

© Y. Sure, 2005

**Intelligente Systeme
im World Wide Web**

Anwendungen

Dr. York Sure
Institut AIFB, Universität Karlsruhe


AIFB

Slide 1

© Y. Sure, 2005

the foaf project (RDF)
see <http://www.foaf-project.org/>

The *Friend of a Friend* (FOAF) project is about creating a Web of machine-readable homepages describing people, the links between them and the things they create and do.



AIFB

Slide 3

© Y. Sure, 2005

Inhalt

- RDF – Friend of a Friend
- RDF Schema – Bibster
- OWL – Web Service Matching
- F-Logic – Halo Chemistry

AIFB

Slide 2

© Y. Sure, 2005

<http://www.ldodds.com/foaf/foaf-a-matic.html>

- FOAF-A-MATIC
 - <http://www.ldodds.com/foaf/foaf-a-matic.html>
 - Einfaches Javascript
 - Generieren von FOAF-Files
- FOAFNAUT
 - <http://foafnaut.org/>
- FoaF Explorer, usw. ...
 - <http://xml.mfd-consult.dk/foaf/explorer/>

AIFB

Slide 4

© Y. Sure, 2005

AIFB

FOAF File example

```

<rdf:RDF
  xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
  xmlns:foaf="http://xmlns.com/foaf/0.1/"
  xmlns:admin="http://webns.net/mvcb/">
<foaf:PersonalProfileDocument rdf:about="">
<foaf:maker rdf:nodeID="me"/>
<foaf:primaryTopic rdf:nodeID="me"/>
<admin:generatorAgent
  rdf:resource="http://www.ldodds.com/foaf/foaf-a-matic"/>
<admin:errorReportsTo rdf:resource="mailto:leigh@ldodds.com"/>
</foaf:PersonalProfileDocument>

```

Slide 5

© Y. Sure, 2005

AIFB

```

<foaf:phone rdf:resource="tel:+49-721-608-6592"/>
<foaf:workplaceHomepage rdf:resource="http://www.aifb.uni-
karlsruhe.de/WBS"/>
<foaf:workInfoHomepage rdf:resource="http://www.aifb.uni-
karlsruhe.de/WBS/ysu"/>
<foaf:knows>
<foaf:Person>
<foaf:name>Pascal Hitzler</foaf:name>
<foaf:mbox_sha1sum>ab5b33f1535f1e3460024c5cd25bd72bffb53
dbf</foaf:mbox_sha1sum></foaf:Person></foaf:knows></foaf:P
erson>
</rdf:RDF>

```

Slide 7

© Y. Sure, 2005

AIFB

```

<foaf:Person rdf:nodeID="me">
<foaf:name>York Sure</foaf:name>
<foaf:title>Dr.</foaf:title>
<foaf:givenname>York</foaf:givenname>
<foaf:family_name>Sure</foaf:family_name>
<foaf:mbox_sha1sum>c013b5c247e106e7092b1fce764
502052646e30d</foaf:mbox_sha1sum>
<foaf:homepage rdf:resource="http://www.aifb.uni-
karlsruhe.de/WBS/ysu"/>
<foaf:depiction rdf:resource="http://www.aifb.uni-
karlsruhe.de/WBS/ysu/images/me.jpg"/>

```

Slide 6

The image shows a foafnaut visualization in a Microsoft Internet Explorer browser window. The central node is DANBRI/HENDLER, which is connected to many other nodes representing people. The nodes are arranged in a circular pattern around the center. On the right side, there is a profile for DANBRI, which includes a photo and some contact information like 'Known by: 24'.

© Y. Sure, 2005

AIFB

Bibster (RDF + RDFS)
Sharing Bibliographic Metadata in a P2P Network
<http://bibster.semanticweb.org>


Slide 9

© Y. Sure, 2005

AIFB

1. Introduction: Scenario

- **Scenario:** Sharing of bibliographic metadata in a Peer-to-Peer network
 - Bibliographic metadata is created and maintained in a **decentralized** manner, centralized solution not applicable
 - Researchers are willing to share their data
 - Use of semantics is crucial in this setting
- The Bibster system allows to:
 - **Easily share** bibliographic data
 - Save work in finding this data
 - Avoid re-typing this data by hand



Slide 11

© Y. Sure, 2005

AIFB

Agenda

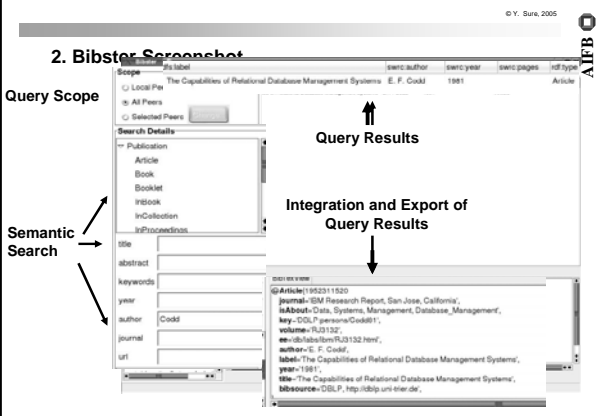
1. Introduction:
The Bibliographic Scenario
2. The Bibster System
System Architecture
Semantic Methods in Bibster
3. Evaluation

Slide 10

© Y. Sure, 2005

AIFB

2. Bibster Screenshot



The screenshot shows a web interface with a search form on the left and a results pane on the right. The search form includes fields for 'title', 'abstract', 'keywords', 'year', 'author', 'journal', and 'url'. The results pane displays a list of search results, with one result expanded to show its details. The interface is annotated with arrows and text:


- Query Scope:** Points to the search form fields.
- Semantic Search:** Points to the search form fields.
- Query Results:** Points to the search results list.
- Integration and Export of Query Results:** Points to the expanded result details.

Slide 12

© Y. Sure, 2005

2. Semantic Methods in Bibster

- Semantic representation and querying of **metadata**
 - Extraction and classification from e.g. BibTeX files
 - Semantic Web Research Community Ontology** and **ACM Topic hierarchy** as light-weight ontologies
- Peer selection** using semantic topologies
 - Scalability requires intelligent query routing
 - Semantic descriptions of peers' expertise to build semantic topologies as basis for peer selection
- Semantic **duplicate detection**
 - Highly redundant and inconsistent representation of bibliographic metadata
 - Semantic similarity measures to detect duplicates

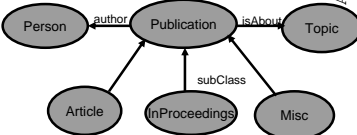


Slide 13

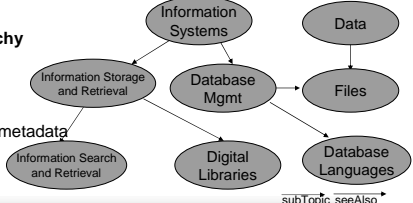
© Y. Sure, 2005

Semantic Representation of Metadata

SWRC as base ontology: models domain of research community



ACM Topic hierarchy
1287 topics from Computer Science Domain for classification of metadata (linked by hasSubtopic)

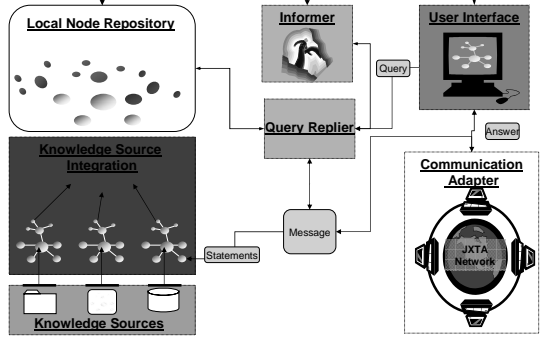


subTopic seeAlso

Slide 15

© Y. Sure, 2005

2. Bibster / SWAP System Architecture



Slide 14

© Y. Sure, 2005

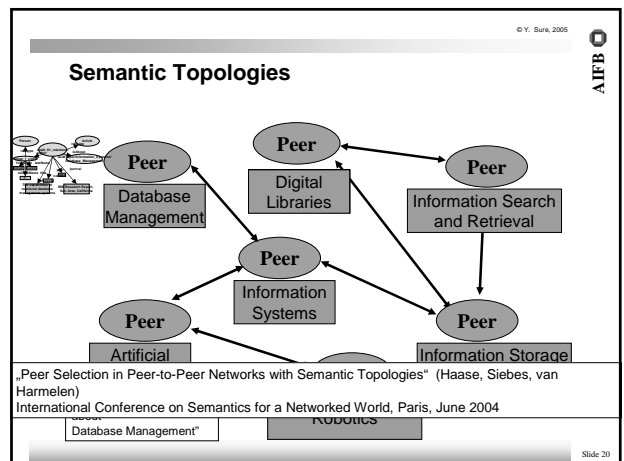
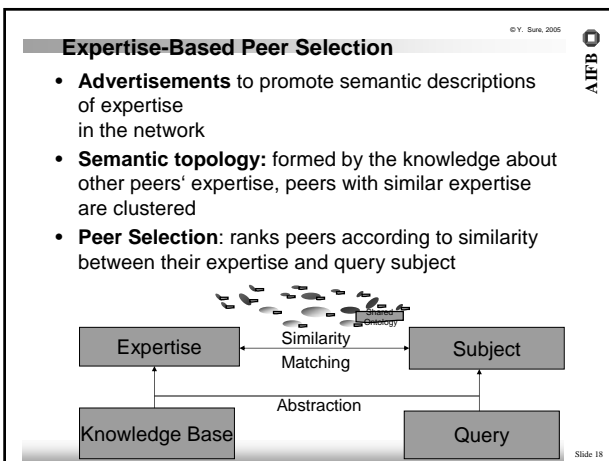
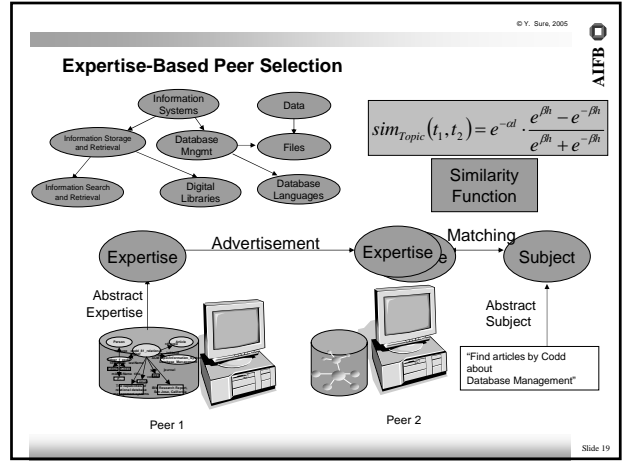
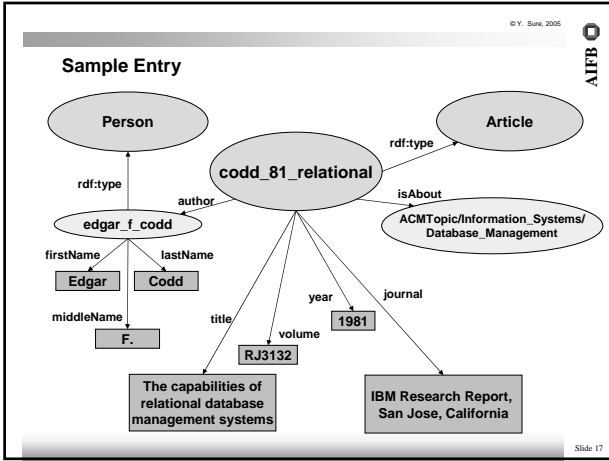
Sample BibTeX Entry

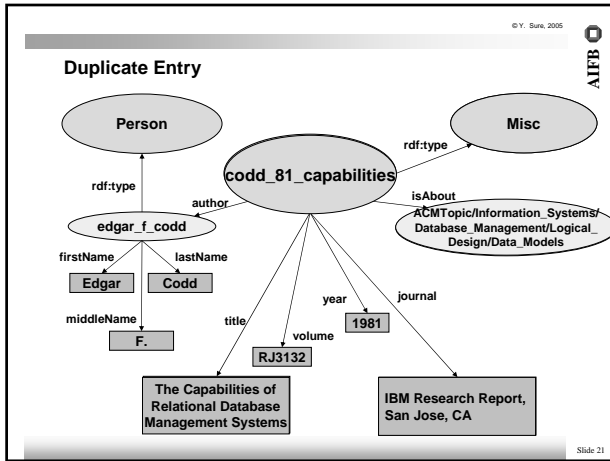
```

@ARTICLE{codd81relational,
  author = {Edgar F. Codd},
  title = {The capabilities of relational database management systems},
  journal = {IBM Research Report, San Jose, California},
  volume = {RJ3132},
  year = {1981}
}

```

Slide 16





- © Y. Sure, 2005
- 3. Evaluation**
- We arranged case studies with Bibster to
 - evaluated the scalability, functionality, and the performance of a semantics based Peer-to-Peer system
 - validated results from simulation experiments
 - How did we evaluate?
 - User queries, routing information etc. were logged for evaluation purposes
 - After the case studies we provided a user questionnaire to evaluate the usability of our system
 - Some findings:
 - Personalized recommendations outperform random selections
 - For more, see <http://bibster.semanticweb.org/>
- Slide 23

- © Y. Sure, 2005
- Semantic Duplicate Detection**
- Individual similarity functions
 - Syntactic: Levenshtein similarity for titles etc.
 - Graph Structure: Sequence of authors
 - Ontological Structure: ACM Topic hierarchy
 - Domain Knowledge: e.g. Type Misc often corresponds to Unknown
 - Aggregated similarity function:
 - e.g. weighted average
 - Duplicates: Entries with similarity above a specified threshold
 - Clusters of duplicate entries
 - Merging of entries based on heuristics
- Slide 22

- © Y. Sure, 2005
- 4. Conclusion**
- Fully implemented semantic P2P system for the bibliographic domain
 - Exploitation ontologies in all steps:
 - Importing and representing the data
 - Querying the data
 - Routing requests
 - Integrating heterogeneous results
 - Evaluation using simulation experiments and real-life case study
- Slide 24