Knowledge Portals – How HLT may help

WORKSHOP ON HUMAN LANGUAGE TECHNOLOGY AND KNOWLEDGE MANAGEMENT ACL'2001 Conference Toulouse, France July 6-7, 2001

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Agenda

- 1. Knowledge Portal
- 2. Knowledge Process
 - Semantic Annotation[★]
- 3. Knowledge Meta Process for Ontologies
 - Ontology Learning *
- 4. Outlook

Knowledge Portal



Portals are *websites* that offer structured access to large volumes of unstructured *information* in the *Internet* or the intranet and possibly offer additional services.

Knowledge Portals are portals that focus on the *generation*, *acquisition*, *distribution* and the *management* of *knowledge* in order to offer their users *high-quality access* to and interaction possibilities with the contents of the portal.





Ontologie as foundation



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

T. Davenport, Working Knowledge 6

Example Ontology (similar to SWRC)



[Wirtschaftsinformatik 2001/2]

Ontologies for Communication between Humans and Machines



The semiotic triangle

Odgen & Richards, in the tradition of Frege, Saussure and Peirce AIFB

Knowledge Portal – Knowledge Process – Knowledge Meta Process – Outlook [JUCS 2001/2, K-CAP 2001]

General Architecture Knowledge Portal





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Knowledge Acquisition

- Templates
- Annotation Tool
- XML-Linkage

 (→ Erdmann & Studer,
 DKE 2001)

Project Plan:	Jihaa
Project Management:	Jill Dole
Last Update:	October 18
State:	in preparation
Client:	Nordic Life
Industry:	
General Goal:	Bringing Knowledge Management to
	Nordic Life
Project Schedule:	May - June 2000
Team Requirements:	XML
Dear,	
We are currently discussing	a project with one of our key customers



Requirements for Annotation

- Consistency: Semantic structures should adhere to
 a given ontology
- Proper Reference: KA2 three identiers for DFe
- Avoid Redundancy: Decentralized knowledge provisioning
- Relational Metadata
- Maintenance: Knowledge markup needs to be maintained
- Ease of use
- Efficiency of annotation

Ont-O-Mat Architecture



[WWW9 Conference]

Presentation Engine

- Hyperlinks refer to "hidden" semantic queries
- Materialize the ontology and KB as hypertext (M. Erdmanns Yahoo-a-lizer; (RST))
- Semantic Ranking [BNCOD 2001]
 - ⇒ Search for Person with Knowledge Management-KnowHow should be anwered with Generalist in KM topics first and Specialist in Knowledge Discovery second
- Personalization
 - \Rightarrow Semantic Bookmarks store queries instead of web pages

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Implemented Knowledge Portals

Anwendung

KA2 Portal CHAR

ProPer

Time2Research

Multi-Project-Management HR Topic Broker

Immediate Future

OntoWeb Portal

Besonderheit

Community Web Portal Temporal Reasoning Skill Management Personalization Non-taxonomic view "Soft" Knowledge

EU Thematic Network

[IEEE Intelligent Systems 2001, 1] Knowledge Process & Knowledge Meta Process



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ONTOLOGY



ONTOLOGY

Wartung

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Machbarkeitsstudie

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luierung

[ETAIJ on Semantic Web, 2001]

Ontologies uirement Concept Manage Revision and elicitation with expansion organizational in RDF(S) domain based on maintenance experts feedback process & Conceptualize Analyze usage and formalize¹ patterns Semantic elop Add relations Analyze seline Patterns competency and axioms mantic net questions

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[IEEE Intelligent Systems 2001, 2] **Knowledge Meta Process for Ontologies**

Feasi-**Refine-**Main-**Kickoff** Evaluation bility ment tenance **Study** Requirement Concept Identify Manage specification problem / elicitation organizational maintenance oportunity domain rts areas process ex^r Ontology Analyze input Select most sources Learning promising Develop focus area Add relatio baseline and target and axiom semantic net 26 solution

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ONTOLOGY

Def.: Abstract Ontology

An abstract ontology $O := (C, R, H^{C}, \sigma, A)$,

- two disjoint sets C and R, the elements of which are called **concepts** and **relations**
- the concept hierarchy $H^C \subseteq C \times C$
- the **signature** σ : R \rightarrow C x C, representing **non-taxonomic** relations between concepts
- a set of axioms A



A Lexicon for an abstract ontology L := (L^C , L^R , F, G),



- For all I in L^C:
$$\begin{split} F(I) &= \{c \in C \mid (I,c) \in F\} \text{ und } \\ F^{-1}(c) &= \{I \in L^C \mid (I,c) \in F\} \\ (G \text{ and } G^{-1} \text{ is defined analogously}) \end{split}$$

Example

Abstract Ontology: C = { c_1, c_2, c_3 }, R = { r_1 }, H^C(c_2, c_1), $r_1(c_2, c_3)$, Lexikon: L^C = {Person, Employee, Organisation}, L^R = {worksAt} F(Person) = c_1 , F(Employee) = c_2 , F(Organisation) = c_3 , G(worksAt) = r_1



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Reuse of existing Ontologies via Import / Merging [Stumme, Maedche, IJCAI'01]

Generation and Maintenance of new ontologies

Architecture







Outlook

In particular

- DAML OntoAgents (HLT and Annotation)
- Multimedia annotation
- Improving Ontology Learning

General

- Knowledge Portals for E-Learning
- Combination of "soft" (=document) and "rigid" (=ontology) knowledge

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Thanks for your attention!