

# State of the Art in Semantic Organizational Knowledge

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## INTRODUCTION

*Semantic organizational knowledge* refers to the Semantic Web and Linked Data technologies that are applied to the principles and procedures of organizational knowledge. The aim of this chapter is to present the state of the art research in *semantic organizational knowledge*. Originally, organizational knowledge is the ability of employees of an organization to perform tasks given the collective understanding of a particular context. As human knowledge comes in many forms and shapes, previous research conducted by Nonaka (2007, chapter 3), Choo (1996) and Spender (1993), has identified the existence of several types of knowledge in organized contexts including *explicit* knowledge, *tacit* knowledge, *cultural* knowledge and *embedded* knowledge. Explicit knowledge is intuitive, based on experience, intractable and refers to knowledge known as “know-how”. It was originally defined by Polanyi (1958). The popular view of this type of knowledge is a form of knowledge encoded in organizational practices, procedures and routines. It is also transmittable in formal language as clear facts, propositions and symbols. Tacit knowledge known as “know-what”, is easy to identify, store, retrieve and disseminate. Cultural knowledge refers to being familiar with various cultural characteristics, including history, moral values, belief systems, history, and social norms. In contrast, embedded knowledge, a substantial part of organizational knowledge, is formal or informal knowledge that is locked in archives, processes and internal practices waiting to be extracted. The essence of this knowledge, either individual or collective, is often perceived as a dynamic array of experiences, values, contextual information and expert insights. When it is individual, knowledge shows an individual’s ability to demonstrate judgment in a particular situation. In contrast, collective knowledge initiatives in an organization consist of creating and sharing knowledge for improving business and increasing productivity. These initiatives may also expand externally over time and include partners and customers. From this perspective, knowledge becomes an organizational asset that can be managed, shared with partners or provided as a service to others. According to recent research, the **Semantic Web**, an extension of the current Web (Berners-Lee, 1999; May 2001), (Decker, 2000) and its related **Linked Data** concepts and techniques appear to be appropriate for solving issues of knowledge acquisition, documentation, transfer and sharing/distribution in an organizational context. In fact, these concepts rely heavily on Resource Description Framework (RDF) and Ontology. 1) The popular RDF model and syntax is a World Wide Web Consortium (W3C) recommendation in February 1999 (Heflin, 2001). An ontology provides an agreed understanding of an organization domain knowledge that rests on a common vocabulary. More precisely, an ontology defines the meaning of the terms in that vocabulary together with their inner relationships (De Araújo, 2015; Chandrasekaran et al., January 1999). It plays a central role in enabling the processing and sharing of knowledge within an accepted domain. Originally, the concept of ontology was created in the branch of philosophy that studies being or existence, the kind of things that exist. Then, the term was co-opted by Artificial Intelligence researchers to represent computational models for automated reasoning. A widely accepted and

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interesting technical definition of an ontology that still stands in computer science is that “*an ontology is an explicit specification of a conceptualization*” (Gruber, 1993, p. 1).

The main purpose of this chapter is to present a state of the art survey of research and development in semantic Web and Linked Data applied to the management of organizational knowledge. The applications of these technologies can have a direct impact on people, internal processes and support the distribution of knowledge throughout and outside of the organization. However, these advances are not without social and cultural issues and technical challenges. To this end, a tentative structure<sup>1</sup> of this contribution is the following: The first section is an **Introduction** to the main topic in the Semantic Web context. A **Background** section provides details on the real nature of organizational knowledge, the Semantic Web and Linked Data. The **Focus of the Article** section presents results of our state of the art survey on R&D in semantic organizational knowledge. This survey focuses on current issues and challenges in knowledge management that could be solved using Semantic Web or Linked Data technologies. Then, some known solutions to current challenges are suggested in the **Solutions and Recommendations** section. Last, a number of research ideas are presented along the lines of our discussions in a **Future Research Direction** section. A short summary of contributions concludes the chapter.

## BACKGROUND

### Types of Knowledge

This section introduces the concepts of *organizational knowledge* and presents the *Semantic Web* and *Linked Data* as enabling technologies. In the modern economy, many organizations implement initiatives for the management of *organizational knowledge* for improving process performance, raising product/service quality, engaging customers and laying the ground for innovation. To reach these goals, large organizations have been investing time, energy and funds into the capture, storage, sharing and dissemination of existing collective knowledge and the creation of new one. The vast, previously unexplored, human knowledge across these large organizations, is helping them build competitive advantage on the marketplace. Polanyi (1958) was the first to explain the term “tacit knowledge” in his pioneering work in the mid 50s. The main principle of Wiig’s knowledge management model (1993) requires knowledge to be organized according to its applications. Practical dimensions of this model are completeness (relevant knowledge), connectedness (relations between knowledge objects), congruency (facts, concepts, values between the objects are consistent), and perspective and purpose (Dalkir, 2011). Then, Koenig and Srikantaiah (2000), Nonaka (1994, 1998) and Cvusgil et al. (2003) laid the foundations of the most accepted depiction of knowledge with its *tacit*, *explicit* and *implicit* dimensions (see Figure 1).

*Explicit knowledge* is easy to identify, capture and represent in formal languages. Examples explicit knowledge include corporate publications, internal business messages and records, intranet, relational and knowledge bases. This type of knowledge can be extracted, edited, managed, stored, retrieved and distributed within the organization. Managing explicit knowledge means creating, acquiring, sharing and disseminating it with the support of information and communication technologies (ICT).

*Tacit knowledge* in contrast to explicit knowledge, is inherently elusive and cannot be articulated because it rests in individuals’ mind in the form of experience gathered as insights, heuristics, intuitions, and skills difficult to share with others in formal terms (Stenmark, 2001). Tacit knowledge is hard to codify and transfer from one individual to another or to an organization. Since this form of knowledge lays the ground of intellectual capital in organizations according to Koenig and Srikantaiah (2000), it

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