DEVELOPMENT OF E-BUSINESS BASED ON ADOPTION OF SEMANTIC TECHNOLOGIES

Georgiana STĂNESCU (NICOLAE)*

Abstract. *Since the appearance of the World Wide Web in 1989, semantic technologies evolve from one year to another, becoming more versatile in any field, starting from IT, business or banking. With time, this was an advantage and they felt the need to introduce semantic technologies that will make the web more efficiently for business purpose. Once with the appearance of semantic technologies, a simplification of relationships and communication between software has begun. Current web space is designed in such a way, that is easily adaptable and usable in any field and e-business domain is taking the maximum advantage of these benefits. E-business domain makes use of all electronic devices and semantic technologies, in order to promote the interests of a company. Nowadays the online presence of a company brings many benefits. The purpose of this article is to demonstrate that e-business refers to the development of traditional business using semantic technologies, will later to completely transform the way business companies.*

Keywords: *web, semantic technologies, e-business, web evolution.*

1. Introduction

In the past, the World Wide Web environment was a static place for information and the urgent need of evolution helped in semantic technologies appearance.

The semantic web is like an addition to today's World Wide Web and helps people to easily distribute content without any boundaries from websites or applications. From all the numerously mentions of the semantic web we can highlight the followings descriptions: 'as a utopian vision, as a web of data, or merely as a natural paradigm shift in our daily use of the Web.'[1] The semantic web is the one which determined the innovative creation of semantic technologies and all the related applications.

The first mention of semantic technologies was in the year 2001 in an article supported by Tim Berners-Lee, which affirmed that 'the Semantic

* The Bucharest University of Economic Studies, Romania, Doctoral School of Economic Informatics, georgianastanescu17@gmail.co

Web is not a separate Web but an extension of the current one, in which information is given well-defined meaning, better enabling computers and people to work in cooperation.'[2]

E-business concept was already a part of our lives, before the appearance of semantic technologies or even the World Wide Web. Everyone was making the business a part of everyday leaving but in the traditional way.

The appearance of the internet and semantic technology helped in publishing online all the information an e-business have and make it accessible from all over the world, breaking the limitation barrier.

2. A short brief about semantic technologies

The semantic technologies are based on ten years of researchers and are like an extension for web service, along with all its improvements.

If in the past the web was a static place, but starting with the year 2005 appeared a necessity of internet evolution, including blogs, social sites, web applications, video, etc. The old web infrastructure suggested everyone to use the new technology in order to exchange information and interact more easily, but this was not enough. Today we are confronting the new web 3.0, which was a new semantic web environment and helps people easily distribute content without limit on sites or applications.

With the emergence of a semantic web, there was a simplification of relations and communication between programs. This is what led to the innovative creation of semantic technologies and all related applications.

As far as we know, semantic technologies offer us 'a new approach to managing information and processes, the fundamental principle of which is the creation and use of semantic meta-data'. [3]

What we should know about semantic technologies is that they simplify the relations and the communication between the programs. The semantic technologies help in connecting all the data has a better integration in the systems; the implementation is much easier and understandable.

According to an article[4] from Economic Informatics magazine, no. 3 (35)/ 2005, written by Sabin Corneliu Buraga, the 'architecture of semantic web is a functional one, because the constitution of the specification is based on its incremental some languages, starting from the lower level (ie the metadata) and reaching higher levels (e.g., logic level).'

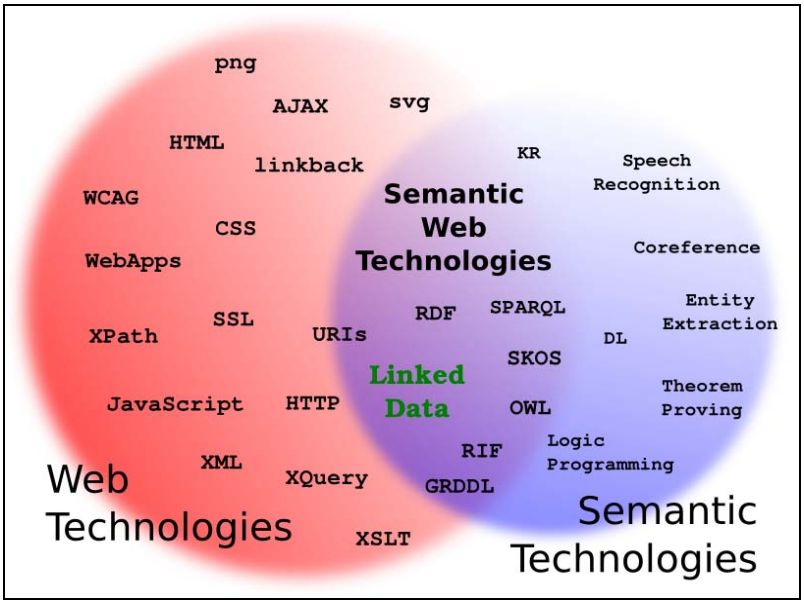

Figure 1. The semantic technologies applications [5].

The most useful and important semantic technologies in the web environment are eXtensible Markup Language (XML) and Resource Description Framework (RDF), but also there can be mentioned the followings: SPARQL, OWL, SPARQL, RDFa, JSON-LD, SKOS, RDFS, GRDDL, POWDER, PROV, RIF, SAWSDL, RDB2RDF[6].

All of those are languages of semantic technologies, which facilitate the relationship between data and sharing across applications. The architecture of the web is based on a combination of those and the main facility is that the content of a page is easily updated or changed without the necessity of changing the main schema.

They have the role to improve existing web, not by making a change, but by keeping the initial content and adding useful information in the web structure.

The old way of organizing data and information is more advanced with the use of semantic technologies. The web evolves from listing the data in a static way, to a more interactive and user-friendly way. Also, it is faster and more accurate, according to Tim Berners Lee, 'the web was designed as an information space, with the goal that it should be useful not only for human-human communication but also that machines would be able to participate and help.'[7]

3. About e-business domain

We can say that the idea of an e-business came to life when traders realized they could use the web to promote and sell their products and to make a bigger profit and attract new customers.

The term e-business was first used in 1997 by IBM, which defines it as 'a secure, flexible and integrated approach to delivering differentiated business value by combining the systems and processes that run core business operations with the simplicity and reach made possible by internet technology.'[8]

Theoretically, by linking the information on the web, we can say that we develop an e-business, this means that we can obtain a reliable system for implementing the business idea. E-business domain contains a lot of components and tries to make use of all the technology, according to the below schema:

Figure 2. The e-business components [9].

In our days, the most difficult and challenging part that e-business is facing is to provide a reliable solution needed by data in a business environment. From all the challenges, we can mention the followings:

- the available data is variable and continuously growing;
- new product models are available and this is increasing the use of data;
- 'there's too much data that's too fragmented, redundant, under-utilized, inconsistent, hard to find, hard to understand, and growing too fast. It's combined with increasing demands for new products, slick apps, new business models, better customer experiences, and compliance to new regulations.'[10]

The e-business is basically 'about transforming key business processes by using internet technologies'[11]

Semantic technologies have solved e-business need to optimize the relationship between the user and the web. Analyzing the current state of the presence of semantic technologies in e-business, it can be seen that the large companies began to rely on them and in the near future, there will be no business without the web part.

4. Example of adding semantic technologies in e-business domain

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The option to use the semantic technology in a business or not, it can make the difference for a successful company. Today, each business is relying on technology for reaching the goals and making a profit.

Semantic technologies are making use of languages as the OWL, RDFa, RDFS, etc., that are specially designed to help develop complex and rich information sites as well as the relationships between data. Those are used to implement and design applications serving an e-business.

In the article 'Considerations on the Use of Semantic Web Technologies in the Context of e-Business Applications'[4] written by Dr. Sabin-Corneliu Buraga, it is defined the use of semantic technology components in the e-business application development. It classifies the use of language on levels, all from metadata and advancing to the logical level, offering numerous possibilities for the requirements of an application, as follows:

- metadata are based on RDF and other metadata models such as the Dublin Core Metadata Initiative (DCMI), RSS (Rich / RDF Site Summary), FOAF (Friend Of A Friend), 'providing the general framework for expressing some simple semantic assertions'[4];
- schemas, 'offers the possibility of specifying simple ontologies to define a hierarchical description of concepts and prophets'[4];
- the logical level includes complex languages, which help to create ontologies for the semantic web, 'interest in e-business destination applications'[4].

A good example of using for the logic languages like OIL (Ontology Inference Layer), OWL, and RDFS, can be a website for e-commerce, promoting and selling products, ‘where the customer can choose the product they want following a 'classification' based on a specific ontology, making it easier to search for a "smart" product on various criteria or taking into account user preferences, based on already purchased shopping categories.’[4]

The semantic technologies are flexible and these languages are perfectly combined to facilitate the relationship between data and sharing between applications.

Another example of the use of semantic technologies can be given by IBM[12], which is producing global computer systems and advanced technology. IBM is making use of the potential given by semantic technologies, applying them in most of its products. In an article written in IBM Redbooks[12], there are highlighted some interesting things about semantic technologies:

- semantic technologies add contextual information over existing information technologies, connecting data, content, and processes;
- compared to traditional technologies, semantic technologies have predefined relationships, providing a flexible integration approach, the addition and modification is simpler;
- semantic technology enables the machine to understand human requirements, using semantic structures.

Based on that, IBM has created a supercomputer named Watson, 'that combines Artificial Intelligence (AI) and sophisticated analytical software for optimal performance as a “question answering” machine.'[13]

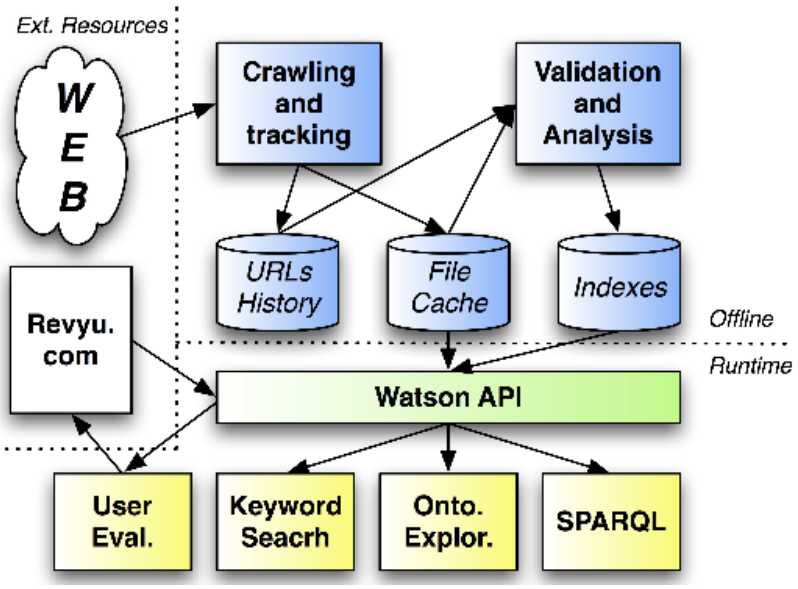

Figure 3. The Watson architecture [13].

Using the semantic technologies and combining it with today's big volume of data, Watson has access to a large amount of information and is developing methods 'to evaluate the benefit of structuring search results on the basis of ontology relations, for a more efficient ontology selection approach.'[14]

There are a lot of systems that can use semantic technologies way of search, but the Watson concept is different. We can say that 'Watson is the only tool to provide the necessary level of services for applications to dynamically exploit Semantic Web data.'[14]

Making use of keywords, Watson is focusing 'on implementing an infrastructure component, a gateway, for applications to find, access and exploit ontologies and semantic data published online.'[14]

5. Conclusions

Semantic technologies have solved the need for e-business to optimize the relationship between the user and the web. Analyzing the current state of the presence of semantic technologies in e-business, we can notice that large companies have begun to rely on them and in the near future, there will be no business without the web.

The concept of e-business has already been a part of our lives before using semantic technologies and even before appearing on the web

worldwide. Everyone was doing business as part of everyday life, but traditionally.

In my opinion, the e-business domain is about the strategy of a business and to improve the efficiency with the use of semantic technologies. Implementing, adding or changing something in e-business is easy with semantic technologies. All the e-business components combined with a web interface, results in a very strong and sustainable company, improving the whole business process.

With the help of semantic technologies, the static web is evolving to a much friendly user perspective. The semantic technologies have the ability to shape the virtual space and make it more affordable and reachable for e-business domain.

The world is evolving along with the semantic technologies and the e-business domain gets all the advantages and benefits of implementing all the technology in the needed tools.

The semantic technologies offer better interoperability of information and better integration, once it is used in e-business domain.

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