Style Guide for Laboratory Observables

DRAFT Model for Testing

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SNOMED CT has been created by combining SNOMED RT and a computer based nomenclature and classification known as Clinical Terms Version 3, formerly known as Read Codes Version 3, which was created on behalf of the UK Department of Health and is Crown copyright.
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## Document History

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<th>Version</th>
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<tr>
<td>April 2009</td>
<td>• Initial draft</td>
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Introduction

1.1 Purpose
This document describes a draft of the SNOMED CT concept model for laboratory observable concepts. It is part of the Trial SNOMED CT Content intended to be used in the project entitled An Operational Trial of a Division of Labor in Laboratory Test Terminology Development Involving LOINC, NPU & SNOMED CT, the details of which can be found at the following web site:


The referenced Memorandum of Understanding has given perpetual rights to IFCC-IUPAC and LOINC for use of this Trial SNOMED CT Content.

1.2 Notation used in this document
The following notation is used in this User Guide to represent key types of SNOMED CT information:

- SNOMED CT concept names (and draft or proposed concept names) are represented in italics.
  Example: Peribronchial pneumonia (disorder)

- SNOMED CT Attributes (and draft or proposed attributes) are represented entirely in capital letters.
  Example: INHERES IN

1.3 Additional information
Feedback and questions on this draft style guide can be sent by email to:

ksp@ihtsdo.org

or contact:

IHTSDO
Rued Langgaards Vej 7, 5te
DK-2300 Copenhagen S
Denmark

Tel: +45 36 44 87 36
Fax: +45 44 44 87 36
1.4 **Attributes used to define lab observables, qualities, properties, and processes**

**NOTE:** Permissible values for these attributes include the concepts listed and their descendants.

**Table 1: Draft lab observable attributes summary table**

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<th>Defining Attribute</th>
<th>Permissible Values (Concepts listed and their descendents)</th>
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<td>Qualities and properties (nested definitions)</td>
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<td>Time frame 7366001</td>
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<td>SCALE TYPE</td>
<td>Quantitative 30766002, Qualitative 26716007, Ordinal value 117363000, Ordinal or quantitative value 117365007</td>
</tr>
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<td>NOMINAL VALUE</td>
<td>Nominal value 117362005</td>
</tr>
<tr>
<td>SCALE TYPE</td>
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<tr>
<td>UNITS</td>
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<tr>
<td>TECHNIQUE</td>
<td>Laboratory procedure categorized by method 127788004, Techniques 272394005</td>
</tr>
<tr>
<td>DIRECT SITE</td>
<td>Specimen 123038009, Physical anatomical entity 91722005</td>
</tr>
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<td><strong>Attributes for Properties</strong></td>
<td></td>
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<tr>
<td>PROPERTY TYPE</td>
<td>Property of measurement 118568001</td>
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<td>INHERES IN</td>
<td>Physical anatomical entity 91722005, Organism 410607006, Device 49062001</td>
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<td>INHERES IN PROCESS</td>
<td>Process 415178003, Function 246464006</td>
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<tr>
<td>TOWARDS</td>
<td>Substance 105590001, Observable entity 363787002</td>
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<tr>
<td>RELATIVE TO</td>
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</tr>
<tr>
<td>HAS LOCATION</td>
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<td>HAS INGREDIENT</td>
<td>Substance 105590001</td>
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<td><strong>Attributes for processes that are values of INHERES IN PROCESS</strong></td>
<td></td>
</tr>
<tr>
<td>HAS AGENT</td>
<td>Physical anatomical entity 91722005, Organism 410607006</td>
</tr>
</tbody>
</table>
ATTRIBUTES FOR OBSERVABLES

1. OBSERVABLE TARGET
   This attribute takes as its value the entity that is the object or target of the observable. In most measurement observables, this target will be a property. A property may be a characteristic of either a processual entity (the “heart rate” is a property that is a characteristic of the process “beating of the heart”), or may be a characteristic of a continuant (the “concentration of sodium in plasma” is a property of plasma). In the latter case, when the property is a characteristic of a continuant, we follow BFO and call it a “dependent quality”. In other words, we consider a dependent quality as a special case of a property, where the property is inherent in, and dependent on, a continuant.

   Properties or qualities in this model are not observables themselves, but rather are the objects (“targets”) of the observable.

   The target of the observable exists independently of being observed. The observable target should not include aspects of the observable that define the way in which an observation is carried out. For example, plasma has an inherent concentration of sodium (even if zero), regardless of whether it is measured or not, and regardless of whether a reported value would be in mEq/L or some other unit.

   Property representation in this model is compositional in nature, and properties are considered to be sufficiently defined by their definitional attributes, as listed in the section on ATTRIBUTES FOR PROPERTIES (below). As a result, there are currently no SNOMED hierarchies listed as value sets for this attribute; instead, nested definitions are used to represent the properties or qualities.

2. TIME ASPECT
   This attribute represents the timing of an observation; it is ordinarily a single point in time, but also may take values that represent time periods, in order to represent observables that are carried out across a specified period of time.

   Permissible values include the following concepts and their descendants:

   Time frame 7389001

3. SCALE TYPE
   This attribute refers to the scale of the result of an observation.

   Permissible values include the following concepts and their descendants:
4. UNITS
This attribute specifies the units used to report an observation.
Permissible values include the following concept and its descendants:

- Unit (qualifier value) 258666001

5. TECHNIQUE
This attribute specifies the technique by which an observation is made. There is a difference between technique and a procedure done by a technique. To use a non-medical example, consider “high jumping by Fosbury flop technique”, vs “Fosbury flop.” In this case, high jumping is the procedure, and Fosbury flop is the technique by which the high jumping is accomplished.

EN1614 quotes the ISO9000 definition of procedure as “a specified way to carry out an activity or a process.” This EN1614 use of the word ‘procedure’ corresponds to the SNOMED use of the word ‘technique’. EN1614 use of the words ‘activity’ or ‘process’ corresponds to the SNOMED CT use of the word ‘procedure’. In SNOMED, a technique is a formalized way to do things, and a procedure is a doing of something.

The existing SNOMED attribute METHOD, which defines procedures, will take value “measurement action” as its value for most laboratory test procedures.
Permissible values for TECHNIQUE include the following concepts and their descendants:

- Laboratory procedure categorized by method 127789004
- Techniques 272394005

6. DIRECT SITE
This attribute specifies the location at which an observation is made. This may differ from the value of INHERES IN, since the site of certain properties may be inaccessible or difficult to measure, and are inferred by observing a different site. For example, plasma properties may be inferred by measuring substances in serum. As a clinical example, “core body temperature” may be inferred by observing the temperature in the axilla.
Permissible values include the following concept and its descendants:

- Specimen 123038009
- Physical anatomical entity 91722005

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**Example:**

*Seraum sodium level*

DIRECT SITE *Seraum (specimen)*

**ATTRIBUTES FOR PROPERTIES**

1. **PROPERTY TYPE**
   This attribute specifies the type of property of the target of the observable. It is important to differentiate between the PROPERTY TYPE and the property that is defined by that type. For example, “mass concentration of sodium in plasma” is a property of plasma; it has a property type of “mass concentration.” The property types are abstracted; that is, they do not specify any material entity in which a property may inhere, nor processual entity of which the property is a characteristic.

   Permissible values include the following concepts and their descendants:

   - *Property of measurement* 118598001

     **Example:**

     *Plasma glucose concentration*

     PROPERTY TYPE *Mass concentration*

2. **INHERES IN**
   This attribute applies to properties that are dependent qualities, and represents the independent continuant in which the dependent quality inherees, and on which it depends. In other words, the quality is manifest in that entity.

   For example, the color of a lesion inherees in the lesion. The length of a body part inherees in the body part. The concentration of sodium in plasma inherees in plasma. The taxon of an organism inherees in the organism. The susceptibility of an isolate of *Staphylococcus aureus* to penicillin inherees in the organism(s).

   Permissible values include the following concepts and their descendants:

   - *Substance (substance)* 105590001
   - *Physical anatomical entity (body structure)* 91722005
   - *Cell structure (cell structure)* 4421005
   - *Organism (organism)* 410607006
   - *Device (device)* 49062001

   **Example:**

3. **INHERES IN PROCESS**
   This attribute refers to the process of which the property is a characteristic.
Permissible values include the following concepts and their descendants:

- Process (observable entity) 415178003
- Procedure (procedure) 71388002

4. **TOWARDS**

Only valid for relational property types, this attribute specifies the third element of a relational quality, the first being the property type and the second being the continuant in which the property inheres. For example, it represents sodium, in the quality of concentration of sodium in plasma.

Permissible values include the following concept and its descendants:

- Substance 105590001
- Observable entity 363787002

5. **RELATIVE TO**

This attribute specifies the second component of a ratio, the first being the TOWARDS value.

Permissible values include the following concept and its descendants:

- Substance 105590001
- Observable 363787002

6. **PRECONDITION**

This attribute specifies the body states, time, or conditions that necessarily hold true at the time an observation is made. These are states of the subject that contextualize the observable.

Permissible values include the following concept and its descendants:

- Clinical finding 404684003

**ATTRIBUTES FOR CONTINUANTS THAT ARE VALUES OF INHERES IN**

1. **HAS LOCATION**

This attribute is used to represent the location in the body of an entity that is the value of INHERES IN. The attribute modifies the entity that is the value of INHERES IN. It does not directly modify the property.

Permissible values include the following concept and its descendants:

- Physical anatomical entity (body structure) 91722005
Example:

Bacterial throat culture organism #1

INHERES IN organism (organism)

HAS LOCATION pharynx

2. HAS INGREDIENT
This attribute specifies the substance that is the ingredient of a dose (or other entity) in which a property inheres.

Permissible values include the following concept and its descendants:

- Substance (substance) 105590001

ATTRIBUTES FOR PROCESSES THAT ARE VALUES OF INHERES IN PROCESS

1. HAS AGENT
This attribute specifies the continuant upon which the process depends. It modifies the process that is the value of PROPERTY OF PROCESS. It does not directly modify the property itself.

Permissible values include the following concept and its descendants:

- Physical anatomical entity (body structure) 91722005
Appendix A: Attributes used to define measurement procedures

The following six attributes are used by current SNOMED CT measurement procedures, and also were used in the LOINC integration table that was distributed with SNOMED RT (the LOINC integration table has not been updated in several years).

**NOTE:** Permissible values for these attributes include the concepts listed and their descendants.

**Table A.1: Approved measurement procedure attributes summary table**

<table>
<thead>
<tr>
<th>Defining Attribute</th>
<th>Permissible Values (Concepts listed and their descendents)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HAS SPECIMEN</td>
<td>Specimen 123038009</td>
</tr>
<tr>
<td>COMPONENT</td>
<td>Substance 105590001</td>
</tr>
<tr>
<td></td>
<td>Cell structure 4421005</td>
</tr>
<tr>
<td></td>
<td>Observable entity 363787002</td>
</tr>
<tr>
<td></td>
<td>Organism 410607006</td>
</tr>
<tr>
<td>TIME ASPECT</td>
<td>Time frame 7389001</td>
</tr>
<tr>
<td>PROPERTY</td>
<td>Property of measurement 118598001</td>
</tr>
<tr>
<td>SCALE TYPE</td>
<td>Quantitative 30786002</td>
</tr>
<tr>
<td></td>
<td>Nominal value 117362005</td>
</tr>
<tr>
<td></td>
<td>Qualitative 26716007</td>
</tr>
<tr>
<td></td>
<td>Narrative value 117364006</td>
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<td></td>
<td>Ordinal value 117363000</td>
</tr>
<tr>
<td></td>
<td>Text value 117444000</td>
</tr>
<tr>
<td></td>
<td>Ordinal or quantitative value 117365007</td>
</tr>
<tr>
<td>MEASUREMENT METHOD</td>
<td>Laboratory procedure categorized by method 12778004</td>
</tr>
</tbody>
</table>

1. **HAS SPECIMEN**
   This attribute specifies the type of specimen on which a measurement or observation is performed.
   Permissible values include the following concepts and their descendants:
   - *Specimen (specimen) 123038009*

2. **COMPONENT**
   This attribute refers to what is being observed or measured by a procedure.
   Permissible values include the following concepts and their descendants:
   - *Substance (substance) 105590001*
   - *Observable entity (observable entity) 363787002*
   - *Cell structure (cell structure) 4421005*
   - *Organism (organism) 410607006*

   **Example:**
   
   Protein measurement (procedure)
   
   COMPONENT Protein (substance)

3. **TIME ASPECT**
   This attribute specifies temporal relationships for a measurement procedure.
   Permissible values include the following concept and its descendants:
• Time frame (qualifier value) 7389001

4. PROPERTY
This attribute specifies the kind of property being measured (e.g. concentration).
Permissible values include the following concept and its descendants:
  • Property of measurement (qualifier value) 118598001

5. SCALE TYPE
This attribute refers to the scale of the result of an observation of a diagnostic test (i.e. quantitative, qualitative, semi-quantitative).
Permissible values include the following concepts and their descendants:
  • Quantitative (qualifier value) 30766002
  • Qualitative (qualifier value) 26716007
  • Ordinal value (qualifier value) 117363000
  • Ordinal or quantitative value (qualifier value) 117365007
  • Nominal value (qualifier value) 117362005
  • Narrative value (qualifier value) 117364006
  • Text value (qualifier value) 117444000

6. MEASUREMENT METHOD
This attribute specifies the method by which a procedure is performed.
Permissible values include the following concept and its descendants:
  • Laboratory procedure categorized by method (procedure) 127789004