

Background

Representing and managing life sciences data and related knowledge require a deep understanding of life sciences concepts.

Chen and Carlis have identified **four challenging characteristics** that make difficult modeling in life sciences:

- complexity of data (heterogeneous, incomplete, uncertain, inconsistent, multi-dimensional)
- domain knowledge barrier
- evolving knowledge
- modeling skills of actors.

The wiki page http://en.wikipedia.org/wiki/Portal:Gene_Wiki/Other_Wikis maintains a list of bioinformatics wikis:

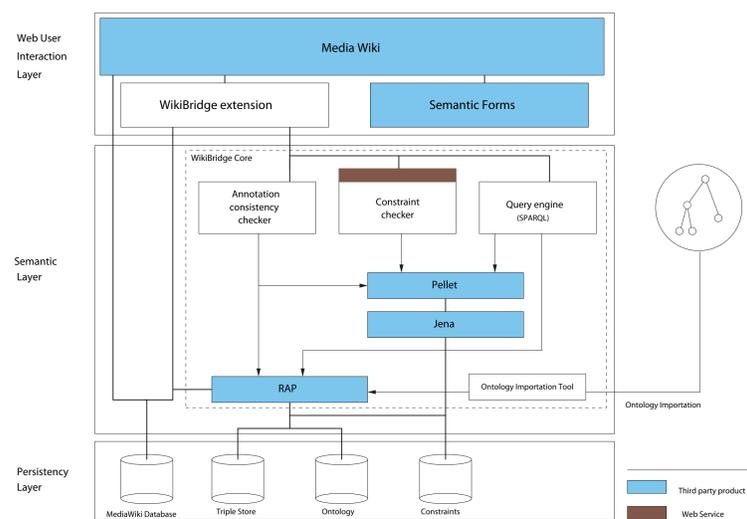
- **BOWiki** provides access to genes by using ontology annotations (Gene Ontology)
- **OpenDrugWiki** uses a semantic wiki as a consolidation tool for integrating heterogeneous drug data
- **LabService Wiki** is dedicated to the management of a production laboratory and adds workflow capabilities to the semantic wiki engine
- **Brede Wiki** provides template forms to record neuroinformatics data and generate automatically database schema and content.

These projects are based on Semantic Media Wiki engine.

An Overview of WikiBridge

Our main objective is to build a platform that allows to:

- capture both free and **controlled data**
- describe the semantics of data and the context of knowledge by using **annotations**
- check the **consistency of annotations**
- ensure a **reasonable cost** of developing and maintaining.



Principles of WikiBridge

Easy to Use, Interactive Interface:
WYSIWYG editor using AJAX technology

User collaborative design

Support for different levels of experience:
ACL to describe privilege control

Support of heterogeneous document formats

Compatibility with Semantic Web standards:
OWL for describing ontologies
W3C's RDF for annotations

Annotation storage:
by using RDF triple store engine

Support for reasoning
First Order Logic including DL and Horn clauses rules

User interaction layer

Covered by MediaWiki
Structured data managed by Semantic Forms extension for MediaWiki

Semantic layer

Annotations, made by experts, are guaranteed by a **domain ontology** which can be imported with RAP into a database. Experts directly enter and modify annotations through an extension within the wiki's editing interface which relies on the form-based annotation component.

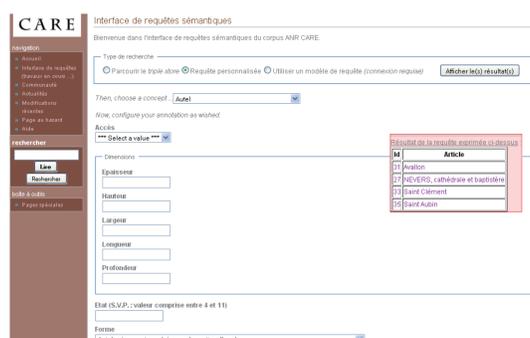
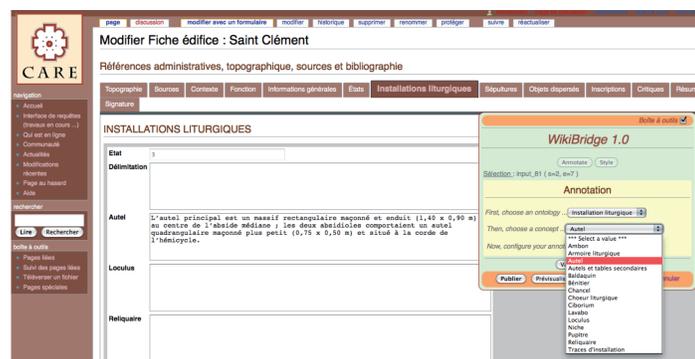
An object (real/virtual entity) described in a paragraph of a document can be associated with an id:

- the description of an object can be refined in an article or through several articles
- properties are defined using annotation triples
- annotation can be simple or complex.

Annotations are stored by RAP as RDF triples.

Intelligent navigation and queries

1. **Faceted browsing**
exploration by filtering available information through an ontology tree
2. **Form based searching**
semantic search by filling in parameters associated with ontology concepts
3. **Aggregate view** for each article as factbox



Conclusion

For biobank directories, the adoption of a semantic wiki approach:

- does not require the development of a new application (no dedicated database)
- allows to simply and quickly describe collections.

Ontology engineering is mandatory: preexisting ontologies such as MeSH, ICD, or TNM can be integrated in the semantic wiki.

Strong theoretical foundation: first order logic (description logic and defined logic).

Perspectives: interoperability without schema by using rules on domain ontologies.

Acknowledgment

Thanks to ANR for funding: ANR-07-CORP-011

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