

# Style Guide for Laboratory Observables

DRAFT Model for Testing

DRAFT

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## Table of Contents

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Document History .....	4
Introduction .....	5
1.1 Purpose .....	5
1.2 Notation used in this document .....	5
1.3 Additional information .....	5
1.4 Attributes used to define lab observables, qualities, properties, and processes .....	6
Appendix A: Attributes used to define measurement procedures .....	12

## Document History

Version	Notes
April 2009	<ul style="list-style-type: none"><li data-bbox="418 310 605 338">• Initial draft</li></ul>

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## Introduction

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### 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:

[http://www.nlm.nih.gov/research/umls/Snomed/loinc\\_npu\\_mou.pdf](http://www.nlm.nih.gov/research/umls/Snomed/loinc_npu_mou.pdf)

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:

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## 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**

<i>Defining Attribute</i>	Permissible Values (Concepts listed and their descendents)
<b><i>Attributes for Observables</i></b>	
OBSERVABLE TARGET	<i>Qualities and properties (nested definitions)</i>
TIME ASPECT	<i>Time frame</i> 7389001
SCALE TYPE	<i>Quantitative</i> 30766002 <i>Nominal value</i> 117362005 <i>Qualitative</i> 26716007 <i>Narrative value</i> 117364006 <i>Ordinal value</i> 117363000 <i>Text value</i> 117444000 <i>Ordinal or quantitative value</i> 117365007
UNITS	<i>Unit</i> 258666001
TECHNIQUE	<i>Laboratory procedure categorized by method</i> 127189004, <i>Techniques</i> 272394005
DIRECT SITE	<i>Specimen</i> 123038009, <i>Physical anatomical entity</i> 91722005
<b><i>Attributes for Properties</i></b>	
PROPERTY TYPE	<i>Property of measurement</i> 118598001
INHERES IN	<i>Physical anatomical entity</i> 91722005, <i>Organism</i> 410607006, <i>Device</i> 49062001
INHERES IN PROCESS	<i>Process</i> 415178003, <i>Function</i> 246464006
TOWARDS	<i>Substance</i> 105590001, <i>Observable entity</i> 363787002
RELATIVE TO	<i>Substance</i> 105590001, <i>Observable entity</i> 363787002
PRECONDITION	<i>Clinical finding</i> 404684003
<b><i>Attributes for continuants that are values of INHERES IN</i></b>	
HAS LOCATION	<i>Physical anatomical entity</i> 91722005,
HAS INGREDIENT	<i>Substance</i> 105590001
<b><i>Attributes for processes that are values of INHERES IN PROCESS</i></b>	
HAS AGENT	<i>Physical anatomical entity</i> 91722005, <i>Organism</i> 410607006

## 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:

- *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

#### 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



**Example:**

*Serum sodium level*

DIRECT SITE *Serum (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 inheres, and on which it depends. In other words, the quality is manifest in that entity.

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

<i>Defining Attribute</i>	<i>Permissible Values (Concepts listed and their descendants)</i>	
HAS SPECIMEN	<i>Specimen</i> 123038009	
COMPONENT	<i>Substance</i> 105590001 <i>Observable entity</i> 363787002	<i>Cell structure</i> 4421005 <i>Organism</i> 410607006
TIME ASPECT	<i>Time frame</i> 7389001	
PROPERTY	<i>Property of measurement</i> 118598001	
SCALE TYPE	<i>Quantitative</i> 30766002 <i>Qualitative</i> 26716007 <i>Ordinal value</i> 117363000 <i>Ordinal or quantitative value</i> 117365007	<i>Nominal value</i> 117362005 <i>Narrative value</i> 117364006 <i>Text value</i> 117444000
MEASUREMENT METHOD	<i>Laboratory procedure categorized by method</i> 127789004	

### 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