



Vol-596

urn:nbn:de:0074-596-3

Copyright © 2010 for the individual papers by the papers' authors. Copying permitted only for private and academic purposes. This volume is published and copyrighted by its editors.

ORES-2010

Ontology Repositories and Editors for the Semantic Web

Proceedings of the 1st Workshop on Ontology Repositories and Editors for the Semantic Web

Hersonissos, Crete, Greece, May 31st, 2010.

Edited by

Mathieu d'Aquin, The Open University, UK
Alexander García Castro, Universität Bremen, Germany
Christoph Lange, Jacobs University Bremen, Germany
Kim Viljanen, Aalto University, Helsinki, Finland

10-Jun-2010: submitted by Christoph Lange
11-Jun-2010: published on CEUR-WS.org

SOBOLEO – Editor and Repository for Living Ontologies

Simone Braun and Valentin Zacharias,

Forschungszentrum Informatik, FZI
Haid-und-Neu Strasse 10-14
76131 Karlsruhe, Germany
{braun,zach}@fzi.de

Abstract. SOBOLEO is a web based system that enables groups of people to collaboratively develop and use SKOS ontologies and semantically organized information spaces. SOBOLEO supports the development and refinement of living ontologies – i.e. ontologies that are never finished and that are used and developed at the same time. It offers tools to edit the SKOS ontology used and the information space. It also offers interfaces for remote applications to be notified of changes and to change the ontology itself.

Keywords: Ontology engineering, SKOS, social software, collaboration, semantic annotation, Ontology Maturing, SOBOLEO

1 Introduction

SOBOLEO¹ is a system that enables groups of people to jointly structure information (documents and experts) in a domain. SOBOLEO's goal is to serve as a repository for 'living ontologies' according to the principles of Ontology Maturing [1]. This theory understands ontology development as a continuous and collaborative process embedded and interwoven with actual usages processes; e.g. the users can directly change the ontology when finding it deficient during use of the semantic search. All modeling can be done while the application is used (i.e. no large up-front investment in ontology engineering) and even partial formalizations are used immediately to improve user experience [2].

In this paper, we start with a short overview of use cases for SOBOLEO before introducing design principles and core concepts. In the next section we give an overview of the main functions of SOBOLEO by looking at ontology editing, document and person annotation, semantic search, and browsing. Finally we conclude with a discussion of related systems.

¹ An installation of the SOBOLEO system is publicly available at <http://tool.soboleo.com>. Users can try out the system in one collaboration space that is open to edits from anyone. SOBOLEO is completely web based – no installation or registration is required.

2 Use Cases

Example use cases for SOBOLEO are:

- An HR department organizing data about available experts. Here SOBOLEO supports an HR department in maintaining a competency ontology and using this ontology to keep track of - and search within - the database of experts. Note that the competency ontology is never really finished – as new possible skills are emerging all the time.
- A learning course that is jointly developing an understanding of a domain, creating an ontology and interlinking it with relevant documents. SOBOLEO supports this use case through the management of both the ontology and the relevant documents. Note that here the ontology is also evolving throughout its use – always reflecting the current knowledge of the course participants.
- A group of expert jointly collecting the state of the art in a scientific domain (with links to both documents and experts). Here, too, the ontology will constantly evolve to reflect both the knowledge of the experts as well as the current scientific consensus.

3 Architecture & Implementation

SOBOLEO is fundamentally organized around the concept of **Collaboration Spaces**. A Collaboration Space is the virtual space in which collaboration between people with a shared goal takes place. Each Collaboration Space has one SKOS ontology and may have information about documents and experts that are annotated with this ontology. All information in a space is jointly edited by the members of this space (spaces can also be configured to allow anonymous users to read and write). Each SOBOLEO installation supports an arbitrary number of collaboration spaces and these are (except for user data) completely independent of each other.

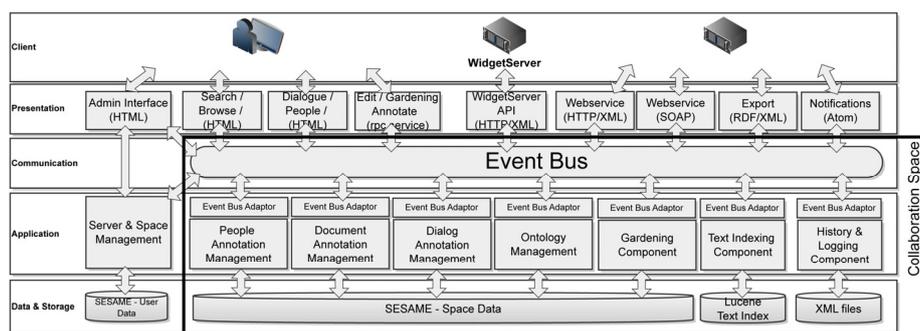


Fig. 1. Overview of SOBOLEO's architecture

Technically each collaboration space is represented by an **Event Bus** component that manages the communication within the space. Different parts of the functionality

are realized as services (both local within the server and remote) that are registered to the event bus. These services have access to a shared SESAME triple store and to disk space to store files (e.g. for the text index and logging information). On the server each collaboration space is represented as one folder that can even be moved between SOBOLEO installations.

Communication within the space is organized around the concept of **Events**. Any change is represented as a **Command Event** object, a query as a **Query Event** and any notification as a **Notification Event**. The event bus routes these events (and results) between the requester (mostly in the presentation layer) and the services that can process it. For example, a delete-concept command event is processed in the following way: 1) the event bus asks all registered command processing services to extend this command event with implied commands. In this example implied commands include the removal of relations that start or end in the deleted concept. 2) Next a different class of services is asked whether this event is permitted – this tests the user credentials sent with the event as well as the adherence to SKOS integrity constraints. 3) Command processors actually execute the change. 4) All registered event listeners are notified of the changes that have been done.

All events exist as Java objects, as JavaScript objects (allowing to create and receive them within AJAX applications), as XML serializations (allowing to create and receive them by applications written in any language) and as SOAP methods (allowing to create and receive events them from any SOAP client). Thanks to these interfaces almost all conceivable remote clients can do arbitrary changes to the collaboration space. The interfaces also allow to poll for recent events – enabling remote clients to stay up to date with the changes to the information space. We also supply a (Java) client library that takes care of the communication details and manages a local copy of the ontology (kept up-to date by polling the server in customizable intervals). In addition to these custom interfaces, SOBOLEO supports export of space data as RDF/XML and notification about changes to the information space in the ATOM format.

SOBOLEO is implemented in Java 6 on top of the Apache Tomcat 6.0 application server (<http://tomcat.apache.org>). The AJAX interfaces of the ontology editor and annotation tool are created with Google's Web Toolkit framework (<http://code.google.com/webtoolkit>). For the storage of RDF data we use Sesame 2.3.0 (<http://www.openrdf.org/>) and the text index is built on Apache Lucene 2.9.1 (<http://lucene.apache.org>).

4 User Interface & Functionality

SOBOLEO supports five function groups (detailed below) to support a group of people in the joint structuring of an information space containing an ontology, data about documents and people. Following the ideas of Ontology Maturing, SOBOLEO supports both development and use processes – to seamlessly support the refinement of the ontology immediately whenever a deficiency becomes apparent in use.

- The **ontology editor** enables users to structure the concepts with hierarchical relations (broader and narrower) and to indicate that concepts are “related”. Concepts can have a (multi-word) preferred label and a description in multiple languages; they can have any number of alternative and hidden labels. The collaborative editor can be used by several users at the same time. Changes are immediately visible and effective to all users and the ontology's usage (for search and in the web interface).

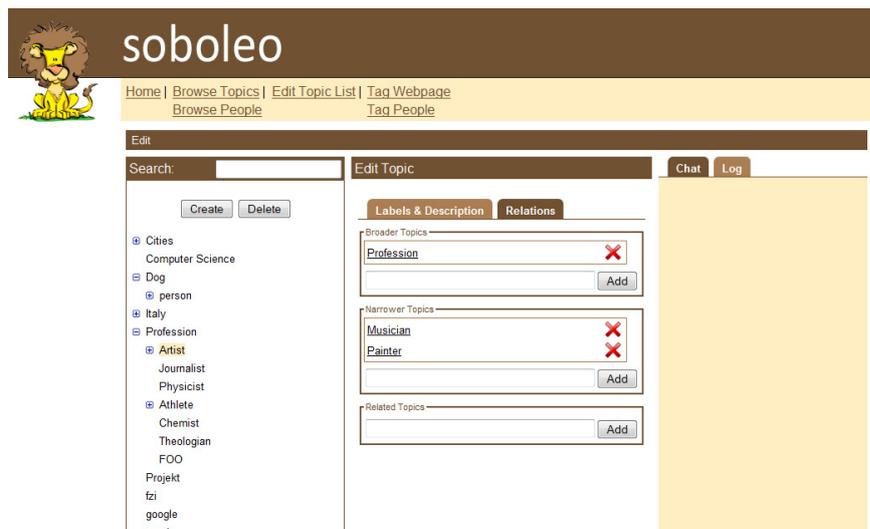


Fig. 2. User interface of the ontology editor

- Users can add semantically annotated web-documents to the shared information space through a **document annotation interface** that is available both as a bookmarklet and a web page. For annotating the resource, users can use any concept from the ontology or arbitrary (multi-word) tags. New tags are automatically added to the ontology as "prototypical concepts"; users can later consolidate and move them within the ontology. When saving the bookmark and annotation, the SOBOLEO system automatically sends out a crawler to fetch and index the contents of the page. The crawler is able to parse HTML, pdf and both the 2004 and 2007 MS Office formats.
- **Annotating people** works similarly to annotating web-documents. The primary idea is to annotate a person (identified by his/her email address) via his/her personal webpage, e.g. in the intranet, on the company's website or on a social network site. Each person that is tagged at least once is represented by one page within SOBOLEO and can also be tagged directly on this page.
- SOBOLEO's **semantic search engine** enables users to search and retrieve annotated documents and people. The users can type their search terms into a text field—similar to common internet search engines. The semantic search

engine analyzes the entered search string for occurrences of concepts from the ontology. If it recognizes references to concepts, it searches for documents and people annotated with these concepts or narrower ones. At the same time it also searches the full text of all annotated webdocuments. On the result page the users get feedback on which concepts it understood the query to be referencing. Depending on the search string, the results and the ontology, the system may also propose a number of query refinements or relaxations.

- The **browsing interface** enables users to navigate through the ontology and the directory of annotated documents and people.

Note that the service oriented structure of the SOBOLEO system and the multitude of remote interfaces allow easily adding more functions to the SOBOLEO system. For example in the past we have extended it with capabilities to support structured dialogs about proposed ontology changes.

5 Related Work and Conclusions

There is a large number of applications that support groups of users in the collaborative creation of semantic data – the most prominent ones being the semantic wikis and particularly SMW [3]. SOBOLEO differs from these approaches in the use of a more specialized user interface geared towards the organization of data external to the system. PoolParty (<http://poolparty.punkt.at/>) also offers a web-based SKOS editor, but lacks comparable tools for the management of relevant web pages and people. Finally there is also a large number of social semantic bookmarking systems that combine social bookmarking with some semantics (see [4] for an overview), however, none of these has a similar functionality with respect to supporting multiple collaboration spaces or people tagging.

Acknowledgements. This work was supported by the MATURE EU IP under contract no. 216356.

6 References

1. Braun, S., Schmidt, A., Walter, A., Zacharias, V.: Using the Ontology Maturing Process Model for Searching, Managing and Retrieving Resources with Semantic Technologies. In: OTM 2008, LNCS vol. 5332, pp. 1568-1578, Springer, Heidelberg (2008)
2. Zacharias, V., Braun, S.: Tackling the Curse of Prepayment - Collaborative Knowledge Formalization Beyond Lightweight. In: 1st Workshop on Incentives for the Semantic Web, ISWC2008, Karlsruhe, Germany (2008)
3. Krötzsch, M., Vrandečić, D., Völkel, M., Haller, H., Studer, R.: Semantic Wikipedia. In: Journal of Web Semantics vol. 5, pp. 251–261, Elsevier (2007)
4. Braun, S., Schora, C., Zacharias, V.: Semantics to the Bookmarks: A Review of Social Semantic Bookmarking Systems. In: I-SEMANTICS 2009, pp. 445-454, Verlag der Technischen Universität Graz