# Ontology Evaluation Criteria

Asunci´on G´omez-P´erez lists the following criteria (G´omez-P´erez, 2004):

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| **Criteria** |  |
| **Consistency:** capturing both the logical consistency (i.e. no contradictions can be inferred) and the consistency between the formal and the informal descriptions (i.e. the comments and the formal descriptions match) |  |
| **Completeness**: All the knowledge that is expected to be in the ontology is either explicitly stated or can be inferred from the ontology. |  |
| **Conciseness**: if the ontology is free of any unnecessary, useless, or redundant axioms |  |
| **Expandability**: refers to the required effort to add new definitions without altering the already stated semantics. |  |
| **Sensitiveness**: relates to how small changes in an axiom alter the semantics of the ontology. |  |

Thomas Gruber defines the following criteria (Gruber, 1995):

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| **Criteria** |  |
| **Clarity**: An ontology should effectively communicate the intended meaning of defined terms. Definitions should be objective. When a definition can be stated in logical axioms, it should be. Where possible, a definition is preferred over a description. All entities should be documented with natural language |  |
| **Coherence**: Inferred statements should be correct. At the least, the defining axioms should be logically consistent. Also, the natural language documentation should be coherent with the formal statements |  |
| **Extendibility**: An ontology should offer a conceptual foundation for a range of anticipated tasks, and the representation should be crafted so that one can extend and specialize the ontology monotonically. New terms can be introduced without the need to revise existing axioms. |  |
| **Minimal encoding bias**: An encoding bias results when representation choices are made purely for the convenience of notation or implementation. Encoding bias should be minimized, because knowledge-sharing agents may be implemented with different libraries and representation styles. |  |
| **Minimal ontological commitment**: The ontology should specify the weakest theory (i.e. allowing the most models) and defining only those terms that are essential to the communication of knowledge consistent with that theory. |  |

Obrst et al. name the following criteria (Obrst et al., 2007):

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| **Criteria** |  |
| **Coverage** of a particular domain, and the richness, complexity, and granularity of that coverage |  |
| **Intelligibility** to human users and curators |  |
| **Validity and soundness** |  |
| Evaluation against the **specific use cases**, scenarios, requirements, applications, and data sources the ontology was developed to address |  |
| **Consistency** |  |
| **Completeness** |  |
| The sort of **inferences** for which they can be used |  |
| Adaptability and reusability for wider purposes |  |
| Mappability to upper level or other ontologies |  |

Gangemi et al. define the following criteria (Gangemi et al., 2005

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| **Criteria** |  |
| **Cognitive ergonomics:** this principle prospects an ontology that can be easily understood, manipulated, and exploited. |  |
| **Transparency (explicitness of organizing principles):** this principle prospects an ontology that can be analyzed in detail, with a rich formalization of conceptual choices and motivations. |  |
| **Computational integrity and efficiency**: this principle prospects an ontology that can be successfully/easily processed by a reasoner (inference engine, classifier, etc.). |  |
| **Meta-level integrity:** this principle prospects an ontology that respects certain ordering criteria that are assumed as quality indicators. |  |
| **Flexibility (context-boundedness):** this principle prospects an ontology that can be easily adapted to multiple views. |  |
| **Compliance to expertise:** this principle prospects an ontology that is compliant to one or more users. |  |
| **Compliance to procedures for extension, integration, adaptation, etc.:** this principle prospects an ontology that can be easily understood and manipulated for reuse and adaptation. |  |
| **Generic accessibility (computational as well as commercial):** this principle prospects an ontology that can be easily accessed for effective application. |  |
| **Organizational fitness:** this principle prospects an ontology that can be easily deployed within an organization, and that has good coverage for that context. |  |

Summarized above criteria’s into a concise set.

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| **Criteria** |  |
| **Accuracy:** A higher accuracy comes from correct definitions and descriptions of classes, properties, and individuals. |  |
| **Adaptability** measures how far the ontology anticipates its uses |  |
| **Clarity** measures how effectively the ontology communicates the intended meaning of the defined terms |  |
| **Completeness** measures if the domain of interest is appropriately covered |  |
| **Computational efficiency** measures the ability of the used tools to work with the ontology, in particular, the speed that reasoners need to fulfil the required tasks, be it query answering, classification, or consistency checking. |  |
| **Conciseness** is the criteria that state if the ontology includes irrelevant elements with regards to the domain to be covered or redundant representations of the semantics. |  |
| **Consistency** describes that the ontology does not include or allow for any contradictions |  |
| **Organizational fitness** aggregates several criteria that decide how easily an ontology can be deployed within an organization. |  |