

# Chapter 21

## Web 3.0 in Web Development

**João Vieira**

*Lisbon School of Economics and Management, Portugal*

**Pedro Isaías**

*Universidade Aberta (Portuguese Open University), Portugal*

### ABSTRACT

*The Web 3.0 has revolutionized the Internet in the last years and its benefits are still being studied. The way that websites are being developed is also changing because of this Web evolution, giving to Web developers new technologies where computers can better understand and give meaning to content. This chapter presents an overview of technologies considered to be included on the Web 3.0 concept. The main objective of the chapter is to introduce a conceptual framework of Web 3.0, or Semantic Web, technologies that can be used for developing a website. This review of literature introduces the evolution of each of the technologies mentioned, as well as their functions. Some examples and opportunities for use are also presented. The chapter offers a current state-of-the-art and an opportunity for future relevant research in the Web development area.*

### INTRODUCTION

Websites have become an important tool for different areas such as commerce, information and education (Thyagarajan & Nayak, 2007). There has been an explosive increase in the number of users, which leads to new challenges in order to meet the needs of each user (Antoniou, Paschou, Sourla & Tsakalidis, 2010; Arora & Kant, 2012; Alpert, Karat, Karat, Brodie & Vergo 2003). The competition between web sites has also increased in recent years, which means that it is necessary to find certain competitive advantages to give better results. Considering this scenario, new

web development technologies were developed to improve the relationship between the user and the web site in order to increase user satisfaction and consequently the number of sales, access, or other measurable objectives. These technologies seek to offer customized services to meet the individual needs of each user and reduce the complexity in consumer choices (Alpert et al., 2003).

The concept of Web 3.0 is considered to be the next step in the evolution of the web, with several new ideas adding new functionalities to existing services. Some of these changes promise to enhance data mining with improved search capability, bigger databases, intelligent search and

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recommendation options, better software agents, and new personalization techniques. The idea behind Web 3.0 is to create a form of language that the computer can understand, with the goal of processing, transforming, understanding and acting on the information received (Dwivedi, Williams, Mitra, Niranjana & Weerakkody, 2011). This is also the main reason why it is known as semantic web, as it allows the computers to understand the meaning of the information, and not just display it. Within this idea, web development is also at a time of change and constantly evolving, with new technologies being implemented and new research to be reasoned in order to transform the web according to the concept of Web 3.0 (Barassi & Treré, 2012). The main focus of Web 3.0 technologies is to encourage users to contribute information in such a way that computers can understand and act on it. In this way, web systems will assist users in various tasks such as research, recommendations, navigation, and organization, among other tasks, in particular, taking into account the needs and preferences of each user, creating a smart and personalized web. This set of technologies led to the growing interest in the new generation of web development, which leads to more business investment in these strategies, as well as studies conducted in the subject (Dwivedi et al, 2011). This chapter will therefore propose a conceptual framework of technologies that can be applied to web development via the concept of Web 3.0. The framework proposed will be a review chapter which presents some of the most popular technologies for web development. The chapter will begin to explain and give a background of several concepts essential to the meaning of Web 3.0 technologies, such as semantic web technology, user model and data mining techniques. Then, the chapter will discuss some of the issues of web development and the need to implement the framework proposed in this chapter. After this discussion, a detailed explanation is given of each of the technologies which can be considered to be

Web 3.0. It will explain how these technologies have evolved in recent years, and how they work in the present, giving known examples and cases where they can be used.

## **BACKGROUND**

### **Semantic Web Technologies**

Semantic technologies have been the focus of study since the earlier 2000s, and numerous studies have been conducted in order to improve and define these technologies. The concept of semantic web was created by Tim Berners-Lee with the purpose of creating a web that could recognize the meaning of the information in the web documents. Berners-Lee saw it as a way to bring a common structure to the content on web pages, allowing software agents to carry out several tasks on behalf of the user, creating a mutual cooperation between the computer and the humans (Sabucedo, Rifón, Corradini, Polzonetti & Re, 2010; Kück, 2004). With the semantic web, the machines become much better at processing and understanding the meaning of the data. For example, an agent on a clinic's web page can understand the working days of a specific doctor and the appointment times, for the user to schedule a consult (Berners-Lee, Hendler & Lassila, 2001). The technologies of semantic web are based on three trends (Martin et al, 2011):

- Knowledge representation;
- Knowledge generation through collaboration; and
- Personalization of the gathered knowledge.

Several important terms need to be explained, in order to understand semantic technologies. Ontologies are conceptual models that describe the main concepts of the domain and their relationships. An example of an ontology stated by

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