

# Rethinking the Use of Ontologies in Learning

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## Overview

- Motivation
- Ontologies from a computer science and activity  
theoretical perspective
- Ontologies and knowledge creation
- Pedagogical scenarios and technical requirements

## Motivation & Guiding Question

### Motivation

Work and learning in the knowledge society requires ongoing collaborative knowledge creation.

Ontologies play a crucial role in the explication and use of collective knowledge.

**But**, the potential of ontologies to foster processes of knowledge creation has rarely been explored.

### Guiding Question

How to utilize ontologies and respective technologies to support and trigger processes of collaborative knowledge creation?

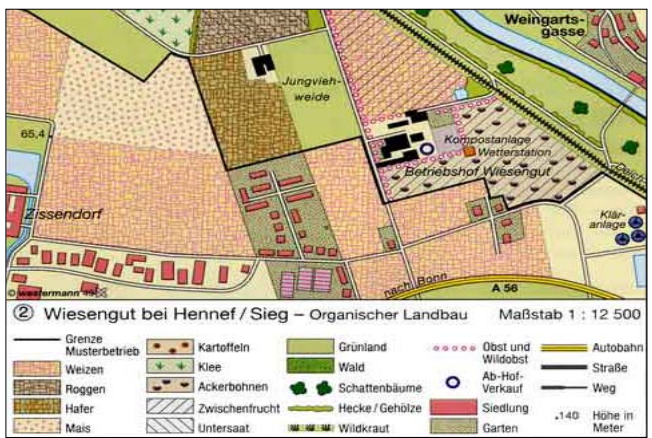
## Ontologies in Computer-Science

*“An ontology is a formal explicit specification of a shared conceptualization for a domain of interest.”* (Gruber, 1993)

An ontology includes:

- A vocabulary of terms,
- Some specifications of their meaning,
- An indication of how the concepts are related, i.e. a structure of the domain,
- A meta-model entailing the underlying rationale of the ontology.

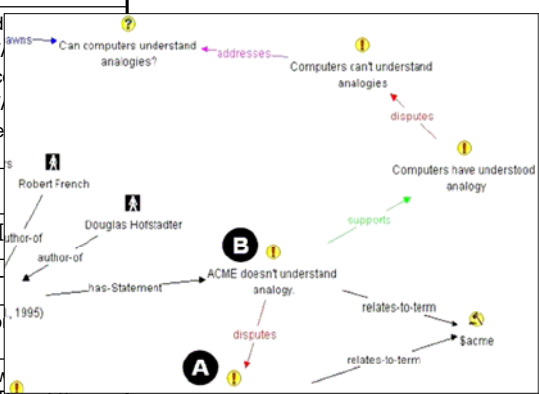
# Pupils Work with Domain Specific Maps in Geography



Source: Diercke Weltatlas.

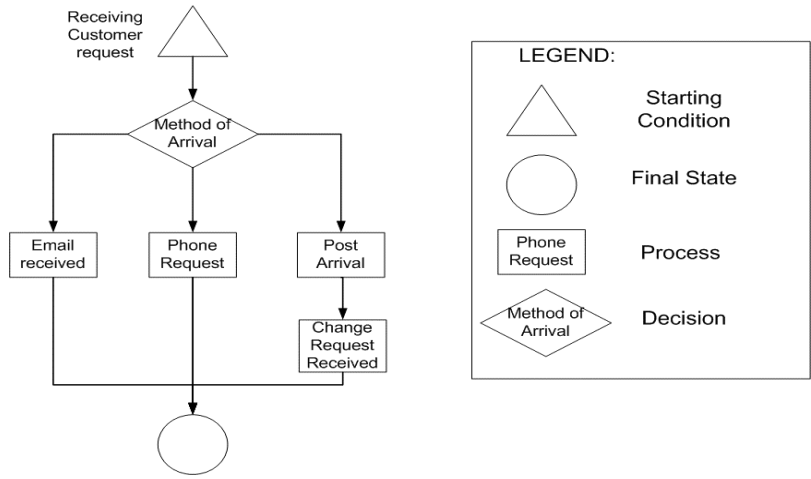
# Students Analyse a Scientific Debate and Classify the Statements

Concept	Attributes	Typical relations
Statement	Text	{supports, d [Statement/ {cohere, inc [Statement/ relates-to-te Term]
Question	Text	
Issue	Text	Spawns ->
Perspective	Text	Addresses
Argument	Premises, Conclusion	{same as fo
School-of-Thought	Postulates, Members	Competes-v [School-of-Thought]

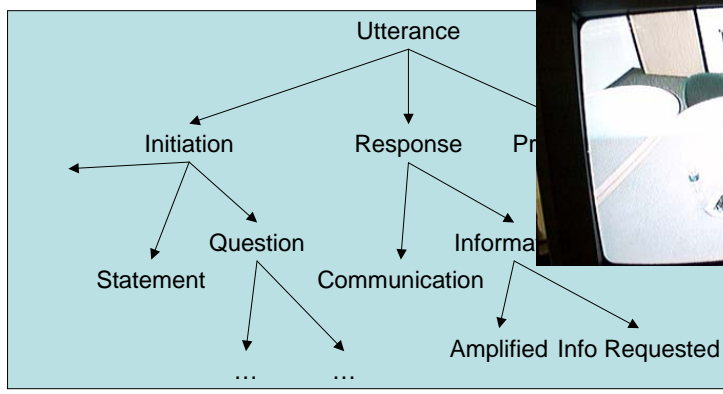


Excerpt of the argumentative ontology (Benn et al., 2005)

# Project Members Model a Business-Process



# Students Develop a Coding Scheme for Analysing Dialogues



Excerpt of the „Move Coding Schema“ for coding dialogues (Carletta et al., 1997)

## Activity Theory and Ontologies

### **Ontologies are mediating artefacts.**

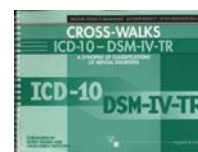
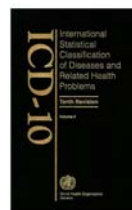
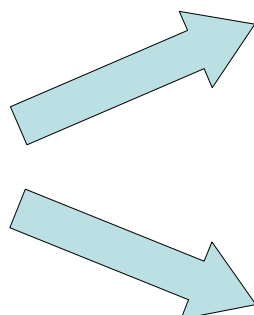
- ⇒ Ontologies are not neutral to the activities performed.
- ⇒ Ontologies are the result of a development process, they have a history.
- ⇒ Ontologies reflect the underlying values and epistemic beliefs of the respective community.
- ⇒ Ontologies can become the object of activity, often resulting in far reaching changes.

## Understanding and Applying Domain Specific Ontologies

### **„Learning Tasks“**

- Getting familiar with the ontologies relevant to a community.
- Learning to select and apply the respective ontologies as tools.
- Understanding the underlying rationale and history of an ontology.

## Psychiatric Classification Systems and Changing Rationales

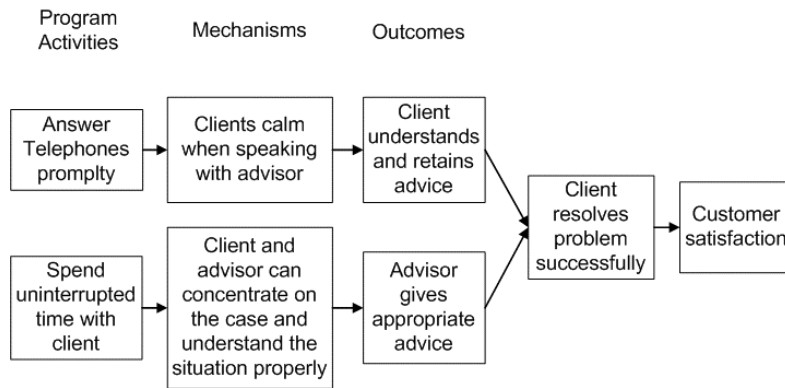


## Creating and Modifying Ontologies

### „Learning Tasks“

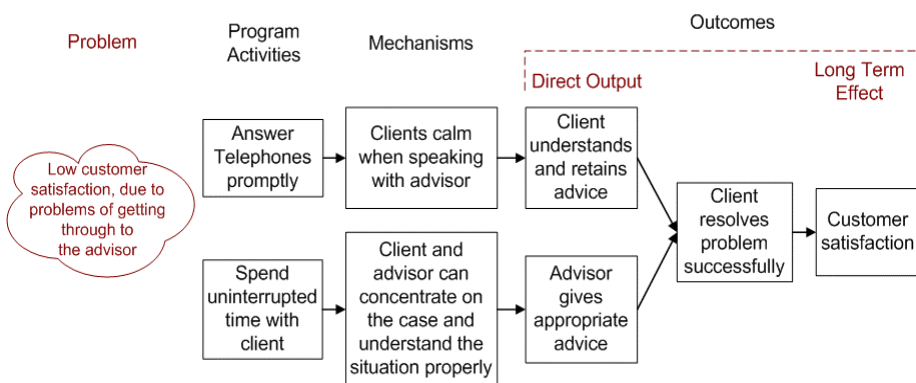
- Understanding the provisional character of ontologies.
- Seeing the need for adapting ontologies when practices change.
- Learning to develop and negotiate shared conceptualizations.
- Solving cognitive conflicts and unraveling misunderstandings.

## Basic Program Logic Model Based on Textbook Instructions



A program model of a telephone advice program (Rogers, 2000)

## Extended Program Logic Model



## Challenging and Reflecting the Underlying Rationale

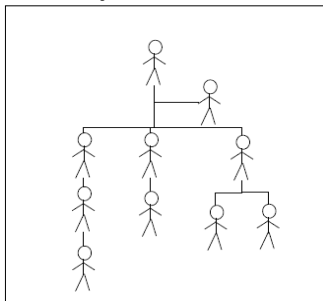
### „Learning Tasks“

- Unraveling conflicts and contradictions between multiple ontologies and/or practices.
- Understanding the underlying rationale of an ontology.
- Handling multiple ontologies and valuing diversity.
- Developing new perspectives and triangulating perspectives.

## Multiple Representations of an Organisation

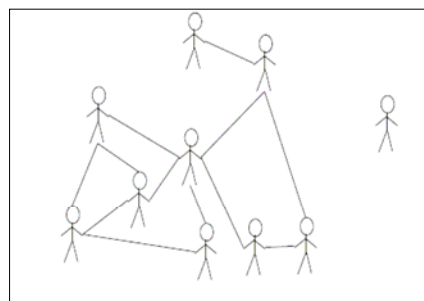
### Organigram

- Chief,
- Organisational Unit
- Project Team



### Sociogram

- Star,
- Clique,
- Outsider



## Scenarios of Ontology-Based Collaborative Knowledge Creation

- **Using existing ontologies to carry out an activity** (e.g. classifying arguments)
- **Using ontologies to organize or annotate shared artefacts** (e.g. organizing field data)
- **Collaborative ontology development as part of an overarching task** (e.g. developing coding schemes)
- **Collaborative inquiry based on multiple ontologies** (e.g. using multiple models to analyse a complex phenomenon)
- **Ontologies as meta-cognitive tools** (e.g. using argumentative schemes to scaffold discussions)

## Requirements for „Ontological Technologies“ in Learning

- Easy Retrieval of Ontologies
- Intuitive and easy-to-use tools for ontology creation and manipulation
- Integrative use and creation of ontologies
- Support for evaluation of ontologies
- Semi-automatic ontology evolution and annotation of media content
- Supporting dynamic and multiple classification

# Question? and Comments!

## References

- Benn, N., Buckingham Shum, S., Domingue, J. (2005). *Integrating scholarly argumentation, texts and community: towards an ontology and services*. Technical report, kmi-05-5.
- Carletta, J. C., Isard, A., Isard, S., Kowtko, J., Doherty-Sneddon, G., & Anderson, A. (1997). The reliability of a dialogue structure coding Scheme. *Computational Linguistics*, 23(1), 13-31.
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