**Open Standards and Technologies in the S2S Framework**

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**Abstract**

The S2S Search Interface Framework provides tools and services to build customized user interfaces. It also serves as a focal point for repository managers to develop science data services and reusable components for search interfaces. The framework has been designed to leverage semantic web technologies such as OWL, a W3C standard for ontologies, and to support web services, including OpenSearch and SAWSDL. This exemplar faceted browsing platform has been applied in our development of search interfaces for 1) an international open government dataset catalog and 2) a metadata catalog for biological and chemical oceanography.

S2S was designed from the ground up using open standards and technologies. The framework was initially created to develop "data dashboard" interfaces on top of OpenSearch services, but has been generalized to support web services and standards with semantic annotation capabilities. We apply OWL, a W3C standard for ontologies, on the web, to create a vocabulary for the description of framework metadata. Our faceted browsing platform is heavily focused on the use of open standards and technologies to support web services and standards with semantic annotation capabilities. We apply OWL, a W3C standard for ontologies, on the web, to create a vocabulary for the description of framework metadata. Our faceted browsing platform is heavily focused on the use of open standards and technologies to support web services and standards with semantic annotation capabilities.

The framework has been designed to support a wide range of use cases and ideas that have emerged. The use of open standards and technologies has enabled rapid iterations over software development lifecycles, and has kept the framework agile as new use cases and ideas have emerged.

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**Open Technologies**

S2S has been applied in the creation of an integrated MapServer and faceted browsing interface. BCO-DMO has been using MapServer to provide data access for a number of years. They have collaborated with the TWC to develop an RDF knowledge base for the contents of their metadata catalog. We used this knowledge base to develop an S2S OpenSearch interface for the BCO-DMO data access service. The S2S framework was also used to develop a faceted browsing interface for the SeaVox project.

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**S2S as Open Technology**

S2S is available for download at our SVN repository:
- [https://scm.escience.rpi.edu/svn/public/s2s/](https://scm.escience.rpi.edu/svn/public/s2s/)

There are multiple ways to use and extend the project, whether its widget development for user interfaces, design and implementation of alternative search interfaces, creation of data services, or extension of the S2S Server for additional Web service standards.

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**Towards an Application Integration Framework**

We are shifting the focus of S2S development from a search interface framework to a broader application integration framework. The intent is to create vocabularies and rules that match user interface components with underlying data services and scientific intent. One of the first use cases is to extend the S2S framework to support a workflow system with rules regarding dataflow and scientific intent.

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**Open Standards**

Semantic Web Standards
- SPARQL Protocol and RDF Query Language
- OWL – W3C Semantic Web Ontology
- RDF – Resource Description Framework
- RDF Schema (RDFS) – W3C Semantic Web Ontology

Open Vocabularies
- GeoNames

Open Search

S2S provides an OWL ontology for describing Web services, their operations, inputs and outputs. The ontology can be extended for different Web Service standards (such as SAWSDL or OpenSearch).

Using an ontology and RDF allows us to perform simple reasoning tasks for matching UI “widgets” with Web service outputs. Our next version of the S2S server will support descriptions of Web Services provided as 5-star linked data.

S2S is able to leverage open vocabularies and linked data for providing contextual search information. This reduces the amount of data duplication required for an individual provider. We have developed widgets for retrieving labels from DBpedia, shown in the Countries facet example. For BCO-DMO, we have widgets that use vocabularies from the SeaVox vocabulary governance group. We are also planning to use vocabulary terms from the R2R and SeSF projects.

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**Glossary:**
- IN31A-1435
- OpenSearch
- BCO-DMO
- Semantic Web Standards
- Linked Data
- RDF
- SPARQL
- SAWSDL
- RDF Schema (RDFS)
- TWC – Tetherless World Constellation
- S2S – Open Technology
- OWL – W3C Semantic Web Ontology
- RDF – Resource Description Framework
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