



Ontology Engineering Supporting Industrial Symbiosis

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Industrial Symbiosis Requirements

Represent the knowledge for:



Ontology Definition

Explicitly Defined Concepts, Properties etc. Abstract Model and Simplified View of some Phenomenon

Formal, explicit specification of a shared conceptualisation

[Gruber, 1993]

Commonly accepted understanding/knowledge

Machine Readable



Gruber, T.R. 1993, "A translation approach to portable ontology specifications", *Knowledge acquisition,* vol. 5, no. 2, pp. 199-220.



Our Approach

- Our approach was to automate the process
- To achieve this:
 - We need to mimic the way practitioners work
 - Emulate two fundamental aspects that made practitioners essential to the process
 - Knowledge
 - Reasoning





Knowledge

- Different people have expertise in different areas
- Knowledge is being accumulated
- Some knowledge is easily described (explicit)
- Other is hard to put on paper (tacit) and is the most challenging part





Reasoning

- Simply having the knowledge is not enough
- To enable reasoning we need:
 - Knowledge in a format that can be processed
 - A reasoning mechanism in the form of a mathematical algorithm that manipulates the available knowledge and mimics the manual process





The Solution

- Ontology is used for knowledge representation
- A semantic algorithm has been devised for the reasoning and the potential symbiotic synergies
 - This algorithm uses the knowledge modelled in the ontology (tacit) and the knowledge provided by users of the platform
 - Identifies and ranks potential symbiotic synergies





The Solution - Ontology



eSymbiosis Ontology







Registration (1/3)





Registration (2/3)







Registration (3/3)







Semantic Matching







Semantic Matching (technology relevance)



• Distance Measurement Result: 2.5 Dissimilarity → 36% similarity



Semantic Matching (property similarity)



Matching Industry A against Industry B Based on Vector Space Modelling:



Thank you!











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