# Guidance on Overlaps between RIM and SNOMED CT Semantics

Introduction

When used together, SNOMED CT and HL7 often offer multiple possible approaches to representing the same clinical information. This need not be a problem where clear rules can be specified that enable transformation between alternative forms. However, unambiguous interpretation and thus reliable transformation depends on understanding the semantics of both the RIM and SNOMED CT and having guidelines available to manage areas of overlap or apparent conflict.

Table 1: Key to phrases used in this section

|  |  |  |
| --- | --- | --- |
| Phrase | Meaning | Examples |
| *[RimClass]* class  | The HL7 Version 3 Reference Information Model class named *[RimClass]*.  | "Act class" - refers to the RIM class Act as specified in the RIM. |
| *[RimClass]* class specialization  | Any class in the RIM that is a specialization of the named *[RimClass]*.  | "Act class specialization" - refers to any RIM class that is modeled as a specialization of Act in the RIM. For example, the "Observation class". |
| *[RimClass]* class clone  | A class in a constrained information model (e.g. an DMIM, RMIM, HMD or template) that is derived from one of the following: * the named *[RimClass]*
* a *[RimClass]* class specialization.
 | "Observation class clone" - refers to any design time constraint on the Observation class. This may be part of a domain model, a message design specification or a template.  |
| *[RimClass]* class instance  | An instance of information structured in accordance with one of the following: * the named *[RimClass]*
* a *[RimClass]* class specialization
* a *[RimClass]* clone.
 | "Act class instance" - refers to an instance of run time information structured in accordance with either the Act class or any specialization or constraint applied to the Act class.  |
| *[RimClass]*.*[Attribute]* | The named *[Attribute]* in any of the following: * the named *[RimClass]*
* a *[RimClass]* class specialization
* a *[RimClass]* clone
* a *[RimClass]* instance
 | "Act.code" refers the "code" attribute of either the Act class itself or of an Act class specialization (.e.g. Observation, Procedure).In contrast, "Observation.code" refers specifically to the "code" attribute of an Observation class.  |
| SNOMED CT expression | One or more SNOMED CT concept identifiers used to represent meaning. | See the examples for "Pre-coordinated expression" and "Post-coordinated expression" in the following two rows. |
| Pre-coordinated expression | A SNOMED CT expression containing only one SNOMED identifier. In an HL7 attribute any of the coded data types can be used to represent a pre-coordinated expression.  | <value code="195967001 | asthma |" codeSystem="2.16.840.1.113883.6.96"/> |
| Post-coordinated expression | A SNOMED CT expression containing more than one SNOMED identifier. In an HL7 attribute the Concept Descriptor (CD) data type is used to represent a post-coordinated expression.  | <value codeSystem="2.16.840.1.113883.6.96" code="195967001 | asthma |:246112005 | severity | =24484000 | severe |"/> |

Attributes

Act.classCode

The Act.classCode is a structural code which specifies the general nature of the Act. Its values are drawn from the HL7 ActClass code system.

Potential Overlap

The RIM definition of Act.classCode is “The major class of Acts to which an Act-instance belongs”. Accordingly, Act.classCode has the effect of specializing the Act class, and therefore it also necessarily constrains the concept domains that apply to other coded attributes of that class (particularly Act.code). If a SNOMED CT expression is used to encode the value of Act.code or any of the coded attributes of the class, the meaning of the expression must be appropriate to the constrained conceptual space that is established by the value of Act.classCode (which should also be consistent with the vocabulary binding to a particular concept domain or value set).

Rules and Guidance

The concept domain constraints applicable to specific SNOMED CT encoded attributes of different HL7 classes are specified in SNOMED CT Concept Domain Constraints (§ **Error! Reference source not found.**).

Discussion and Rationale

The rationale for the concept domain constraints applicable to particular HL7 classes are discussed in SNOMED CT Concept Domain Constraints (§ **Error! Reference source not found.** ). This is supplemented by detailed aspects of issues with a vocabulary specification formalism (§ **Error! Reference source not found.**), which discusses different ways in which constraints may need to be expressed to take account of the SNOMED CT terminology model.

Act.code (applicable to all Act class specializations)

The Act.code represents a refinement of the Act.classCode and expresses the specific nature of the Act.

 Potential Overlap

A SNOMED CT expression can be used in the Act.code to represent the nature of the action (e.g. using concepts from the Procedure hierarchy).

Rules and Guidance

The following rules are intended to support validation and consistent interpretation of the Act.code attribute where SNOMED CT is used.

1. In a constrained information model or template that permits or requires the use of SNOMED CT to represent the nature of an Act class clone:
* the Act.code attribute SHOULD permit the use of the Concept Descriptor (CD) data type.
	+ This is required to allow inclusion of post-coordination where appropriate (via qualifiers in CDA R2 using the R1 CD datatype, and full compositional grammar expressions with the R2 CD datatype).
* the Act.code attribute MAY be constrained to an HL7 data type that prohibits qualifiers, only if there is known to be no requirement for representation of meanings that might require the use of post-coordinated expressions.
1. In an Act class instance where the Act.code attribute is a SNOMED CT expression
* the expression SHOULD represent a type of [ <<363787002 | observable entity |] or [ << 71388002 | procedure |], with application of the SNOMED CT Context Model when appropriate.

Discussion and Rationale

The use of Act.code in Act class specializations other than Observation is generally straightforward, as described above.

**Note:** Additional guidance for the Observation class (a specialization of Act) is provided below in section 2.2.3.

Observation.code and Observation.value

Follow 2.2.2.2 Rules and Guidance when using SNOMED CT in the Act.code attribute of Act class specializations other than Observation. Section 2.2.3 provides additional guidance for using SNOMED CT in the Observation.code and Observation.value attributes.

Potential Overlap

A SNOMED CT expression (a single concept identifier, or, when required, a post-coordinated exppression) can be used in Observation.code to represent the nature of the observation (using concepts from the Observable entity or Procedure hierarchy). For specific implementations it is often preferred to constrain the Observation.code value set to a predefined set of pre-coordinated concepts.

In cases where an observation results in a non-numeric result this can also be represented using a SNOMED CT expression. Actions involving measurement of a quantity or observation of a specified quality can readily be represented using this pair of attributes. The SNOMED CT context model may be applied to Clinical findings.

Some kinds of observation are typically expressed in a way that does not specify the observation action but merely asserts a result (or finding). In these cases the asserted result is fully specified and does not require a detailed indication of the action taken (e.g. "abdomen tender", "past history of renal colic", etc.). SNOMED CT supports representation of these assertions in a single expression using concepts from the [ <<404684003 | clinical finding |] and [ 413350009 | finding with explicit context |] hierarchies.

Several different ways of representing the same information exist using different combinations of the Observation.code and Observation.value. Unconstrained use of the alternatives presents a major challenge for computation of semantic equivalence and for safe interpretation of observations origination from different applications and users. For example the following instances could reasonably represent the same case:

* <observation>
 <code code=[Examination]/>
 <value code=[Abdomen tender]/>
 ...
</observation>
* <observation>
 <code code=[Abdominal examination]/>
 <value code=[Tenderness]/>
 ...
</observation>
* <observation>
 <code code=[Abdominal tenderness]/>
 <value code=[found]/>
 ...
</observation> (Note: this last example is violating TermInfo recommendations)

Rules and Guidance

The following rules are intended to support validation and consistent interpretation of particular combinations of the Observation.code and Observation.value attributes where SNOMED CT is used. The general rules and guidance for the use of Act.code also apply, as described above in section 2.2.2.2.

##### Recommended (normative) rules

1. In a constrained information model or template that permits or requires the use of SNOMED CT to represent the result of an Observation class clone:
* The vocabulary constraint contained in the Vocabulary Declaration of the Observation.code attribute SHALL permit the use of the code value "[ASSERTION](#Observation_code_ASSERTION)" (from the HL7 ActCode code system [2.16.840.1.113883.5.4]).
* the Observation.value attribute SHOULD permit the use of the Concept Descriptor (CD) data type.
	+ This is required to allow inclusion of post-coordination where appropriate (via qualifiers in CDA R2 using the R1 CD datatype, and full compositional grammar expressions with the R2 CD datatype).
* the Observation.code and Observation.value attributes MAY be constrained to a data type that prohibits qualifiers, only if there is known to be no requirement for representation of meanings that might require the use of post-coordinated expressions.
1. In an Observation class instance where the Observation.code attribute is a SNOMED CT expression:
* the expression SHOULD represent a type of [ <<363787002 | observable entity |] or [<<386053000 | evaluation procedure |],
with application of the SNOMED CT Context Model when appropriate.
1. In an Observation class instance where the Observation.code is the HL7 code "ASSERTION" and the Observation.value is represented by a SNOMED CT expression:
* the concept represented SHALL be a type of [ <<404684003 | clinical finding |], [ <<413350009 | finding with explicit context |] or [ <<272379006 | event |], with application of the SNOMED CT Context Model when appropriate.
1. An Observation class instance in which the Observation.value is a SNOMED CT expression representing a [ <<404684003 | clinical finding |] or a [ <<413350009 | finding with explicit context |] SHALL NOT contain an Observation.code which when interpreted with the Observation.value yields a meaning that is substantially different from the meaning implied if the Observation.code was "ASSERTION".
* For example, an Observation.code meaning "Past history" or "Family history" may substantially alter the interpretation of a [ <<404684003 | clinical finding |] and should not be used in this way. Instead the SNOMED CT context model should be used to capture these significant differences in meaning.

##### Deprecated or non-recommended forms

1. In an Observation class instance where the Observation.code attribute is a SNOMED CT expression representing a [ <<404684003 | clinical finding |] or [ <<413350009 | finding with explicit context |], if the Observation.value is omitted, the Observation SHALL be interpreted as semantically equivalent to the same SNOMED CT expression in the Observation.value attribute with the Observation.code "ASSERTION" (see point 3 above).
* This deprecated form of representation is permitted to support backward compatibility with existing implementations.
* For example:
	+ <observation><code code=[ 195967001 | asthma |]/>...</observation>
	+ *is treated as equivalent to*
	+ <observation><code code="ASSERTION"/><value code=[ 195967001 | asthma |]/>...</observation>
1. An Observation class instance in which the Observation.code is a SNOMED CT expression representing a [ <<404684003 | clinical finding |] or [ <<413350009 | finding with explicit context |] SHALL NOT contain an Observation.value attribute.
* If a value attribute is applied to a [ <<404684003 | clinical finding |] there are multiple possible interpretations of what that value means. For example, the possible meanings of a value applied to a clinical finding such as [ 195967001 | asthma |], [ 195114002 | acute left ventricular failure |] or [ 254838004 | carcinoma of breast |] might include severity, stage, duration, certainty, presence or absence. Thus in this context, the meaning of the value is ambiguous and open to misinterpretation. Further more, such misinterpretation might fundamentally alter the intended meaning. The SNOMED CT Concept Model and HL7 attributes provide ways to explicitly state these nuances of meaning. Therefore use of the non-specific value attribute is not appropriate.
* In contrast, a value applied to an [ <<363787002 | observable entity |] clearly represents the observed quantitative or qualitative value of the specified entity. Similarly a value applied to a [ <<386053000 | evaluation procedure |] clearly represents the quantitative or qualitative result of that measurement.
1. An Observation class instance in which the Observation.value is a SNOMED CT expression representing a [ <<404684003 | clinical finding |] or a [ <<413350009 | finding with explicit context |] MAY contain an Observation.code other than "ASSERTION" provided that the interpretation of the Observation.code together with the Observation.value does not yield a meaning that is substantially different from the meaning implied if the Observation.code was "ASSERTION". Observations of this type SHOULD be interpreted as having a meaning that is equivalent to the meaning of the same Observation.value when used with the Observation.code "ASSERTION".
* This deprecated form of representation is permitted to support backward compatibility with existing implementations.
* For example:
	+ <observation><code code=[Abdominal examination]/><value code=[Abdomen tender]/>...</observation>
	+ *does not differ significantly from the asserted observation ...*
	+ <observation><code code="ASSERTION"/><value code=[Abdomen tender]/>...</observation>
* In addition, the same Observation class instance can separately be interpreted to determine that an "abdominal examination" was carried out.
	+ In the preferred representation this information would be expressed in a separate Observation class instance because it relates to a general examination procedure which may have resulted in several distinct assertions.

Discussion and Rationale

In some cases the way that the Observation.code and Observation.value attributes are populated and interpreted has led to extensive discussions which are summarized below.

A clinical record consists of statements related directly or indirectly to the health of a patient. Some statements relate to actions taken or requested as part of the provision of care. These actions may include procedures, investigations, referrals, encounters, supply and administration of medication. In the case of these statements, SNOMED CT expressions representing [ <<71388002 | procedure |] concepts provide appropriate content for the Observation.code attribute of the relevant Observation class specialization.

Other statements in a clinical record relate to information found or derived in a variety of ways during the delivery of care. These statements can be referred to as “statements about clinical findings”. The way in which “statements about clinical findings” are represented has been a source of considerable discussion within HL7. This discussion focuses on the way in which the coded representation of such statements is expressed in the Observation.code and Observation.value attributes of the Observation class.



Figure 1: Options for Observation.code

Statements about clinical findings can be divided into two categories.

*A) Statements about findings in which two facets are clearly distinct*

* (1) The action taken to make the finding (and/or the property about which the property was observed)
* (2) The result of the observation

Examples:

* *Measurement of blood hemoglobin (1)* = 14 g/dl (2)
	+ This example follows the formal RIM semantics.
* *Body weight (1)* = 75 Kg (2)
	+ This example is not in line with strict interpretation of the formal RIM definition in which the Observation.code is the action taken to make the observation. However, it is a more familiar form in real-world clinical statements about many observations. A possible bridge between these two views is to regard the name of the property observed (e.g. [ 27113001 | body weight |]) as implying the action to measure or observe that property (e.g. [ 39857003 | weighing patient |]).

*B) Statements about findings that are often captured as a single “nominalized” expression*

* The term "nominalized" is used to indicate a statement reduced to a single name (or term) which can then be coded as a single expression.
* The fact that a statement is often nominalized does not mean it consists of a single atomic item of information. Many such statements can be readily divided into several identifiable facets. However, unlike statements of type A, there are different views on how the semantics of the facets of these statements might be divided between the “code” and/or “value” attributes of the observation class.

Examples: The following examples are statements that might appear in clinical records. In each case they assert a finding in relation to the “record target”. Each of these examples illustrates a particular aspect of the potential for nominalizing a statement.

*Record target …*

* has a fracture of her left femur
* is complaining of pain in his right knee for the last two days
* reports that she had a heart attack in January 2001
* may have pernicious anemia
* has an aortic ejection murmur
* has normal visual acuity

Type (A) statements can be readily represented using the Observation class as documented in the RIM. However, a variety of options have been considered for type (B) "nominalized" statements. These options vary in the use they make of the Observation.code and Observation.value attributes.

In summary the options considered included

* Using only one of the attributes to represent the nominalized meaning of the statement and omitting the other attribute.
* Applying a fixed value to one of the attributes and using the other one to represent the nominalized meaning of the statement.
* Using the value to represent the nominalized meaning of the statement while allowing the other code to operate independently to track the question or process without affecting the meaning of the result to the observation.
* Creating a separate class for nominalized statement rather than using the Observation class.

A joint meeting of the HL7 Modeling and Methodology and Vocabulary Technical Committees was asked to rule on the validity of these options. The discussions of these committees led to a decision to clarify the RIM definition of the Observation class. The clarification made clear that both Observation.code and Observation.value should be present and should be interpreted together rather than independently.

As a result the preferred option is for a fixed Observation.code value "ASSERTION" to be used and for the meaning of the nominalized statement to be conveyed in the Observation.value. All other options are deprecated but some of these are permitted for backward compatibility.

The options permitted for backward compatibility are those that are known to be in use and these are supported as far as possible with transformation rules to allow the preferred form to be derived for comparison. There is a practical limitation to the transformation rules where code and value are used independently because it may not be possible to confirm computationally whether the code was intended to significantly modify the meaning of the value.

Act.moodCode

The Act.moodCode is a structural code which is defined as "a code distinguishing whether an Act is conceived of as a factual statement or in some other manner as a command, possibility, goal, etc.". Its values are drawn from the HL7 ActMood vocabulary table.

Potential Overlap

The values specified in the ActMood vocabulary partially overlap with SNOMED CT representations of [ 408729009 | finding context |] and [ 408730004 | procedure context |].

* SNOMED CT [ 408729009 | finding context |]:
	+ Represents an assertion that the [ 246090004 | associated finding |] is: present, absent, a goal, a risk or an expectation.
	+ May also represent an assertion that the presence or absence of a finding is unknown, possible or probable.
	+ Applies to:
		- any SNOMED CT expression that represents a [ <<404684003 | clinical finding |].
		- any SNOMED CT expression that represents either a [ <<71388002 | procedure |] or an [ <<363787002 | observable entity |] provided that the expression is combined with a relevant result or value.
	+ Is relevant to instances of HL7 Observation classes expressed in "event", "goal", "expectation" and "risk" moods.
* SNOMED CT [ 408730004 | procedure context |]
	+ Represents an assertion that the [ 363589002 | associated procedure |] is: "requested", "planned", "started", "done", "cancelled", "not done", "not to be done" or one of several more specific [ <<408730004 | procedure context |] values.
	+ May also represent an assertion that it is not known whether the procedure has been done.
	+ Applies to any SNOMED CT expression that represents a [ <<71388002 | procedure |] (except where that expression is combined with a relevant result value).
	+ Is relevant to:
		- instances of various HL7 Act classes including Procedure, SubstanceAdministration and Supply.
		- instances of the HL7 Observation class except in "intent" moods (including "request" and other subtype of "intent").

#### Rules and Guidance

The following rules ensure validation and consistent interpretation of particular combinations of moodCode and SNOMED CT context. They also specify the context a particular moodCode value applies to a SNOMED CT expression that does not include an explicit representation of context (explicit representations of context can be made either in pre-coordinated concepts or post-coordinated expressions).

1. The moodCode SHALL be present in all Act class instances[4](file:///C%3A%5C%5CUsers%5C%5CLisa%5C%5CDocuments%5C%5C05%20Professional%5C%5C90%20HL7%5C%5C00%20Standard%20-%20TermInfo%5C%5CTermInfo%20Course%2020130506%5C%5Chtml%5C%5Cinfrastructure%5C%5Cterminfo%5C%5Cterminfo.htm%22%20%5Cl%20%22fn4)
2. If the *code* attribute of an instance of the Observation class, with a moodCode that is neither "intent" (INT) nor a subtype of "intent", is populated with a SNOMED CT expression, this expression MAY include an explicit representation of [ 408729009 | finding context |].
* If the expression does not include an explicit [ 408729009 | finding context |], it SHALL be interpreted as having the default context specified for the relevant moodCode in Table 2.
* If the expression includes an explicit [ 408729009 | finding context |], the context SHALL be compatible with the constraints specified for the relevant moodCode in [Table 3](file:///C%3A%5CUsers%5CLisa%5CDocuments%5C05%20Professional%5C90%20HL7%5C00%20Standard%20-%20TermInfo%5CTermInfo%20Course%2020130506%5Chtml%5Cinfrastructure%5Cterminfo%5Cterminfo.htm#TableHl7ActMoodFindingContextConstraint). Any Act class instance that does not conform to these constraints SHALL be regarded as an error.
1. If the *value* attribute of an instance of the Observation class is populated with a SNOMED CT expression, this expression MAY include an explicit representation of [ 408729009 | finding context |].
* If the expression does not include an explicit [ 408729009 | finding context |], it SHALL be interpreted as having the default context specified for the relevant moodCode in [Table 2](file:///C%3A%5CUsers%5CLisa%5CDocuments%5C05%20Professional%5C90%20HL7%5C00%20Standard%20-%20TermInfo%5CTermInfo%20Course%2020130506%5Chtml%5Cinfrastructure%5Cterminfo%5Cterminfo.htm#TableHl7ActMoodFindingContextDefault).
* If the expression includes an explicit [ 408729009 | finding context |], the context SHALL be compatible with the constraints specified for the relevant moodCode in [Table 3](file:///C%3A%5CUsers%5CLisa%5CDocuments%5C05%20Professional%5C90%20HL7%5C00%20Standard%20-%20TermInfo%5CTermInfo%20Course%2020130506%5Chtml%5Cinfrastructure%5Cterminfo%5Cterminfo.htm#TableHl7ActMoodFindingContextConstraint). Any Act class instance that does not conform to these constraints SHALL be regarded as an error.
1. If the *code* attribute of an instance of any Act class (except Observations included in points 2 or 3 above) is populated with a SNOMED CT expression, this expression MAY include an explicit representation of [ 408730004 | procedure context |].
* If the expression does not include an explicit [ 408730004 | procedure context |], it SHALL be interpreted as having the default context specified for the relevant moodCode in [Table 4](file:///C%3A%5CUsers%5CLisa%5CDocuments%5C05%20Professional%5C90%20HL7%5C00%20Standard%20-%20TermInfo%5CTermInfo%20Course%2020130506%5Chtml%5Cinfrastructure%5Cterminfo%5Cterminfo.htm#TableHl7ActMoodProcedureContextDefault).
* If the expression includes an explicit [ 408730004 | procedure context |], the context SHALL be compatible with the constraints specified for the relevant moodCode in [Table 5](file:///C%3A%5CUsers%5CLisa%5CDocuments%5C05%20Professional%5C90%20HL7%5C00%20Standard%20-%20TermInfo%5CTermInfo%20Course%2020130506%5Chtml%5Cinfrastructure%5Cterminfo%5Cterminfo.htm#TableHl7ActMoodProcedureContextConstraint). Any Act class instance that does not conform to these constraints SHALL be regarded as an error.
1. If a SNOMED CT expression includes an explicit statement of context, this SHALL be validated by the rules stated above and SHALL be interpreted as a restatement or refinement of the meaning specified by the moodCode. The meaning of the SNOMED CT context SHALL NOT be interpreted as an independent compounding semantic modifier.

*For example*
moodCode="RQO" and Act.code <<129125009 | procedure with explicit contect (situation) |:[ 408730004 | procedure context | = 385644000 | requested | ]
This means "requested". It does not mean a "request to request".

moodCode="INT" and code=[ 408730004 | procedure context | = 385650005 | organised ]
This means "organized". It does not mean an "intention to organize".

moodCode="INT" and value=[ 408729009 | finding context | = 410518001 | goal ]
This is an error. It does not mean an "intention to set a goal".

moodCode="GOL" and value=[ 408729009 | finding context | = 410518001 | goal ]
This means that a goal is set. It does not mean a "goal to set a goal".

[Table 2](file:///C%3A%5CUsers%5CLisa%5CDocuments%5C05%20Professional%5C90%20HL7%5C00%20Standard%20-%20TermInfo%5CTermInfo%20Course%2020130506%5Chtml%5Cinfrastructure%5Cterminfo%5Cterminfo.htm#TableHl7ActMoodFindingContextDefault) shows the mapping from moodCode to the default [ 408729009 | finding context |] for concepts that are subtypes of [ 404684003 | clinical finding |]. [Table 4](#Table4) shows the mapping from moodCode to default [ 408730004 | procedure context |] for concepts that are subtypes of [ <<71388002 | procedure |].

[Table 3](#Table3) shows the [ 408729009 | finding context |] validation constraints for SNOMED CT expressions based on the moodCode of the containing Act class instance. [Table 5](#Table5) shows the [ 408730004 | procedure context |] validation constraints for SNOMED CT expressions based on the moodCode of the containing Act class instance.

In these tables the symbol "<<" preceding a value indicates that either the value or any subtype of the value is permitted.

The context values in these tables are based on the following assumptions about other attributes in the same Act class instance:

* the HL7 negationInd is omitted from the Act class instance (see [Act.negationInd (§ 2.2.10)](#Act_negationInd))
* the HL7 uncertaintyCode is omitted from the Act class instance (see [Act.uncertaintyCode (§ 2.2.11)](#Act_uncertaintyCode))
* the HL7 statusCode in the Act class instance has a value that does not influence the context (see [Act.statusCode (§ 2.2.5 )](#Act_statusCode))

If any of these assumptions do not apply then refer to the referenced sections for further information.

Table 2: HL7 Act.moodCode mapping to default context for SNOMED CT findings

|  |  |  |
| --- | --- | --- |
| moodCode | Mood Name | Finding context |
| EVN | Event | [ 410515003 | known present |] |
| GOL  | Goal | [ 410518001 | goal |] |
| RSK  | Risk | [ 410519009 | at risk |] |
| EXPEC  | Expectation | [ 410517006 | expectation |] |

Table 3: HL7 Act.moodCode constraints on explicit context for SNOMED CT findings

|  |  |  |
| --- | --- | --- |
| moodCode | Mood name | Finding context |
| EVN | Event | [(<<36692007 | known |)OR(<<261665006 | unknown |)]  |
| GOL  | Goal | [ <<410518001 | goal |] |
| RSK  | Risk | [ <<410519009 | at risk |] |
| EXPEC  | Expectation | [ <<410517006 | expectation |]  |

Table 4: HL7 Act.moodCode mapping to default context for SNOMED CT procedures

|  |  |  |
| --- | --- | --- |
| moodCode | Mood name | Procedure context |
| EVN | Event | [ 385658003 | done )OR(*values dependent of Act.statusCode - see note* )]  |
| INT | Intent | [ 410522006 | pre-starting action status |] |
| RQO | Request | [ 385644000 | requested |] |
| PRP | Proposal | [ 385643006 | to be done |] |
| PRMS | Promise | [ 385645004 | accepted |] |
| ARQ | Appointment request | [ 385644000 | requested |] |
| APT | Appointment | [ 416151008 | scheduled |] |

**NOTE:** For more information on statusCode dependent values see [Table 7](file:///C%3A%5CUsers%5CLisa%5CDocuments%5C05%20Professional%5C90%20HL7%5C00%20Standard%20-%20TermInfo%5CTermInfo%20Course%2020130506%5Chtml%5Cinfrastructure%5Cterminfo%5Cterminfo.htm#TableHl7ActStatusProcedureContext)

Table 5: HL7 Act.moodCode constraints on explicit context for SNOMED CT procedures

|  |  |  |
| --- | --- | --- |
| moodCode | Mood name | Procedure context |
| EVN | Event | [ (<<410523001 | post-starting action status)OR*(values dependent of Act.statusCode - see note )* ]  |
| INT | Intent | [ << 410522006 | pre-starting action status |] |
| RQO | Request | [ << 385644000 | requested |] |
| PRP | Proposal | [ (<< 385649005 | being organized |)OR(<< 385643006 | to be done |) ]  |
| PRMS | Promise | [ <<385649005 | being organized |] |
| ARQ | Appointment request | [ << 385644000 | requested |] |
| APT | Appointment | [ << 385649005 | being organized |] |

**NOTE:** For more information on statusCode dependent values see ***Table 7: HL7 statusCode impact of defaults and constraints applicable to procedure context for Acts in "event" mood***

[Table 6](file:///C%3A%5CUsers%5CLisa%5CDocuments%5C05%20Professional%5C90%20HL7%5C00%20Standard%20-%20TermInfo%5CTermInfo%20Course%2020130506%5Chtml%5Cinfrastructure%5Cterminfo%5Cterminfo.htm#TableHl7ActMoodNoSnomedContext) lists Act.moodCodes that have no direct relationship to SNOMED CT context attributes. This assertion is made based on knowledge of the definitions in the HL7 RIM for these mood codes and of the SNOMED CT qualifier values for context model attributes. Based on those definitions (in both standards) there are, in fact, no SNOMED CT concepts which directly correspond to the meaning of these specific mood codes. While no constraints are specified for these moodCodes, some combinations may be irrational or open to misinterpretation. Therefore, caution should be used when combining these moodCodes with explicit representations of SNOMED CT context.

Table 6: HL7 MoodCodes that have no direct relationship to finding or procedure context

|  |  |
| --- | --- |
| moodCode | Name |
| DEF | Definition |
| SLOT | Resource slot |
| EVN.CRT | Event criterion |
| OPT | Option |

Discussion and Rationale

The Act.moodCode is a mandatory component of all HL7 Act classes. Therefore this HL7 representation is required irrespective of whether SNOMED CT context representations are used.

SNOMED CT [ 408729009 | finding context |] and [ 408730004 | procedure context |] value hierarchies include more specific meanings than those associated with the Act.moodCode. Therefore, the SNOMED CT representation cannot be prohibited without resulting in loss of information.

For example, Act.moodCode cannot be used to express various:

* SNOMED CT [ 408730004 | procedure context |] values, including [ 410536001 | contraindicated |] and [ 385661002 | considered and not done |].
* SNOMED CT [ 408729009 | finding context |] values, including [ 410596003 | likely outcome |] and [410605003 | confirmed present |].

The SNOMED CT context model permits default context values to be applied, based on the surrounding information model. Therefore, inclusion of SNOMED CT context can be specified as optional, provided there are explicit rules (such as those in [Table 2](file:///C%3A%5CUsers%5CLisa%5CDocuments%5C05%20Professional%5C90%20HL7%5C00%20Standard%20-%20TermInfo%5CTermInfo%20Course%2020130506%5Chtml%5Cinfrastructure%5Cterminfo%5Cterminfo.htm#TableHl7ActMoodFindingContextDefault) and [Table 4](file:///C%3A%5CUsers%5CLisa%5CDocuments%5C05%20Professional%5C90%20HL7%5C00%20Standard%20-%20TermInfo%5CTermInfo%20Course%2020130506%5Chtml%5Cinfrastructure%5Cterminfo%5Cterminfo.htm#TableHl7ActMoodProcedureContextDefault)) for deriving default context values from the moodCode and, where relevant, from other HL7 Act class attributes.

Act.statusCode

The Act.statusCode is defined "a code specifying the state of the Act". This definition is further elaborated by the state-machine diagram for the Act class in the RIM documentation and the ActStatus vocabulary.

Potential Overlap

The interaction between statusCode and SNOMED CT semantics varies according to the nature of the statusCode and the value of the Act.moodCode.

* The most general HL7 Act.statusCode values ("NORMAL", "OBSOLETE" and "NULLIFIED") relate to whether the Act class instance is currently valid. These states do not result in any overlaps with SNOMED CT semantics.
* Other states overlap with aspects of SNOMED CT semantics in a manner that is to some extent dependent on the mood of the Act.

Unlike the other attributes discussed in this section the value of the statusCode may progress over time. Thus the fact that a "request" was aborted implies that a request was made, as well as indicating that the request was not acted upon. Therefore, the impact of an Act.statusCode on SNOMED CT semantics depends on whether the concern is to know what steps were taken or to know whether a step was completed.

The relevance of statusCode is fairly clear cut when the Act.moodCode value is "EVN", since this implies an actual occurrence. In these cases, the statusCode pertains to whether the event is complete and thus directly to the SNOMED CT [ 408730004 | procedure context |].

In other moods, this relationship is less clear. For example, the Act.statusCode applies to an Act with moodCode "RQO" refers to the status of the request, whereas the [ 408730004 | procedure context |] refers to the progress of the concept specified by the [ 363589002 | associated procedure |].

Rules and Guidance

The following rules deal only with cases where the Act.statusCode has a clear effect on the meaning of an Act class instance in a particular mood. Other rules or guidelines, based on similar principles, may be added in the future.

1. Act class instances SHALL be interpreted taking account of the Act.statusCode and the way particular values of this attribute when combined with the Act.moodCode may alter the default or permitted [ 408730004 | procedure context |] values.
2. In the case of an Act in "event" mood the defaults and constraints specified in Act.code (§ 1.2.2) and Act.moodCode (§ 1.2.4) should be modified in accordance with statusCode as shown in [Table 7](file:///C%3A%5CUsers%5CLisa%5CDocuments%5C05%20Professional%5C90%20HL7%5C00%20Standard%20-%20TermInfo%5CTermInfo%20Course%2020130506%5Chtml%5Cinfrastructure%5Cterminfo%5Cterminfo.htm#TableHl7ActStatusProcedureContext).

Table 7: HL7 statusCode impact of defaults and constraints applicable to procedure context for Acts in "event" mood

|  |  |  |
| --- | --- | --- |
| statusCode | Default procedure context | Procedure context constraints |
| new | [ 410522006 | pre-starting action status |] | [ <<410522006 | pre-starting action status |] |
| active | [ 410523001 | post-starting action status |] | [ <<410523001 | post-starting action status |] |
| complete | [ 385658003 | done |] | [ <<385658003 | done |] |
| held | [ 385642001 | under consideration |] | [ <<385642001 | under consideration |] |
| cancelled | [ 89925002 | cancelled |] | [ <<89925002 | cancelled |] |
| suspended | [ 385655000 | suspended |] | [ <<385655000 | suspended |] |
| aborted | [ 385657008 | abandoned |] | [ <<385657008 | abandoned |] |

Discussion and Rationale

The HL7 statusCode changes throughout the life cycle of an Act in its specified mood, until it reaches an end-state. Consideration of the impact of a statusCode on aspects of semantics depends on whether the requirement is to know 'what steps were taken' or 'whether a step was completed'. Thus the fact that a "request" was aborted implies that a request was made, as well as indicating that the request was not taken through to normal completion.

The statusCode values "new", "active", "held", "completed", "cancelled", "suspended", "nullified" and "obsolete" track the progress of the Act in its specified mood. The semantic relevance of statusCode in "event" mood is more clear cut than in other moods.

* For example, statusCode="completed"
	+ when applied to an Act with moodCode="ENV" implies [ 408730004 | procedure context | = 385658003 | done |]
	+ when applied to an Act with moodCode="RQO" implies that the act of request has been completed. It does *not* mean that the requested action has been completed.

The statusCode values "NORMAL", "OBSOLETE" and "NULLIFIED" relate to the validity of a particular representation of an Act class instance. These states do not result in any overlaps with SNOMED CT semantics because the meaning of an Act class instance is no longer relevant if it has been "NULLIFIED" or marked as "OBSOLETE".

Procedure.targetSiteCode and Observation.targetSiteCode

The Procedure.targetSiteCode is defined by HL7 as “the anatomical site or system that is the focus of the procedure.” The Observation.targetSiteCode is defined as "a code specifying detail about the anatomical site or system that is the focus of the observation if this information is not already implied by the observation definition or Act.code."

Potential Overlap

SNOMED CT finding concepts have a defining attribute that specifies the [ 363698007 | finding site |] and similarly SNOMED CT procedure concepts have a defining attribute that specifies the "procedure site". The post-coordination rules that apply to SNOMED CT permit refinement of these defining attributes. The resulting post-coordinated expressions can be represented in a single coded attribute using the HL7 Concept Descriptor (CD) data type.

The result of this is that there are two completely overlapping approaches to the representation of sites associated with observations and procedures.

Rules and Guidance

The following rules avoid redundancy and the risk of misinterpretation by restricting the use of targetSiteCode in Act class instances. There are two sections dealing with information models which 1) contain only SNOMED content and 2) allow multiple terminologies to be used.

If an Act.code or Observation.value contains only SNOMED CT content then the following shall apply:

1. The targetSiteCode attribute SHOULD be omitted from any Act instance.
2. If necessary the specific applicable site SHOULD be represented (in Act.code or Observation.value) as a refined relevant site attribute, either as part of a SNOMED CT pre-coordinated concept or a post-coordinated expression.

If an Act.code or Observation.value contains SNOMED CT content as one permitted code system then the following shall apply:

1. The targetSiteCode attribute SHALL be optional in any Act instance.
2. If the targetSiteCode attribute is present in an Observation or Procedure class instance in which the Act.code or Observation.value is expressed using SNOMED CT then:
	* The targetSiteCode SHALL also be represented using SNOMED CT
	* The targetSiteCode SHALL be the same as, or a subtype of, the value of the relevant site attribute as specified in the SNOMED CT expression
	* The targetSiteCode SHALL be treated as equivalent to a restatement or refinement of the relevant site attribute in the SNOMED CT expression
	* If the value of the targetSiteCode attribute is incompatible with the above rules then this SHALL be interpreted as an error

**NOTE:** The *relevant site attribute* depends on the SNOMED CT Concept Model for the type of procedure or finding. It may be one of the following: [ 363698007 | finding site |], [ <<363704007 | procedure site |], [ 405813007 | procedure site - Direct |] or [ 405814001 | procedure site - Indirect |]. In some cases, "procedure morphology", "direct morphology" or "indirect morphology" may also provide more specific site related information.

Discussion and Rationale

The notes following the definition of Observation.targetSiteCode make it clear that the intent is not to repeat a site implied by the Act.code.

Most observation target sites are implied by the observation definition and Act.code, or Observation.value. For example, "heart murmur" always has the heart as target. This attribute is used only when the observation target site needs to be refined, to distinguish right and left etc.

The notes following the Procedure.targetSiteCode definition are perhaps a little less clear cut. However, they convey a similar general sense.

Some target sites can also be "pre-coordinated" in the Act definition, so that there is never an option to select different body sites. The same information structure can handle both the pre-coordinated and the post-coordinated approach.

Therefore, if the Procedure.code or Observation.code specifies the site to a sufficient level of detail, there is no requirement to include a separate targetSiteCode attribute. When using SNOMED CT post-coordination to refine the site, the Act.code specifies the site to the same level of detail as can be achieved using the targetSiteCode.

SNOMED CT offers additional features which make it significantly more expressive than the targetSiteCode:

* Specific subtypes of the [ <<363704007 | procedure site |] attribute distinguish between the direct and indirect targets of a procedure. One use of this is to ensure that removal of a something from an organ does not classify as a type of removal of that organ.
	+ For example:
		- [ 287742007|ureter calculus removal ]
		is defined as a procedure with
		{260686004|method|=129303008|removal - action|
		,363700003|direct morphology|=56381008|calculus|
		,405814001|procedure site - Indirect|=87953007|ureteric structure|}
		- [ 51607004|total ureterectomy | ]
		is defined as a procedure with ...
		{260686004|method|=129304002|excision - action|
		,405813007|procedure site - Direct|=302511008|entire ureter|}
* Explicit grouping of attributes allows representation of multiple sites to be associated with different actions in a single procedure.
	+ For example
		- The procedure [ 11401008 | dilation and curettage of uterus |] involves dilatation of one site (cervix uteri) and curettage of another (endometrium) so it is defined as a procedure with the following two relationship groups ...
		- {260686004 | method | = 129319001 | curettage - action |
		,405813007 | procedure site - Direct | = 2739003 | endometrial structure | }
		{260686004 | method | = 129419002 | dilation - action |
		,405813007 | procedure site - Direct | = 71252005 | cervix uteri structure | }

The recommendation to use the SNOMED CT representation of site is based on its added expressivity. Omission of the HL7 targetSiteCode attribute is recommended to avoid the redundancy and the potential for conflicts between the two forms of representation of site. However, while the use of these HL7 attributes is deprecated, it is permitted to support use in environments that do not support SNOMED CT post-coordination. In this case, requiring these attributes to be encoded using SNOMED CT and interpreted as refinements of the relevant SNOMED CT attributes enables a simple transformation to the recommended form.

Procedure.approachSiteCode and SubstanceAdministration.approachSiteCode

The Procedure.approachSiteCode is defined by HL7 as "the anatomical site or system through which the procedure reaches its target (see targetSiteCode)." The SubstanceAdministration.approachSiteCode works simular to the Procedure.approachSiteCode.

Potential Overlap

SNOMED CT procedure concepts have a defining attribute that specifies the [ 424876005 | surgical approach | ] which has a comparable meaning to the HL7 approachSiteCode. The post-coordination rules that apply to SNOMED CT permit refinement of this defining attribute. The resulting post-coordinated expressions can be represented in a single coded attribute using the HL7 Concept Descriptor (CD) data type.

The result of this is that there are two completely overlapping methods for representing approaches associated with procedures.

While HL7 models SubstanceAdministration as a separate class from Procedure, the SNOMED CT concept [ 432102000 | administration of substance | ] is a subtype of procedure. Therefore the [ 424876005 | surgical approach | ] attribute can also be applied to refine SNOMED expressions that encode the action associated with SubstanceAdministration. Therefore, this overlap also applies to that class.

Rules and Guidance

The following rules avoid redundancy and the risk of misinterpretation by restricting the use of the approachSiteCode in Procedure and SubstanceAdministration class instances. There are two sections dealing with information models which 1) contain only SNOMED content and 2) allow multiple terminologies to be used.

If a Procedure.code or SubstanceAdministration.code contains only SNOMED CT content then the following shall apply:

1. The approachSiteCode attribute SHOULD be omitted from any Act instance.
2. If necessary the specific applicable site SHOULD be represented as part of the SNOMED CT expression (in Procedure.code or SubstanceAdministration.code) by refining the relevant site attribute as part of a pre or post-coordinated expression.

If a Procedure.code or SubstanceAdministration.code contains SNOMED CT content as one permitted code system then the following shall apply:

1. The approachSiteCode SHALL be optional in any Act instance.
2. If the approachSiteCode attribute is present in a SubstanceAdministration or Procedure class instance in which the Act.code is expressed using SNOMED-CT then:
* The approachSiteCode SHALL also be represented using SNOMED CT
* The approachSiteCode SHALL be the same as, or a subtype of, the value of the relevant site attribute as specified in the SNOMED CT expression
* The approachSiteCode SHALL be treated as equivalent to a restatement or refinement of the relevant site attribute in the SNOMED CT expression
* If the value of the approachSiteCode attribute is incompatible with the above rules then this SHALL be interpreted as an error

Discussion and Rationale

The notes following the Procedure.approachSiteCode definition suggest that the intent is not to repeat the approach if it is fixed by the nature of the procedure specified by the Act.code.

Some [ 424876005 | surgical approach | ] sites can also be "pre-coordinated" in the Act definition, so that there is never an option to select different body sites. The same information structure can handle both the pre-coordinated and the post-coordinated approach.

Therefore, if the Procedure.code or SubstanceAdministration.code specifies the [ 424876005 | surgical approach | ] to a sufficient level of detail, there is no requirement to include a separate approachSiteCode attribute. When using SNOMED CT post-coordination to refine the [ 424876005 | surgical approach | ] , the Act.code can specify the approach to the same level of detail as can be achieved using the approachSiteCode attribute.

The concept domain specified for approachSiteCode is ActSite which is the same as the concept domain for targetSiteCode. In contrast SNOMED CT uses a specific value hierarchy for approaches which is different from the one used for [ 363698007 | finding site |] or [ <<363704007 | procedure site |]. The distinction is that an approach is a route used to reach a target site rather than a specific structural landmark that represents a point on or part of that route.

The example values in the approachSiteCode include a mixture of approaches (e.g. "trans-abdominal approach" and "retroperitoneal approach") which fit the idea of approach as used by SNOMED CT. However, references to the punctured area of skin or structural landmarks have a significantly different semantic quality. Many sites are never the names of routes, several routes may pass through a single site and a route may pass through several sites. Therefore attempts to combine SNOMED CT and HL7 representations of approach may result in confusion rather than clarity.

The recommendation to use the SNOMED CT representation of [ 424876005 | surgical approach | ] is based on the more appropriate range of values available for this attribute, and on the fact that many procedure concepts pre-coordinate an implied or explicitly stated approach. Omission of the HL7 approachSiteCode attribute is recommended to avoid the redundancy and the potential for conflicts between the two forms of representation of site. However, while the use of these HL7 attributes is deprecated, it is permitted to support use in environments that do not support SNOMED CT post-coordination. In this case, requiring the approachSiteCode attributes to be encoded using SNOMED CT and interpreted as refinements of the SNOMED CT [ 424876005 | surgical approach | ] , enables a simple transformation to the recommended form.

Procedure.methodCode and Observation.methodCode

The Procedure.methodCode is defined by HL7 as “identifies the means or technique used to perform the procedure”. The Observation.methodCode is defined as “a code that provides additional detail about the means or technique used to ascertain the observation.”

Potential Overlap

SNOMED CT Procedure concepts have a defining attribute that specifies the [ 260686004 | method |] used. SNOMED CT "evaluation procedure" concepts, which may be used to specify the nature of an observation, have a defining attribute that specifies the [ 370129005 | measurement method |]. SNOMED CT [ 404684003 | clinical finding |] concepts, which may be used as values of a nominalized observation or assertion, have a defining attribute that specifies the [ 418775008 | finding method |]. The post-coordination rules that apply to SNOMED CT permit refinement of this defining attribute. The resulting post-coordinated expressions can be represented in a single coded attribute using the HL7 Concept Descriptor (CD) data type.

The result of this is that there are two overlapping approaches to the representation of methods associated with observations and procedures.

Rules and Guidance

The following rules avoid redundancy and the risk of misinterpretation by restricting the use of the methodCode in Procedure and Observation class instances. There are two sections dealing with information models which 1) contain only SNOMED content and 2) allow multiple terminologies to be used.

If an Act.code or Observation.value contains only SNOMED CT content then the following shall apply:

1. The methodCode attribute SHOULD be omitted from any Act instance.
2. If necessary the method applicable SHOULD be represented as part of the SNOMED CT expression (in Act.code or Observation.value) by refining the relevant method attribute as part of a post-coordinated expression.

If an Act.code or Observation.value contains SNOMED CT content as one permitted code system then the following shall apply:

1. The methodCode attribute SHALL be optional in any Act instance.
2. If the methodCode attribute is present in an Observation or Procedure class instance in which the Act.code or Observation.value is expressed using SNOMED CT then:
* The methodCode SHALL also be represented using SNOMED CT
* The methodCode SHALL be the same as, or a subtype of, the value of the relevant method attribute as specified in the SNOMED CT expression
* The methodCode SHALL be treated as equivalent to a restatement or refinement of the relevant method attribute in the SNOMED CT expression
* If the value of the methodCode attribute is incompatible with the above rules then this SHALL be interpreted as an error

**NOTE:** The *relevant method attribute* depends on the SNOMED Concept Model in respect of the type of procedure or finding. It may be one of the following: [ 260686004 | method |], [ 418775008 | finding method |] or [ 370129005 | measurement method |].

Discussion and Rationale

The notes following the definition of Observation.methodCode make it clear that the intent is not to repeat a method implied by the Act.code.

In all observations the method is already partially specified by simply knowing the kind of observation (observation definition, Act.code) and this implicit information about the method does not need to be specified in Observation.methodCode.

The notes following the Procedure.methodCode are less explicit about avoidance of duplication. However, they do suggest that code systems might be designed with relationships between procedures and possible method – which is exactly how SNOMED CT is designed. What the note does not take into account is that the terminology may also specify a way to represent a specific method with the procedure in a single code or expression.

'… a code system might be designed such that it specifies a set of available methods for each defined Procedure concept'

Therefore, if the Act.code or Observation.value specifies the method to a sufficient level of detail, there is no requirement to include a separate methodCode attribute. When using SNOMED CT post-coordination to refine the method, the Act.code or Observation.value specifies the method to the same level of detail as can be achieved using the methodCode.

The notes on methodCode use "open" and "laparoscopic" procedures as examples of differences in method. SNOMED CT makes this same differentiation using another defining attribute [ 260507000 | access |]. This highlights the potential for confusion from using both SNOMED and HL7 representations of method.