

# Challenges in archetypes terminology binding using SNOMED-CT compositional grammar: the Norwegian patient summary case

## Abstract

In order to cover the requirements for interoperability in the Norwegian context, we studied the terminology binding of archetypes to terminology expressions created with the SNOMED-CT compositional grammar. As a result we identified important challenges categorized as technical, expressivity, human and models mismatch related.

## Keywords

openEHR; SNOMED-CT; Archetypes; terminology binding.

## Introduction

In order to fulfill the interoperability requirements of the Norwegian national health IT strategy in a scalable manner, machine-interpretable representation of archetype's clinical semantics is needed. As a result, we studied the feasibility of using SNOMED-CT compositional grammar to build semantic models that distilled the implicit ontology contained in archetypes [1] (i.e. leaving data constraints aside).

## Methods

In collaboration with the National Editorial Group of Archetypes (NRUA) we selected the most representative archetypes of the Norwegian patient summary. For each archetype, terminology binding was attempted by creating a projection of its clinical semantics using the SNOMED-CT compositional grammar. When some element/section of the archetype could not be represented using a SNOMED-CT expression, we defined a new expression and tagged the cause. Additionally, when a blocker caused by the complexity of the process, lack of tooling etc. was found, we tagged it. Afterwards we reviewed all the tags and classified them into categories of challenges.

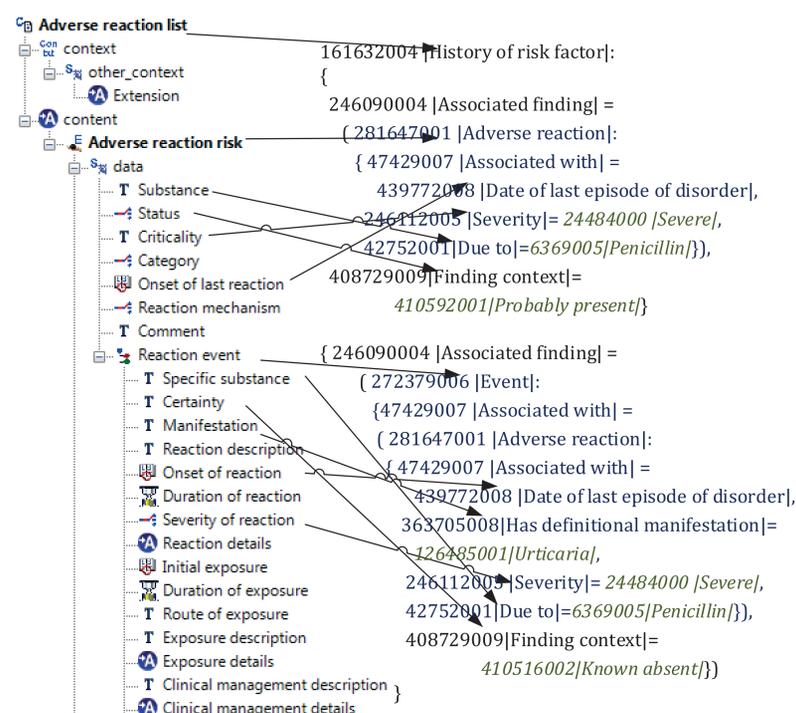
## Results

Four types of challenges were identified:

**Technical challenges** were related to: a) lack of support in archetypes to include verbose post-coordinated expressions in their term\_bindings section; b) lack of tooling to assist the binding process suggesting valid concepts/attributes while building the terminology expression.

**Expressivity challenges** were related to: a) variation of the original meaning of the archetype element introduced by the terminology concept; b) lack of expressiveness of SNOMED-CT context model; c) lack of candidates in SNOMED-CT to represent some archetype elements.

**Human challenges** were related to: a) doubts in determining which sections of the archetype should be represented in the SNOMED-CT expression; b) selecting the appropriate terminology hierarchy (e.g. represent blood pressure with the concept from Observable Entity or Clinical Finding hierarchies).



**Models mismatch challenges** were related to: a) alignments of the archetype contextual information and the SNOMED-CT context model; b) low coverage in SNOMED-CT for the attributes in the protocol section; c) overlap of semantics in the archetype (the archetype Problem\_Diagnosis corresponds to two concepts from different hierarchies in SNOMED-CT).

## Discussion

The results show that major challenges are present when representing archetype's clinical semantics as SNOMED-CT expressions. First, technical challenges show that clinical modelers need to clarify if post-coordinated expressions should be placed within the archetype definition. An alternative is to let terminology specialists maintain complex expressions in external repositories and use Linked Data principles to reference them [2]. Second, expressivity challenges show that better guidelines elicited by archetypes and SNOMED-CT editors are needed to determine what elements can be bound to SNOMED-CT expressions, and what elements should be bound to other domain ontologies (if needed). Thirdly, technical and human challenges show that defining and binding SNOMED-CT expressions requires support tooling. However, further investment in this kind of tools [3] is needed to allow them supporting such functionality.

## References

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