Three-Layer Model of Tagging

Resources

- $r_1$
- $r_2$
- $r_3$
- $r_4$
- $r_5$

Tags

- $t_1$
- $t_2$
- $t_3$
- $t_4$
- $t_5$

Users

- $u_1$
- $u_2$
- $u_3$
- $u_4$
- $u_5$

Explicit link: 

- (via $t_1$)
- (via $r_3$)
- (via $u_4$)
- (via $t_3$, $r_4$, $u_4$)
- (via $t_5$)

Implicit link:

- (via $t_5$)
Hypergraph Structure of Folksonomies

Tagging Axiom: Each tagging links one resource with one user account and one or more tags.
**Towards Interoperable Folksonomies**

**Taxonomies vs. Folksonomies**

SKOS = Simple Knowledge Organization System
Semantifying Folksonomies – Two Approaches

1. Transforming folksonomies into controlled vocabularies
   - Tag clustering
   - Disambiguation
   - Synonym mapping
   - ...

2. Making folksonomies interoperable, i.e. independent from individual tagging systems
   - Using ontologies
   - Goal: Exchanging folksonomies as we exchange controlled vocabularies
What’s there? What’s needed?

Folksonomy Hypergaph

Resources

Dublin Core

FOAF / SIOC

Users

Tags

SKOS

Taggings?
Related Work

- Several initiatives (in the past)
  - TagCommons (Tom Gruber et al.)
  - Dublin Core Social Tagging Community
  - CommonTag (DERI, Yahoo!, Zemanta, Faviki, ...)
  - ...

- Several tagging ontologies exist already

- But: Selection and alignment is difficult

- Review and unification is needed
# Overview of Tagging Ontologies

<table>
<thead>
<tr>
<th>Name</th>
<th>Authors</th>
<th>Release (latest update)</th>
<th>Main purpose</th>
<th>Newly introduced concepts</th>
<th>Reused vocabularies</th>
<th>OWL sublanguage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tag Ontology</td>
<td>Newman et al.</td>
<td>2005-03-23 (2005-12-21)</td>
<td>First formal tagging ontology</td>
<td>Fundamental concepts and structure, restricted tagging</td>
<td>DC, FOAF, SKOS</td>
<td>OWL Full</td>
</tr>
<tr>
<td>Tagging Ontology</td>
<td>Knerr</td>
<td>2006 (2007-01-15)</td>
<td>Comprehensive domain description</td>
<td>Tagging source and note, private and group tagging</td>
<td>DC, DCTERMS, DCTYPE, FOAF, SKOS</td>
<td>OWL Full</td>
</tr>
<tr>
<td>Ontology of Folksonomy</td>
<td>Echarte et al.</td>
<td>2007 (—)</td>
<td>Comprehensive domain description</td>
<td>Aggregated tag, tag position, polarity, and type</td>
<td>--</td>
<td>OWL DL</td>
</tr>
<tr>
<td>Social Semantic Cloud of Tags</td>
<td>Kim et al.</td>
<td>2007-03-23 (2008-06-13)</td>
<td>TAGS extension for tag clouds</td>
<td>Tag clouds, frequencies, occurrences, and spelling variants</td>
<td>FOAF, SIOC (DC, SKOS via TAGS)</td>
<td>OWL Full</td>
</tr>
<tr>
<td>Meaning of a Tag</td>
<td>Passant &amp; Laublet</td>
<td>2008-01-15 (—)</td>
<td>TAGS extension for semantic tagging</td>
<td>Tag meaning, automatic tagging</td>
<td>FOAF, SIOC, (DC, SKOS via TAGS)</td>
<td>OWL Full</td>
</tr>
<tr>
<td>Upper Tag Ontology</td>
<td>Ding et al.</td>
<td>2008 (—)</td>
<td>Upper ontology</td>
<td>Voting via tags</td>
<td>DCTERMS, FOAF, SIOC, SKOS</td>
<td>OWL Lite (OWL Full)</td>
</tr>
<tr>
<td>Common Tag</td>
<td>Tori et al.</td>
<td>2009-06-08 (—)</td>
<td>Minimal ontology (optimized for RDFa)</td>
<td>Author vs. reader tags</td>
<td>DCTERMS, (MOAT, SIOC, SIOCT, SKOS, TAGS)</td>
<td>OWL Full</td>
</tr>
<tr>
<td>NiceTag Ontology</td>
<td>Limpens et al.</td>
<td>2009-01-09 (2010-09-09)</td>
<td>Taggings as speech acts (intention of tags)</td>
<td>Named graphs, tag intensions</td>
<td>FOAF, IRW, SIOC, RDFG</td>
<td>OWL Full</td>
</tr>
<tr>
<td>Modular Unified Tagging Ontology</td>
<td>Lohmann et al.</td>
<td>2011-09-02 (2011-11-16)</td>
<td>Unification, modularization</td>
<td>--</td>
<td>DCTERMS, SIOC, SKOS, (FOAF, all tagging ont.)</td>
<td>OWL Lite</td>
</tr>
</tbody>
</table>
Modular Unified Tagging Ontology (MUTO)

- Unification of existing approaches
- Compact and consistent design
- Modular architecture (core <> extensions)
- Conform to OWL Lite/DL and OWL 2

- Specification at: http://purl.org/muto
MUTO Core Ontology

- Tags are aligned with SKOS
- Taggings are aligned with SIOC
MUTO Core Ontology

- Tags have a label (exactly one label).
- Tags are entered in a certain order.
MUTO Core Ontology

- Users are linked via SIOC (and FOAF)
- Resources can be anything (rdfs:Resource)
MUTO Core Ontology

- Supports private, automatic, and semantic tagging
Complete UML Diagram of MUTO

More information at: http://purl.org/muto
Example of Using MUTO
Summary

MUTO:

- Not yet another tagging ontology
- But: Unification of existing tagging ontologies

And:

- Review of available tagging ontologies
- Shared conceptualization of the domain of tagging
Outlook

- Interoperable folksonomies
- Graph visualizations:
  - ChainGraph