INTERNATIONAL HEALTH TERMINOLOGY
STANDARDS DEVELOPMENT ORGANISATION

SemanticHealthNet
A Semantic Infrastructure Towards Semantic Interoperability

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Audience

People interested in semantic interoperability of clinical information, in particular in the use of electronic health record (EHR) standards, terminology standards like SNOMED CT, and formal ontologies.

Objectives

To show the importance of formally expressing the meaning of clinical information; to differentiate between their structural and semantic representations; and to demonstrate the possibility to represent them in a meaningful way, based on ontologies and mediated by semantic patterns and appropriate tools.

Abstract

The consistent use of terminology and EHR systems is essential to achieve semantic interoperability and to enable the exploitation of clinical data. However, it is not realistic to expect that all healthcare systems will use the same EHR representation and terminology systems. Diverging, often proprietary models, terminologies and value sets will continue characterising the clinical information landscape.

The European SemanticHealthNet network (http://www.semantichealthnet.eu/) addresses this challenge by proposing the formal ontologies as harmonization tools, which provide a homogeneous access point to heterogeneous representations of clinical information. To this end, SemanticHealthNet proposes a semantic infrastructure consisting of an *ontological framework* and a set of ontology content patterns (i.e. *semantic patterns*) that use this framework as reference.

The framework consists of three kinds of ontologies: (i) the top-level ontology BioTopLite, (ii) a small information entity ontology, and (iii) the medical domain ontology SNOMED CT, all of them expressed in description logics using the Semantic Web standard OWL DL. Some of the SNOMED concepts used are re-interpreted [1] in order to clarify their meaning. Results of this re-interpretation are fed back to the SNOMED CT curators.

Semantic patterns provide close-to-user representations, thus facilitating the binding of ontological expressions to clinical models, without in-depth ontology engineering skills. Our assumption is that a great variety of clinical models can be represented by the specialization and composition of a limited set of semantic patterns. Instantiated patterns then translate into OWL-DL ontologies. The initial results obtained as outcome of the ontology-based representation of a heart failure summary report, demonstrated the feasibility of this approach. Other potential uses of semantic patterns have to be further investigated. We are aware of the challenges involved in the uptake of such an approach and that implementation decisions might reduce the functionality in order to facilitate implementation and computation.

References

1. Martínez-Costa C; Schulz S. Ontology-based reinterpretation of the SNOMED CT context model. Proceedings of the 4th International Conference on Biomedical Ontology. CEUR Workshop Proceedings 2013; 1040:90-95.