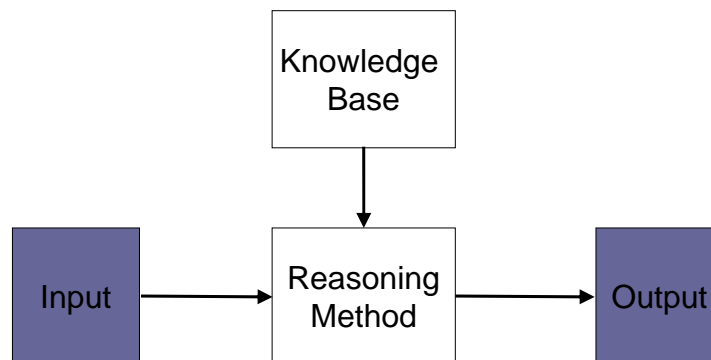


## WP 2.1 Scalability

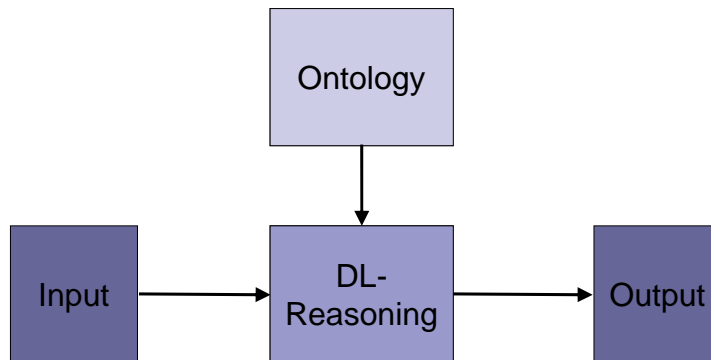
H. Wache (VU)  
EPFL, INRIA, CERTH, L3S, UPM, UKARL, UM, UniTn, VU, VUB

Manchester, 27.-29.Sept 2004

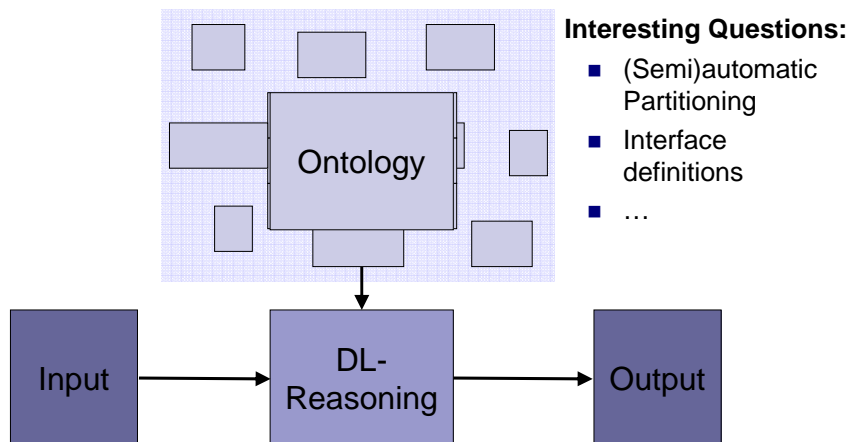
## Knowledge-based Systems in General ...



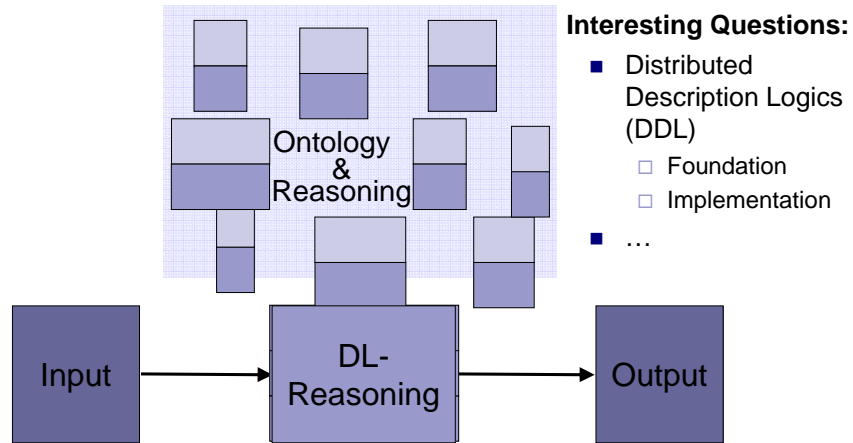
# Semantic Web Systems in Particular ...



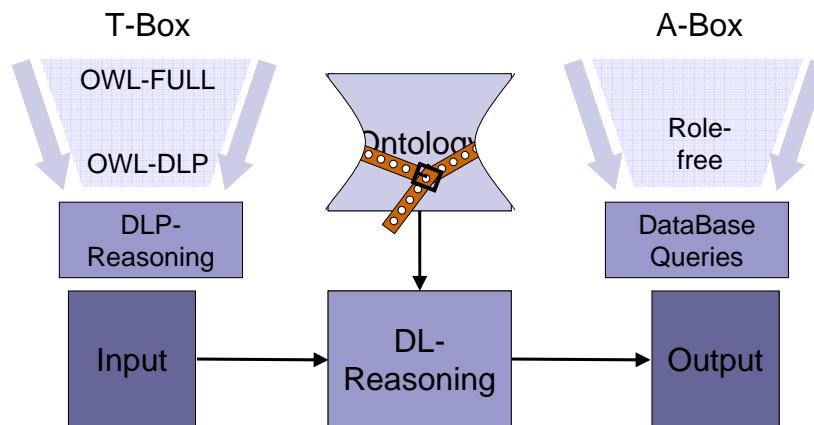
# Scalability through Modularization



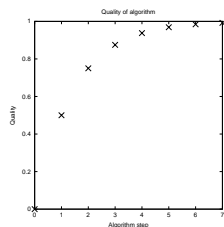
# Scalability through Distribution



# Scalability through Language Weakening



# Scalability through Anytime Approximation



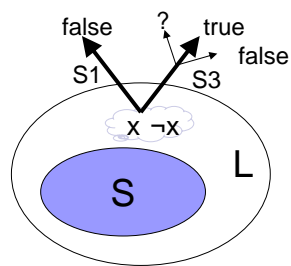
Input

Ontology

Approximated DL-Reasoning

## S1/S3 Approximation:

$\models_0^T, \models_1^T, \models_2^T, \dots, \models_{n-1}^T, \models$



# Approximation Practical Useless?

$\exists R.C \mapsto \top$

- $\Leftrightarrow (\text{Query} \sqsubseteq \text{WhiteNonSweetWine})$  holds.
- $\Leftrightarrow (\text{Query} \sqcap \neg \text{WhiteNonSweetWine})$  is unsatisfiable
- $\Leftrightarrow (\text{Query} \sqcap \neg \text{WhiteNonSweetWine})_0^T$  is unsatisfiable
- $\Leftrightarrow \text{Query}_0^T \sqcap (\neg \text{WhiteNonSweetWine})_0^T$  is unsatisfiable

$\text{WhiteNonSweetWine} \equiv \text{Wine} \sqcap \exists \text{hasColor}.\{White\} \sqcap \forall \text{hasSugar}.\{OffDry, Dry\}$

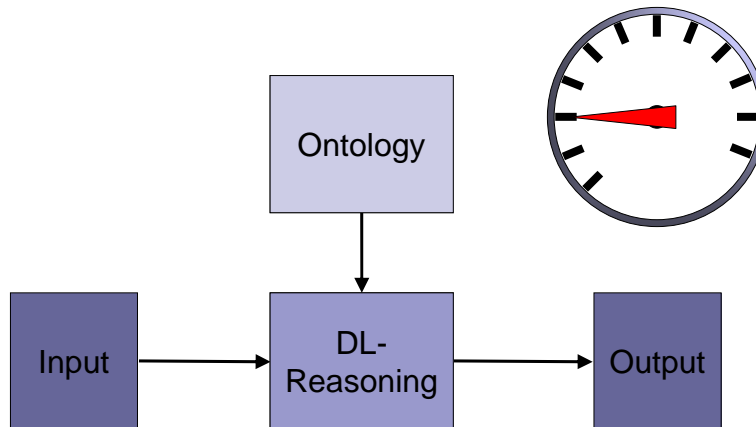
$\neg \text{WhiteNonSweetWine} \equiv \neg \text{Wine} \sqcup \forall \text{hasColor}.\neg\{White\} \sqcup \exists \text{hasSugar}.\neg\{OffDry, Dry\}$ .

$(\neg \text{WhiteNonSweetWine})_0^T \equiv \neg \text{Wine} \sqcup \forall \text{hasColor}.\neg\{White\} \sqcup \top$   
 $\equiv \top$ .

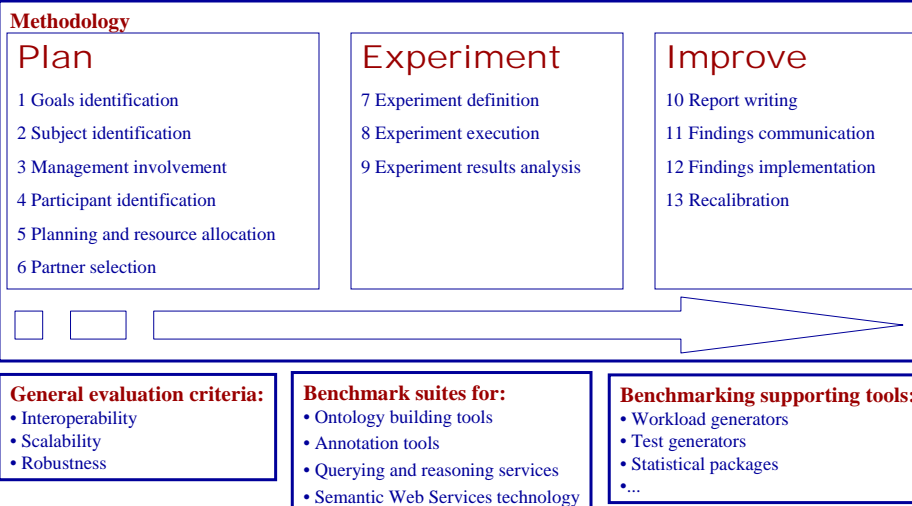
**! Many concept terms are approximated to  $\top$**

$\Leftrightarrow \text{Query}_0^T \sqcap \top$  is unsatisfiable  
 $\text{Query}_0^T$  is unsatisfiable

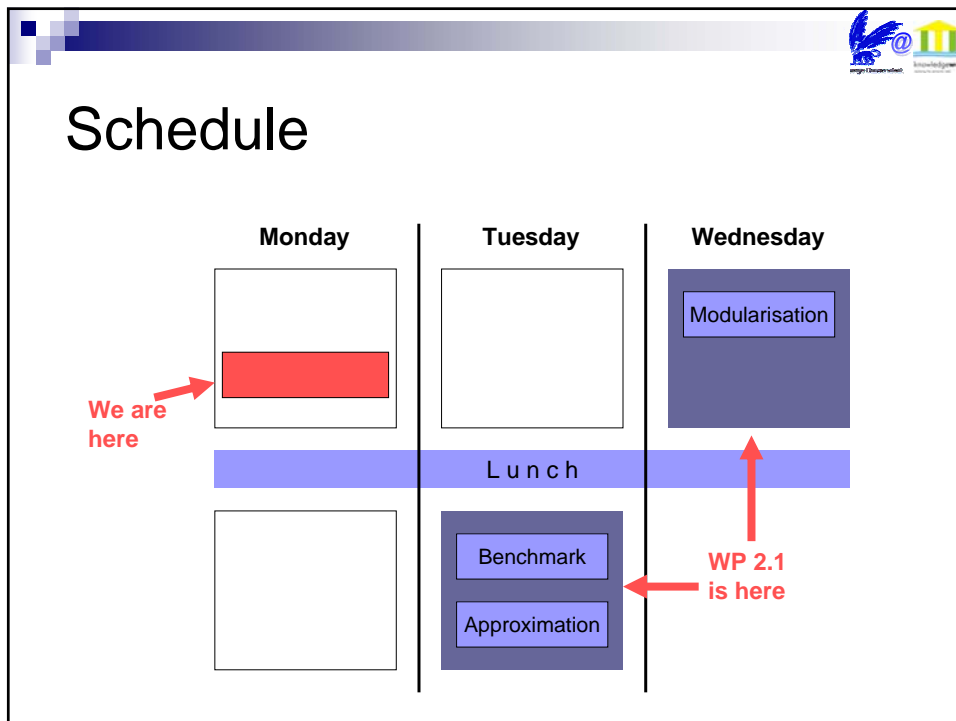
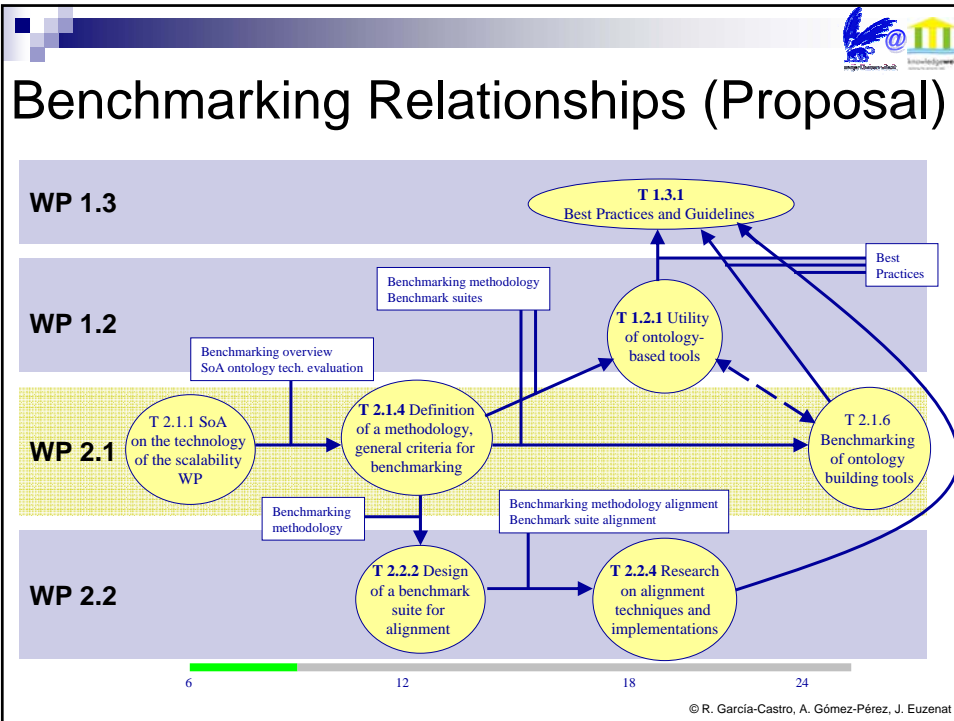
# Scalability proved by Benchmarking



# General Benchmark Methodology



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# Agenda

## 1. Benchmarking

- Raúl García Castro (UPM): General Benchmark Methodology
- Discussion: Further Steps
- Discussion: Outline and time line of the Deliverable 2.1.4

## 2. Approximation

- Holger Wache (VU): S3-Approximation and DL reasoning
- Pascal Hitzler (UKarI): (Working title: Language weakening for OWL)
- Daniele Turi (UoM): Implementing the Instance Store
- Discussion: Outline and time line of the Deliverable 2.1.2

## 3. Modularisation and Distribution

- Stefano Spaccapietra (EPFL): Introduction to the deliverable 2.1.3.
- Holger Wache (VU): Structure-Based Partitioning of Large Concept Hierarchies
- Discussion: Outline and time line of the Deliverable 2.1.3