

# Ontologies

## *Web-based Knowledge Representation*

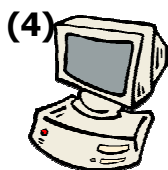
Marta Sabou

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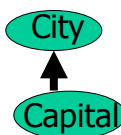
## How will the SW work?

City(Amsterdam)  
City(The Hague)

City in Nederland? (1)



(4)



(2)



Capital(Amsterdam)  
Capital(The Hague)

(3)

Government	Netherlands
Country name:	<input type="checkbox"/> <input type="checkbox"/> <i>conventional long form:</i> Kingdom of the Netherlands <i>conventional short form:</i> Netherlands <i>local long form:</i> Koninkrijk der Nederlanden <i>local short form:</i> Nederland
Government type:	<input type="checkbox"/> <input type="checkbox"/> constitutional monarchy
Capital:	<input type="checkbox"/> <input type="checkbox"/> Amsterdam; The Hague is the seat of government
Administrative divisions:	<input type="checkbox"/> <input type="checkbox"/> 12 provinces (provincies, singular - provincie); Drenth Flevoland, Friesland, Gelderland, Groningen, Limbura

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## Semantic Web: Ingredients

### Representation:

- decide on a **model** of the world
- represent it in a formal **language**
- annotate web-data

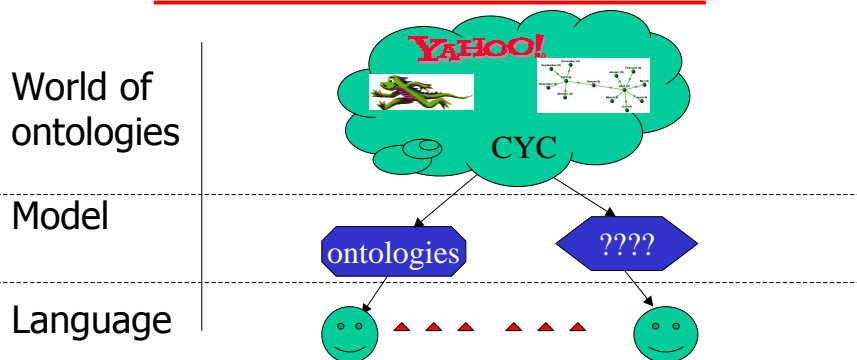
### Reasoning:

- mechanism to interpret the formal language

Capitals are cities                       Amsterdam is a city  
Amsterdam is a capital

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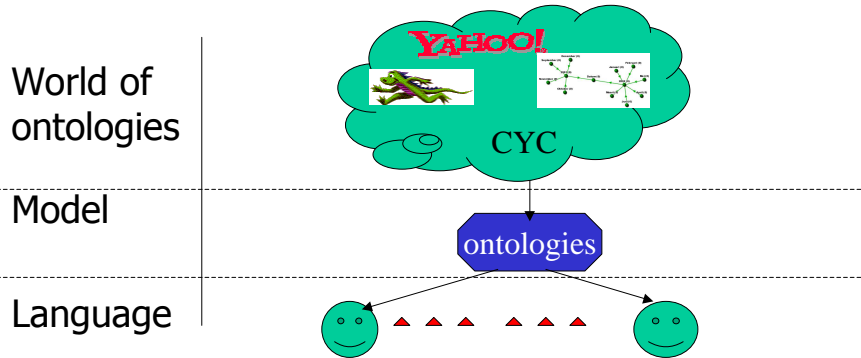
## Talking about ontologies



We have a different way of conceptualising ontologies =>we cannot communicate about them.

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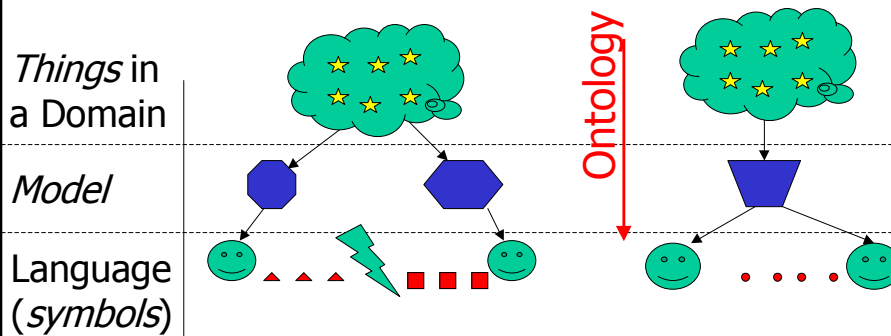
# Goal



- present main concepts about ontologies (these concepts - adopted by the community)
  - explain these concepts
- => allows communication

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# General scene - Communication



Lack of shared understanding

Agree on a model.

Conceptual and terminological confusion

Make it explicit in a language.

Actors: both humans and machines

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## Outline

- ➔ 1) What is an ontology?
- 2) Parts of an ontology
- 3) How to build an ontology?
  
- 4) Other issues (characteristics, examples)
- 5) Employing Ontologies
- 6) Meaning and databases

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## What is an ontology? - the roots

*ontology = ontos (being) + logos(word)*

*Philosophy (400BC):*

Systematic explanation of Existence

Aristotle: universal categories for classifying everything that exists

*Merriam Webster :*

1) a branch of metaphysics concerned with the nature and relations of being

2) a particular theory about the nature of being and kinds of existents

Ontology - both a science and its result.

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# Ontology in Computer Science

*Neches (91):*

Ontology defines **basic terms** and **relations** comprising the **vocabulary** of a topic area as well as the rules for combining terms and relations to define extensions to the vocabulary

*Gruber (93):*

Explicit specification of a conceptualization

*Borst (97):*

Formal specification of a shared conceptualization

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## What is an ontology?

*Studer(98):*

Formal, explicit specification of a shared conceptualization

Machine  
readable

Consensual  
knowledge

Concepts, properties,  
functions, axioms  
are explicitly defined

Abstract model of  
some phenomena  
in the world

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## Benefits

{ Communication between people  
{ Interoperability between software agents

{ Make domain knowledge explicit  
{ Reuse of domain knowledge  
{ Analyze domain knowledge

Building an ontology  
is not a goal in itself.

**Knowledge sharing and reuse**

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## Practical information -I

### **Course organisation:**

#### ***I. lectures and small assignments (weeks 6-14)***

- 8 lectures
- 6 small assignments during lectures
  - \* to be sent before next lecture
  - \* evaluated as pass/fail
  - \* if at least 5 assignment passed
    - => +1 point in final grade

#### ***II. final assignment (2 months)***

- in groups of 2 (announce by end of lectures)

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## **Practical information-II**

### **Course material and support:**

#### **•website:**

- on Blackboard system
- (including discussion/questions /announcements)
- !! subscribe before the next lecture

#### **•syllabus:**

- The Semamtic Web: a Primer
- soon in the library (15€)

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