

QUOMOS Project - FAQ

What is QUOMOS ?

QUOMOS is an ontology of quantities, units and measures.

What is the QUOMOS Project?

QUOMOS is a new project for formalization of Units of Measure in a new standard. It is not changing any measuring system or elements thereof – it is only formalizing the coding to make it computer sensible. It will enable more efficient searching and information exchange. The project is under the leadership of Dr Steve Ray and includes well know experts from around the globe.

What is an ontology?

An ontology is a formalized description of a collection of related concepts, written in a logic-based formalism designed for machine processing. Ontologies are used to embody agreements on technical meanings of concepts within a community of practice, or to support e-commerce. Compared to traditional 'controlled vocabulary' or 'data schema' approaches, ontologies give much wider scope, greater precision, support advanced software processing, and give immediate advantages of interoperability and information transfer; but, like computer software, they require specialized technical skills and time to create.

Toward Ontology-based Standards

Members of the Ontology Community and the Standards Community got together in the Spring of 2009 for a series of activities (spanning 3-months of virtual discourse that culminated in a 2-day symposium at NIST and a published Communiqué.) [ref. 2] The Summit conveners unanimously endorsed the application of ontology science and engineering to standards, recommending that standards which have traditionally been written in natural languages (say, in English), be expressed, both in natural language (as it has always been) and (additionally, in parallel) in the form of an ontology. Benefits that may be gained from this approach include:

- * Improved quality
- * Easier implementation
- * Improved conformance checking
- * Improved integration and interoperability
- * Increased precision and rigor
- * Improved search and discovery
- * Reuse of standards
- * Reduced ambiguity and misinterpretation
- * Easier management of standards and applications

The preliminary work on QUOMOS (prior to its official induction as an SDO activity) was among one of the "sample projects" that came out of Ontology Summit 2009. (ref. [3])

Is this for real?

Yes. Ontological techniques are being actively used in bioinformatics, medical informatics, process industries, e-commerce and several recent 'open government' initiatives. They complement and extend traditional database technology in new ways, overcoming crippling problems of translation between rival formats and schemas. The 'semantic web' initiative sets standards for world-wide publication, Web access and use of simple ontologies used to link together multiple information sources. It is estimated that approximately a billion pieces of such linked information are now available, and the number is increasing rapidly. The availability of standardized formalisms (for Web use: RDF, OWL, SPARQL) is the key enabling factor.

"Ontology" sounds like philosophy rather than commerce.

The idea originated in the use of formal logics for 'knowledge representation' in artificial intelligence laboratories in the 1980s, and some of that work was being done by philosophical logicians, hence the rather exotic terminology. But ontology engineering (as it is now called) is a technical field which is driven by applications, with a primary focus on achieving interoperability of knowledge-based computations. Still, that said, many of those philosophical logicians are now active in this area, and bring a vital sense of conceptual clarity to these efforts. This is a large part of what makes ontology engineering so useful.

There are already many efforts devoted to standardizing units and quantities, why do we need another?

QUOMOS is not "another" in this sense. Take VIM (International Vocabulary for Metrology), for example. QUOMOS does not set out to replace or compete with VIM: on the contrary, QUOMOS will as far as possible simply re-use and confirm the notions defined by the VIM standard. But it will provide a logical formalization of the underlying ideas (which can test for internal consistency, be used by software to draw conclusions and check data formats, compiled to software which performs unit conversions, etc..) and, most significantly, relate them precisely to concepts described in other units/ measures/ quantities standards, such as ISO 2955:1983 (the International 'SI units'), NASA's QUDT and the UCUM unit-conversion system. The purpose of an ontology such as QUOMOS is not to replace or obsolete existing standards, but to provide a higher-level, wider-scope conceptual framework which relates them all together into a single framework in a way that can be checked, processed and manipulated by software so as to guarantee that concepts do not become distorted or mis-transcribed when the various terminologies are used together. The use of a formal descriptive logic provides the right level of abstraction to achieve precision without sacrificing

generality. (QUOMOS will use ISO Common Logic, the new Web standard OWL-2 and UML, widely used in industrial applications.)

In this particular area, it is notable that various existing standards each embody a particular view of quantities, measurements, dimensions and units. Physics-based standards may disagree about whether angle is a dimension; most science-based systems do not recognize the kinds of dosage measures that are widely used in pharmacology, or such engineering notions as Rockwell hardness; and so on. The goal of QUOMOS is to cover all of these within one comprehensive set of concepts, described with absolute logical precision. Analyzing and reconciling such conceptual mis-matches are what ontology engineering is all about.

Who is driving the development?

Modern ontology engineering work in the 1980s emerged from US research laboratories largely funded by DARPA, which also supported the pioneering DAML program in 2000-2002, which became the basis for the now standard OWL formalism for the semantic web initiative. After the DAML program, however, virtually all funding in this area was eliminated from US agencies budgets, while the EEC invested hundreds of millions of Euros in extended development support during the last decade, creating entire new centers in Ireland, Germany, the UK and Italy. The few large US centers of ontology work are still experiencing funding crises, while European centers continue to grow. The bulk of the new ideas come now from Italy (Genoa), Germany (Karlsruhe), England (Oxford and Southampton) and Ireland (DERI, in Galway.) Even private US funding sources are largely directed towards supporting European initiatives.

(This appears to be due to a perception in US agencies that this is 'standards' work, rather than R&D, and as such should be performed by the private sector. But this dichotomy is completely inadequate to deal with the situation of setting 'standards' for open communities of practice and especially for the Web, where industrial and commercial investment relies upon the prior creation of appropriate standards (HTML, HTTP, XML, RDF, OWL,...) which define the infrastructure necessary as a prerequisite for commercial activity. These are driven more by a synergy between funded academic research and venture capital than by consortia of established industries.)

References:

- [1] http://www.oasis-open.org/committees/tc_home.php?wg_abbrev=quomos
- [2] http://ontolog.cim3.net/cgi-bin/wiki.pl?OntologySummit2009_Communique
- [3] http://ontolog.cim3.net/cgi-bin/wiki.pl?UoM_Ontology_Standard