

# ***Quelques ontologies existantes et leurs applications***

Ontologies existantes

1

## ❖ Classification des ontologies:

- ▼ Van Heist en 1997 : Domaine / Application / Générique / Méta
- ▼ Chandrasekaran en 1998 : tâches / méthodes
- ▼ Uschold et Gruninger <sup>(11)</sup>: Informelle / Semi-informelle / Semi-formelle / Formelle
- ▼ GRACQ <sup>(9)</sup>:
  - Méta-ontologies
  - Ontologies génériques ( haut réutilisable)
  - Ontologies de domaine
  - Ontologies de tâche
  - Ontologies d'application: spécialisée pour l'application à une tâche dans un domaine

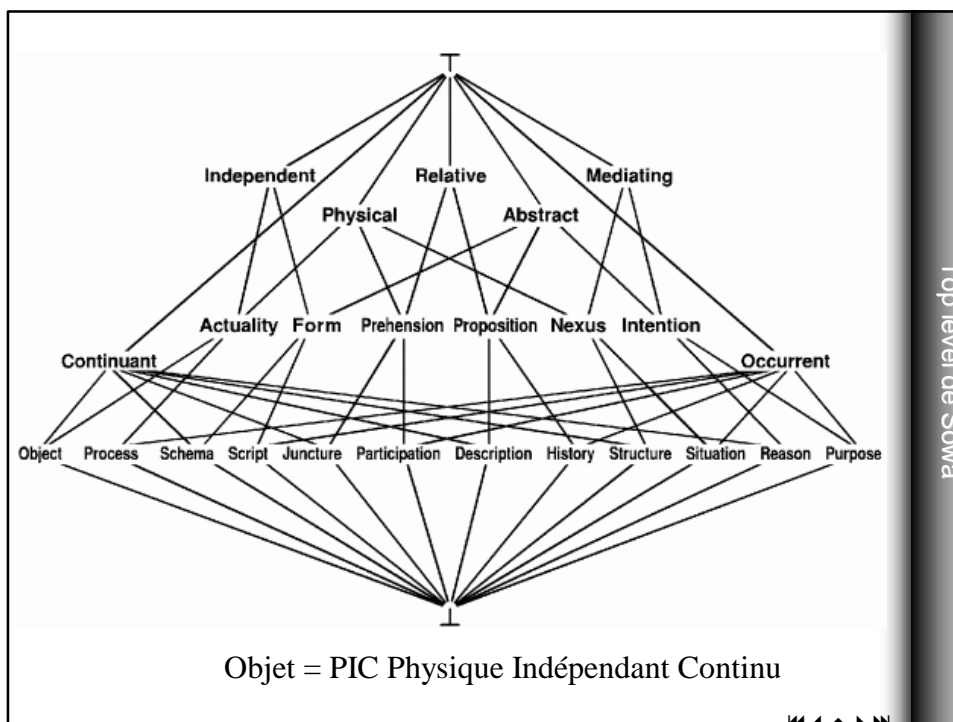
❖ <http://babage.dia.fi.upm.es/ontoweb/wp1/OntoRoadMap/index.html>

Classifier les ontologies

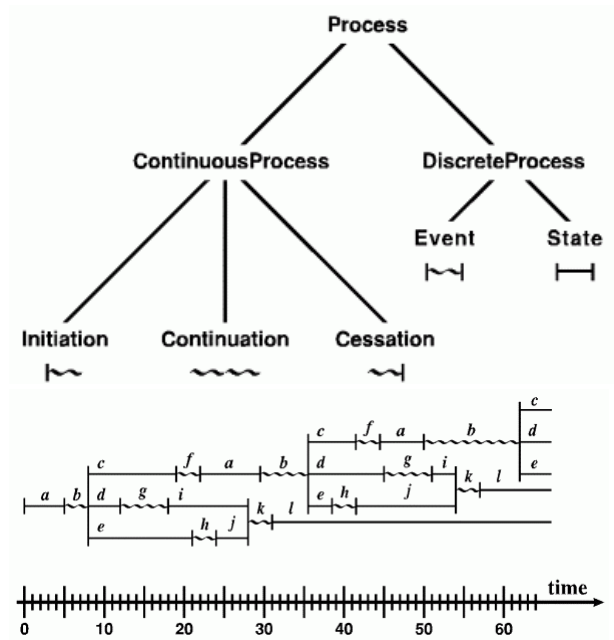
2

## ❖ Top-level catégories Sowa (6)

- ▼ (Charles Sanders Peirce et Alfred North Whitehead)
- ▼ 3 façons de diviser le top T:
  - Physique ou Abstrait (P, A)
  - Indépendant, Relatif, or Méditeur (I, R, M);
  - Continu ou Occurrent (C, O).

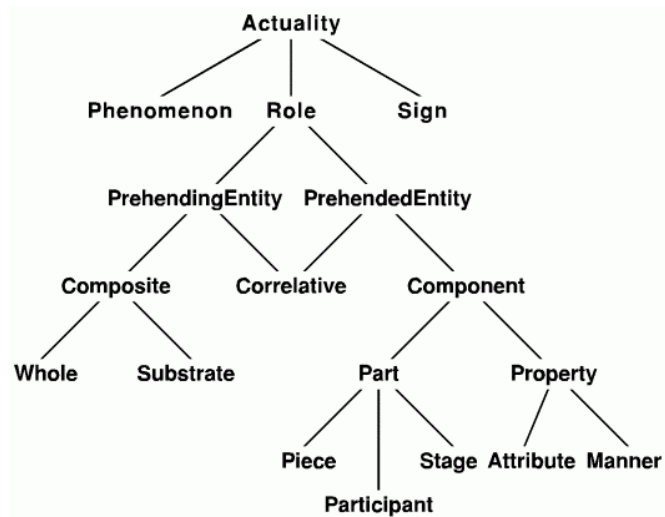


## ❖ Processus



Sowa

## ❖ Rôles et relations



Sowa

❖ AIAI : The **Enterprise Ontology** is a collection of terms and definitions relevant to business enterprises.

❖ Conceptually, the Enterprise Ontology it is divided into a number of main sections

- ▼ Activity : Activity Specification, Execute, Executed Activity Specification, T-Begin, T-End, Pre-Conditions, Effect, Doer, Sub-Activity, Authority, Activity Owner, Event, Plan, Sub-Plan, Planning, Process Specification, Capability, Skill, Resource, Resource Allocation, Resource Substitute.

AIAI

⏪ ⏩ ⏴ ⏵ ⏶ ⏷

7

- ▼ Organisation : Person, Machine, Corporation, Partnership, Partner, Legal Entity, Organisational Unit, Manage, Delegate, Management Link, Legal Ownership, Non-Legal Ownership, Ownership, Owner, Asset, Stakeholder, Employment Contract, Share, Share Holder.

- ▼ Strategy : Purpose, Hold Purpose, Intended Purpose, Strategic Purpose, Objective, vision, Mission, Goal, Help Achieve, Strategy, Strategic Planning, Strategic Action, Decision, Assumption, Critical Assumption, Non-Critical Assumption, Influence Factor, Critical Influence Factor, Non-Critical Influence Factor, Critical Success Factor, Risk.

AIAI

⏪ ⏩ ⏴ ⏵ ⏶ ⏷

8

- ▼ Marketing Sale, Potential Sale, For Sale, Sale Offer, Vendor, Actual Customer, Potential Customer, Customer, Reseller, Product, Asking Price, Sale Price, Market, Segmentation Variable, Market Segment, Market Research, Brand Image, Feature, Need, Market Need, Promotion, Competitor.
- ▼ Time Time Line, Time Interval, Time Point.

A/A

⏮ ⏪ ⏩ ⏭

9

## ❖ Cyc : Encyclopedias

- ▼ Natural language understanding and generation
- ▼ Semantic database integration, consistency-checking, and mining
- ▼ Semantic information retrieval
- ▼ Ontology-constrained simulation
- ▼ Building and utilizing user models
- ▼ Knowledge sharing by groups working independently

Cyc

⏮ ⏪ ⏩ ⏭

10

❖ The Entries for the CYC® Constants (divided up among 43 pages)

❖ Fundamentals
❖ Top Level
❖ Time and Dates
❖ Types of Predicates
❖ Spatial Relations
❖ Quantities
❖ Mathematics
❖ Contexts
❖ Groups
  
❖ "Doing"
❖ Transformations
❖ Changes Of State
❖ Transfer Of Possession
❖ Movement

Cyc
11

❖ Parts of Objects
❖ Composition of Substances
  
❖ Agents
❖ Organizations
❖ Actors
❖ Roles
❖ Professions
❖ Emotion
❖ Propositional Attitudes
❖ Social
  
❖ Biology
❖ Chemistry
❖ Physiology
❖ General Medicine
❖ Materials
❖ Waves

Cyc
12

- ❖ Devices
- ❖ Construction
- ❖ Financial
- ❖ Food
- ❖ Clothing
- ❖ Weather
- ❖ Geography
- ❖ Transportation
  
- ❖ Information
- ❖ Perception
- ❖ Agreements
  
- ❖ Linguistic Terms
- ❖ Documentation

Cyc

13

- ❖ TOVE : **Enterprise Modelling**
  
- ❖ Activities
  - ▾ Activities and States
  - ▾ Aggregation of Activities
  
- ❖ Time
  
- ❖ Resource Ontology
  - ▾ Resource Ontology
  - ▾ Relation of the resource ontology with that of the activity-state

TOVE

14

## ❖ Product

- ▼ Part Definition:
- ▼ Feature Ontology
- ▼ Parameter Ontology
- ▼ Constraint Ontology
- ▼ Requirements Ontology

## ❖ Orders

- ▼ Order Representation
  - Customer Frame
  - Frame
  - Line Item Frame
- ▼ Order Cluster

## ❖ Organisation Ontology

- ▼ Organisation-Entity
  - Organisation-Group
  - Organisation-Individual
- ▼ Organisation-Role
- ▼ Organisation Position
- ▼ Organisation Goals
- ▼ Communication-Link
- ▼ Empowerment
- ▼ Authority
- ▼ Coordination Speech Acts

## ❖ END.

## ❖ AOS

The **Agricultural Ontology Service**. A federated clearinghouse for terms, definitions and relationships in the agricultural and related domains for use by the agricultural community. (Kickoff meeting to be held in November 2001).

- ❖ KACTUS: Knowledge About Complex Technical systems for multiple USE.  
**Electrical engineering Domain**

## ❖ GUM

This document describes the latest version of the Generalized Upper Model, a general task and domain independent 'linguistically motivated ontology' that **supports sophisticated natural language processing** while significantly simplifying the interface between domain-specific knowledge and general linguistic resources. We also expect the proposed ontology to provide a solid basis for domain modelling in general, not only where natural language is concerned.

## ❖ MENELAS **comptes rendus d'hospitalisation**

## ❖ STEP/PDES

**Standard for Exchange of Product Data.** A

huge, international effort to create an interlingua for exchanging manufacturing product data.

## ❖ Twente Ontology Collection -- (Univ Twente, Netherlands).

On Ceramics, **substances, and engineering design**

## ❖ CHEMICALS

It is an ontology built according to METHONTOLOGY, it contains knowledge within the domain of **chemical elements** and crystalline structures

▼ Number of concepts in the ontology:  
Between 10 & 50

▼ Number of instances in the ontology:  
Between 100 & 500

#### ❖ AAT- Art & Architecture Thesaurus

The terms defined in AAT may be used to describe **art, architecture, decorative arts, material culture, and archival materials**. The coverage of the AAT ranges from Antiquity to the present, and the scope is global. The vocabularies provide terminology and other information about the objects, concepts, artists, and places important to various disciplines that specialize in these subjects. The primary users of the Getty Vocabularies include museums, art libraries, archives, visual resource collection catalogers, bibliographic projects concerned with art, researchers in art and art history, and the information specialists who are dealing with the needs of these users. In addition, a significant number of users of the vocabularies are students or members of the

AAT - Art

⏮ ⏪ ⏩ ⏭

21

#### ❖ ASBRU

A global ontology for guideline-application tasks. A language specific to the set of **guideline-support tasks and the problem-solving methods performing these tasks**. The Asbru language is a text-based, machine-readable language, that enables developers to represent and to annotate clinical guidelines in standardized form. The Asbru language enables developers to represent both complex, time-oriented actions and world states, and the multiple knowledge roles (e.g., intentions) required by the task-specific problem-solving methods we are developing.

ASBRU

⏮ ⏪ ⏩ ⏭

22

## ❖ GALEN

At the heart of GALEN is a semantically valid model of **clinical terminology**, represented in a formal language, and associated with sophisticated support for different natural languages and conversion between different coding schemes. GALEN is based on a semantically sound model of clinical terminology: the GALEN Coding reference (CORE) model. This model comprises elementary clinical concepts (such as 'fracture', 'bone', 'left', and 'humerus'), relationships (such as 'fractures can occur in bones'), that control how these may be combined, and complex concepts (such as 'fracture of the left humerus') composed from simpler ones.

GALEN

⏮ ⏪ ⏩ ⏭

23

## ❖ Gene Ontology

A dynamic controlled vocabulary that can be applied to all **eukaryotes** even as knowledge of **gene and protein** roles in cells is accumulating and changing. The three organizing principles of GO are molecular function, biological process and cellular component.

Gene Ontology

⏮ ⏪ ⏩ ⏭

24

#### ❖ Goi-Taikai's ontology

400,000-word Japanese lexicon developed by NTT for **machine translation applications**. GT consists of three main components: (i) an ontology, (ii) a semantic word dictionary, and (iii) a semantic structure dictionary. GT's ontology classifies concepts to use in expressing relationships between words. The meanings of common nouns are given in terms of a semantic hierarchy of 2,710 nodes. Each node represents a semantic class. Edges in the hierarchy represent is-a or has-a relationships. In addition to the 2,710 classes for common nouns, there are 200 classes for proper nouns and 108 classes for predicates. Words can be assigned to semantic classes anywhere in the hierarchy. Not all semantic classes have words assigned to them. The semantic classes are used in the Japanese word semantic dictionary to classify nouns, verbs and adjectives.

#### ❖ MeSH

**Medicine's controlled vocabulary thesaurus**. Thesauri are carefully constructed sets of terms often connected by "broader-than," "narrower-than," and "related" links. These links show the relationship between related terms and provide a hierarchical structure that permits searching at various levels of specificity from narrower to broader. MeSH consists of a set of terms or subject headings that are arranged in both an alphabetic and a hierarchical structure. At the most general level of the hierarchical structure are very broad headings such as "Anatomy," "Mental Disorders," and "Enzymes, Coenzymes, and Enzyme Inhibitors." At more narrow levels are found more specific headings such as "Ankle," "Conduct Disorder," and "Calcineurin."

## ❖ The Mikrokosmos Ontology

For **multilingual Natural Language Processing**. The main principle is a careful distinction between language-specific knowledge, represented in the lexicon, and language-neutral knowledge represented in the ontology. As a consequence, the semantics of words is represented partly in the lexical entries and partly in the ontological concepts. A set of detailed guidelines governs what belongs in a concept and what belongs in a lexical entry. The division of semantics also gives us the answer to how concepts are related to lexical items. In Mikrokosmos you are not forced to have one-to-one mapping between words and concepts. Words with related but not equivalent meanings can map to the same concept, while the differences are captured in the lexical entries.

Mikrokosmos

⏮ ⏪ ⏩ ⏭

27

## ❖ Molecular-Interactions Ontology

An ontology representing small-molecule metabolic reactions and, to a lesser extent, small molecules. This Molecular-Interactions Ontology resulted from a meeting entitled, "Shared Ontologies for Interactions Databases," held on May 11, 2000 at SRI International, and sponsored by the National Institutes of Health.

Molecular-Interactions

⏮ ⏪ ⏩ ⏭

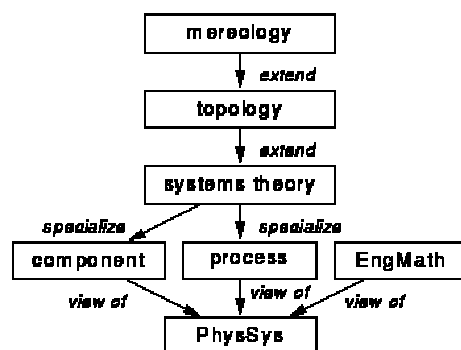
28

## ❖ EngMath

The ontology for **engineering mathematics** deals with the following basic concepts: Physical Quantities, Physical Dimensions, Comparability and Order, Function Quantities, Tensor Quantities, Units of Measure, Magnitudes, Standard Systems of Units, Algebraic Properties of quantities. The EngMath family includes ontologies for Scalar Quantities, Vector Quantities, and Unary Scalar Functions. The Standard Units ontology defines many of the most common physical dimensions and units, and includes the SI system. Other engineering ontologies that build on the EngMath family--for describing component structure, design tasks, discrete events, and specific analysis domains such as kinematics--are being developed.

## ❖ PHYSSYS

Formal ontology based upon **system dynamics theory as practiced in engineering modelling, simulation and design**. It forms the basis for the OLMECO library, a model component library for physical systems like heating systems, automotive systems and machine tools. The ontology expresses different conceptual viewpoints on a physical system.



## ❖ PLANET

- ❖ Planet is a reusable ontology for representing **plans** that is designed to accommodate a diverse range of real-world plans, both manually and automatically created.
- ❖ cycl, kif loom

PLANET

⏮ ⏪ ⏩ ⏭

31

## ❖ ProPer

The growing need for finding knowledge within a company requires efficient mechanisms to manage **skills and competencies of people**: People and their competence can be found by searching through their own documents which are annotated according to a given Human Resource Ontology. These documents might be homepages, project-reports etc. from people within the company, but they might also be applications from people outside the company and they contain valuable information about the competence of these people like skills, working experiences, language abilities etc..

ProPer

⏮ ⏪ ⏩ ⏭

32

## ❖ SENSUS

Developed by the Natural Language group at ISI in order to provide a broad conceptual structure for work in **machine translation**. It contains tens of thousands of nodes (more than 70,000) representing commonly encountered objects, entities, qualities and relations. SENSUS provides a hierarchically structured concept base. The upper (more abstract) region of the ontology is called the Ontology Base and consists of approximately 400 items that represent generalizations essential for the linguistic processing during translation. The middle region of the ontology, approximately 50,000 items, provides a framework for a generic world model, containing items representing many English word senses. The lower (more specific) regions of the ontology provide anchor points for different application domains.

SENSUS

⏮ ⏪ ⏩ ⏭

33

## ❖ SPAR Ontology

**Shared Planning and Activity Representation** Ontology. The SPAR ontology constitutes an effort to build on the accumulated expertise from past DARPA and ARPI sponsored research in order to create a shared plan representation suitable for use in ARPI and on applied research programmes in their communities.

## ❖ UML

SPAR

⏮ ⏪ ⏩ ⏭

34

### ❖ Survey Ontology

The terms in this Survey ontology are used to describe large questionnaires. The ontology was developed for clients at the census bureau and department of labor. The ontology covers the content of the questionnaires, the logic for selecting the next question, and the logic for transferring answers into a relational database.

### ❖ DAML

### ❖ ThoughtTreasure

A comprehensive platform for **natural language processing and commonsense reasoning**.

Basic component of this system is the ThoughtTreasure Ontology. This ontology is available under the terms of the GNU General Public License

### ❖ Sample items in ThoughtTreasure are:

- ▼ Soda is a drink.
- ▼ People have necks.
- ▼ Gold hair is called blond hair.
- ▼ A play lasts about two hours.
- ▼ One hangs up at the end of a phone call.

#### ❖ UMDL

The **University of Michigan Digital Library** Ontology is an ontology for describing digital library content. The UMDL Ontology group has developed a formal conceptualization of bibliographic relations. The ontology defines a fairly elaborate structure of precisely defined concepts. The ontology includes at least two modules: one generic to many digital libraries, and another specific to the UMDL (including concepts to describe societies of agents organized as computational economies).

UMDL

⏮ ⏪ ⏩ ⏭

37

#### ❖ UMLS (Meta-thesaurus)

The **Unified Medical Language System** (UMLS) is large database designed to link biomedical vocabularies together from disparate sources such as clinical terminologies, drug sources, vocabularies in different languages, and clinical terminologies. There are three UMLS Knowledge Sources, which are the following: The Metathesaurus contains semantic information about biomedical concepts, their various names, and the relationships among them. The Semantic Network is a network of the general categories or semantic types to which all concepts in the Metathesaurus have been assigned. The SPECIALIST lexicon contains syntactic information about biomedical terms and will eventually cover the majority of component terms in the concept names present in the Metathesaurus.

#### ❖ Includes MESH

UMLS

⏮ ⏪ ⏩ ⏭

38

## ❖ WordNet

Very large lexical database for English based on psycholinguistic theories. It is organized into 70,000 sets of synonyms ("synsets"), each representing one underlying lexical concept. Synsets are linked with each other via relationships such as hynonymy and antonymy, hypernymy and hyponymy, meronymy and holonymy. Approximately one half of the synsets have short English explanations of their intuitive sense. Wordnet divides the lexicon into five categories: nouns, verbs, adjectives, adverbs and function words. Nouns are organized as topical hierarchies, verbs are organized by a variety of entailment relations and adjectives and adverbs are organized as N-dimensional hyperspaces. Each of these lexical organizations reflects a different way of categorizing experiences and the psychological complexity of lexical knowledge. The last version contains 121,962 words and 99,642 concepts.

WordNet

⏮ ⏪ ⏩ ⏭

39

## ❖ Lien

<http://babage.dia.fi.upm.es/ontoweb/wp1/OntoRoadMap/index.html>

## ❖ Exemples ouvrant sur d'autres problématiques:

- ▼ Ontologies pour des parfumeurs / œnologues / fromagers ...
- ▼ cartographie de compétences (l'information n'est pas seulement dans les livres mais aussi et surtout dans les personnes)
- ▼ génétique (masse énorme et nommage des gènes)

Lien et conclusion

⏮ ⏪ ⏩ ⏭

40