Ontology?

- Historically, ontology began (and thrives) as the field of study in philosophy that investigates "what exists": kinds of things, their properties and relationships.
- In our more humble endeavor, we say an ontology is a systematic formalization of concepts, definitions, relationships, and rules that captures the semantic content of a domain in a machine-readable format.
- Machine readable information is much more useful than machine processed (archived); it allows:
  - automatic logical "checking" [consistency, completeness, correctness, 'common sense', etc.]
  - automatic creation/extension of knowledge [not explicitly encoded]
  - automatic classification and organization
  - automatic search, discovery and association
    - internal [within the system]
    - local [within a distributed team]
    - global [on the Semantic Web]
  - "natural language" interaction
  - interaction with knowledge based tools.....

Quality

Production Efficiency

Program and System Management

Growth

Ontology 101

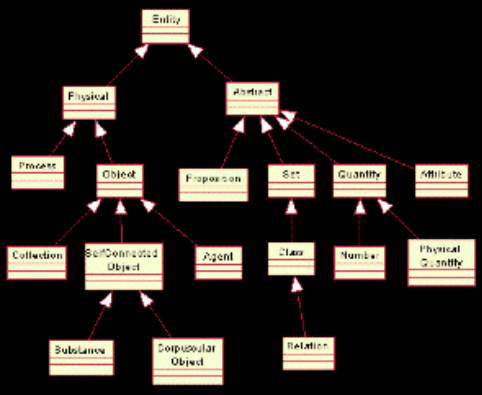
- Determine the purpose of the ontology
  - who will use it?
  - what questions will they ask it?

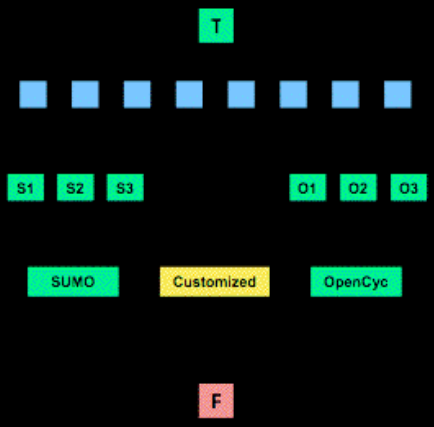
  - what statements will they want to make?
  - what problems will it be applied to?
- List and organize the basic concepts and relations

- Define the basic concepts and relations
- Check and refine
  - OntoClean
  - Racer

Borrowing the Wheel...

- OpenCyc, SENSUS, SUMO
- OWL & UML modelling languages
- OpenSource Tools and Engines
- Re-use of public domain ontologies





http://ontology.teknowledge.com/Phytila/Phytila-SUMO.html

OpenCyc

- Top-Level Ontology
  - respected point of departure
  - re-use vs re-invention
- Open Source subset of the Cyc "common sense" ontology
- 20+ years in development
- AbstractInformation vs InformationBearingObject
  - explicit distinction between "assigned meaning" and "document"

Ontologies Should Create Iluminating Distinctions

- An Ontology needs to prove its power by making distinctions that illuminate
- OpenCyc's difference between AbstractInformation and InformationBearingObject
  - AbstractInformation is the content and information
  - InformationBearingObject is a physical manifestation (e.g. a document)
  - An InformationBearingObject contains information but is not per se information.
- Enables to distinguish between
  - Database-AbstractContent = abstract repositories of information
  - Database-Physical = an Information Bearing Object (IBO) that stores many pieces of information, organized for easy scanning and access, i.e. some particular, tangible copy of a database.

Ontologies Should Enable Useful Classifications

- For example, how should we define military plans, orders, requests, reports and pictures?
- Military plans, orders, and requests are clearly abstract information
  - Can be realized into many different InformationBearingObjects (e.g. electronic and printed versions)
- Military pictures are better defined as InformationBearingObjects
  - We normally refer to a physical realization (e.g,. the picture file acquired by a UAV) rather than the abstract picture it contains
- Reports (and manuals, etc.) have a dual character
  - Sometimes we mean the physical printed copy distributed (an IBO), sometimes the report content (AbstractInformation).

Complementary Ontologies

- Military Communication
- Military Organizations
- Time*
- Spatial Relations*
- Military Capability
- Military Assets
- C2
- Military Effects

* Open Source/Public Domain

Links

John Sowa's Ontology Site: http://www.jfsowa.com/ontology/index.htm

IEEE Standard Upper Ontology Working Group (SUO WG) - Home Page: http://suo.ieee.org/

Open Cyc Home Page: OpenCyc.org

Ontology Driven Architectures and Potential Uses of the Semantic Web in Software Engineering: http://dl-web.man.ac.uk/~panz/swse/ODA08.htm

Swoogle: http://swoogle.umbc.edu/index.php

Ontosaurus: http://sevak.isi.edu:8000/loom/shuttle.html

The Protégé Ontology Editor and Knowledge Acquisition System: http://protege.stanford.edu/