Networked Ontologies

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http://www.neon-project.org/
The Semantic Web Explosion

"Microsoft Acquires Powerset": Why a Semantic Web Will Be Smarter, Faster & All-Around Better

Microsoft's acquisition of Powerset signals building of a future when the entire world will likely have access to virtual "software agents" who will "roam" across the Web, making our information more accessible.

The future of the Web is Semantic

Ontologies form the backbone of a whole new way to understand and work with information.

Level: Introductory

The New York Times Embraces the Semantic Web: "Opportunities are Quite Vast," R&D Chief Says

The BBC Music Beta project is an ongoing semantically linked and annotated web whose songs are played on BBC radio: collections of data are enhanced and in metadata, letting music fans explore co-may not have known existed.

Berners-Lee briefs Brown on opening up government data

Prime minister meets worldwide web inventor at Number 10 to discuss progress of plan to make public sector data more accessible.

Written by Bryan Glick
Computing, 15 Sep 2009
Agenda

- Applications
- Networks
- Ontologies
- Data
What is the status of the „semantic Web“?
Agenda

Applications

Networks

Ontologies

Data
One Type of Ontology Network

Requirement: Version, provenance and consistency management
Another Type of Ontology Network

Requirement: Joint Development
Yet Another Type of Ontology Network

Requirement: Ontology Design Pattern Management
Agenda

Applications

Networks

Ontologies

Data
FAO has numerous information systems about the world’s Fisheries:

- Heterogeneous data:
  - statistics, documents, GIS, thesaurus...
- Multilingual:
  - Arabic, Chinese, English, French, Spanish and Russian
- Much of the data are ‘structured’, but not necessarily interoperable.

FAO’s previous work (2003) to build a Fisheries ontology had drawbacks:

- too big
- un-manageable for maintenance
- inefficient to be used by systems

NeOn vision:

- resources remain independent and they are networked by mapping them:
  - smaller ontologies
  - mapping them
  - effective maintenance of ontologies and mappings

Better exploited using ontologies, by bringing together related information
Networked Ontologies: An Example

Fisheries ontology

Fisheries networked ontologies

territories

territorial water

species

fish lives in a sea

synonyms, translations

commodities

commodities from fish

AgroVoc

gear types

fish is fished with a gear

gear is on vessel

vessel types

AgroVoc
Fisheries Ontologies for the Fish Stock Depletion Assessment System (FSDAS)

FSDAS requirements:
- Using NeOn Toolkit runtime functionality

Fishery ontologies lifecycle requirements:
- Using NeOn Toolkit design time functionality
Networked Applications: Talk to Each Other

- Fire Department
  - Coordinate and keep up to date
  - Report and update about incident
  - Reports about incident by taking photos etc.

- Emergency Hotline
  - Creates incident event with audio
  - Calls to report about an incident

- Emergency Control Center
  - Coordinate and keep up to date

- Emergency Response Coordination
  - Requests to report about a situation
  - Coordinate and keep up to date

- Forward Liaison Officer
  - Requests to report about a situation

- Citizen
  - Event description with photo attached

- Police Department
  - Report and update about incident

http://www.weknowit.eu/
29 Plugins available for the current download
The NeOn Toolkit ontology development environment

Core ontology editor with
- Support ontology engineering and management
- Support for complete ontology lifecycle
- Support for different languages (OWL, F-Logic)
- Support for networked ontologies (modules, mappings)

Built on the Eclipse platform

Extensible architecture
- Via Eclipse plugin mechanism

Community support
- http://neon-toolkit.org
Requirement: Version, provenance and consistency management

O_1 \text{ priorVersionOf } M_{1,2} \text{ source } M_{1,2} \text{ target } O_2

O_1 \text{ relatedWith } O_3

O_1 \text{ extends } O_4

O_1' \text{ priorVersionOf } M_{1',2} \text{ source } M_{1',2} \text{ target } O_1''

O_1' \text{ incompatibleWith } O_2

Requirement: Version, provenance and consistency management
Example from FAO Case Study: Water Area – RADON to the rescue

From Peter Haase
Provenance Tracing

\[
\{\text{OntoEngSmith, KnowEngJones}\}
\]

Also applicable to time, location, fuzzy, ....
Requirement: Joint Development
Joint Development of AGROVOC@FAO

Problems:

- Communication between world-wide users and development team
- Communication within the development team
Allow an efficient, collaborative decision process
- Structuring and understanding the problem
- Systematic exploration of possible solutions

Documentation of the ontology design rationale
- Attach discussions to changes in the ontology
- Resuming of discussions, e.g. if requirements have changed
Enhanced discussion support for Semantic MediaWiki

- Guiding the user through the discussion workflow
- Different argument types, voting and decision procedures
Plugin for NeOn Toolkit

Integration of Cicero into an ontology editor (NeOn toolkit)

- Creating and searching discussions from within the toolkit
- Annotating discussions to ontology elements

http://isweb.uni-koblenz.de/Research/systeme/Cicero
Requirement: Ontology Design Pattern Management

From Ansgar Scherp
ÁWL is not enough for building a good ontology, and we cannot ask all web users either to learn logic, or to study ontology design.

ÁReusable solutions are described as Ontology Design Patterns, which help reducing arbitrariness without asking for sophisticated skills ...

Á... provided that tools are built for any user.

An ontology design pattern is a successful reusable solution to a recurrent modeling problem.

From Aldo Gangemi
Pattern-based ontology design is the activity of searching, selecting, and composing different patterns.

Based on a catalogue of design patterns:

- [http://www.ontologydesignpatterns.org](http://www.ontologydesignpatterns.org)

From Aldo Gangemi
Support for Extreme Ontology Design

From Valentina Presutti
FSDAS requirements:

- Using NeOn Toolkit runtime functionality

Fishery ontologies lifecycle requirements:

- Using NeOn Toolkit design time functionality

**NeOn Toolkit – GUI = Runtime Backend**

**Fish Stock Depletion Assessment System (FSDAS)**

Thesauri, classification schemes, glossaries

- ASFA thesaurus
- RTMS taxonomies
- AGROVOC thesaurus

Populate, map, transform

Fisheries ontologies

Connect to

Knowledge bases (metadata, documents, statistics...)

Use

**Fish Stock Depletion Assessment System**
Integrating Multiple Web2.0 Apps: Semaplorer
Networked Repositories

Networked Graphs + Federator

Views, Distributed Joins, & “Function Tables” built into SPARQL

birthplace

PlaceOfBirth birthplace

RDFS

Rules

fulltext

WordNet

Swoogle

GeoNames

DBpedia

flickr

Winner of 1st Prize in the Billion Triples Track of the Semantic Web Challenge

SEMAPLOERER

€1000.00

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€1000.00

http://isweb.uni-koblenz.de/Research/systeme/NetworkedGraphs
Conclusion

Networked Ontologies, Data and Applications
- Develop
- Operate

NeOn Toolkit
- Versatile
- 29 Plugins currently available
- Development environment
- Runtime environment
- Functionality constantly extended

Interesting New Challenges: Networked Ontologies of and for
- Ontology Reuse
- Ontology Publishing
- Ontology Trust
- ....
Thank You!

Steffen Staab
Scratching the tip of the iceberg


