

Post-Coordination in the Mapping of Interface Terms of a Clinical Wound Documentation System to SNOMED CT

Martin Boeker^a, Stefan Schulz^a, Thilo Schuler^{a,b}

^a Dept. of Medical Biometry and Medical Informatics,

University Medical Center Freiburg,

^b Department of Dermatology,

University Medical Center Freiburg, Germany

martin.boeker@uniklinik-freiburg.de

The objective of this work is to provide a formalization of the semantics of SNOMED CT's refinement rules in Description Logics and to exemplify their usage on a real world wound documentation system.

The goal of unambiguous documentation and communication of medical information with explicit semantics can be reached by combining standards and terminologies. Information Models (e.g. the HL7 Clinical Document Architecture on Level 3) together with terminology systems (e.g. LOINC and SNOMED CT) are promising candidates for building a semantically interoperable framework for electronic health records.

We investigated how LOINC and SNOMED CT concepts can unambiguously and completely cover user interface terms of an existing electronic, form-based documentation system used in clinical dermatology. Especially, the feasibility of post-coordinating complex expressions according to the SNOMED CT terminology model is target of our investigations. Besides analyzing completeness and uniqueness of the mappings and the user-friendliness of the mapping process, we discuss the different ways of post-coordination (refinement types) presented in SNOMED CT's technical documentation. Where post-coordination was required, we adhered to the SNOMED CT terminology model refinement types and the "SNOMED Compositional Grammar" syntax.

The manual mapping process proved to be time consuming and prone to ambiguous solutions where post-coordination of SNOMED CT expressions was necessary. However, for most user interface terms a complete semantic representation could be generated. A coverage of nearly 100% of clinical user interface terms shows the appropriateness of SNOMED CT as a reference terminology for the domain under scrutiny. The natural language descriptions of refinement types in the SNOMED CT documentation were formalized in Description Logics and reduced to four basic patterns.

Problems with coding and post-coordination can be explained by weak documentation and poor tool support. The structure of the documentation forces users to collect necessary information from several SNOMED CT reference documents. Although mechanisms for post-coordination allowed to express a substantial amount of terms we suggest that tool support and formalized documentation for post-coordination (refinement) is enhanced. Tool support should reduce browsing complexity, support post-coordination and give clear advice how to use SNOMED CT according to the SNOMED CT compositional grammar and refinement rules. Furthermore, we recommend a thorough redesign of the post-coordination guidelines which entails the clarification of SNOMED CT's logical and ontological foundations.