

# Semantic Commitment for Designing Ontologies: a Proposal

*Bruno Bachimont*

*Raphaël Troncy*

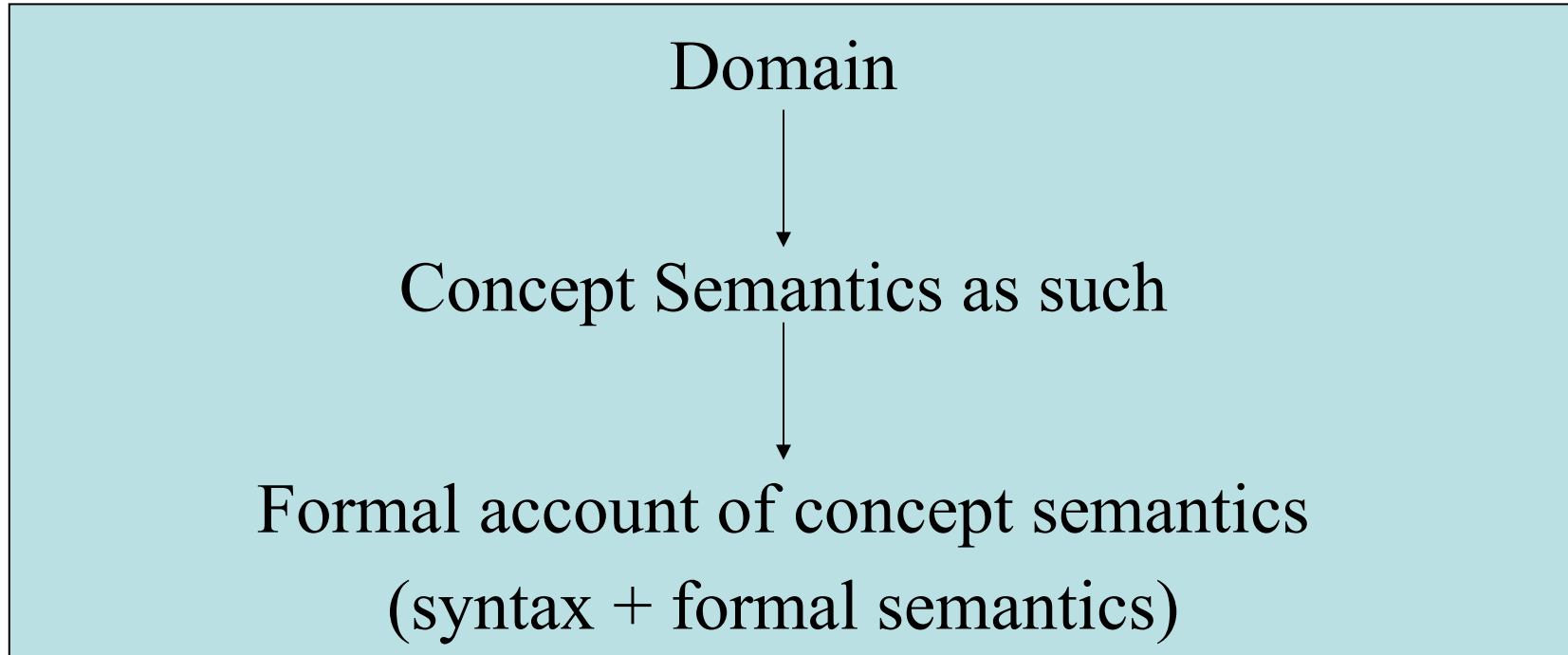
*Antoine Isaac*

**Institut National de l'Audiovisuel**  
**France**

# Ontology

- Ontologies propose a way of conceptualizing concepts in a domain:
  - Need for a *method* to determine which concepts are useful and what they mean;
  - Need for *tools* and formalisms to represent them in a tractable form.

# Problem



- Expressing concepts in formalisms should rely on the determination of their semantics in the domain
- Formal representation is only a way to represent concepts, <sub>3</sub> not to model them.

# Two levels for modelling semantics

- Intensional level :
  - *intensional* understanding of a concept ;
  - Characterised as properties associated with a notion, independently of empirical facts.
- Extensional level :
  - *referential/denotational* understanding of a concept.
  - Characterised as sets of individuals denoted by the concept.

# Example

- Audiovisual domain :
  - Concepts : *Actor* and *Director*
- Two points of view :
  - Intensional :
    - *Actor* and *Director* are two different concepts ; nothing allows to assert that they can denote same objects ;
  - Extensional :
    - *Actor* and *Director* are two different classes of individuals; nothing prevents from asserting they may denote some same objects.

# Example (followed)

- But, according to the domain :
  - It is a *conceptual* fact that the two concepts are different:
    - It is not the same thing for an individual to be an *actor* or to be a *director* ;
  - It is an *empirical* fact they may denote the same objects:
    - Some objects are *actor* and *director* (Clint Eastwood, Woody Allen, etc.)
- Conclusion:
  - One should take into account those two levels ;
  - ⌘ What is usually done is the modelling of the extensional content of concepts
  - ⌘ Our proposal is about adding a previous modelling of the intensional content of concepts.

# Intensional content

- Problem:
  - Where and how to define concept meaning ?
- An answer:
  - Where they are used : texts, documents that reflect how concepts are used in practice and real life:
    - Notes, memorandum, didactic documents, etc.

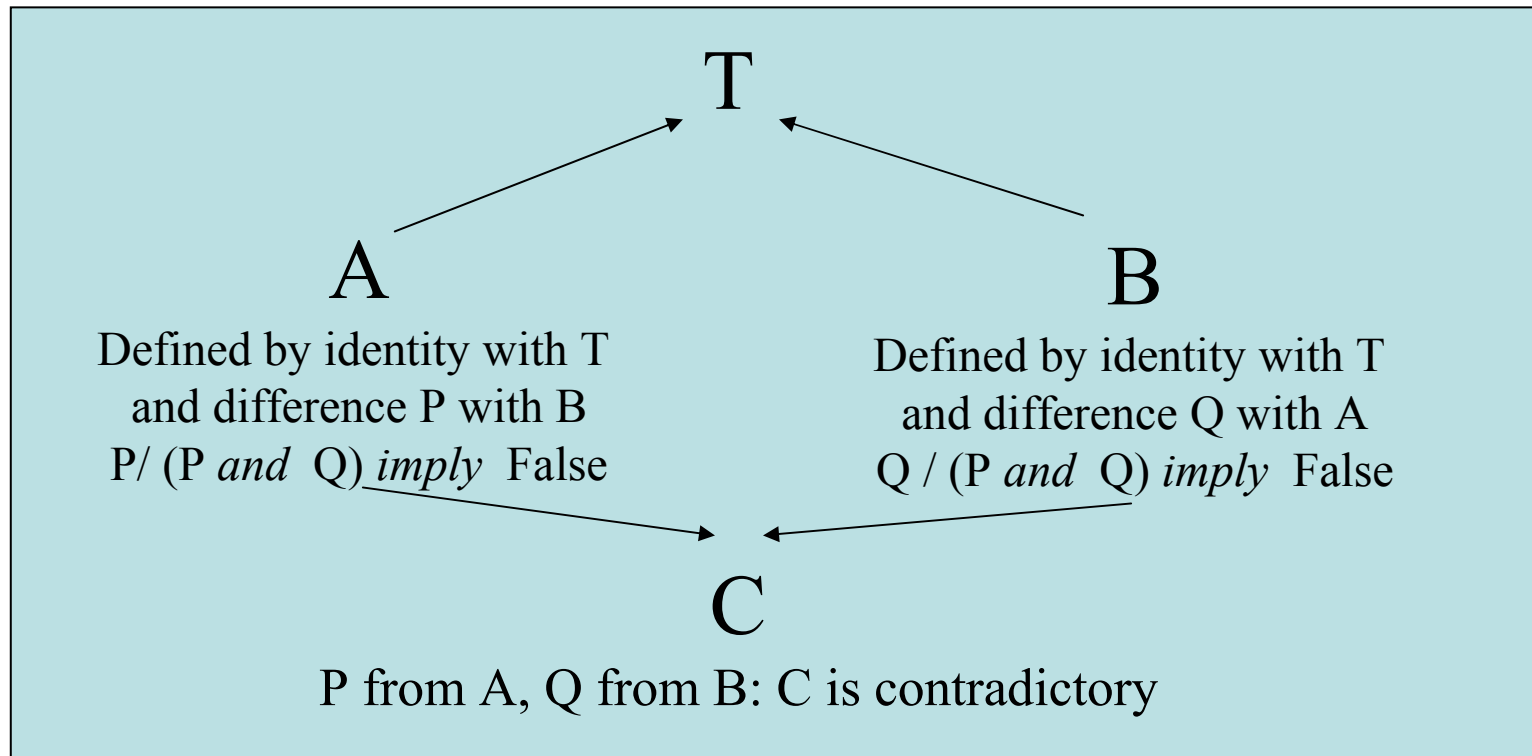
# From language to meaning

- Our approach relies on linguistic (semantic) analysis of corpus:
  - Corpora extraction (e.g. Terminae, ...)
  - Concept organisation according to semantic principles.

# Semantic principles

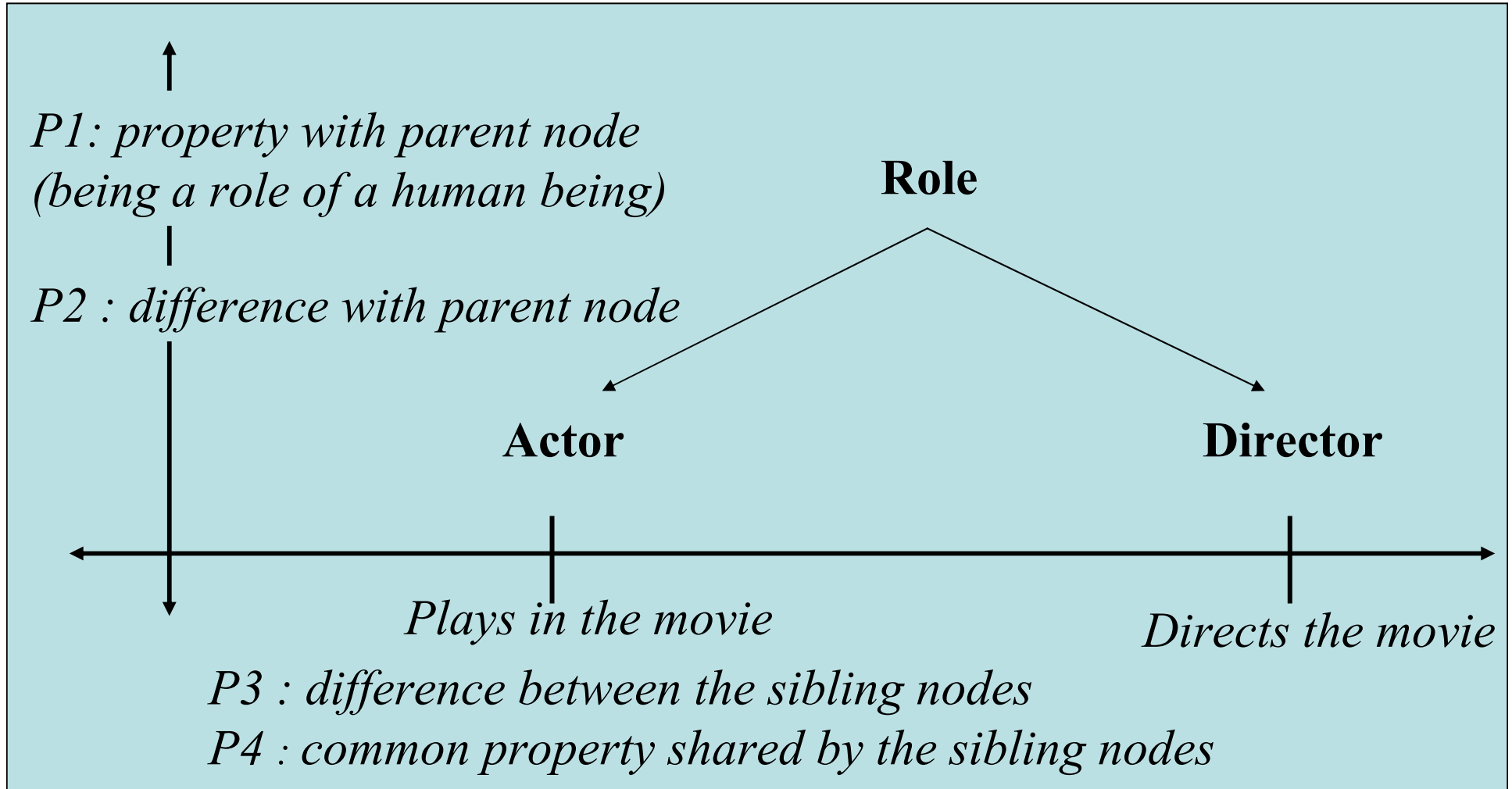
<ul style="list-style-type: none"><li>• Actor</li></ul>	<ul style="list-style-type: none"><li>• Director</li></ul>
<ul style="list-style-type: none"><li>– Role of a human being</li><li>– Role in making movies</li></ul> <p>Generic “sèmes”</p>	<ul style="list-style-type: none"><li>– Role of a human being</li><li>– Role in making movies</li></ul>
<ul style="list-style-type: none"><li>– Is a character <i>in</i> the movie</li></ul> <p>Specific “sèmes”</p>	<ul style="list-style-type: none"><li>– Is <i>not</i> in the movie, but directs it</li></ul>

# Semantic network structure



- Intensional properties are set in terms of *differences*
- Semantic network must be a tree !

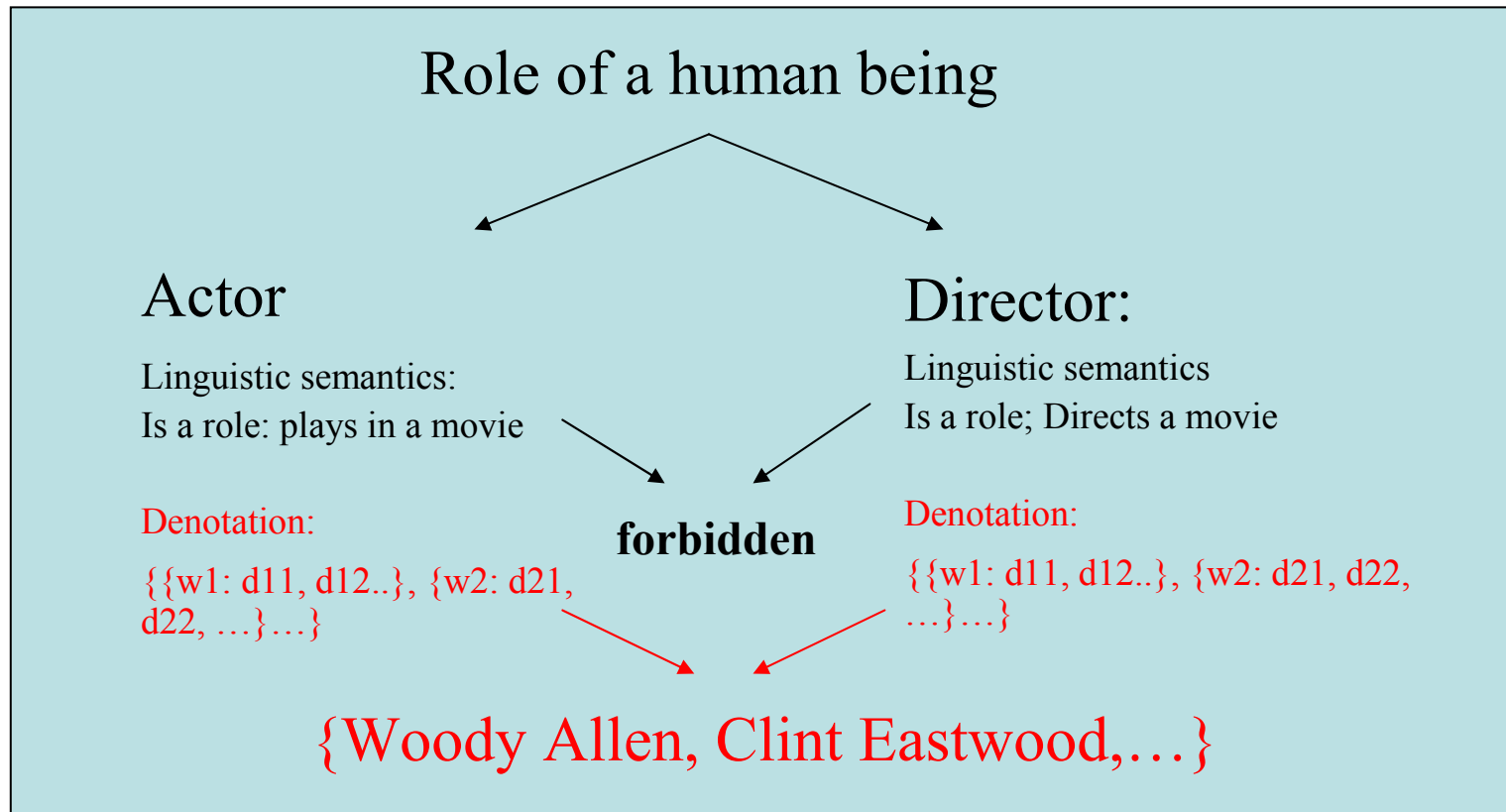
# Differential Principles



# Differential Principles

- Amount to *explicitly* specify what is understood when using a concept
- Formulate the *semantic commitment* that should be respected to use concepts

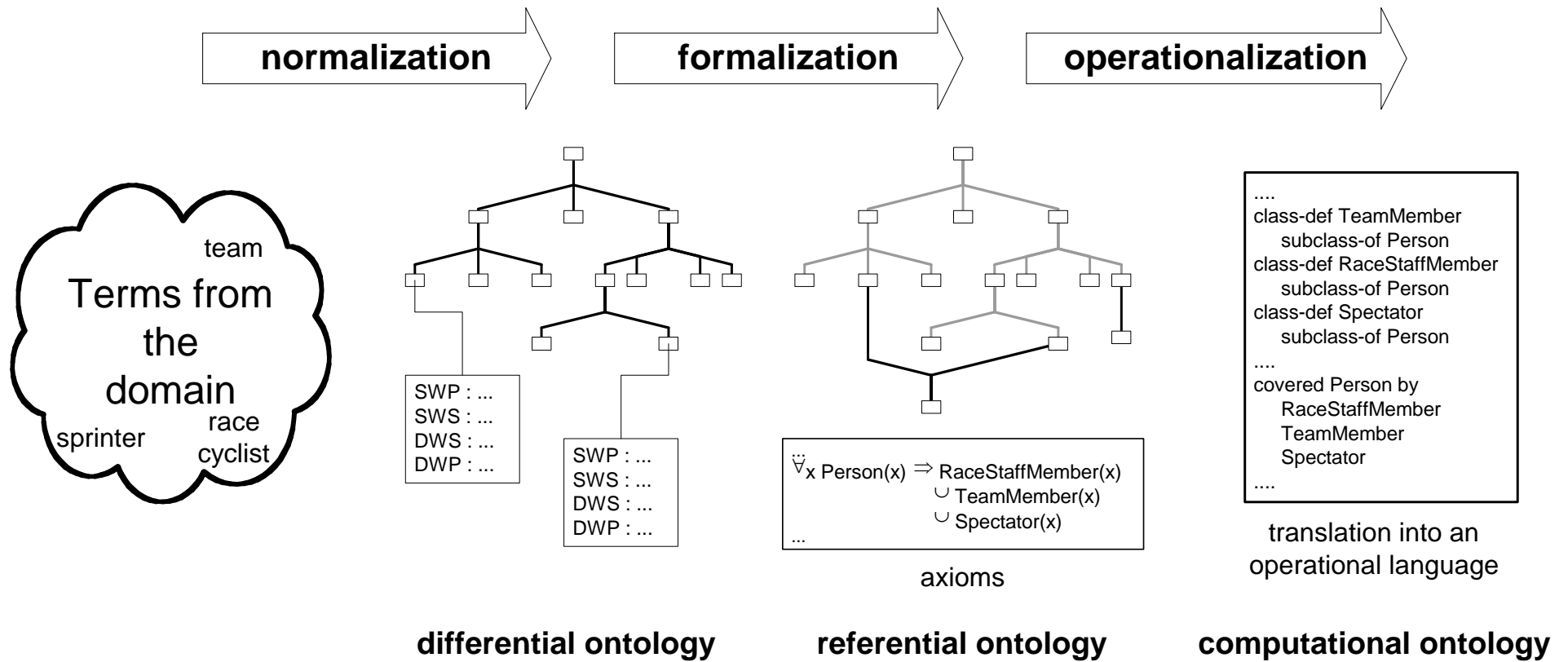
# Extensional description of concepts



Extensional **red** links: lattice structure is possible

Intensional black links : lattice structure is forbidden (tree).

# Summary



## Differential Ontology Referential Ontology

## Tree Browser

## Concept Relation

Concept

Objet

ObjetAbstrait

SupportDeDescription

ObjetConcret

ObjetConcretTemporel

ObjetTemporelDuratif

Evenement

ObjetConcretSpatial

ObjetIndividuel

ObjetBiologique

Personne

PersonnelEpreuve

CommissaireDeCou

DirecteurEpreuve

Journaliste

MedecinEpreuve

Spectateur

PersonnelEquipe

ObjetGeographique

ObjetManufacture

Collection

Propriete

## Editor

## French English Spanish

## Definition

## Differential Principles

Similarity  
with Parent :Personne accréditée  
par la Direction de  
l'Epreuve

edit SWP

Similarity  
with Siblings :

Précision du rôle

edit SWS

Difference  
with Siblings :Suit l'Epreuve pour le  
compte d'une  
rédactionDifference  
with Parent :Précision du rôle : Suit  
l'Epreuve pour le  
compte  
d'une rédaction

build DWP

# Conclusion

- Compatible with other approaches:
  - Export towards other environment (e.g. Protégé).
- Introduces a semantic commitment prior to formal representation.
- Several applications:

<b>Domain</b>	<b>Concepts</b>	<b>Relations</b>
Medicine	1832	488
Cycling	91	60
Childhood	301	37
Water	205	17
Mathematics	197	11