

# Intelligent Systems on the World Wide Web

## 4 Knowledge Portals

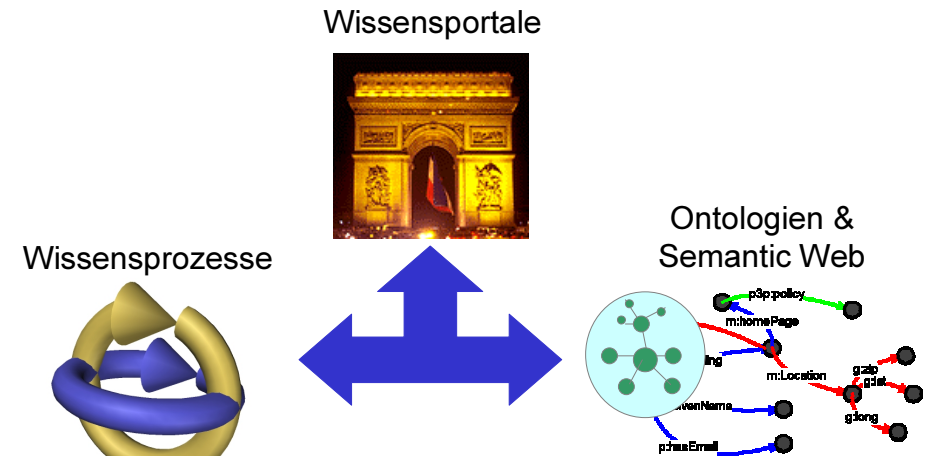
Lecture Slides

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Karlsruhe University

With acknowledgements to Carol Goble, U Manchester, UK

## Thematik



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## Agenda

1. Wissensportal
2. Wissensprozess
3. Conceptual Open Hypermedia
4. Wissensmetaprozess

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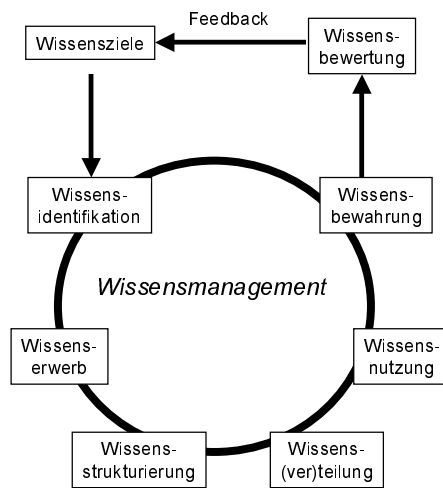
## Wissensportal

Definition:

- Website
- Strukturierter Zugriff
- auf große Mengen Information
- Spezialisiert auf
  - Produktion
  - Akquisition
  - Vermittlung und
  - Management von Wissen

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## Bausteine des Wissensmanagements



**Wissensziele:** Bestimme Ziele für WM Aktivitäten

## Wissensidentifikation: Übersicht über internes und externes Wissen

**Wissenserwerb:** Schulungen, „Einkauf“, F&E

## Wissensstrukturierung: Strukturierung und Integration von Wissen

**Wissensverteilung:** Verteilung/Kommunikation von Wissen im Unternehmen

**Wissensnutzung:** produktive (Aus-)Nutzung von Wissen (Patente, nachfolgende Maßnahmen)

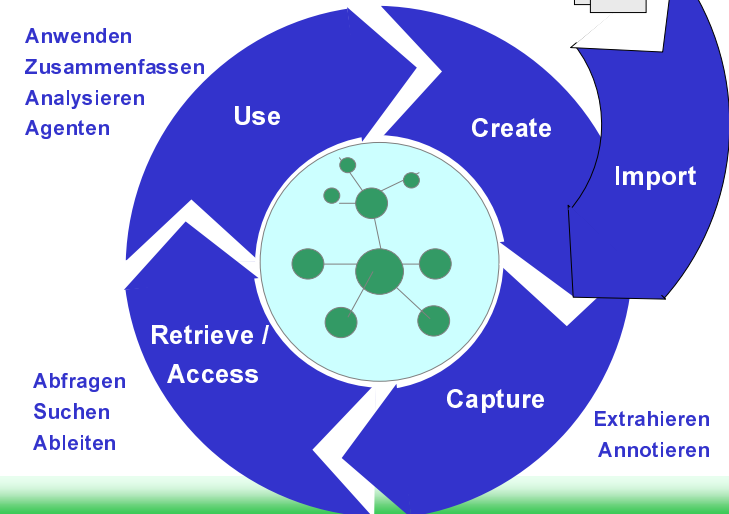
**Wissensbewahrung:** Speichern und Bewahren von relevantem Wissen und Erfahrungen

## Wissensbewertung: Controlling des Wissensmanagementprozesses

Angelehnt an [Probst et al. 1999]

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## Wissensprozess



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## Knowledge Portals

## Ontologie als Kerntechnologie

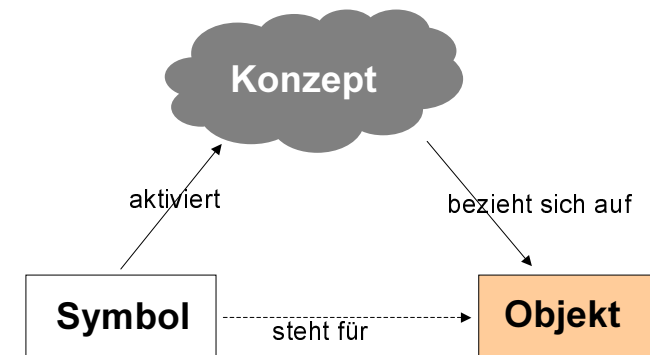


„People can't share knowledge if they don't speak a common language“

*T. Davenport, Working Knowledge*

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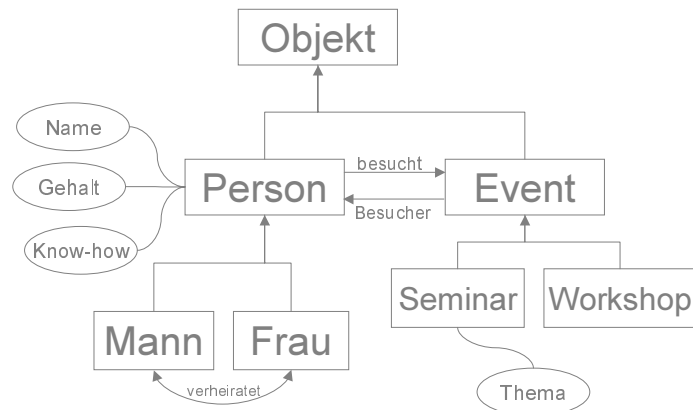
## Ontologien zur Kommunikation zwischen Mensch und Maschine



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## Knowledge Portals

## Beispiel Ontologie



- Verheiratet ist symmetrisch
- Besucht und Besucher sind invers
- Wenn eine Person ein Seminar besucht, eignet sie sich Wissen über ein Thema an

Regeln

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## Knowledge Portals

## Wissensprozess &amp; Wissensmetaprozess

Arbeiten mit dem Portal

Wissensprozess

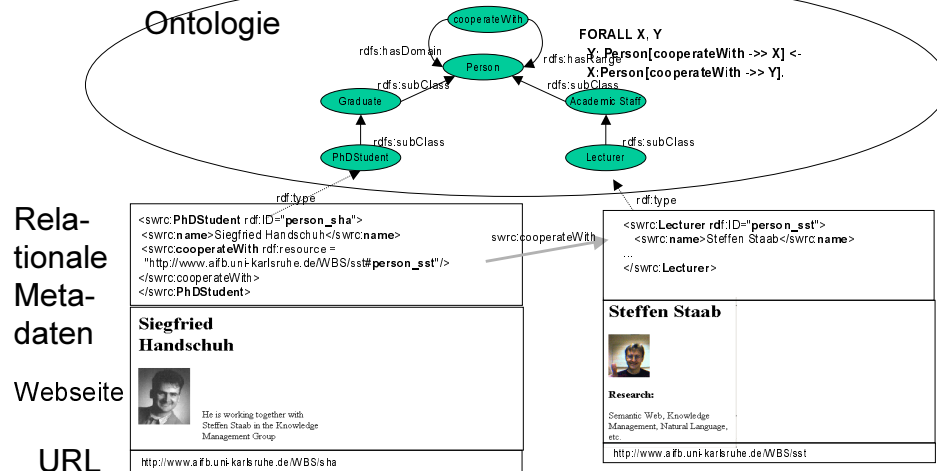
Wissensmetaprozess

Konzeption, Realisierung und Wartung

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## Knowledge Portals

## Ontologiebasierte Metadaten

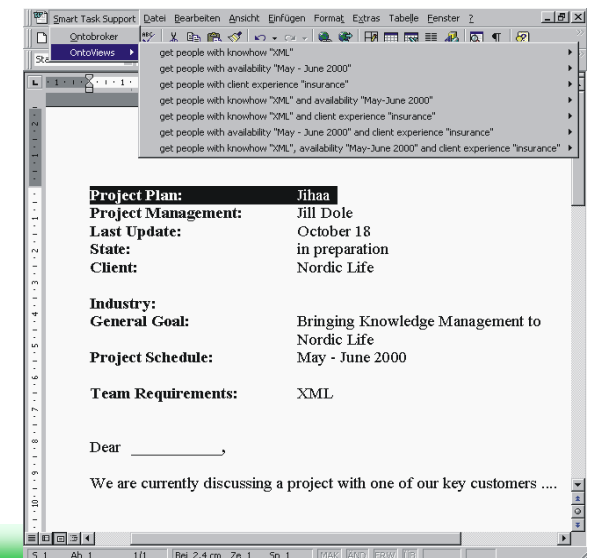


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## Knowledge Portals

## Wissensakquisitionswerkzeuge

- Templates
- Annotierungswerkzeug
- XML-Anbindung (→ M. Erdmann)



## OntoAnnotate



## Open Conceptual Hypermedia

- The Semantic Web is a *Web* – a collection of linked nodes.
- *People* will use it as well as *agents*, and for them, *navigation* of links is a key mechanism for exploring the space.

## Question

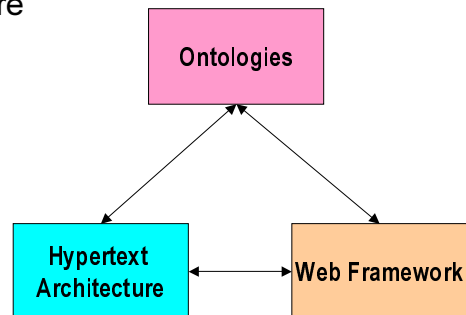
- Can we use *semantic metadata* to support the *construction* of our *hypertexts*...
- ...and if so, does it help?

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## Technologies for the Semantic Web

Three pieces needed for implementing the Semantic Web:

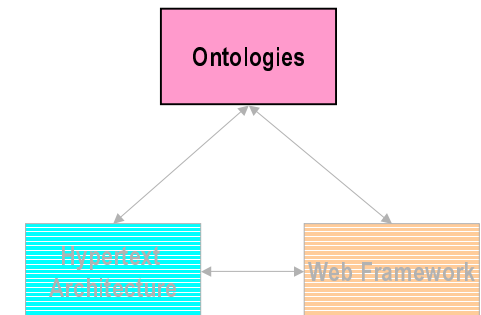
- Ontologies
- Hypertext Architecture
- Web Framework



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## Ontologies

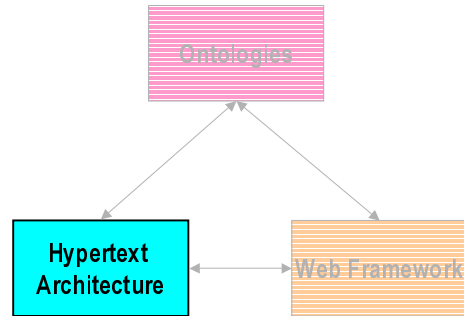
- The Semantic Web relies on the provision of *Semantics*.
- Representations and tools are thus required for the
  - *delivery*;
  - *construction*;
  - *maintenance*;
  - *management* of ontologies



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## Hypertext Architecture

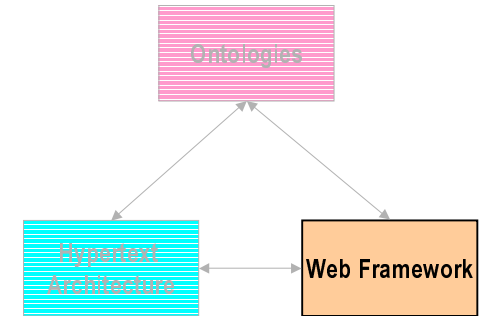
- The Semantic Web is a **Web**.
- Thus we need an underlying architecture supporting the notion of nodes and links.



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## Web Framework

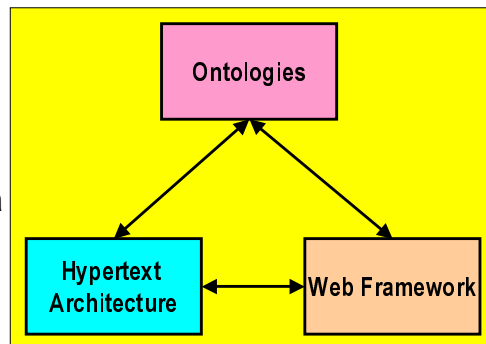
- A delivery mechanism that:
  - conforms to existing **standards**;
  - can **scale**



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## Historical Combinations

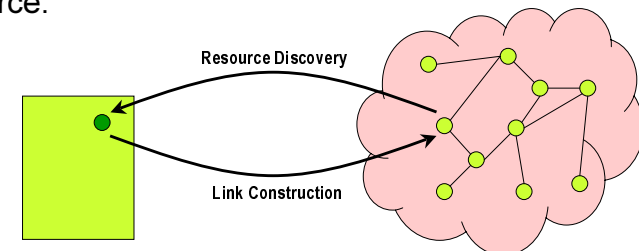
- Open Hypermedia Systems and Link Services.
  - DLS
  - XLink
- Ontology Services for document metadata.
  - DAML+OIL, RDFS
  - SHOE, On2Broker
- Conceptual Hypermedia
  - Nanard
  - Tudhope
- The Semantic Web?



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## COHSE Philosophy

- Metadata can provide a mechanism not only for the support of **resource discovery**, but also for the provision of **source anchors**.
- Annotation allows both linking **into** and **out of** a resource.



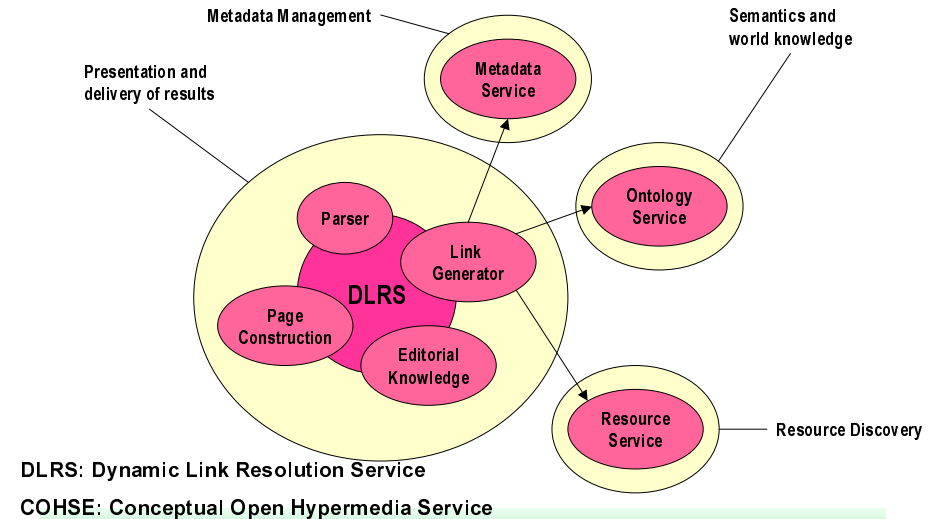
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## COHSE Prototype System

- A software agent that generates and presents links on behalf of both an **author** and a **reader**.
- Used at **browsing** time, provides just-in-time hypertext.
- Used at **authoring** time, supports the authoring task.
- **Link Creation**, not just **Resource Discovery**
- This is not a radical new departure, but is the bringing together of existing, reasonable well understood technology.
- It won't solve **all** the problems!

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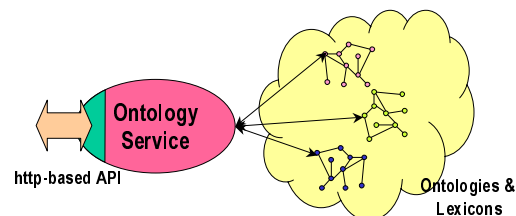
## COHSE Architecture



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## Ontology Service

- Provides access to ontologies represented using **OIL** (Ontology Inference Layer) and **DAML+OIL**.
- Simple http based interface provides a number of services such as traversal of the conceptual hierarchy and mappings to/from words or terms.



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## Ontology Service: DAML+OIL

- **OIL**: the Ontology Inference Layer.
- Draws on frame-based and logic-based languages.
- A friendly face with a well-defined semantics and reasoner.
- RDFS and XML-schema representations.
- Simple tools
  - OilEd
  - FaCT
- **DAML+OIL**
  - Less frame-like
  - Same expressivity

Description Logics:  
Formal Semantics &  
Reasoning Support

Frame-based Systems:  
Epistemological Modelling  
Primitives



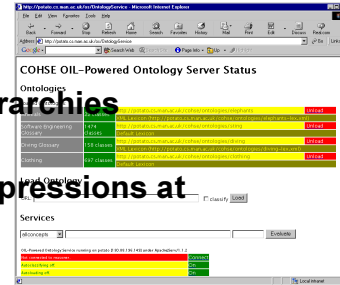
Web Languages:  
XML- and RDF-based  
syntax

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## Ontology Service



- Can use third-party (OIL) ontologies.
  - Increased open-ness
- More than just a thesaurus:
  - Complex concept expressions are possible in annotations and resource descriptions.
- Reasoner can assist in:
  - Ontology creation
    - **Organising concept hierarchies**
  - Ontology deployment
    - **Positioning complex expressions at read or author time**

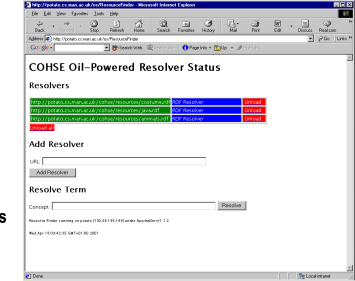
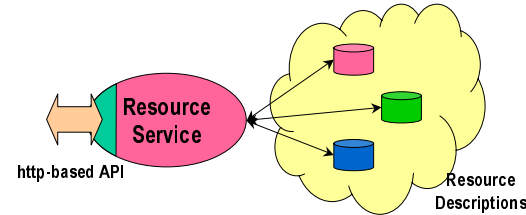


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## Resource Service



- Maps concepts to resources.
- Supports the activity of resource discovery, as already explored in projects such as SHOE or Ontobroker.
- Third-party resource descriptions.

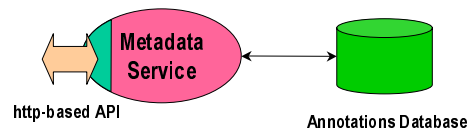


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## Metadata Service

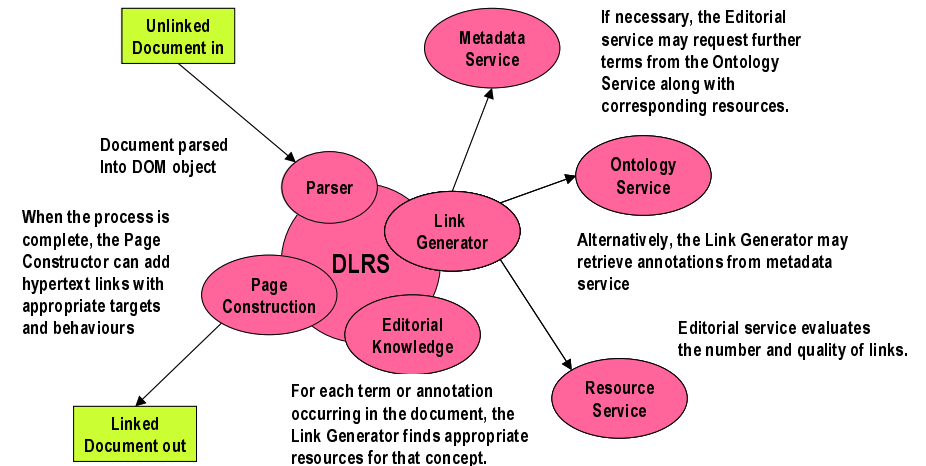


- An Annotation Service (cf. W3C's [Annotea](#)).
- Complimentary to the Resource Service.
- Allows the decoration of resources with metadata.
- As metadata is not embedded in the resources, allows the use of different **perspectives** producing different **hypertexts**.
- Third party annotation servers.



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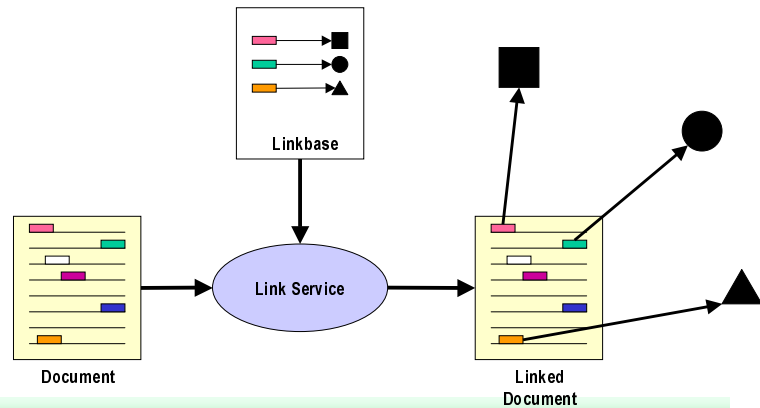
## COHSE In Action



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## Generic Links

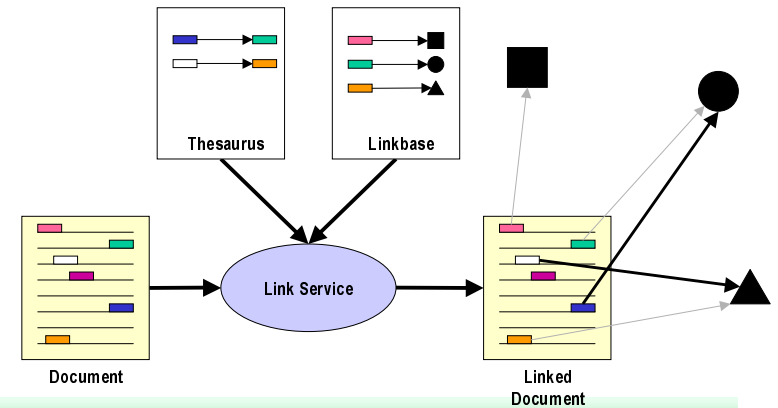
- Generic Links in Open Hypermedia are based on **words**.



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## Generic Links + Thesaurus

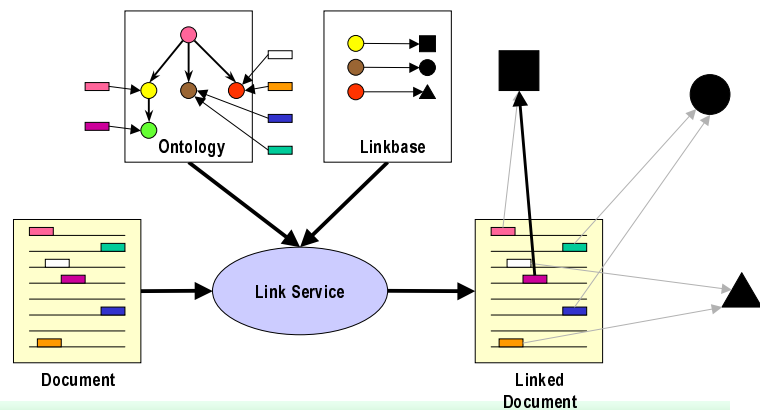
- A thesaurus can bridge gaps between **terms**.



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## Generic Links + Ontology

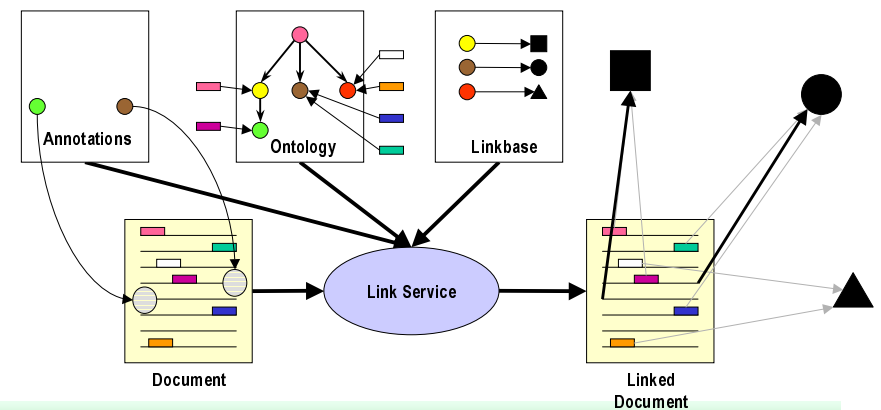
- An ontology can bridge gaps between **concepts**.



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## Annotation Links + Ontology

- Annotation allows **explicit** decoration of documents with **concepts**.



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## Supporting Change

- The use of an **open hypermedia architecture** helps to support change in the structure of the web.
- The use of an **ontology** helps to support change to the semantics of documents. In particular, **reasoning** can help us to organise and structure the ontology and guide our interactions with it.

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## Questions

- Where does the metadata come from?
- What about dynamic content?
- How can the editorial component best make use of the ontological services?
  - What's a good number of links?
- How do we present the discovered links?
  - Lists look like search results
  - Pruning and Ranking?
  - Expose or hide the ontology?

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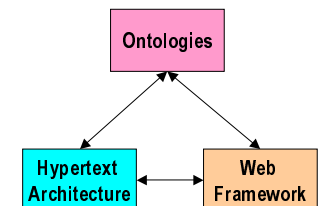
## Demonstrator and Evaluation

- Ontology Construction
- Document mark-up
- Evaluation
  - Does it help the authoring process?
  - Does it improve the reader's experience?

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<http://cohse.semanticweb.org>

- One view of (at least a subset of) the Semantic Web is as a collection of nodes and links that can be browsed by people.
- How best can we use semantic metadata to support the construction and navigation of those links?
- COHSE may not be the definitive architecture, but we believe that it provides the necessary components.
  - Ontologies/semantics
  - Hypertext architecture
  - Web delivery framework



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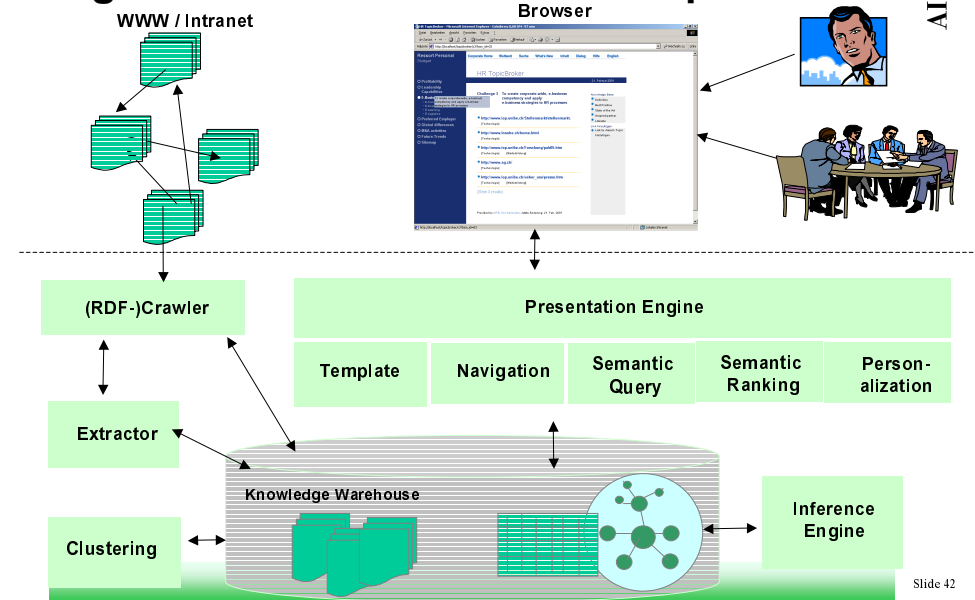
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- Dipl.-Inform. Yue Chen
- Dipl.-W.-Ing. Tobias Dietrich
- Dipl.-Inform. Michael Erdmann
- Thomas Erwin
- Andreas Frick

## Weitere relevante Techniken

- Ontologiebasiertes Clustern [JUCS 2001/2]
- Semantic Ranking [BNCOD 2001]
- Personalisierung [Studienarbeit, D. Oberle]
- Wrapper-Bau basierend auf Annotierung [Diplomarbeit, J. Klotzbücher]
- Proaktives Eingreifen [Knowledge-Based Systems 2000]

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## Allgemeine Architektur Wissensportal



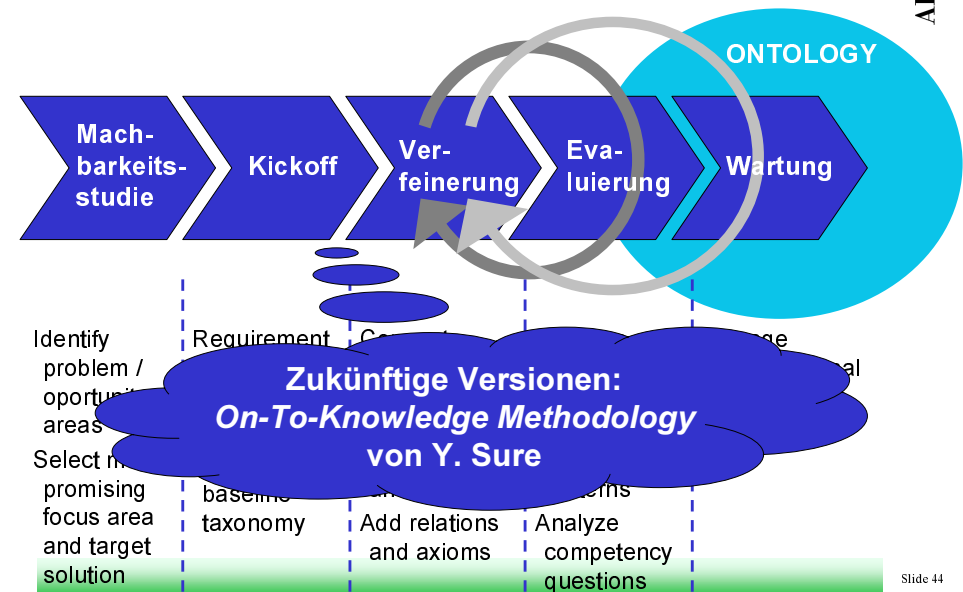
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## Realisierte Wissensportale

	Besonderheit
KA2 Portal	Community Web Portal
CHAR	Temporales Schlussfolgern
ProPer	Skill Management
Time2Research	Konfigurierbarkeit
Multi-Project-Management	Nicht-taxonomische Sichten
CustCare	Customer Care
AIFB Intranet	AIFB Intranet
BR Shop	Explizite Business Rules
HR Topic Broker	„Weiches“ Wissen

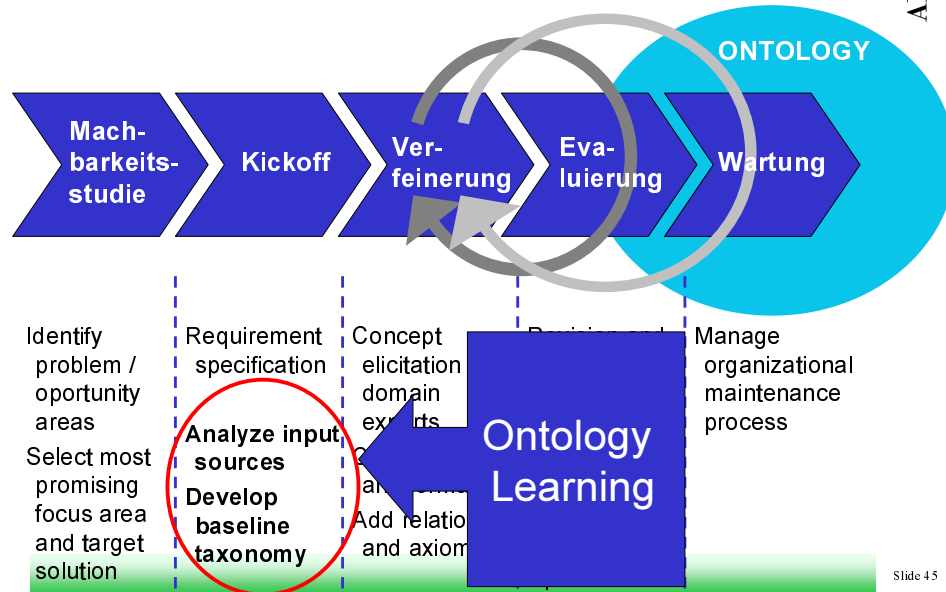
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## Wissensmetaprozess

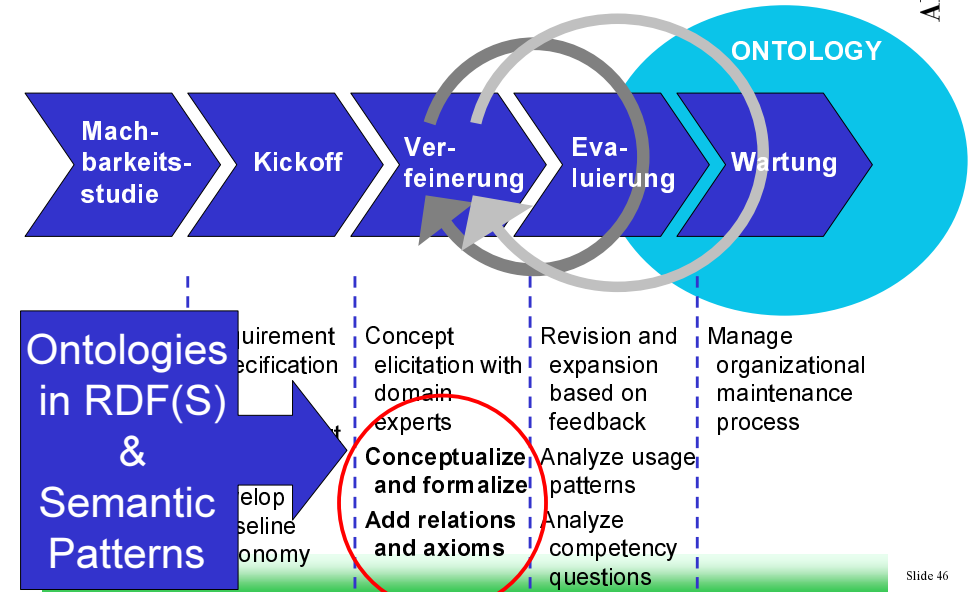


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## Wissensmetaprozess



## Wissensmetaprozess



## Ausblick

## Speziell

- Weitere Erfahrung sammeln mit Semantic Patterns
- Toolunterstützung für Semantic Patterns
- Interoperabilität (*WonderWeb*)
- DAML OntoAgents (Sprachverarbeitung und Annotierung)
- Multimediaannotierung

## Generell

- Ontologielernen (FET Proposal)
- Emergent Semantics (EU IST Proposal)
- Bootstrapping von Ontologiebasierten Systemen
- Wissensportale für E-Learning
- Kombination von „weichem“ und „hartem“ Wissen