

## Knowledge Representation in the Context of E-business Applications

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### Abstract

The article emphasizes the theoretical principles of knowledge representation. The paper also tries to show how to represent knowledge in the context of e-business applications creating a tagging platform for economic knowledge using SKOS language.

**Keywords:** Knowledge Representation, Semantic Web, E-business, SKOS

### 1. Introduction

Knowledge is defined conform the Oxford English Dictionary as expertise and skills acquired by a person through experience or education; what is known in a particular field or in total; facts and information or awareness or familiarity gained by experience of a fact or situation. So we can conclude that knowledge is a perception of reality, a description of the way things are and the relationships between them. The question that arises is how can we model reality to describe how things really are from the perspective of computer expansion and Internet? How can we create a medium for human expression, or in other words how can we represent knowledge so that computer can “understand” it? For that we need specialized web languages capable to describe concepts and concepts scheme. The vision about Semantic Web or Web 3.0, as Sir Tim Berners-Lee states, is to become an extension of the current web, in which information has a well defined meaning and it is understood and processed by computers.

We have specialized web languages as XML mark-up language and all the derived languages: RDF, OWL, XBRL and SKOS [3] etc. Semantic Web was built on XML language capacity to define ordinary schemes much closer to data representation. Every tag that composes XML language is defined by the user and in this way has a specific meaning and can be understood both by man and by machine.

Every web language has its own specification and applicability as well as advantages and disadvantages. Also not all software applications are based on Semantic Web technologies.

Creating standards based on web languages for knowledge representation no matter the approached domain and using them in applications for semantic processing, represents viable solutions for problems regarding interoperability and portability between programs and different systems. Being a standard, the created model for knowledge representation will not depend of the operating system or how the implementation of the software was made; it can be analysed and processed by any compiler.

The paper tries to show the importance of knowledge representation for an automated elaboration by any software application. In this meaner web documents can become machine-readable not only human-readable.

Knowledge representation on the web is made using tags to mark-up different words and enrich then with specific exact meaning. If we look on the Internet upon the definition of a tag we find that it is considered to be a simple word you can use to describe a bookmark. Unlike folders, you make up tags when you need them and you can use as many as you like. So the utility of these tags would be to better organize your bookmarks and a great way to discover interesting things on the Web. The classification of terms presumes that each of them have a single meaning, but talking of web resources, each of these documents can have many associated terms. This paper tries to create a tagging platform as a standard way of representing content – we try to establish a set of terms with a clearly defined relation between the terms. The proposed platform was designed to

make an immediate tagging of economic web resources by their authors to make a automatic interaction and connectivity through users across the web.

## 2. Using Semantic Web technologies in e-business

One of the major domains of semantic web technologies utility is e-business offering different services like enabling companies to link their internal and external data processing systems more efficiently and flexibly, facilitate the exchange of data between companies, processing orders electronically, handling customer service, and assuring decision making reasoning helping managers in activities from e-business aria.

Semantic Web technologies have future important implications regarding modelling and development of intelligent e-business applications on Internet changing the future of digital economy.

## 3. Representing economic knowledge

In this section we propose a tagging platform for describing economic knowledge using SKOS (Simple Knowledge Organization System) language. The purpose is to create taxonomy of web resources with economic themes for an automatic and optimal economic knowledge management. Through taxonomy we can list and describe material that could be of interest to academic economists or researchers or simple users interested in economic fields.

In the following we will present the conceptual scheme for tagging platform in SKOS:

```
<?xml version="1.0" encoding="utf-8"?>
<rdf:RDF

  xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns:skos="http://www.w3.org/2004/02/skos/core#"
  xmlns:dc="http://purl.org/dc/elements/1.1/"
  xmlns:doc="http://www.w3.org/2000/10/swap/pim/doc#">

  <skos:Concept      rdf:about="{http://the web address of the resource}"
  dc:date="{last accessed date of the site}" dc:title="{the title of the web
  site}" doc:version= "{version}" >
    <skos:prefLabel >
      {the name of the principal economic domain}
    </skos:prefLabel>
    <skos:altLabel>
      { the name of the alternative economic domain }
    </skos:altLabel>
    <skos:{broader | narrower}>

  <!-- We use broader to tag the web site that refer to more than one economic
  field and we use narrower to tag only the web sites that refer to a specific
  economic field. -->

    <skos:Collection>
      <skos:member [rdf:resource="{link for additional resources}"]>

        <skos:definition>
          {definition about the economic concept}
        </skos:definition>
        <skos:related>
          {referencences to other terms which have a
  certain relation with the defined concept}
        </skos:related>
        <skos:note>
          {different notes; e.g.: differences between the
  last and the current version of the web resource}
        </skos:note>
      </skos:member>
    </skos:Collection>
  </skos:Concept>
</rdf:RDF>
```

```
        [<skos:example>
          {examples about the defined concept in different
contexts}
        </skos:example>]
      </skos:member>
    </skos:Collection>
  </skos:{broader | narrower}>
</skos:Concept>

</rdf:RDF>
```

A concrete example of how we can tag web sources from heterogeneous sources is given below. All the web resources used in this example are virtual examples.

```
<?xml version="1.0" encoding="utf-8"?>
<rdf:RDF
  xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns:skos="http://www.w3.org/2004/02/skos/core#"
  xmlns:dc="http://purl.org/dc/elements/1.1/"
  xmlns:doc="http://www.w3.org/2000/10/swap/pim/doc#">

<skos:Concept rdf:about="http://www.economy.org/" dc:date="11 Nov 2000"
dc:title="All about e-business " doc:version="01" >
  <skos:prefLabel>
    E-business
  </skos:prefLabel>
  <skos:altLabel>
    Electronic business
  </skos:altLabel>
  <skos:altLabel>
eBusiness or e-business
  </skos:altLabel>
  <skos:narrower>
  <skos:Collection>
    <skos:member rdf:resource="">

      <skos:definition>
        Electronic business, commonly referred to as
        "eBusiness" or "e-business", may be defined as the utilization of information
        and communication technologies (ITC) in support of all the activities of
        business. Electronic business methods enable companies to link their internal
        and external data processing systems more efficiently and flexibly, to work more
        closely with suppliers and partners, and to better satisfy the needs and
        expectations of their customers [8].
      </skos:definition>
      <skos:related>
        E-commerce
      </skos:related>
      <skos:related>
        Virtual Communities
      </skos:related>
      <skos:related>
        Collaboration Platforms
      </skos:related>
      <skos:note>
        No other version of the site
      </skos:note>
    </skos:member>
  </skos:Collection>
</skos:narrower>
</skos:Concept>
</rdf:RDF>
```

Because SKOS is a conceptual oriented model choosing this semantic web language to create a tagging platform we believe is the adequate solution. As you can see we can use instances like skos:Concept to define a web resources represented through an Uniform Resource identifier. SKOS concepts have lexical labels and offer documentation and can refer other concepts using semantic relations [2]. All this properties can be adapted to correspond to a possible standard tagging platform for web resources. [6] [7] [8]

#### 4. Conclusions

This paper tries to show how to represent knowledge in the context of e-business applications creating a tagging platform for economic knowledge using SKOS language. We used SKOS language, an XML based language because this standard was created by the Web Consortium as a way of representing glossary, thesaurus and taxonomies. It offers possibility to create a well structured content in a machine readable form in a very simple and less endeavour in terms of time and human effort than ontology languages [4].

The problems that yet have to be resolved are the way how a creator of a web site can tag the resource automatically and also how to avoid synonymy and polysemy.

For future work we will try to implement a tool where a user can offer the required information about the resource and making interrogations after a certain tag to find all the associated tags meaning all the web resources related to that tag. These can avoid the labour of tagging each resource in an specialized web site.

#### 5. Acknowledgement

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#### 6. References

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