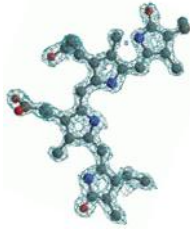


# Ontologien für das Semantic Web

*Referent: Jens Barth*



# Übersicht

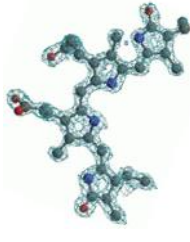
## Vorstellung von Anwendungsszenarien

im Bereich **Computer Science**:

- ❖ CS AKTive Space
- ❖ OntoWeb

im Bereich **Bioinformatik**

- ❖ TAMBIS



## CS AKTive Space

- ❖ „Explorer“
- ❖ Computer Science Research Domäne in Großbritannien
- ❖ Informationen über Institute, Arbeitsgruppen, Personen
- ❖ Informationen stammen aus vielen heterogenen

### Quellen

- ❖ RDF Sources
- ❖ Persönliche Webseiten
- ❖ Datenbanken



## Ontologien für das Semantic Web

About this page  research area/region  region/research area

### Radial:

200 miles

### Map:

uk-political

### Research area

### Researcher

Top  5  10  20  unlimited

Order by  Grant total  RAE result



|   |  |
|---|--|
| <b>Computing Milieux</b><br>management of computing and information systems<br>computers and society<br>computers and education | <b>Information Systems</b><br>information systems applications<br>information interfaces and presentation<br>database management<br>information storage and retrieval  |
| <b>Software</b><br>software engineering<br>programming languages<br>general<br>operating systems                                | <b>Hardware</b><br>performance and reliability<br><b>Computer Systems Organization</b><br>computer-communication networks<br>general<br>computer system implementation |

## Research groups selected

The University of Strathclyde

Telephone: +441415524400

Web page: <http://www.strath.ac.uk/>

- ◆ Global Information Management Systems
- ◆ Software Engineering
- ◆ High Performance Technologies

University of Dundee

Telephone: +441382344000

Web page: <http://www.dundee.ac.uk/>

About this page

research area/region

region/research area

Radial:

200 miles

Map:

uk-political

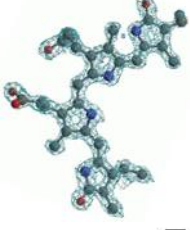
Research area

Ontologien für das Semantic Web

Researcher

Top  5  10  20  unlimited

Order by  Grant total  RAE result



|                                      |   |
|--------------------------------------|---|
| <b>Computing Milieux</b>             | management of computing and information systems<br>computers and society<br>computers and education                                     |
| <b>Information Systems</b>           | information systems applications<br>information interfaces and presentation<br>database management<br>information storage and retrieval |
| <b>Software</b>                      | software engineering<br>programming languages<br>general<br>operating systems   |
| <b>Hardware</b>                      | performance and reliability   |
| <b>Computer Systems Organization</b> | computer-communication networks<br>general<br>computer system implementation  |

|             |
|-------------|
| SO Anderson |
| PE Stevens  |
| R Morrison  |
| K Hammond   |
| MI Wood     |

browse

**Sub area of Software**

- Software Engineering
- Miscellaneous
- Management
- Metrics

**Sub areas**

- Distribution, Maintenance, and Enhancement
- Programming Environments
- Testing and Debugging
- Software/Program Verification
- Coding Tools and Techniques
- Design Tools and Techniques
- Requirements/Specifications



## Triplestore Browser

[about](#) [browse](#) [manage](#) [query](#) [demo](#)

### SOFTWARE ENGINEERING

<http://www.acm.org/class/1998/D.2>

has pretty name

has research interest <—

[SOFTWARE ENGINEERING](#)

[Software Engineering](#)

[Software architecture](#)

[Software Engineering](#)

[Communications and Software Engineering Research](#)

[Distributed Software Engineering](#)

[Reverse Engineering and Software Visualisation](#)

[Software Engineering](#)

[System Design and Verification](#)

[Software Engineering](#)

[Systems Software Engineering](#)

[Software Engineering](#)

[Empirical Software Engineering Research Group](#)

[Requirements Engineering](#)

[Performance Modelling and Engineering](#)

[Systems and Software Engineering](#)

[System Engineering](#)

[show sources](#)



# Ontologien für das Semantic Web

About this page  research area/region  region/research area

**Radial:**

200 miles

**Map:**

uk-political



## Research area

- history of computing
- the computer industry
- Data**
- data encryption
- data storage representations
- coding and information theory
- Computing Methodologies**
- document and text processing
- pattern recognition
- artificial intelligence
- image processing and computer vision
- computer graphics
- simulation and modeling
- symbolic and algebraic manipulation
- general
- Information Systems**
- information interfaces and presentation
- database management
- information storage and retrieval
- information systems applications

## Researcher

Top  5  10  20  unlimited  
 Order by  Grant total  RAE result

- NR Shadbolt
- SJ Cox
- P Johnson
- PC Treleaven
- ACW Finkelstein

## Overview: NR Shadbolt

[browse](#)

**Name** Professor NR Shadbolt

**Institution** Department of Electronics and Computer Science, University of Southampton

**Email** nrs@ecs.soton.ac.uk

**Tel** +442380597682

**Fax** +442380592865

### Research interests

- Fluid Dynamics
- Aerodynamics
- Design and Testing Technology
- Biological Sciences Domain
- Image and Vision Computing
- Networks and Distributed Systems
- Design Processes
- Information and Knowledge Management
- New and Emerging Computer Paradigms
- Cognitive Science and its Applications
- Software Engineering
- User Interface Technologies

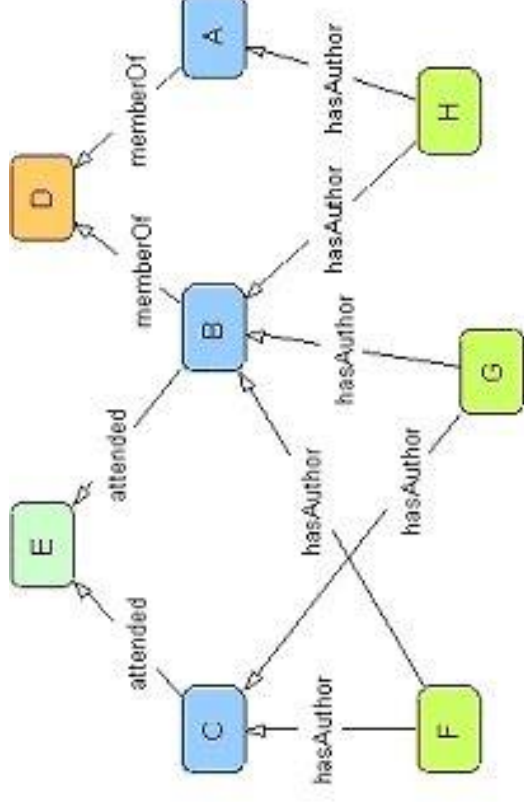
## CoP

- Kieron O'Hara
- Harith Alani
- Terry Elliott
- David De Roure
- Nick Jennings
- Nicholas Gibbs
- Stephen Harris
- Stuart Middleton
- Sanghee Kim
- Paul Lewis
- Wendy Hall
- David Millard
- Mark Weal
- Yannis Kalfoglou
- Srinandan Dasrathapatra
- H. Cottam
- N. Milton
- J. Tennison
- N. Milton



# Ontocopi

- ❖ Ontologiebasiertes Netzwerk Analyse Tool
- ❖ Untersucht **Zusammenhänge von Instanzen** in der Wissensbasis
- ❖ Filterung relevanter Beziehungen durch **Gewichtung** der Pfade im Netz

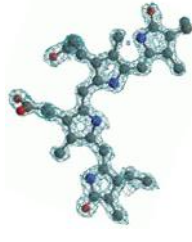






## Armadillo

- ❖ Information Extraction Tool
- ❖ Interpretiert fremde Texte mittels bekanntem Wissen und natürlicher Sprachverarbeitung
- ❖ Aufbau einer RDF Ontologie und Wissensbasis







## Ontologien für das Semantic Web

### NR Shadbolt

<http://194.66.183.26/WEBSITE/GOW/ViewPerson.aspx?Person=14179>  
<http://www.ecs.soton.ac.uk/info/#person-02686>  
<http://www.hero.ac.uk/rae/#id-227401>  
<http://www.ecs.soton.ac.uk/industry-panel-day-2003#staff03>  
<http://www.aktors.org/ontology/signage#person-D6000009BC39B901>

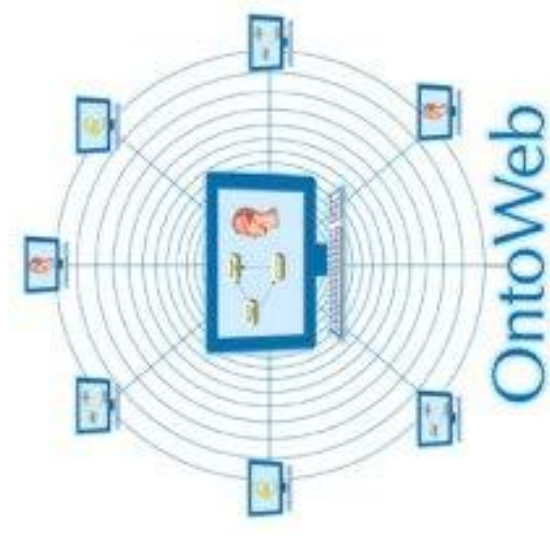
[hide sources](#)

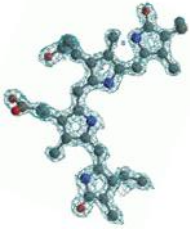
|                               |   |   |
|-------------------------------|---|---|
| <b>family name</b>            | <a href="#">Shadbolt</a>  | <a href="#">RAE RA1 Submissions for Unit of Assessment 25</a> |
|                               | <a href="#">Shadbolt</a>  | <a href="#">EPSRC People</a>                                  |
| <b>full name</b>              | <a href="#">NR Shadbolt</a>   | <a href="#">EPSRC People</a>                                  |
|                               | <a href="#">NR Shadbolt</a>   | <a href="#">RAE RA1 Submissions for Unit of Assessment 25</a> |
| <b>has appellation</b>        | <a href="#">Professor</a>   | <a href="#">EPSRC People</a>                                  |
| <b>has email address</b>      | <a href="mailto:nrs@ecs.soton.ac.uk">nrs@ecs.soton.ac.uk</a>  <a href="#">Send email</a> | <a href="#">industry-panel-day-2003-visitors.rdf</a>          |
|                               | <a href="mailto:nrs@ecs.soton.ac.uk">nrs@ecs.soton.ac.uk</a>  <a href="#">Send email</a> | <a href="#">EPSRC People</a>                                  |
| <b>has fax number</b>         | <a href="tel:+442380592865">+442380592865</a>    | <a href="#">EPSRC People</a>                                  |
| <b>has telephone number</b>   | <a href="tel:+442380597682">+442380597682</a>    | <a href="#">EPSRC People</a>                                  |
| <b>has email address hash</b> | <a href="https://www.ecs.soton.ac.uk/~dderr/SanFram/C75NigelDavid.jpg">482675986dafdc32657cf98018139ad7</a>   | <a href="#">signage-preview-day-people-hashed.rdf</a>         |
| <b>has pretty name</b>        | <a href="#">Nigel Shadbolt</a>  | <a href="#">industry-panel-day-2003-visitors.rdf</a>          |
|                               | <a href="#">Nigel Shadbolt</a>  | <a href="#">signage-preview-day-people-hashed.rdf</a>         |
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| <b>organisation</b>           | <a href="#">University of Southampton</a>   | <a href="#">industry-panel-day-2003-visitors.rdf</a>          |
| <b>visiting person &lt;—</b>  | <a href="#">KMi Planet : AKT Project Gathering</a>  | <a href="#">industry-panel-day-2003-visitors.rdf</a>          |
| <b>depicted in</b>            | <a href="http://www.ecs.soton.ac.uk/~dderr/SanFram/C75NigelDavid.jpg">http://www.ecs.soton.ac.uk/~dderr/SanFram/C75NigelDavid.jpg</a>                                       | <a href="#">sssw2003.rdf</a>                                  |
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# OntoWeb

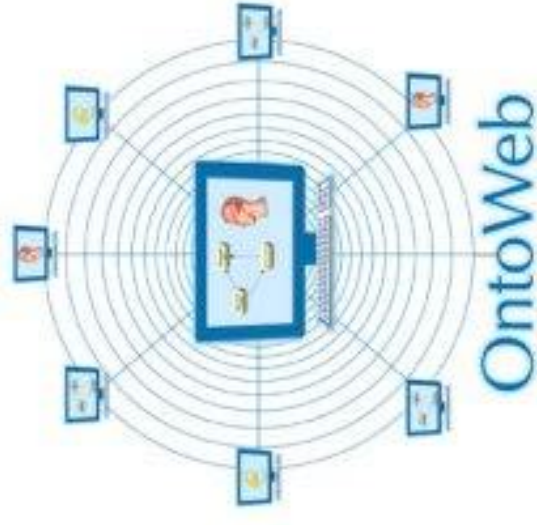
- ❖ Knowledge Portal
- ❖ bildet thematisches Netzwerk
- ❖ Wissensplattform für den Bereich Knowledge Management und eCommerce





# Ontologie

- ❖ Shared Concepts für
  - ❖ OntoWeb Organisationen
  - ❖ Dokumente
  - ❖ Events
  - ❖ Wissenschaftliche Ergebnisse
  - ❖ Materialien





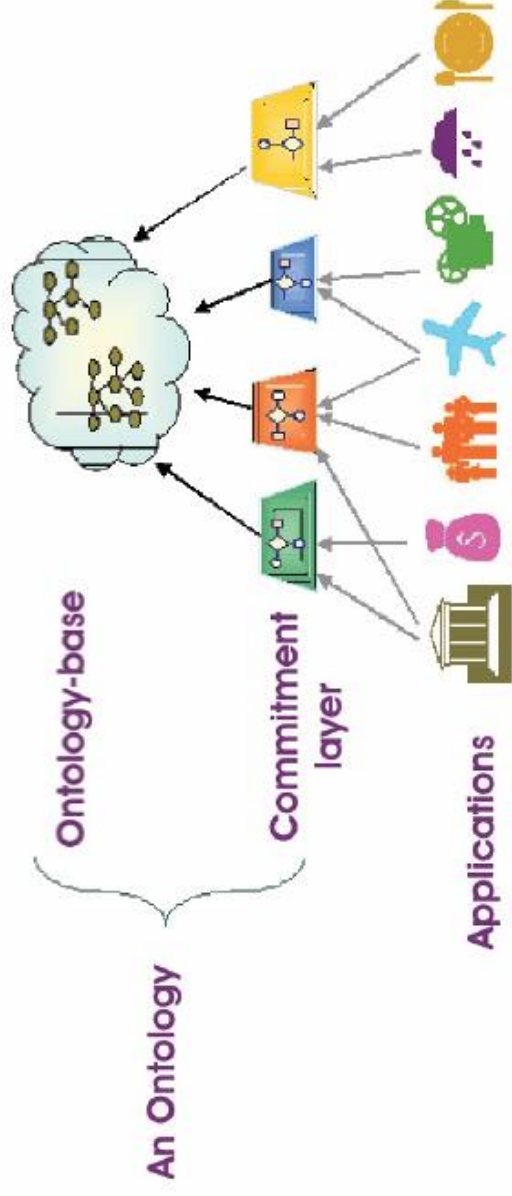
## Frameworks

- ❖ **Zope**
  - ❖ Content Management System
  
- ❖ **DOGMA**
  - ❖ Developing **O**ntology **G**uided **M**ediator for **A**gents
  - ❖ Framework zum **A**ufbau der **O**ntologien
  
- ❖ **SEAL**
  - ❖ **S**emantic port**AL**
  - ❖ Framework zur **E**rstellung und **V**erwaltung von Wissensportalen

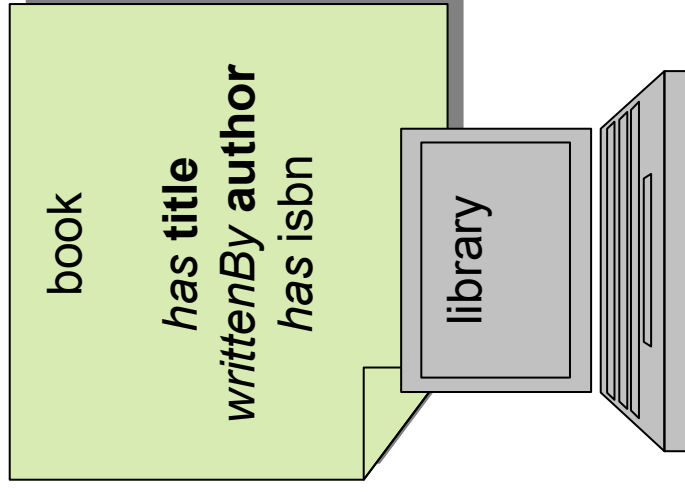
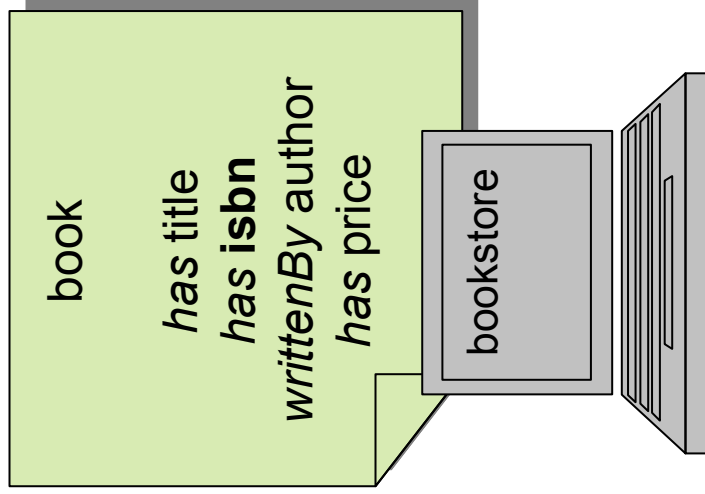
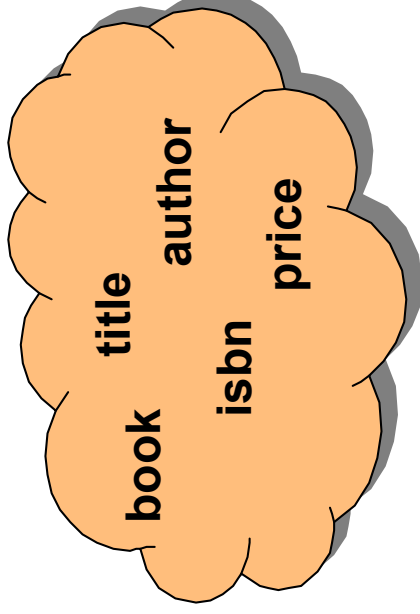
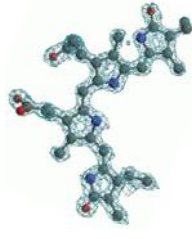


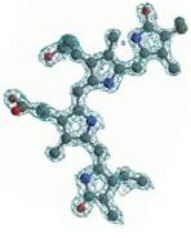
# DOGMA

- ❖ Double Articulation
  - ❖ Ontologie Basis: Die einzelnen Konzepte
  - ❖ Commitment Layer: Die Regeln für die Domäne



# Beispiel





## SEAL

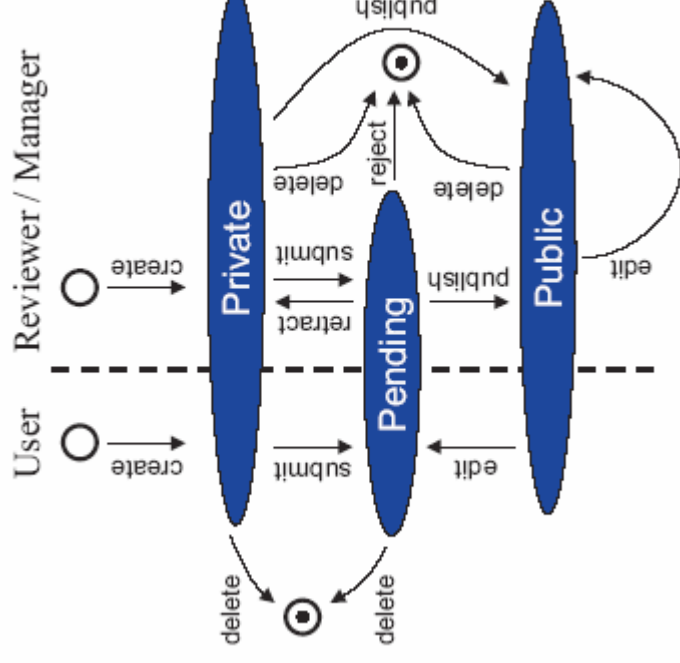
- ❖ **halbautomatisches Erstellen und Verwalten** der Webseite
- ❖ **Beispiel: Navigation**
- ❖ **erkennt Redundanzen**
- ❖ **unterstützt Suchanfragen**





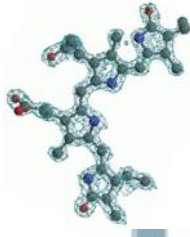
# Erstellen von Inhalten

- ❖ 2 Möglichkeiten
  - ❖ Teilnehmer versieht seine persönlichen Webseiten mit Metadaten
  - ❖ direktes Erstellen in OntoWeb
- ❖ Publishing Prozess



# Content Access

Ontologien für das Semantic Web



Total 4 FacultyMember page 1 of 1 Instance 1 - 4

Find a **FacultyMember** using keywords  Search [or try the ontological search form](#)

[View more generic FacultyMember AcademicStaff](#)  
[View more specific FacultyMember](#)

[AssistantProfessor](#)
[AssociateProfessor](#)
[FullProfessor](#)

**Person >> Employee >> AcademicStaff >> FacultyMember**

|                                       |                                 |
|---------------------------------------|---------------------------------|
| <a href="#">Dieter Andreas Fensal</a> | <a href="#">Glo Wiedenhof</a>   |
| <a href="#">D. Seese</a>              | <a href="#">Robert Meersman</a> |

Result Pages: 1

**Ontological Search for FacultyMember**

|                    |                       |               |  |
|--------------------|-----------------------|---------------|--|
| author             | dcContributor         |               |  |
| dcCoverage         | dcCreator             |               |  |
| dcDate URI         | dcDescription address |               |  |
| email              | fax                   |               |  |
| homepage           | name                  |               |  |
| phone              | photo                 |               |  |
| affiliation        | cooperateWith         | AcademicStaff |  |
| editor             | headOf                | Project       |  |
| headOfGroup        | memberOfPC            | Event         |  |
| organizerOrChairOf | publication           | Publication   |  |
| supervises         | worksAtProject        | Project       |  |
| and                |                       | or            |  |

Search



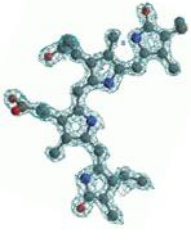
# Search Result



OntoWeb  
★ ALL(?)  
★ Person(1)  
★ FullProfessor(1)

**Search results:**  
If your search did not return the results you are looking for, you can also search document contents.

Person >> Employee >> AcademicStaff >> FacultyMember >> FullProfessor >>  
Robert Meersman => cooperateWith = Rudi Studer => supervises = Alexander  
Maedche => publication = AI for the Web - Ontology-based Community Web Portals => author =  
Hans-Peter Schnurr



# TAMBIS

- ❖ Einheitliche Suche über verschiedene Ressourcen der Bioinformatik
- ❖ Ohne TAMBIS wäre die Suche sehr zeitaufwendig und schwierig
  - ❖ angemessene Ressource finden
  - ❖ Fragen in der richtigen Syntax formulieren
  - ❖ Antworten richtig interpretieren

## TAMBIS

- ❖ Findet die Informationsquellen
- ❖ Stellt die Fragen
- ❖ Fügt die Antworten zusammen
- ❖ Antwortet auf konsistente Weise

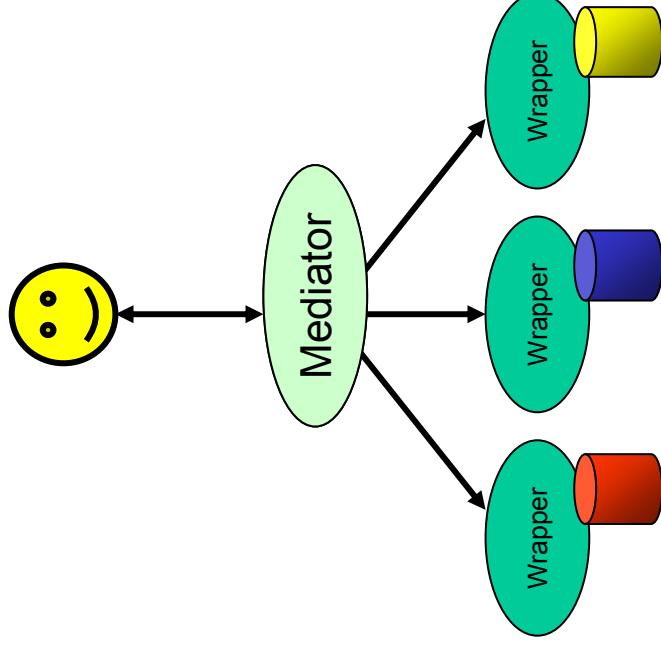
- ❖ Dadurch **effektiverer Nutzen** von mehreren Informationsquellen





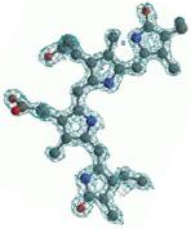
## Homogenisierter Layer

- ❖ befindet sich über den Datenquellen
- ❖ Illusion einer einzelnen Datenquelle
- ❖ Mediator (Vermittler)
- ❖ Wrapper

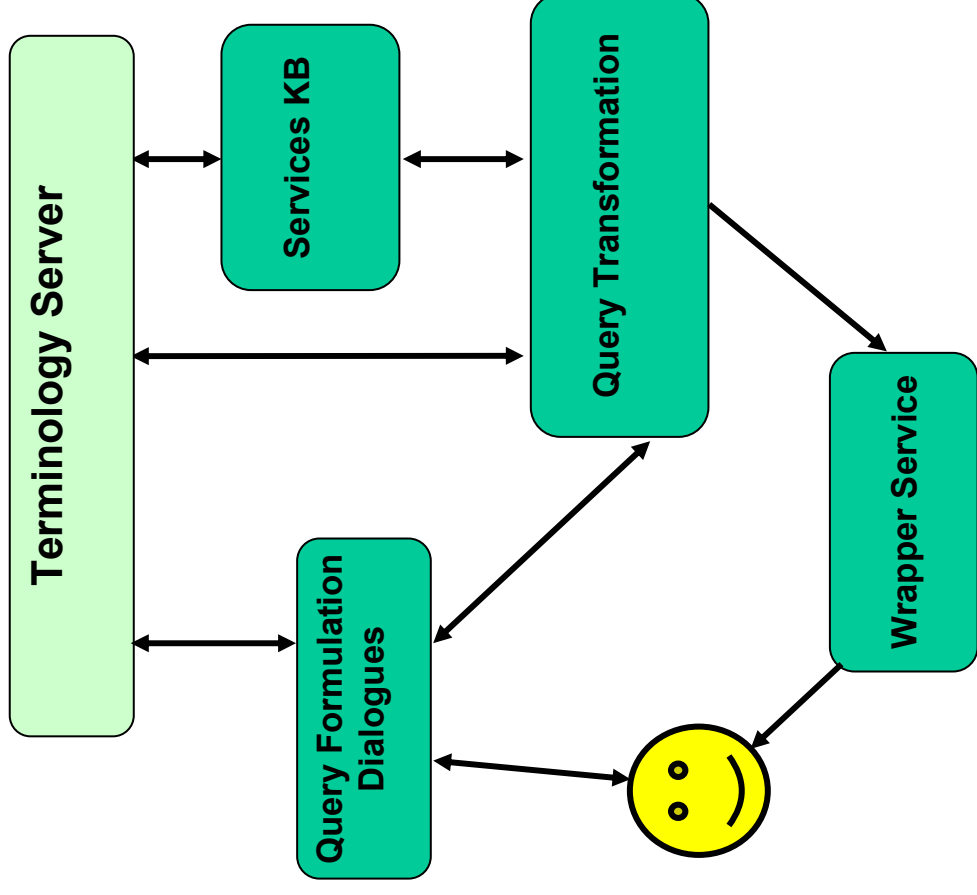


# Die Stufen der Suche

Ontologien für das Semantic Web

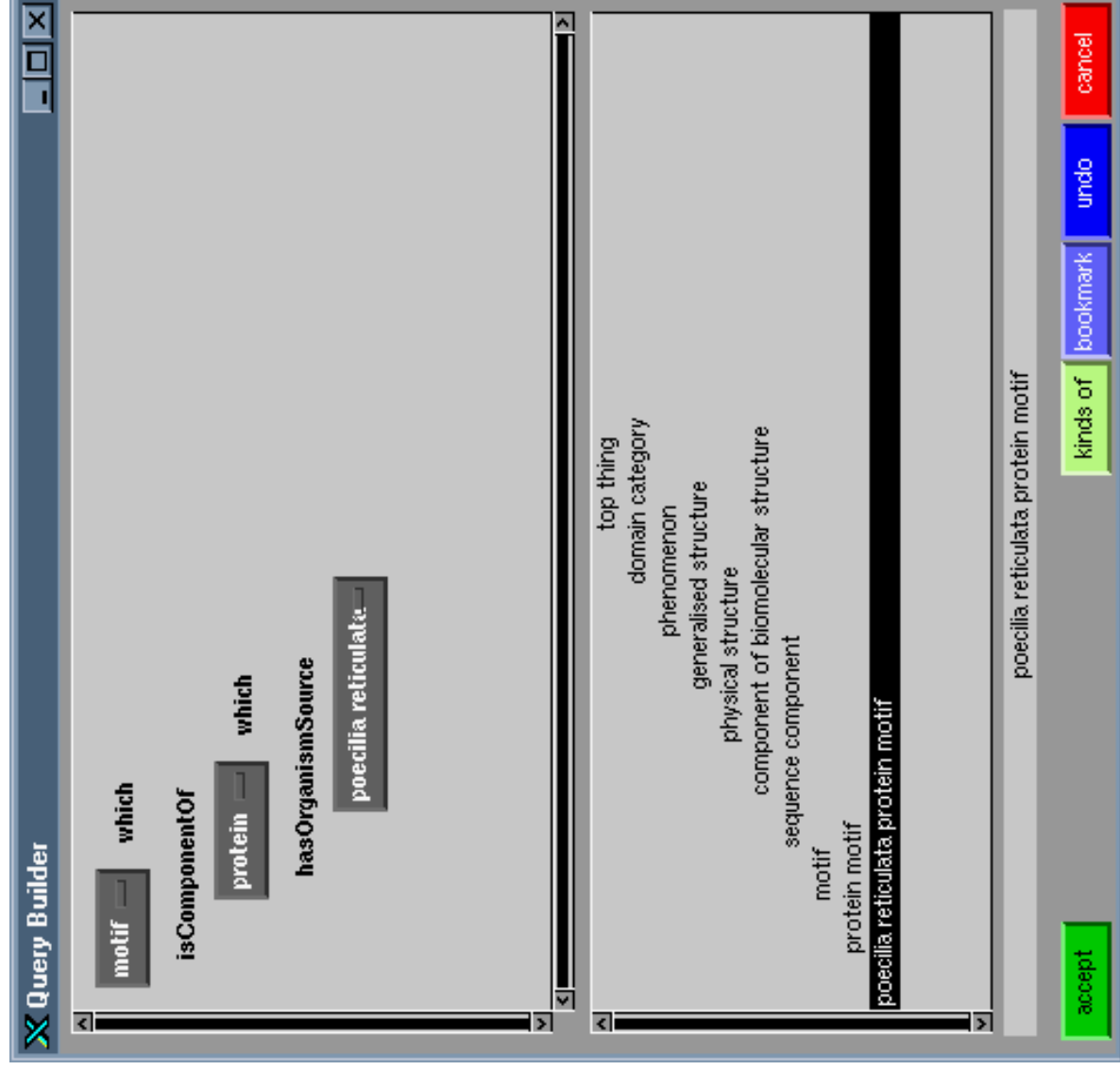
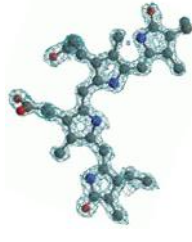


- ❖ **Conceptual Query Formulation Interface**
  - ❖ Formulierung durch Konzepte und Relationen aus der Ontologie
  - ❖ Senden der quellenunabhängigen Konzeptquery an den Transformationsprozess um sie evtl. zu verfeinern
- ❖ **Service Knowledge Base**
  - ❖ Verknüpft die Ontologie mit den Quellen und ihren entsprechenden Schemata
  - ❖ Welche Quellen kommen überhaupt in Frage
- ❖ **Query Transformation**
  - ❖ Übersetzung der Query in ausführbaren Queryplan
  - ❖ Spezielle Wünsche des Users
  - ❖ Wrapper führt Queryplan aus
- ❖ **Wrapper Service**
  - ❖ Koordiniert die Ausführung der einzelnen Queries
  - ❖ Ergebnisse werden gesammelt
  - ❖ Benutzer erhält Antwort



# Das Conceptual Query Formulation Interface

Ontologien für das Semantic Web



Query Builder

motif which  
isComponentOf protein which  
hasOrganismSource poecilia reticulata

top thing  
domain category  
phenomenon  
generalised structure  
physical structure  
component of biomolecular structure  
sequence component  
motif  
protein motif  
poecilia reticulata protein motif

poecilia reticulata protein motif

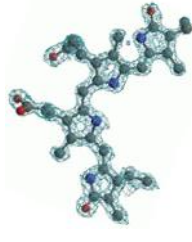
accept kinds of bookmark undo cancel



## Description Logic

- ❖ Sprache GRAIL
- ❖ Ermöglicht es Bedingungen auf Relationen zu formulieren
- ❖ Solche Restriktionen ermöglichen es Fragen auf semantische Korrektheit zu überprüfen
- ❖ Durch wenig Konzepte kann ein ausführliches und komplexes Modell gefolgert werden





## Verweise

- ❖ CS Aktive Space  
<http://triplestore.aktors.org/SemanticWebChallenge/CSAKTiveSpace/>
- ❖ OntoWeb  
<http://www.ontoweb.org>
- ❖ Tambis  
<http://imgproj.cs.man.ac.uk/tambis/>