the ontological nature of knowledge generation, management and transformation. It is necessary to consider SMW2.0 is attempting to combine native Web 2.0 tools and use them with the SW ones, but both are apparently diverging. SW tools are designed for an environment where the system is mainly focused on client-server architectures, where the knowledge owner is the ontology one. Nonetheless, W2.0 users generate their own information, which have to be transformed into knowledge by means of usable applications. Actually this is not a new idea; it is -from a more general point of view- the Metaweb, envisioned by Nova Spivack (2004).

Within this context, the role of ontologies should be analyzed and, therefore, revised. Ontologies are considered as formal theories designed to organize and perform the trustworthy conversion of information into knowledge. In the case of SMW2.0, ontologies can be used in several dimensions of Knowledge Organization and Representation (KOR) and, within this chapter, some of them will be discussed. The reader is warned about the amazing growth of mobile telecommunications, applications and services, which prevent to isolate all of these (some of them are appearing in emerging research and multidisciplinary fields, as, for example, Urban Informatics). Other interesting and controversial applications as contextual advertising or applications on the idle screen in mobile devices (Voulgaris, Constantinou & Benlamlih, 2007 and Constantinou, 2009) are unexplored territories for KOR techniques.

In spite of the difficulties, there exist evident needs of knowledge organization and representation in current application markets (see e.g. Apple App Store for iPhone/iPod). The absence of logical application and service descriptions is a strong barrier for users, who can not access them (for consuming, composing and discovering). This barrier can be harmful for developers' billing aims. Similar *semantic divides* will exist if smart generated contents by users, from mobile phones, are not semantically annotated in any proper way. Actually, this latter problem asks for finding a sound balancing among several limitations of devices and user's needs. Mobile phone usability, user's behavior of social widgets and application in mobile devices and ontological interpretation of weak annotations (including incomplete or rough classifications) will play an important role in this balance. The own selection of elements where Ontological Engineering is applied on SMW2.0 projects may be discussed, for instance, in the case of KOR being applied to knowledge management represented by ontologies. The balance between SW philosophy and MW2.0 behavior is a big claim which seems to mostly depend on social and psychological features of users. An important issue is the user-generated information management in order to transform it into Knowledge. As in Nykänen (2009), it could be appropriate to start analyzing, from the perspective of SMW2.0 applicability, the roles and processes for Knowledge Asset Management (KAM) in creating knowledge organizations, represented in Nonaka & Takeuchi's cycle (Nonaka & Takeuchi, 1995) (see Figure 1). This cycle is based on four activities which transform the visibility, importance and the value of KAM into organizations (socialization, externalization, combination and internalization).

In the SW, knowledge is a current asset and the very substance of processing; and in W2.0, user generated content is often based on the combination of different contributions by different users of sub-communities. Therefore, in SMW2.0 similar KAM cycles can be studied and supported by devices and processes. That is, in SMW2.0 networks, creating knowledge com-