

What is an Ontology?

What do you understand about the ontology that has been presented for your reading this week?

Semantic Web Technologies
Lecture 4:
Knowledge Representation I
02: Ontologies in Computer Science
Dr. Harald Sack
OPEN HPI Hasso Plattner Institut

The Concept of Ontology in Computer Science

"An ontology is an explicit, formal specification of a shared conceptualization. The term is borrowed from philosophy, where an Ontology is a systematic account of Existence. For AI systems, what 'exists' is that which can be represented."

Thomas R. Gruber: A Translation Approach to Portable Ontology Specifications, Knowledge Acquisition, 5(2):199-220, 1993.

conceptualization:	abstract model (domain, identified relevant concepts, relations)
explicit:	meaning of all concepts must be defined
formal:	machine understandable
shared:	consensus about ontology

tomgruber.org
important
service
First
HPI

According to Alsanad et al (2019), "Ontologies:

- offer a formal representation of knowledge.
- assist in checking for inconsistency and incompleteness, as well as define a common vocabulary in a specific domain with the purpose of sharing information via the inclusion of basic domain concepts and also the relations between these concepts.
- There are some motivations for building an ontology, some of which are sharing a common understanding of the structure of information between stakeholders, allowing the reuse of domain knowledge, and making explicit domain assumptions that will allow assumptions to be changed easily when the domain knowledge is changed [3].
- In addition, separating domain knowledge from operational knowledge will allow the use of operational knowledge in different domains.
- Building an ontology will also facilitate the analysis of domain knowledge, which in turn will greatly help in reusing existing ontologies [4].
- Particularly for software engineering, ontologies have many advantages such as using the same terminology between software developers for different software applications [5] and, more specifically in software requirements engineering, ensure requirements consistency and facilitate communication between requirements engineers [6]."

In short, to reduce misunderstandings and misinterpretations, involved parties/stakeholders can use an agreed-upon, well-defined conceptual base (ontology).

Could you attempt to define an ontology that would be relevant to the system that you are designing for the summative assessment?

According to Neji H. & Bouallegue R. (2012), the "Ontology development process consists of the various steps: (1) identify the purpose and scope of the Ontology (what and what not to include); (2) perform a feature analysis for the domain to be created and tools/features to be added; (3) collect similar characteristics between different feature models, establish affinity relationships, and group commonalities between the two tools in order to build a federation Ontology representing these commonalities and enter this Ontology into Protégé 4.1". (4) construct the more detailed Ontologies for each tool in Protégé 4.1; (5) use the Unified Modeling Language (UML) to represent the relationships between the three Ontologies, and (6) Document the Ontologies.

According to Alsanad et al (2019), a competency questionnaire can also be created."

According to Gonzalez-Perez C. et al (2006), the common conceptual base, or ontology must have the following properties.

- It must be complete, so that no area of software development lacks coverage. [e.g look at the different activities performed within software development enterprises, and by ensuring that the ontology covers all of them]
- It must be unambiguous, so that misinterpretations are avoided. [Ambiguity can be avoided by providing simple and concise definitions for each concept, as well as a semi-formal model of the complete ontology. This semi-formal model is, in our case, an object-oriented class model that shows the structure of the ontology]
- It must be taken from the appropriate domain, so that concepts are familiar and intuitive to their users.
- It must be as generic as possible, so that different usages in different contexts are possible.
- It must be extensible, so that new concepts can be added to it without breaking the existing one

SE Ontology: Problem Exploration –
Requirements, Design, Implementation, Testing

Sources:

Alsanad et al (2019), "A Domain Ontology for Software Requirements Change Management in Global Software Development Environment", IEEE
[<https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=8684236>]:

Gonzalez-Perez C. et al (2006), "An Ontology for Software Development Methodologies and Endeavours", Springer.

Neji H. & Bouallegue R. (2012) "ONTOLOGY FOR MOBILE PHONE OPERATING SYSTEMS", *International Journal of Wireless & Mobile Networks (IJWMN)* Vol. 4, No. 3. Available from: <https://arxiv.org/ftp/arxiv/papers/1207/1207.2606.pdf> [Accessed 05 January 2022]