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SCHOOL OF NUCLEAR KNOWLEDGE MANAGEMENT

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Knowledge representation methods and their application

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Intention of the Practical Session

- Providing Information on Knowledge Representation Methods and Tools
- Modeling a domain of common knowledge
  - Methodology
- Representing the model by a Concept Map and an Ontology
  - Tools
- Utilization of Knowledge Representations

For the exercise, no previous knowledge is needed!

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Materials

- Wikipedia (http://en.wikipedia.org): Look for
  - „Knowledge Representation“
  - „Concept Map“
  - „Topic Map“
  - „Ontology“
  - „RDF“, „OWL“, „SPARQL“
- Concept Maps:
  - IHMC - Site (http://cmap.ihmc.us/)
    - Free download, Documentation

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- Ontology Development with Protégé (http://protege.stanford.edu/):
  - Documentation: in particular http://protege.stanford.edu/publications/ontology_development/ontology101-noy-mcguinness.html
  - Free download
- SPARQL (http://www.w3.org/TR/rdf-sparql-query/)
  - A query language for RDF

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Knowledge Representation Methods and their Application

Some Methods to Represent Knowledge

- Dossiers
  - Mainly textual, with links in the text to important documents etc.
  - Little flexibility, difficult to keep up to date

    → promising development: Wiki (e.g. the Free Encyclopedia http://www.wikipedia.org) : "dynamic" collaboration on web documents
- "Classical" Web Sites
  - High maintenance efforts

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- "Knowledge Representation" in a more formal sense
  - Method: Conceptualization of a Knowledge Domain (Model)
    - Collection of relevant facts and objects ("concepts") in the domain
    - Characterization of the concepts by its properties ("attributes")
    - Description of the relation between concepts ("relations")
    - Assignment of individuals ("instances") to concepts
  - Knowledge Nets (Topic Maps, Concept Maps, Ontologies, Semantic Nets …)
    - Systematic Approach
    - (semi)formalized: may be understood by machines
      - Inferences may be drawn (queries)
      - Consistency checks
    - Controlled Vocabulary defined by experts
    - Visualization for ease of navigation

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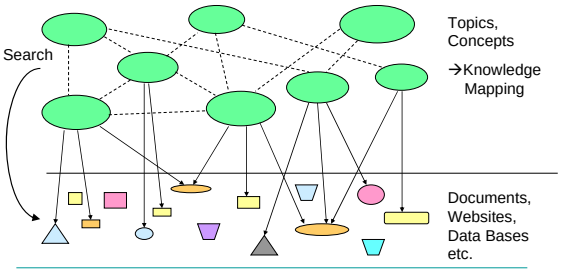
Enhancing Information Retrieval



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A Tool Selection

- Mind Maps
  - Various free and commercial tools
- Concept Map
  - Developed by Institute for Human and Machine Cognition (IHMC)
- Ontology Development
  - Protégé
  - SWOOP

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Knowledge Representation Methods and their Application

- Semantic Miner (commercial)
  - Developed by Ontoprise
  - Pilot project on development of a “Containment”-Ontology
    - 2-days Workshop with 4 field and 3 KM experts: first draft
    - Refined by other experts

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