# Joint Handling of Semantic Knowledge Resources and their Alignments *

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## 1 Motivation

With the adoption of the Semantic Web vision , semantic knowledge resources (KR), which include taxonomies, structured vocabularies and ontologies, acting as pivotal resources, are nowadays commonly used. This is a direct consequence of the desire to attach formal semantic meaning to manipulated data. These KR, developed by different communities with various needs and purposes, are by nature heterogeneous. This heterogeneity leads to the development of systems for finding the correspondences between entities of different KR, called alignment [2]. In addition, KR increasingly involve large volumes of formalized knowledge, containing hundred of thousand entities, which raises the question of generating and validating alignments between large resources.

In order to help finding and reusing these more and more available KRs, a significant effort has been made for providing multi-knowledge resources repositories. This effort is particularly noticeable in the biomedical domain, where classifying existing objects is a secular tradition.

However, to the best of our knowledge, there is no currently available framework which offers the possibility to handle both multiple KRs together with their respective alignments, while keeping their native semantics and offering a support for a transparent visualization of these resources. In addition, with the development of the ontology matching domain, as different systems could be used to generate alignments and sometimes relying on user input, either for mappings validation purpose or initial alignment providing, it is a crucial issue to keep track of users and involved alignment methods or tools.

To fill this gap, we have designed the K-Ware framework [1] which complement existing multi-knowledge resources repositories. Its aim is not to provide a single access point for all available biomedical ontologies and alignments. Rather, it is a framework which could be embedded within projects that have an extensive use of multiple KRs and their respective alignments. In particular, enabling a support for multi point of view navigation and hierarchical visualization of any KR relevant for a dedicated purpose or suitable for a given project.

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# 2 Joint handling of knowledge resources and alignments

## 2.1 Alignment management

In order to properly take into account alignments between different KRs, we have introduced additional properties to the definition of the notion of correspondence introduced in [2]. Therefore, we identify the following components for a correspondence : i) the two entities to be mapped, linked with a **MappingRelation**, in an directed order (*e1-mappingRelation-e2*); ii) its confidence value; iii) the mapping's author / **User**; iv) the mapping's method called **MappingMethod**, either if it is an alignment provided by an automated method **ComputerizedProcess** with an alignment **Tool** or a manual one; v) finally, a flag which indicates whether the considered mapping is valid (and validated by a **User**) for an **Alignment** between two **KRs**.

## 2.2 Handling structural relations within knowledge resources

KRs often exhibits a structural hierarchical organization : the *is-a* relationship translated into *rdfs:subClassOf* or the *part-whole* relationship for formal ontologies and the *narrower/broader* relationship for taxonomies, translated into *skos:narrower* and *skos:broader* respectively. We find similar notions when it comes to express inter relationships between entities in different KRs. For instance, the *skos:narrowMatch* is used to state a hierarchical mapping link between two conceptual resources in different concept schemes. Hierarchical aspect is the the main information to be kept when one wishes to integrate many different semantic resources.

To allow navigating easily KR represented in the OWL or SKOS languages, we distinguish three types of relations : **HierarchicalRelation**, **LiteralDefinition** and **MappingRelation**. In a given KR, a hierarchical relation could be *rdfs:subClassOf*, *skos:broader*, *part_of*, etc.). A literal definition helps rendering a human readable description of an entity (*rdfs:label*, *skos:prefLabel*, etc.). While a mapping relation (for instance *owl:equivalentTo*, *skos:exactMatch*) handle correspondences between entities.

An API has been implemented for the features defined models of K-Ware[4].

# References


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