Chapter XXX

The Geospatial Semantic Web: What are its Implications for Geospatial Information Users?

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ABSTRACT

The Semantic Web (SW) and Geospatial Semantic Web (GSW) are considered the next step in the evolution of the Web. For most non-Web specialists, geospatial information professionals, and non-computer-science students these concepts and their impacts on the way we use the Web are not clearly understood. The purpose of this chapter is to provide this broad audience of non-specialists with a basic understanding of: the needs and visions driving the evolution toward the SW and GSW; the principles and technologies involved in their implementation; the state of the art in the efforts to create the GSW; the impacts of the GSW on the way we use the Web to discover, evaluate, and integrate geospatial data and services; and the needs for future research and development to make the GSW a reality. A background on the SW is first presented to serve as a basis for more specific discussions on the GSW.

INTRODUCTION

The Semantic Web (SW) and its corresponding Geospatial Semantic Web (GSW) in the area of geospatial information have been hailed as the next big thing in the evolution of the World Wide Web (WWW or the Web) and how it is used to accomplish useful tasks. However, for most non-Web specialists, geospatial information professionals, and non-computer-science students, these concepts and their implications are not clearly understood. Even less understood are the principles and technologies underpinning their implementation, how they relate to each
other, and the current state of the art of the efforts to make these concepts a reality. This is not surprising given that the SW and the GSW are relatively new concepts that are fluid, evolving, and approached in different ways depending on the perspective that is taken to analyze them or to try to implement them. However, it is important to disseminate among non-Web specialists and students a basic understanding of the needs and visions driving the evolution toward the SW and the GSW, and what the most important principles and technologies involved in the creation of these visions are. This knowledge will allow them to better participate in this evolution and will facilitate the eventual uptake and dissemination of the principles, technologies, and standards that are fundamental for the emergence of the SW and GSW.

This chapter provides an overview of the GSW and shows how it relates to the general idea of the SW. The purpose of the chapter is to provide a broad audience of non-Web specialists with a basic understanding of: the needs and visions driving the evolution of the SW and GSW; some of the most important principles and technologies involved in the creation of these visions; how these principles and technologies are related to each other and are integrated into current attempts to develop the SW and the GSW; and through examples illustrate some of the possible implications and impacts of the GSW on the way we use the Web to search for information and integrate sources of information and services. The chapter also points to the latest literature and Web resources to expand the basic understanding here provided.

The rest of the chapter is organized as follows. Section two presents a brief background on the SW and a scenario of how it could be used to address information needs. Section three concentrates on the GSW, first it presents an overview of some of the most promising efforts for the implementation of this vision; later an example scenario illustrates how the most promising principles, technologies, and standards are being integrated in the latest efforts to implement the GSW; at the end of this section there is a presentation of the potential impacts of the GSW on the way we search for, discover, and integrate geospatial data and services. Finally, section four presents a series of conclusions and needs for further research and development to achieve the full potential of the SW and GSW.

BACKGROUND ON THE CHARACTERISTICS OF AND THE NEED FOR THE SEMANTIC WEB (SW)

There are numerous definitions of the SW. Yu (2007) reports that there are 290 websites containing the term SW and providing some sort of definition of it; a search in Google for the “Semantic Web” term in Web documents and scholarly works returns 15,300,000 pages (Hepp, 2006). Passin (2004 pp. 3-4) provides several definitions that vary based on the approach taken to analyze or implement the SW. Instead of providing another definition, let’s first consider the current limitations of the WWW and why we need an evolution toward the SW and the GSW.

The original intent of the Web was to create a system where information could be linked. The idea was to define a few basic, common rules or protocols that would allow one computer to talk to another located anywhere. For the Web, those elements were (in decreasing order of importance): Universal Resource Identifiers (URIs), the Hypertext Transfer Protocol (HTTP), and the Hypertext Markup Language (HTML) (Berners-Lee, 2000). After going through several evolution stages the Web has evolved into a complex knowledge space where service agents (software that automates processes, acts independently on behalf of the user and has some decision making capabilities) and Web 2.0 technologies help humans to search and organize information (Ding & Xu, 2007).