



International Workshop on  
*Semantic Web And Reasoning for Cultural  
Heritage and Digital Libraries*  
(SWARCH-DL)

in conjunction with the

*4<sup>th</sup> IEEE International Conference on Semantic  
Computing*

September 22-24, 2010

Carnegie Mellon University, Pittsburgh, PA, USA



## Organization Committee

### Workshop Chair

*Dimitrios A. Koutsomitropoulos*

### Co-Chairs

*Georgia D. Solomou*

*Theodore S. Papatheodorou*



**High Performance Information Systems Lab. (HPCLab)**

Computer Engineering and Informatics Dpt.

University of Patras, Greece

<http://www.hpclab.ceid.upatras.gr>

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## Workshop's Aims and Scope

- ⦿ How Semantic Web techniques apply to cultural heritage collections and digital libraries?

*Need to:*

- improve **access, management** and **dissemination** of world's cultural assets!
- tackle with the **semantics** of web knowledge-intensive systems and cultural applications
- provide **knowledge-based** management of information in digital libraries
- deploy "**intelligent**" search and navigation mechanisms
- produce knowledge through automated **reasoning**

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## Areas of Interest

- ⊙ Use of ***semantically enriched metadata*** schemes
- ⊙ The role of ***ontologies***
- ⊙ ***Semantic-enabled*** search and browsing services in cultural heritage collections and digital libraries
- ⊙ Data integration and processing
  - Interoperability issues
- ⊙ ***Reasoning*** over cultural heritage information
- ⊙ Techniques for ***knowledge acquisition***

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## Areas of Interest

*What else?*

- ⊙ ***Evaluation, scalability*** and ***performance*** issues
- ⊙ Usability and interfaces
- ⊙ Applications involving ***Linked Data***
- ⊙ ***Semantic*** and ***mental maps*** of interlinked cultural information
- ⊙ ***Experience reports*** from relevant projects, use-cases, examples, ....

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## The problem



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## In facts...

- ⊙ In Europe alone, **tens millions** of Euros invested in projects related to cultural heritage and digitization
- ⊙ **Hundreds of institutions** (museums, archives, libraries, ...) participating in them
- ⊙ **Millions of digital objects** already available through digital library infrastructures
  - *Millions of online visitors worldwide!*

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## Digitization



- Huge amount of digital information
- Available through multiple channels
  - The Web
  - e-media
- However...
  - Fragmentation!
  - Missing *links*
  - What about *semantics*?

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## Projects for Cultural Heritage

- **eCHASE** – electronic Cultural Heritage made Accessible for Sustainable Exploitation
  - ...a follow up from **SCULPTEUR** (Semantic and Content-based mUltimedia exPloiTation for EURopean benefit)
- **AMA** - Archive Mapper for Archaeology
- **Multimedia N9C Eculture**
- **MultiMatch** - Multilingual/Multimedia Access To Cultural Heritage
- **STAR** – Semantic Technologies for Archeological Resources
- **Smartmuseum**

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## Projects for Cultural Heritage

- ◎ **CultureSampo** (a follow up from *MuseumFinland*)
- ◎ **STITCH - Semantic, Interoperability To access Cultural Heritage**
- ◎ **Europeana** (~ 10M € from 2009-2011)
  - A multi-lingual online collection of millions of digitized objects from European museums, libraries and archives
  - ⇒ *aims at 10 million records by the end of 2010!*
- **CARARE**
  - Special focus on 3D and virtual reality content
- ◎ **ATHENA** (~ 5,2M € in 3 years)
  - Provides tools and standards for Europeana



## Digital Library Projects

- ◎ **DSpace**
  - A widely adopted digital repository system
- ◎ **SIMILE - Semantic Interoperability of Metadata and Information in unLike Environments**
  - **Longwell**
    - A web-based, configurable faceted browser for RDF data
  - **Dwell**
    - The DSpace version of *Longwell*
- ◎ **JeromeDL – Social Semantic Digital Library**
- ◎ **The Library of Congress National Digital Library Program**
- ◎ ... and *Fedora, DELOS, BRICKS, ...*



# Semantic Search in Europeana

The screenshot shows the Europeana search results for the keyword "Raphael". It features a search bar with the keyword and a "Go" button. Below the search bar, there are three sections of results:

- works created by matching person (33)**: This section displays a grid of artworks, including "Hooft van een vrouw..." by Raphael, "MUSICA" by Raphael, "Maria met kind" by Raphael, "L'Immaculée Conception" by Anton Raphael Mengs, and "Germanicus, pl. I" by Grandjean, Jean.
- works showing (5)**: This section shows a grid of five artworks, including "RAPHAËL AU VATICAN" by Hubert Vernet, "Elsders pour L'Apôtre" by Jean Auguste Chevreux, "L'APOTHEOSE D'HOMEËRE" by Hubert Vernet, "TOBE ET L'ANGE" by Hubert Vernet, and "Jules II oronnant L..." by Hubert Vernet.
- works created by a teacher of matching person (14)**: This section shows a grid of artworks, including "APOLLON ET MARSYAS" by Pierre-Valéry, "LE COMBAT DE L'ANGE" by Pierre-Valéry, "SAINT" by Pierre-Valéry, "LA VERGE ET L'ENFANT" by Pierre-Valéry, "LA VERGE ET L'ENFANT" by Pierre-Valéry, and "SAINT SEBASTIEN" by Pierre-Valéry.
- works created by a student of matching person (19)**: This section shows a grid of artworks, including "Ontwerp voor een pen..." by Pieter de Wisp, "Ontwerp voor de roor..." by Pieter de Wisp, "LA SAINTE FAMILLE" by Gualfredo, "Scheuring van Consta..." by Karel van der, "LA NATIVITE DE L'ENF..." by Gualfredo, and "LE TROISIEME DE..." by Gualfredo.

Searching with keyword "Raphael"



# CultureSampo - Finnish Culture on the Semantic Web

The screenshot shows a Semantic Web application interface. At the top, it displays the title "Semantic Relations Between Locations Using Role: Place of Manufacture and Role: Place of Usage - Mozilla Firefox". Below the title is a map of Europe with blue arrows indicating relationships between various locations. A text box explains: "The thickness of arrows express the confidence for a relation." Another text box states: "By selecting different locations a user can examine its cultural heritage relations to other locations." Below the map, there is a detailed view of Finland with several locations highlighted: Ruokolahti (1920), Joutseno (1930), Jääski (1920), Imatra (1957), and Russia (USSR until 1991). Images of a hat, a chair, and a hat are shown next to their respective locations, representing cultural heritage items.



## Linked Data service by the Library of Congress

**Semantic Web**

From Library of Congress Subject Headings

Details Visualization Suggest Terminology

**Semantic Web**

**URI**  
<<http://id.loc.gov/authorities/sh2002000569#concept>>

**Type**  
Topical Term

**Broader Terms**

- > [Semantic integration \(Computer systems\)](#)
- > [Semantic networks \(Information theory\)](#)
- > [World Wide Web](#)

**Related Terms**

- > [Microformats](#)

**Sources**

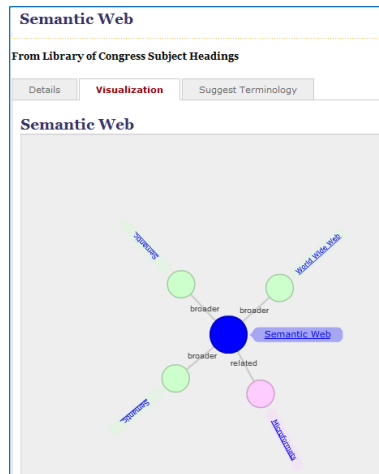
- > Engr. index online, May 6, 2002 (identifier: Semantic Web)
- > ASTI on FirstSearch, May 6, 2002: in titles (semantic Web)
- > Work cat.: 2002070545: The Semantic Web--ISWC 2002, 2002.

**LC Classification**  
TK5105.88815

**Created**  
2004-04-07

**Modified**  
2009-12-15 13:59:47

**Instance Of**  
> [SKOS Concept](#)



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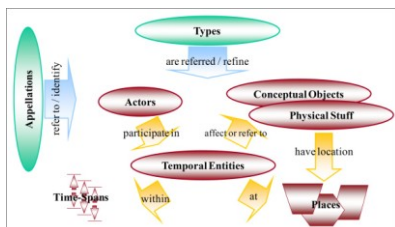
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## CIDOC-CRM

“... a **high level ontology** to enable information integration for cultural heritage data ...”

- ⇒ A reference model and information standard for providing **data integration** and **knowledge representation**  
(Current official version: 5.0.2, January 2010)
- ⇒ CRM's RDFS implementation is also available!



Why useful to have CRM ontology is a more expressive language (e.g., OWL)?

- ⇒ Enables **reasoning** on and **discovery** of cultural heritage information over **distributed** knowledge resources

LIDO, STAR, the Arachne project, SCULPTEUR,  
Museum of New Zealand, ... use CRM

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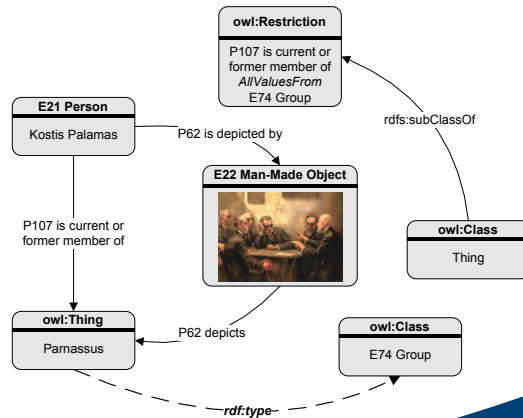
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## CIDOC-CRM in OWL – An example

Using the CRM ontology: Disambiguation of the term “Parnassus” in an example about the poet Kostis Palamas



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## JeromeDL - Semantic Search Service

**Results of search for the resources with RDF and NL interface**

**Browse e-Library**

- This Digital Library's Homepage
- Technical reports(26)
- In books(11)
- Masters thesis(24)
- Articles(2)
- Books(1)
- Proceedings(10)
- In collections(1)
- In proceedings(289)
- PhD thesis(1)
- Deliverables(111)

**Browse Collections**

- Publications from Corrib (86)

**Semantic browse**

- Browse with Exhibit
- Filter with Tags

**Search for Resources**

- Simple search
- Advanced search
- Semantic search
- SQE search

**DL Research**

- JeromeDL project web page
- MarcOnt initiative web page

Natural Language Query    RDF Query

```
SELECT DISTINCT r FROM (r) marcont:hasCreator (c), [(c) foaf:name {fname}] WHERE fname LIKE "**Rruk*" USING NAMESPACE marcont = <http://www.marcont.org/ontology#>, foaf = <http://xmlns.com/foaf/0.1/>
```

Query Language **SPARQL**    Result Format **rdfl+n3**

Search    Clear the form

**Search results** Results 1 - 10 of 97

- ▶ [Hee-Chul Choi](#), [Sebastian Ryszard Kruk](#), [Slawomir Grzonkowski](#), [Stankiewicz Katarzyna](#), [Brian Davis](#), [John G. Breslin](#). *Trust Models for Community-Aware Identity Management*
- ▶ [Vit Novacek](#), [Siegfried Handschuh](#), [Diana Maynard](#), [Loredana Laera](#), [Sebastian Ryszard Kruk](#), [Max Völkel](#), [Tudor Groza](#), [Valentina Tamma](#). *D2.3.8v1 Report and Prototype of Dynamics in the Ontology Lifecycle*
- ▶ [Mateusz Marmolowski](#), [Maciej Dąbrowski](#), [Michał Nowacki](#), [Szymon Pająk](#), [Sebastian Ryszard Kruk](#). *MarcOnt Portal User Guide*
- ▶ [Sebastian Ryszard Kruk](#), [Stefan Decker](#), [Bernhard Haslhofer](#), [Predrag Knezevic](#), [Sandy Payette](#), [Dean Krafft](#). *Tutorial on Semantic Digital Libraries (WWW2007)*

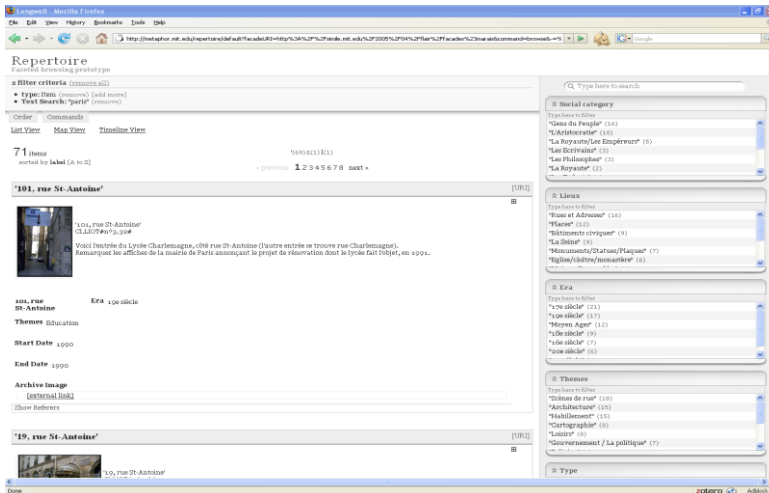
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# SIMILE

## SIMILE'S Longwell - A web-based RDF faceted browser



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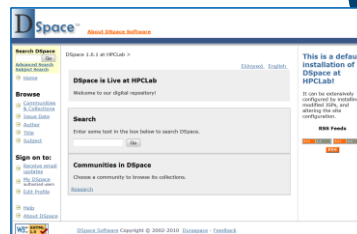


# Semantic Search for DSpace

An advanced "semantic" search facility implemented for the DSpace digital repository system

<https://wiki.duraspace.org/display/DSPACE/Kotsomit>

- ⊙ Semantics for DSpace metadata
  - Knowledge discovery (high, OWL 2 expressivity)
  - Automatic model population
    - Alleviate the "bootstrapping" problem
- ⊙ Novel Semantic Services
  - Augment traditional search and navigation
  - Intelligent retrieval and discovery
  - "Plug-in" philosophy
- ⊙ Interoperable design
  - Easy to integrate in any digital repository (OAI-PMH)
  - Straightforward integration with other schemata (e.g. IEEE LOM)
  - Semantic interoperability



<http://www.dspace.org/>

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## Workshop Presentations

- ◎ Part I: *Cultural Heritage Ontologies and Applications*
  - Semantic collection management on the Web
  - Intelligent mash-ups
  - Applications of the CIDOC-CRM reference model

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## Workshop Presentations

- ◎ Part II: *Web-based Collections and Digital Libraries*
  - Semantic metadata manipulation of bibliographic resources
  - Data integration using well-recognized standards (RDF, SKOS, ...)
  - Efficient data management and cataloguing
  - Personalization techniques

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## Workshop Program

Session I: Cultural Heritage Ontologies and Applications	
10:30-12:30	Welcome and Workshop Opening
10:30-10:50	<b>Semantic Web and Reasoning for Cultural Heritage and Digital Libraries: An Overview</b> <i>Dimitrios A. Koutsomitropoulos</i>
10:50-11:15	<b>Intelligent Book Mashup: Using Semantic Web Ontologies and Rules for User Personalisation</b> <i>Aikaterini Kalou, Tzanetos Pomonis, Dimitrios Koutsomitropoulos, Theodore S. Papatheodorou</i>
11:15-11:40	<b>Museum of London - Collections Information Integration Module</b> <i>Alex Bromley, Rob Tice</i>
11:40-12:05	<b>Toward a Novel Application of CIDOC CRM to Underwater Archaeological Surveys</b> <i>Olivier Curé, Mariette Sérayet, Odile Papini, Pierre Drap</i>
12:05-12:30	<b>Detecting Shape Similarities in 3D Pottery Repositories</b> <i>Anestis Koutsoudis, George Pavlidis, Christodoulos Chamzas</i>
12:30-13:45	Lunch
Session II: Web-based Collections and Digital Libraries	
13:45 - 14:10	<b>A Bi-directional Semantic Framework for Bibliographic Metadata</b> <i>John Del Corral, Benno Blumenthal</i>
14:10 - 14:35	<b>The Use of SKOS Vocabularies in Digital Repositories: The DSpace Case</b> <i>Georgia Solomou, Theodore S. Papatheodorou</i>
14:35 - 15:00	<b>Proposal of a Goal-Oriented Shared Catalog Model</b> <i>Alicia Sellés Carot, Enrique Orduna-Malea, Jorge Serrano-Cobos, Nuria Lloret Romero</i>
15:00 - 15:25	<b>A Semantic Web Personalizing Technique: The Case of Bursts in Web Visits</b> <i>Dimitris Antoniou, Mersini Paschou, Efrosini Sourla, Athanasios Tsakalidis</i>
15:25-15:45	Discussion - Closing

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## Program Committee

- *Andreas Andreou, Cyprus University of Technology, Cyprus*
- *Panayiotis Bozanis, University of Thessaly, Greece*
- *Christodoulos Chamzas, Democritus University of Thrace, Greece*
- *Mark Diggory, @Mire, USA*
- *Kate Fernie, MDR Partners, UK*
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- *Axel Vitzthum, DigiCult SH, Germany*

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## Semantic Web Journal **Special Issue**

- ◎ **SWJ Special Issue on SWARCH-DL** (IOS Press)
  - <http://www.semantic-web-journal.net/>
- ◎ Call out in **October 2010**
- ◎ Editors:
  - *Dimitrios Koutsomitropoulos*, Univ. Patras
  - *Eero Hyvönen*, Aalto University
  - *Theodore Papatheodorou*, Univ. Patras
- ◎ **Open** review process
- ◎ Submissions until **end Jan. 2011**
  - 15-25 pages



**Thank you for your participation  
to SWARCH-DL 2010!**

*Your feedback is welcome!*

**E-mail:** [kotsomit@hpclab.ceid.upatras.gr](mailto:kotsomit@hpclab.ceid.upatras.gr)  
[solomou@hpclab.ceid.upatras.gr](mailto:solomou@hpclab.ceid.upatras.gr)  
[tsp@hpclab.ceid.upatras.gr](mailto:tsp@hpclab.ceid.upatras.gr)

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