

**OASIS**  
**ONTOLOGIE**

Quality of Life for the Elderly

# OASIS Ontological Framework





# Ontologies play a central role for OASIS

- What is an ontology?
- How do you build good ontologies?
- Challenges for using ontologies
- The OASIS perspective
  - The Common Ontological Framework
  - Hyper-Ontology
  - Modularity and Re-use



# What is an ontology for? Representing the World

“a red ball”



<http://squeegie.org/index.php>



# What is an ontology for? Representing the World

?x. red(x)?ball(x)

- ?x. Rx ? Bx
- ?x. R : Bx
- ?x. B : Rx

*“the logical level”*  
+ structuring devices: typing, etc.





# What is an ontology for? Representing the World

- 'redness'
- 'ballness'

*are  
fundamentally  
different!*

*“the ontological level”*

N. Guarino 1994. The Ontological Level. In R. Casati, B. Smith and G. White (ed.), *Philosophy and the Cognitive Science*. Hölder-Pichler-Tempsky, Vienna.



<http://squeegie.org/index.php>



## The Ontological Level

- defining the distinct kinds of entities that need to be distinguished
- identifying their necessary properties
- formalising those properties



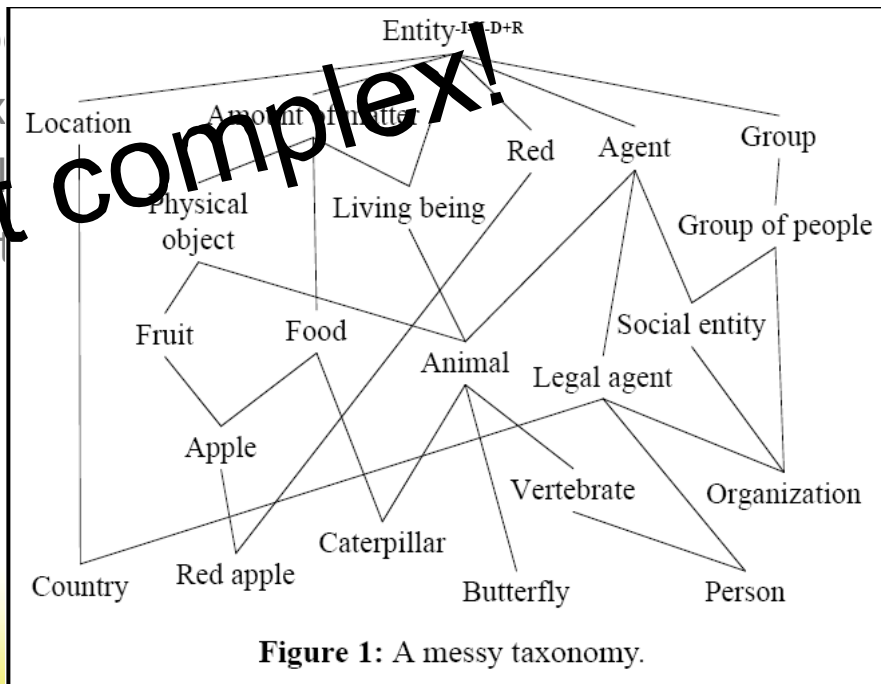
- a sounder, more robust modelling of the world
- to support more sophisticated services with greater reliability and flexibility



# Building an Ontology

- defining classes in the ontology
- arranging the classes in a taxonomy
- defining slots and allowed values
- filling in the values of slots with

**this can get complex!**



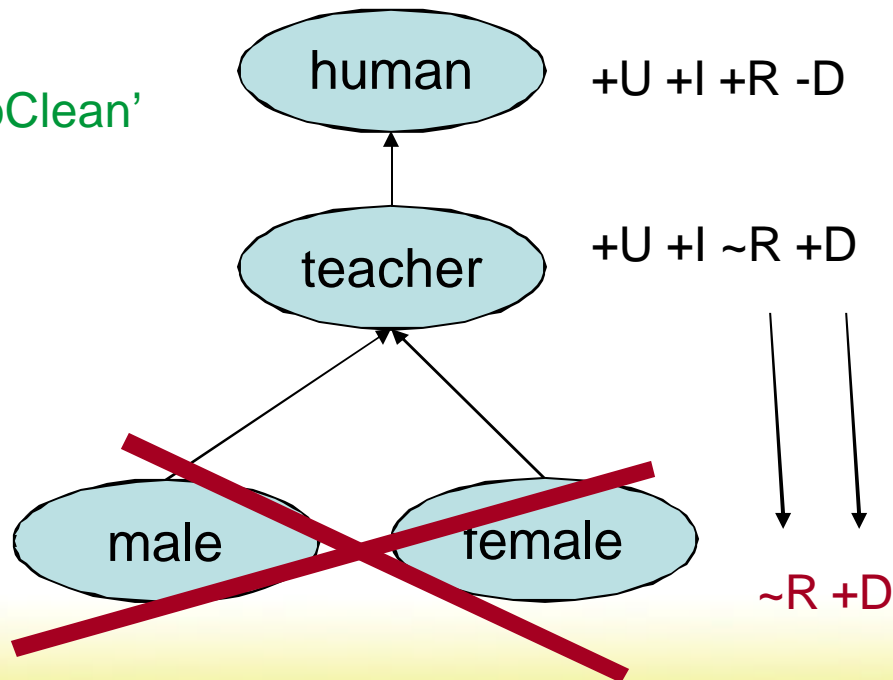


# Need Principles and Guidelines for Ontology Design

Guarino / Welty: 'OntoClean'

metaprinciples

- rigidity
- dependence



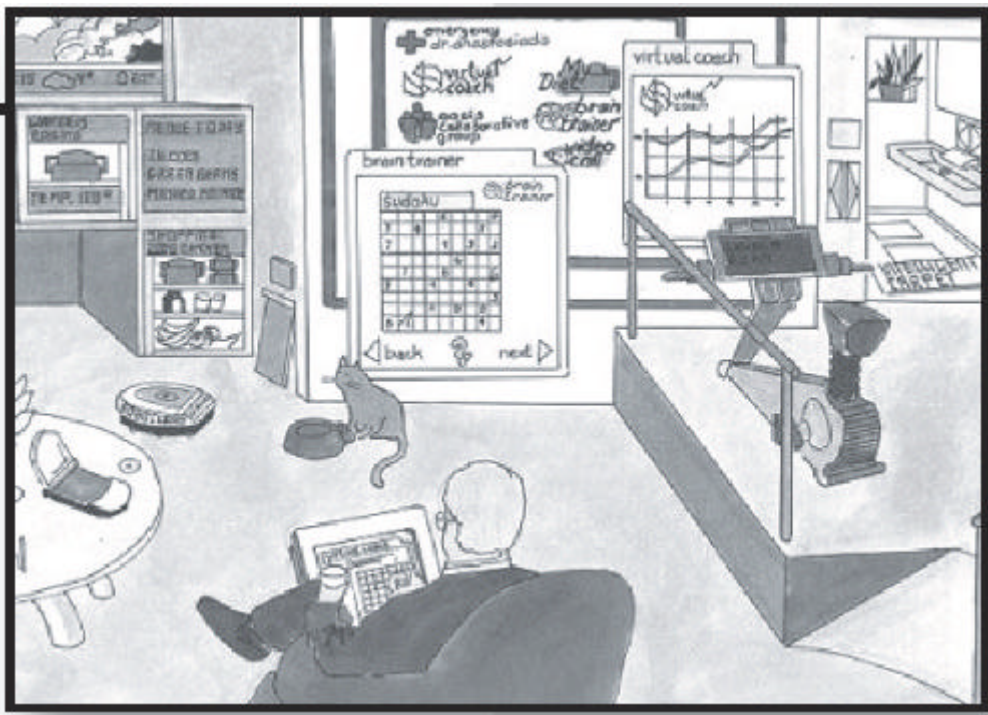


## For scalable ontological solutions...

it is necessary to design ontologies according to sound principles of ontological engineering *and* to achieve a far greater **degree of modularity and re-use** in ontology design than has been possible hitherto



# Modularity



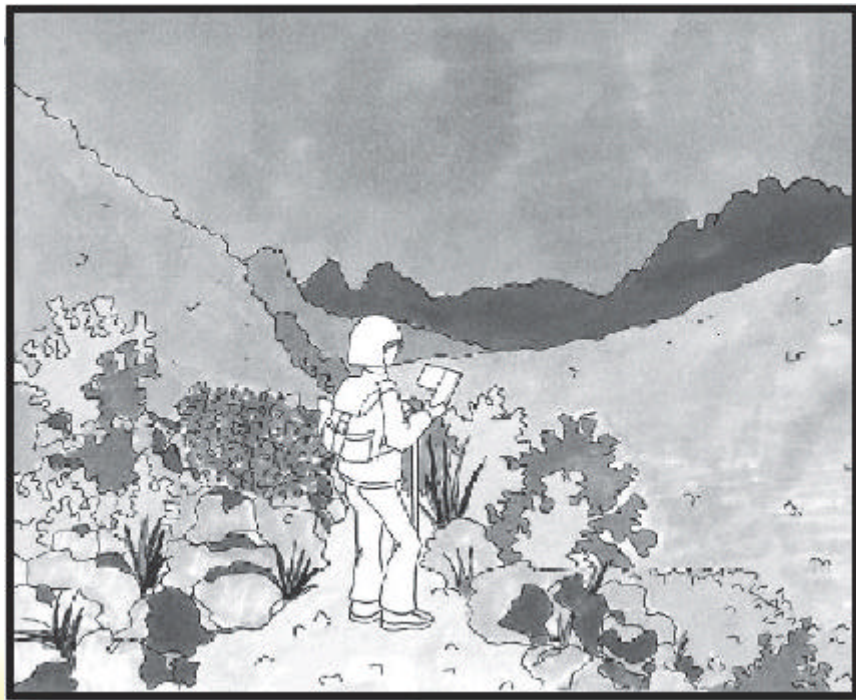
One of the OASIS  
use cases: **assisted  
living environment**

what sources of  
information need to  
be combined here?

- health
- position
- state of home appliances
- communication with  
outside



# Modularity



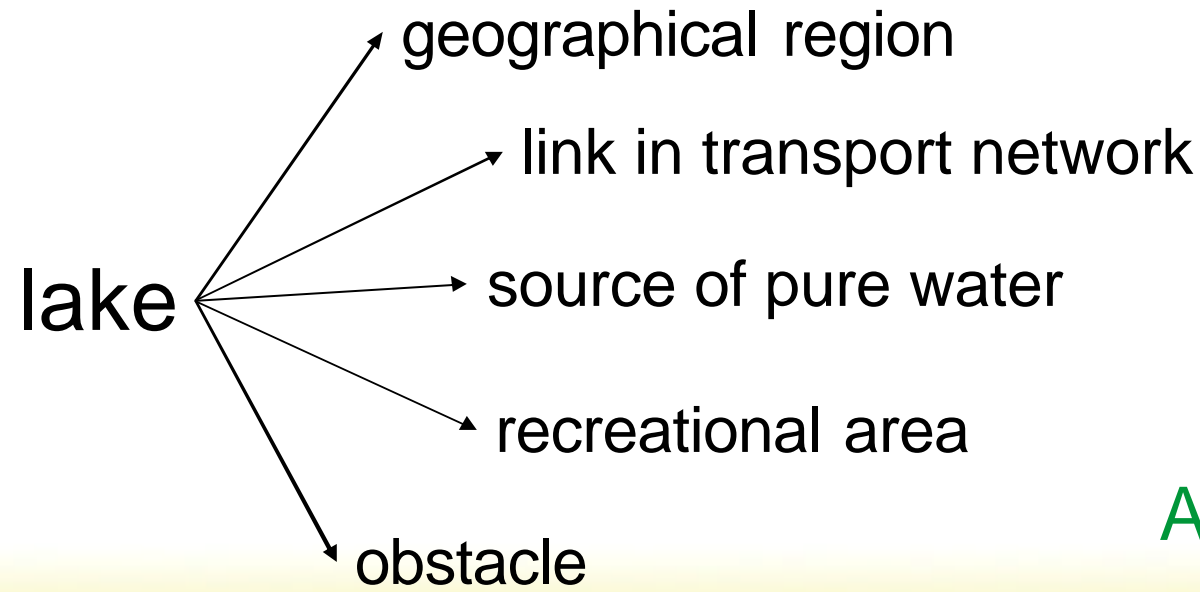
One of the OASIS use cases: **independent travel support**

what sources of information need to be combined here?

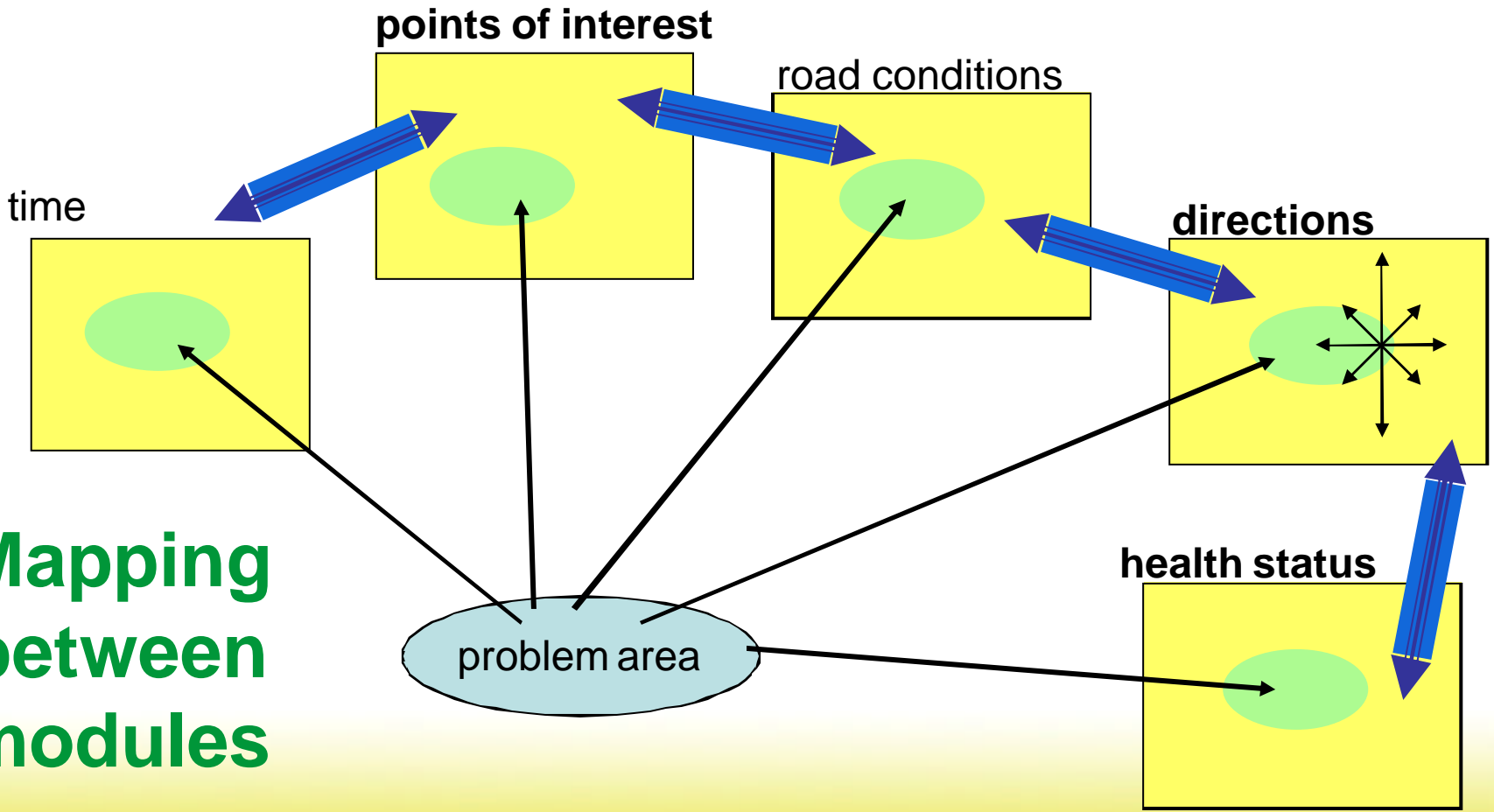
- health
- state of traffic
- environment
- tourism information
- travel schedules
- on-route POI / PO-necessity



# Different Communities have Different Organisations of the World



Alternate theories /  
ontologies



**Mapping  
between  
modules**



# The OASIS solution

## Common Ontology Framework

- defines a **formal specification** of ontology modules, and how they relate
- defines a **methodology and best practice** for ontology construction

this makes it possible to define a

## Hyper-Ontology

- that acts like a **single connected ontology**, even though it is made up of possible heterogeneous modules

which can be stored, accessed and maintained within an

## OASIS Ontology Repository



## The OASIS solution

- A multi-level development path to next generation ontologies
  - Level 1: basic organisation
  - Level 2: methodological discipline
  - Level 3: formal characterisation

Practical test case: the ASK-IT ontologies



# Level 1 Conformance

- See:
  - **“A Methodological Approach for Ontology Evaluation and Refinement”**  
  
Dionysios D. Kehagias, Ioannis Papadimitriou,  
Joana Hois, Dimitrios Tzovaras, John Bateman
  - **“Evaluating ontological decisions with OntoClean”**  
  
Nicola Guarino and Christopher A. Welty (CACM, 2002)



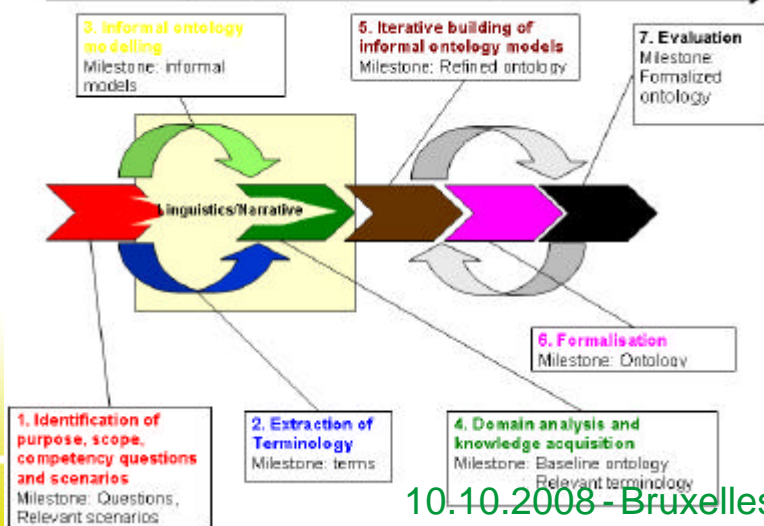
# Level 2 Conformance

- See:
  - “Evaluating ontology engineering methodologies: communities at the melting pot”

Alexander Garcia, Frank Gibson,  
Kieran O’Neill,  
Oscar Corcho, Philip Lord  
and Robert Stevens

- Ongoing  work

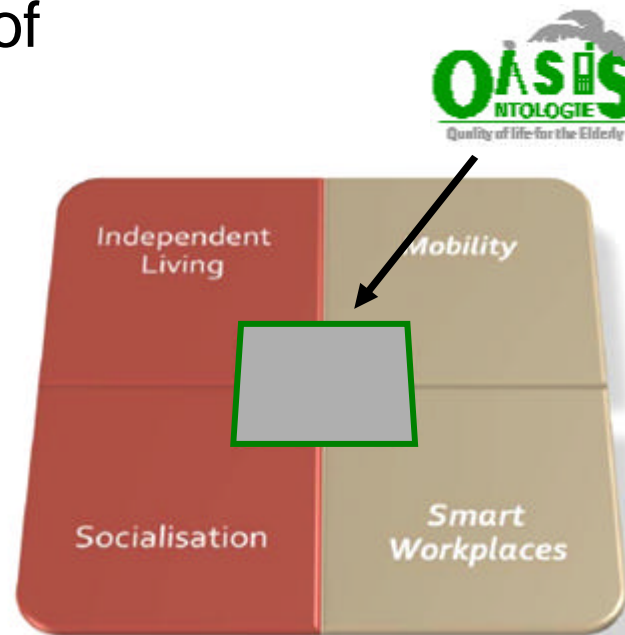
Knowledge acquisition, Domain analysis, and evaluation →





## Level 3 Conformance

- Conformance and Use of Libraries of Ontology Design Patterns
- Explicit modularisation
- Increasing use of reasoning on-demand and for-demand rather than hardcoded connections





# The Future: Supporting activities

- Production of ontology design best practice guidelines
  - using ontology design patterns for relevant domains
- Summer schools, tutorials on ontology design for accessible services
- Web-based release of ontology libraries
- Looking for further domains and the benefits of information exchange across domains for services