




## WG 142 ONTOLOGY




Environment Observation Conferences

Herbert Schentz

Including USE CASES from:  
Integrated Assessment Models  
&  
environmental observation

Thomas Dirnböck



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### Overview

- **Definition**
- Examples
- Why Ontologies?
- Common Ontology for semantic Dataintegration
- Establishing Ontologies
- Invitation for the Kick Off

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### Definition

Part of the definition within Wikipedia


[http://en.wikipedia.org/wiki/Ontology\\_%28computer\\_science%29](http://en.wikipedia.org/wiki/Ontology_%28computer_science%29)

... a **formal logical ontology** is specified as consisting of the following logical elements: **concepts** (classes, objects, or categories) with their **characteristics** (attributes, slots, functions, roles, or properties) and **relations** (generalization and specialization, functions) restrained by logical **axioms** (assertions) and exemplified by instances of classes and specific properties....

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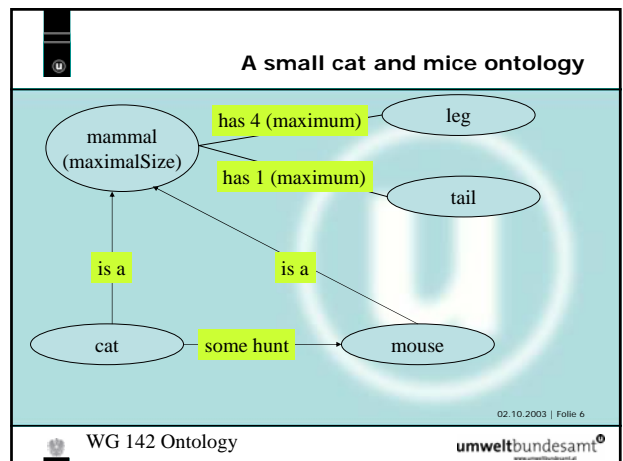
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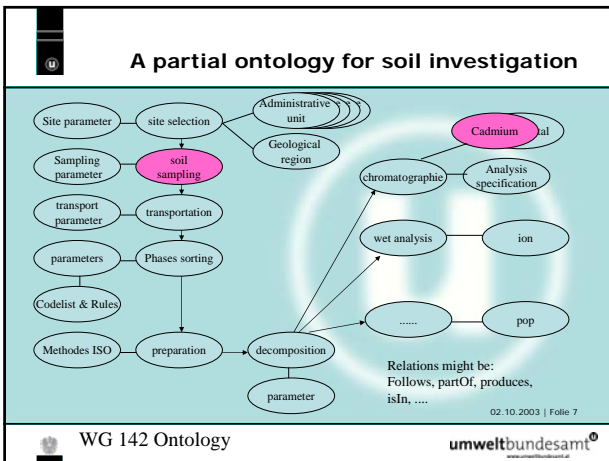
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### Consequence

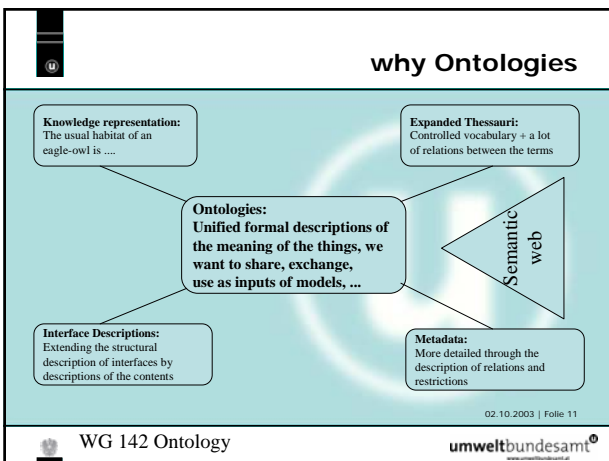
You all have produced, worked with, needed, described, read, ... ontologies without knowing that those were ontologies.

So what is so exciting about ontologies ?

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- ### Formal languages
- There are formal, human and machine readable languages to notify ontologies:
    1. The class model of UML (not so well machine readable)
    2. RDF / RDFs (Resource description File – W3C Standard)
    3. OWL (Web Ontology language – W3C Standard)
- We can exchange, share and harmonize ontologies !**
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## Common Ontologies for semantic Dataintegration

Common Ontology is the key for data sharing and data integration

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## Why models?

- Models combine knowledge from various disciplines in an analytical framework
- Assess the socio-economic and environmental consequences of human activities
- Derive „If-Then“ futures by implementing key processes – Scenarios
- Inform decision makers about consequences and options

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## Integrated Assessment (IA) Models and Scenarios – some examples

IA Models	Scenarios
<ul style="list-style-type: none"> <li>• Environment-Energy Sector               <ul style="list-style-type: none"> <li>• RAINS (IIASA SO2, NOx, NH3 Emission und Effekte)</li> <li>• IPCC multi model approach (IMAGE, AIM, ASF, WARRIA, MESSAGE, MiniCAM, ...)</li> </ul> </li> <li>• Environment-Economy Sector               <ul style="list-style-type: none"> <li>• GTAP (Global Trade Analysis)</li> <li>• WorldScan (e.g. policies for implementing the Kyoto protocol)</li> </ul> </li> <li>• Sustainable development               <ul style="list-style-type: none"> <li>• WORLD 3 („Limits to growth“ and „Beyond the limits“)</li> <li>• TARGETS (Tool to assess regional and global environmental and health targets for sustainability)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• ECN (1995) Energy scenarios for a changing Europe</li> <li>• CPB (1997) Economy and physical environment)</li> <li>• OECD (1997) The world in 2020: towards a new global age</li> <li>• IPCC (2000) SRES Emission Scenarios</li> <li>• VISIONS 4. EU Framework Program</li> <li>• Millennium Ecosystem Assessment (1998-2005) Ecosystem services and human well being</li> </ul>

Source: „Cloudy cristal balls“ report EEA

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ECN – Energy Research Centre of the Netherlands  
CPB – Dutch Central Planning Bureau umweltbundesamt®

## Advantages of IA and needs from environmental observation

- Advantages of IA
  - Reveals consequences of and options for policy
  - Reveals interactions between different environmental issues and the society
  - Rises public awareness of complex and long-term, global environmental problems
- Needs from environmental observation
  - Need for integration of different scales
  - Need for integration of data
  - Need for integration of knowledge
  - Need for evaluation and validation

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## Integration of data and models

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## Integration of knowledge


• The reliability of integrated assessments is based on the use of multidisciplinary methods and the involvement of non-scientists

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## How can we get to a common ontology

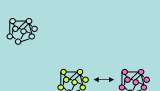
- It is impossible to establish one common ontology for ecology in one step.
- It is possible to establish a commonly agreed core ontology which can be kept stable.
- It is possible to build domain ontologies (species lists, meteorological ontology, air measurement ontology, ...) which are based on the core ontology.
- Ontologies must always be extensible . (Science never stops ! ... ) In .OWL e.g. this can be done a little bit more easily than in an XML Schema (XSD).

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## Ontologies coming together


Establish local Ontologies



Map between Ontologies



Merge Ontologies



Establish standards

SUMO (IEEE)  
DOLCE  
SICoP ?

Bring in standards

ISO 19115  
EML  
ABCD

**Commit to Ontologies**

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## Ontologies are quite new

- So the working group just has to be brought together
- and has to cooperate with ... Other WG like „data model“
- You are invited to come to the stand at the market place.

Or send an e-mail to: [herbert.schentz@umweltbundesamt.at](mailto:herbert.schentz@umweltbundesamt.at)



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