3.3. Substrate

An important consideration in the development of a Clinical Decision Support System (CDSS) is the *substrate* over which the knowledge artifacts are authored and executed. When using SNOMED CT in a CDSS, the *substrate* is the SNOMED CT content over which the CDS rules are authored or executed. Because medical knowledge is constantly changing, it is important that the substrate over which CDS is applied is kept current. To support this requirement, SNOMED CT releases regular new versions of the terminology, and retains a history of changes using its strong versioning mechanism. With this in mind, both the SNOMED CT edition and the specific version of that edition (released on a given date) need to be considered in determining the SNOMED CT substrate. For more information on the topic of versioning, please refer to section 11.4 Versioning in the guide Data Analytics with SNOMED CT.

Knowledge Artifact Substrate

When publishing CDS knowledge artifacts, such as rules or guidelines, it is important to clearly indicate the substrate over which the artifacts were authored. The substrate used to author a CDS artifact needs to be considered when determining the appropriate substrate to use in the execution of that artifact.

For example a CDS rule, using the SNOMED CT US edition, dated 20160901 (September 1st 2016), may refer to the concept 5281000124103 | Persistent asthma| . If this rule was executed against the SNOMED CT International Edition (20170131), then this extension concept would not be found, and the rule could not be executed.

Similarly, a CDS rule using the International edition (20170131) may refer to the concept 721039003 | Dual energy computed tomography| . If the rule was executed against the 20160731 International edition (or an older version), then this concept (created in the 20170131 version) would not be found, and the rule could not be executed. This would also be true if the same CDS rule was executed against the US edition (20160901), because this edition is dependent on the 20160731 International edition.

Therefore, CDS knowledge artifacts referencing SNOMED CT concepts must be executed (by the inference engine) using a SNOMED CT substrate that includes the same modules, or a superset of the modules included in the SNOMED CT substrate used to author the artifact. In addition, the SNOMED CT substrate used to execute the CDS artifacts must use the same version, or a more recent version of these SNOMED CT modules, to ensure that all the referenced concepts are present. Please note that if a newer version of the substrate is used to execute the rules, then it is possible that a concept or relationship used at the time of artifact authoring may have become inactive. Edition and version dependencies such as these should be checked when adopting new CDS artifacts or updating a CDS system to use a newer version of SNOMED CT.

Electronic Health Record Substrate

Another consideration when selecting the SNOMED CT substrate on which to execute CDS artifacts, is the substrate used to record data in the Electronic Health Record (EHR).

For example, if a CDS rule is triggered when the diagnosis recorded in the EHR is a descendant of 195967001 | Asthma| , that is: IF < 195967001 | Asthma| THEN ... and this rule is executed over the SNOMED CT International edition, dated 20170131 (January 31st 2017), then EHR records which capture a diagnosis of 5281000124103 | Persistent asthma| from the SNOMED CT US edition (20160901) will be unsuccessful in triggering the CDS rule.

Similarly, if a CDS rule is triggered when the diagnosis recorded in the EHR is a descendant of 19829001 | Pulmonary disease| , that is: IF < 19829001 | Pulmonary disease| THEN ... and this rule is executed over the US edition (20160901), then EHR records which capture a diagnosis of 12240951000119107 | Squamous cell carcinoma of left lung| will be unsuccessful in triggering the CDS rule. This is because the US edition (20160901) is dependent on the International edition (20160731), and the concept referenced above was added to the International edition (20170131).

Therefore, CDS knowledge artifacts must be executed (by the inference engine) using a SNOMED CT substrate that includes the same modules, or a superset of the modules used by the EHR system to record patient data. In addition, the SNOMED CT substrate used to execute the CDS knowledge artifacts must use the same or a more recent version of these SNOMED CT modules, to ensure that all the referenced concepts are present. Please note that if a newer version of the substrate is used to execute the rules, then it is possible that a concept recorded in the EHR may have become inactive. Edition and version dependencies such as these should be checked when implementing new CDS rules over existing EHR data or updating a CDS system to use a newer version of SNOMED CT.