Semantic Versioning Manager: Integrating SemVersion in Protégé

9th Protégé International Conference,
Stanford, California, USA
July 24th, 2006

Tudor Groza
DERI Galway
tudor.groza@deri.org

Max Völkel
FZI Karlsruhe
voelkel@fzi.de

Dr. Siegfried Handschuh
DERI Galway
siegfried.handschuh@deri.org
Overview

• Why ontology versioning?
• What is SemVersion?
• Semantic Versioning Manager
• Future directions
• Summary
Why ontology versioning?

• The dynamic status of ontologies

• The distributed settings of ontologies’ engineering

• The need for supporting the change management
The ontology lifecycle

- Creation
- Usage
- Versioning
- Evaluation/Refinement
- Adaptation/Mapping
What is SemVersion?

- RDF-based ontology versioning system
- Data management aspects of versioning
- Functional aspects of versioning
Data management aspects
Data management aspects (cont.)

Quad Store  (Named Graphs or RDF with contexts)
Functional aspects

• Structural diff
  – Set theoretic difference of two RDF triple sets

• Semantic diff
  – Language semantics dependent
  – Structural diff between the schema entailment of two RDFS models
### Structural diff vs. semantic diff

<table>
<thead>
<tr>
<th>version A:</th>
<th>version B:</th>
</tr>
</thead>
<tbody>
<tr>
<td>a rdfs:type c</td>
<td>a rdfs:type d</td>
</tr>
<tr>
<td>b rdfs:type c</td>
<td>b rdfs:type d</td>
</tr>
<tr>
<td>c rdfs:subClassOf d</td>
<td>c rdfs:subClassOf d</td>
</tr>
<tr>
<td>e rdfs:type d</td>
<td>e rdfs:type d</td>
</tr>
</tbody>
</table>

#### Added:
- a rdfs:type d
- b rdfs:type d
- e rdfs:type d

#### Removed:
- a rdfs:type c
- b rdfs:type c
### Structural diff

#### version A:
- a rdfs:type c
- b rdfs:type c
- c rdfs:subClassOf d

#### version B:
- a rdfs:type d
- b rdfs:type d
- c rdfs:subClassOf d
- e rdfs:type d

#### added:
- a rdfs:type d

#### removed:
- a rdfs:type c

---

### version A:
- a rdfs:type c
- b rdfs:type c
- c rdfs:subClassOf d

### version B:
- a rdfs:type d
- b rdfs:type d
- c rdfs:subClassOf d
- e rdfs:type d

### added:
- a rdfs:type d
- b rdfs:type d
- e rdfs:type d

### removed:
- a rdfs:type c
- b rdfs:type c
## Semantic diff

<table>
<thead>
<tr>
<th>version A:</th>
<th>version B:</th>
</tr>
</thead>
<tbody>
<tr>
<td>a rdfs:type c</td>
<td>a rdfs:type d</td>
</tr>
<tr>
<td>b rdfs:type c</td>
<td>b rdfs:type d</td>
</tr>
<tr>
<td>c rdfs:subClassOf d</td>
<td>c rdfs:subClassOf d</td>
</tr>
<tr>
<td>e rdfs:type d</td>
<td>e rdfs:type d</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>added:</th>
<th>removed:</th>
</tr>
</thead>
<tbody>
<tr>
<td>e rdfs:type d</td>
<td></td>
</tr>
</tbody>
</table>

```
version A:
a rdfs:type c
b rdfs:type c
c rdfs:subClassOf d

added:
e rdfs:type d
```
### Structural diff vs. semantic diff

<table>
<thead>
<tr>
<th>version A:</th>
<th>version B:</th>
</tr>
</thead>
<tbody>
<tr>
<td>a rdfs:type c</td>
<td>a rdfs:type d</td>
</tr>
<tr>
<td>b rdfs:type c</td>
<td>b rdfs:type d</td>
</tr>
<tr>
<td>c rdfs:subClassOf d</td>
<td>c rdfs:subClassOf d</td>
</tr>
<tr>
<td></td>
<td>e rdfs:type d</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>added:</th>
<th>removed:</th>
</tr>
</thead>
<tbody>
<tr>
<td>a rdfs:type d</td>
<td>a rdfs:type c</td>
</tr>
<tr>
<td>b rdfs:type d</td>
<td>b rdfs:type c</td>
</tr>
<tr>
<td>e rdfs:type d</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>version A:</th>
<th>version B:</th>
</tr>
</thead>
<tbody>
<tr>
<td>a rdfs:type c</td>
<td>a rdfs:type d</td>
</tr>
<tr>
<td>b rdfs:type c</td>
<td>b rdfs:type d</td>
</tr>
<tr>
<td>c rdfs:subClassOf d</td>
<td>c rdfs:subClassOf d</td>
</tr>
<tr>
<td></td>
<td>e rdfs:type d</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>added:</th>
<th>removed:</th>
</tr>
</thead>
<tbody>
<tr>
<td>e rdfs:type d</td>
<td></td>
</tr>
</tbody>
</table>
Diff question

• Where can the diff operation help?
Hospital setting scenario

Controlled Language Information Extraction Engine

Patient History
(Patient Ontology Versions)

Patient File

Patient Ontology

SemVersion
Hospital setting scenario

Patient History
(Patient Ontology Versions)

July 23rd
July 24th
... 
July 30th

Patient **John Doe**

... 
Temperature has constantly increased from X to Y. High blood pressure beginning with ...

... 
Possible cause: ...

Diff op.
Semantic Versioning Manage

• Integration of SemVersion in Protégé
• Support for the ontology lifecycle

• Re-using as much as possible the functionalities already offered by Protégé
• Deployment as an installation kit
Semantic Versioning Manager

Digital Enterprise Research Institute
Semantic Versioning Manager
Semantic Versioning Manage
Semantic Versioning Manager
Semantic Versioning Manager

Digital Enterprise Research Institute

Making Semantic Web real.
Semantic Versioning Manager
Semantic Versioning Manager
Structural diff at class-subclass level
Future directions

• **SemVersion**
  – Partial re-design
  – Client-Server architecture
  – Storage: Full versions vs. Diffs
  – Support for temporal queries

• **Semantic Versioning Manager**
  – 100% Protégé integration as a back-end
Summary

• SemVersion
  – RDF-based ontology versioning system
  – Separation between data management and functional aspects

• Semantic Versioning Manager
  – Integration of SemVersion in Protégé
Acknowledgements

• York Sure, AIFB Karlsruhe
• Tania Tudorache, Protégé
• Brian Davis, DERI Galway

• Part of this work has been funded by the European Commission 6th Framework Programme in the context of the Knowledge Web - Network of Excellence project, FP6-507482 and the EU IST NEPOMUK IP – The Social Semantic Desktop, FP6-027705
The end

Thank you!

http://semversion.ontoware.org/