



SNOMED CT Style Guide: Procedures

Date 20080414
Version 1.06



Document Properties

Filename:	IHTSDO_Modeling_StyleGuide-Procedures-20080414_v1-06
Title:	SNOMED CT Style Guide: Procedures
Creating Author:	Kent Spackman
Subject*:	IHTSDO, Modeling, Style Guide for Procedures

* Subject should be filled in as 3 keywords. The first keyword should be a structural or organizational entity, e.g. "IHTSDO". The second keyword should be the process the document is related to, e.g. a "Meeting". The third keyword should be an object, e.g. an "Agenda".

Amendment History

Version	Date	Editor	Comments
1.06	20080414	Kent Spackman	Update to Standard IHTSDO Document Format. Replace SNOMEDIDs with ConceptIDs. Substantial revisions based on feedback from prior versions.

© 2007-2008 International Health Terminology Standards Development Organisation. All rights of exploitation in any form and by any means are reserved worldwide for IHTSDO Members. SNOMED CT® was originally created by the College of American Pathologists. This document forms part of the International Release of SNOMED CT® distributed by the International Health Terminology Standards Development Organisation (IHTSDO), and is subject to the IHTSDO's SNOMED CT® Affiliate Licence. Details of the SNOMED CT® Affiliate Licence may be found at <http://www.ihtsdo.org/our-standards/licensing/>. No part of this document may be reproduced or transmitted in any form or by any means, or stored in any kind of retrieval system, except by an Affiliate of the IHTSDO in accordance with the SNOMED CT® Affiliate Licence. Any modification of this document (including without limitation the removal or modification of this notice) is prohibited without the express written permission of the IHTSDO. Any copy of this document that is not obtained directly from the IHTSDO [or a Member of the IHTSDO] is not controlled by the IHTSDO, and may have been modified and may be out of date. Any recipient of this document who has received it by other means is encouraged to obtain a copy directly from the IHTSDO [or a Member of the IHTSDO. Details of the Members of the IHTSDO may be found at <http://www.ihtsdo.org/members/>].



Purpose of this document

This document describes editorial policies regarding the intended meanings of the procedure hierarchy in SNOMED CT. It is intended to describe the editorial policies and previous decisions about meanings that are reflected in the current logic-based models. To the extent that there are inconsistencies between the stated policy in this document and the implemented logic-based definitions, these inconsistencies should be resolved through a consensus-based process. For short-term decision-making, the policies in this document should be adhered to. However, this is a working document, subject to change and revision. The intention is to support communication among those who are actively creating definitions, as well as those who are advising, consulting or providing feedback in a variety of capacities.

Status

The document is a working draft. Its contents have in part been derived from several historical sources, including the SNOMED RT Users Guide, Clinical Terms Version 3 documentation, minutes of working groups (SNOMED CT Content Working Group, Concept Model Working Group, Kaiser CMT modelers meetings), the SNOMED CT Users Guide, and minutes of SNOMED Editorial Board / SNOMED International Standards Board meetings.



Table of Contents

1 Procedures	6
2 The SNOMED CT Procedure Concept Model	7
2.1 Attribute hierarchies	8
2.2 Direct and indirect objects	8
2.3 Method	8
2.4 Site	8
2.4.1 Procedure site – direct	9
2.4.2 Procedure site – indirect	10
2.5 Morphology	10
2.5.1 Direct morphology	11
2.5.2 Indirect morphology	11
2.6 Device	11
2.6.1 Direct device	12
2.6.2 Indirect device	12
2.6.3 Using device	13
2.6.4 Using access device	13
2.7 Access	13
2.8 Surgical approach	14
2.9 Direct substance	14
2.10 Priority	14
2.11 Has focus	14
2.12 Has intent	15
2.13 Recipient category	15
2.14 Revision status	15
2.15 Route of administration	16
2.16 Using substance	16
2.17 Using energy	16
3 Measurement procedures	18
3.1 The measurement procedure model	18
3.2 Component	18
3.3 Property	18
3.4 Has specimen	19
3.5 Time aspect	19
3.6 Scale type	19
3.7 Measurement method	19



4 Attribute overlap or interaction.....	20
4.1 Method vs intent.....	20
5 Specific procedure types	20
5.1 Surgical procedure	20
5.1.1 Operation vs. Procedure.....	20
5.2 Surgical Repair.....	21
5.2.1 Plastic operation, -plasty, and plastic repair.....	21
5.3 Endoscopy, endoscopic procedures	21
5.4 Centesis procedures	21
5.5 Transplantation and grafting	22
5.6 Measurement procedures and laboratory procedures	22
5.6.1 Laboratory procedures.....	23
5.7 Radiographic procedures	23
5.7.1 Imaging guidance procedures	24
5.8 Procedure on bone - Procedure on skeletal system	24
5.9 Repair of fistula – Closure of fistula	25
5.10 Biopsy and Excision	25
5.10.1 Excisional – Incisional – ectomy, Excision, total excision, partial excision	25
5.11 Immunization – Vaccination	26
5.12 Division, incision, transection, bisection, and osteotomy	26
5.12.1 Transection and bisection.....	26
5.12.2 Osteotomy	26
5.13 Open reduction and internal fixation (ORIF)	27
5.14 Encounter.....	27
6 Known issues and problems.....	28
6.1 METHOD and the Action hierarchy.....	28
6.2 Access.....	28
6.3 Medical procedures.....	28
7 Changes and historical notes	29
7.1 Surgical procedures in Clinical Terms version 3.....	29
7.2 USING DEVICE replaced USING	29
7.3 ACCESS not used to model endoscopic route of access	29
7.4 USING SUBSTANCE added.....	29
7.5 APPROACH retired.....	29



1 Procedures

The top level of the procedure hierarchy has the following structure:

SNOMED CT Concept

procedure

- administrative procedure
- community health procedure
- environmental care procedure
- general treatment
- laboratory procedure
- obstetric procedure
- outpatient procedure
- patient encounter procedure
- preoperative/postoperative procedures
- procedure by device
- procedure by intent
- procedure by method
- procedure by priority
- procedure by site
- procedure in coronary care unit
- procedure related to anesthesia and sedation
- procedure with a clinical finding focus
- procedure with a procedure focus
- provider-specific procedure
- regimes and therapies
- social service procedure
- specimen collection
- staff related procedure



2 The SNOMED CT Procedure Concept Model

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

Table 1.1: Approved Procedure attributes summary table

Defining Attribute	Permissible Values (Concepts listed and their descendants)
PROCEDURE SITE* PROCEDURE SITE – DIRECT* PROCEDURE SITE – INDIRECT*	<i>Anatomical structure (body structure) Acquired body structure</i> 280115004 91723000
PROCEDURE MORPHOLOGY* DIRECT MORPHOLOGY* INDIRECT MORPHOLOGY*	<i>Morphologically abnormal structure</i> 49755003
METHOD	<i>Action</i> 129264002
PROCEDURE DEVICE* DIRECT DEVICE* INDIRECT DEVICE* USING DEVICE* USING ACCESS DEVICE*	<i>Device</i> 49062001
ACCESS*	<i>Surgical access values</i> 309795001
SURGICAL APPROACH*	<i>Procedural approach</i> 103379005
DIRECT SUBSTANCE*	<i>Substance</i> 105590001 <i>Pharmaceutical/biologic product</i> 373873005
PRIORITY*	<i>Priorities</i> 272125009
HAS FOCUS*	<i>Clinical finding</i> 404684003 <i>Procedure</i> 71388002
HAS INTENT*	<i>Intents (nature of procedure values)</i> 363675004
RECIPIENT CATEGORY	<i>Person</i> 125676002 <i>Donor for medical or surgical procedure</i> <i>Family</i> 35359004 105455006 <i>Community</i> 133928008 <i>Group</i> 389109008
REVISION STATUS*	<i>Primary operation</i> 261424001 <i>Part of multistage procedure</i> 257958009 <i>Revision-value</i> 255231005
ROUTE OF ADMINISTRATION*	<i>Route of administration value</i> 284009009
USING SUBSTANCE*	<i>Substance</i> 105590001
USING ENERGY*	<i>Physical force</i> 78621006

*Attributes should always be grouped with the *method* attribute to which they apply; in the absence of a method attribute, attributes that are related to each other should be grouped. The one exception is “recipient category”, because a single procedure code should not be pre-coordinated in situations where more than one recipient category is involved. Such complex statements should utilize two or more procedure codes that are placed into an appropriately structured information model.



2.1 Attribute hierarchies

Three groups of attributes are organized as a simple two-level hierarchy. The three top level attributes are *procedure site*, *procedure device*, and *procedure morphology*. Each has a sub-attribute to represent the direct object, and another to represent the indirect object. In addition, *procedure device* can be specialized by the attributes *using* and *access instrument*.

2.2 Direct and indirect objects

Procedures that have a METHOD attribute can be described using an action verb that corresponds to the method. The direct object(s) of the action verb should be represented using (at least) one of the four direct object attributes, depending on whether the direct object on which the method acts is a device (*direct device*), anatomical structure (*procedure site direct*), morphologic abnormality (*direct morphology*) or substance (*direct substance*).

When the type (body structure, device, or substance) of direct object is indeterminate, the direct-object attributes should not be used.

2.3 Method

This attribute represents the action being performed to accomplish the procedure. It does not include the surgical approach (e.g., translumbar), equipment (e.g., sutures), or physical forces (e.g., laser energy).

Permissible values include the following concept and its descendants:

Action (qualifier value) 129264002

Example:

Incision of ureter (procedure)

METHOD *Incision-action (qualifier value)*

PROCEDURE SITE - DIRECT *Ureteric structure (body structure)*

The METHOD can be considered the anchor of each relationship group that defines a procedure; if there are two methods, there should be two different relationship groups. It is correct to regard each relationship group as a kind of sub-procedure that defines the overall procedure. Each method can be regarded as the verb of a sentence, and the verb's direct and indirect objects are specified by the site, morphology, device, substance or energy attributes (below) that are grouped with it.

[NOTE: expanded guidance on the definitions and use of the action hierarchy is required.]

2.4 Site

The PROCEDURE SITE attribute describes the body site acted on or affected by a procedure. This attribute subsumes, in an attribute hierarchy (see Section 2.1 above), the more specific attributes (PROCEDURE SITE - DIRECT and PROCEDURE SITE - INDIRECT) that should be used if possible. The anatomical site may be directly acted on (PROCEDURE SITE - DIRECT) or indirectly acted upon (PROCEDURE SITE - INDIRECT).

When modeling procedures where the METHOD is *Removal-action* or one of its subtypes (e.g., *Excision*, *Surgical biopsy*, etc.), removals **of** the structure itself should use PROCEDURE SITE -



DIRECT. Removals of tissue lesions (cysts, tumors, etc.) are considered to be removals of the site, and should also use PROCEDURE SITE - DIRECT. Removals of devices, calculi, thrombi, foreign bodies and other non-tissue entities **from** the structure should use PROCEDURE SITE - INDIRECT.

Permissible values include the following concepts and their descendants:

Anatomical structure (body structure) 91723000
Acquired body structure (body structure) 280115004

Procedures need not necessarily be categorized by site. "Human body structure" should *not* be assigned as a default value of this attribute because many procedures can be performed on non-human subjects, and because this attribute does *not* necessarily need to be present in a procedure concept definition in order for classifier algorithms to work properly.

The general PROCEDURE SITE attribute is used to model the site for high-level "grouper type" procedure concepts. It is most likely to be used for concepts that do not require a METHOD (action) attribute. Relatively few concepts will be modeled using PROCEDURE SITE, rather than the more specific direct and indirect site attributes (see below).

Example:

Procedure on colon (procedure)
PROCEDURE SITE *colon structure (body structure)*

2.4.1 Procedure site – direct

This attribute is used when the action of the procedure is directly aimed at an anatomical structure or site rather than at something else (such as a device) located there.

Permissible values include the following concepts and their descendants:

Anatomical structure (body structure) 91723000
Acquired body structure (body structure) 280115004

Examples:

- (1) *Amputation of the foot (procedure)*
METHOD *Amputation - action (qualifier value)*
PROCEDURE SITE - DIRECT *Foot structure (body structure)*
- (2) *Biopsy of femur (procedure)*
METHOD *Biopsy - action (qualifier value)*
PROCEDURE SITE - DIRECT *Bone structure of femur (body structure)*

2.4.1.1 Multiple values for PROCEDURE SITE – DIRECT

When the METHOD (action) acts directly on a morphological abnormality (more simply, a lesion) arising from, or existing in, the cells of the tissue in which it occurs [e.g. a tumor (including metastatic tumors), granuloma, polyp, or cyst] the attribute DIRECT MORPHOLOGY is used to model the morphological abnormality. Most concept definitions where DIRECT MORPHOLOGY is used, which also require a site in the definition, will use PROCEDURE SITE - DIRECT. Thus, there



can be more than one direct object of the METHOD for a concept. For example, the DIRECT MORPHOLOGY and the PROCEDURE SITE - DIRECT can both be direct objects of the METHOD. An example of an exception to this rule would be removal of a calculus from the ureter. In this case, the calculus is the direct object, but there is no procedure site that is that direct object, since the ureter is an indirect object.

The most common concepts that have more than one direct object of the METHOD are Subtypes of Removal (procedure) where the object of the removal (e.g. a neoplasm) can be considered to be a part of the tissue at the anatomical site in which it occurs. When a part of an anatomical structure (however abnormal) has been removed, both the morphological abnormality and the anatomical structure in which it is located are to be modeled as direct objects for the METHOD Removal - action (qualifier value). Grafts that become attached via in-growth of capillaries, fibroblasts, and/or other cells or tissues would also be regarded as biologically connected, and therefore modeling their removal would include the anatomical structure as a direct object of the action. The anatomical structure is not to be modeled as a direct object of a removal only when the procedure does not necessarily involve removal also of part of the anatomy; examples include removals of things such as a foreign body, a catheter, a renal calculus, or a mechanical implant like a pacemaker.

2.4.2 Procedure site – indirect

This attribute describes the anatomical site, which is acted upon, but is not the direct object of the procedure (The site is indirectly acted on by the procedure.). Usually in these procedures there is another value that is the direct object of the action. Exceptions (concepts that do not specify a direct object, but only an indirect object) are usually general “groupers” such as “shoulder implantation” (meaning implantation of something into the shoulder), since the thing implanted could be either a device or a substance (material).

Permissible values include the following concepts and their descendants:

Anatomical structure (body structure) 91723000
Acquired body structure (body structure) 280115004

Examples:

- (1) *Removal of catheter from brachial vein (procedure)*
METHOD *Removal-action (qualifier value)*
DIRECT DEVICE *Catheter, device (physical object)*
PROCEDURE SITE - INDIRECT *Structure of brachial vein (body structure)*
- (2) *Removal of calculus of urinary bladder (procedure)*
METHOD *Removal-action (qualifier value)*
DIRECT MORPHOLOGY *Calculus (morphologic abnormality)*
PROCEDURE SITE - INDIRECT *Urinary bladder structure (body structure)*

2.5 Morphology

PROCEDURE MORPHOLOGY is the attribute used to specify the morphology or abnormal structure involved in a procedure. This attribute subsumes the more specific attributes DIRECT MORPHOLOGY and INDIRECT MORPHOLOGY that should be used if possible (see below). DIRECT MORPHOLOGY is used when the procedure method acts directly on the morphologic abnormality. INDIRECT MORPHOLOGY is used when the procedure method acts directly on



something else (e.g., a device, substance or anatomical structure) that is associated with the morphologic abnormality. The more general attribute PROCEDURE MORPHOLOGY is used when defining general concepts that subsume both kinds of sub-concepts.

Permissible values include the following concept and its descendants:

Morphologically abnormal structure (morphologic abnormality) 49755003

Hematoma, calculus, foreign body, blood clot, embolus, and some other entities are not strictly body structures, but are in the body structure hierarchy under “morphologically abnormal structure”, and are valid values for the PROCEDURE MORPHOLOGY attributes.

2.5.1 Direct morphology

This attribute describes the morphologically abnormal structure that is the direct object of the METHOD action.

Permissible values include the following concept and its descendants:

Morphologically abnormal structure (morphologic abnormality) 49755003

Example:

Excision of benign neoplasm (procedure)

METHOD *Excision - action (qualifier value)*

DIRECT MORPHOLOGY *Neoplasm, benign (morphologic abnormality)*

2.5.2 Indirect morphology

This attribute represents a morphology that is acted upon, but is not the direct target of the action being performed (i.e., the procedure's method acts directly on something else, such as a device, substance, or anatomical structure).

Permissible values include the following concept and its descendants:

Morphologically abnormal structure (morphologic abnormality) 49755003

Example:

Removal of mesh from wound (procedure)

METHOD *Removal - action (qualifier value)*

DIRECT DEVICE *Mesh (physical object)*

INDIRECT MORPHOLOGY *Wound (morphologic abnormality)*

2.6 Device

PROCEDURE DEVICE is a general attribute used to model devices associated with a procedure. It subsumes the more specific attributes DIRECT DEVICE, INDIRECT DEVICE, USING DEVICE, and USING ACCESS DEVICE, which should be used instead of PROCEDURE DEVICE if possible. The general attribute PROCEDURE DEVICE is mainly useful for defining high-level, general concepts that aggregate procedures according to the device involved.

Permissible values include the following concept and its descendants:



Device (physical object) 49062001

Example:

Catheter procedure (procedure)
DEVICE *Catheter, device (physical object)*

When the device is the direct object of the action (METHOD), the attribute DIRECT DEVICE is used. If the action is done indirectly to the device, that is, the action is done to something that is located in or on a device, but is not done directly to the device itself, then the attribute INDIRECT DEVICE is used. If the device is used to carry out the action, then the attribute USING DEVICE is used. If the device is used to access the site of the action, then the attribute USING ACCESS DEVICE is used.

2.6.1 Direct device

This attribute represents the device on which the method directly acts.

Permissible values include the following concept and its descendants:

Device (physical object) 49062001

Example:

Removal of arterial stent (procedure)
METHOD *Removal - action (qualifier value)*
DIRECT DEVICE *Arterial stent (physical object)*

2.6.2 Indirect device

This attribute models action done on something that is located in or on a device, but is not done directly on the device itself.

Permissible values include the following concept and its descendants:

Device (physical object) 49062001

For the example below, the vegetation is being excised. The mitral valve prosthesis is where the excised vegetation is located but the mitral valve prosthesis itself is not excised. Thus, mitral valve prosthesis is the INDIRECT DEVICE.

Example:

Excision of vegetations from implanted mitral valve (procedure)
METHOD *Excision - action (qualifier value)*
DIRECT MORPHOLOGY *Vegetation (morphologic abnormality)*
INDIRECT DEVICE *Mitral valve prosthesis, device (physical object)*
PROCEDURE SITE - INDIRECT *Mitral valve structure (body structure)*

NOTE: The attribute INDIRECT DEVICE is infrequently needed, so when using this attribute a second look is advisable just to be sure it is needed.



2.6.3 Using device

This attribute refers to the instrument or equipment utilized to execute an action. USING DEVICE is used when the device is actually used to carry out the action that is the focus of the procedure. If the device is simply the means to access the site of the procedure, then USING ACCESS DEVICE is used instead of USING DEVICE.

Permissible values include the following concept and its descendants:

Device (physical object) 49062001

Example:

Core needle biopsy of larynx (procedure)

METHOD Biopsy - action (qualifier value)

USING DEVICE Core biopsy needle, device (physical object)

PROCEDURE SITE - DIRECT Laryngeal structure (body structure)

2.6.4 Using access device

This attribute specifies the instrument or equipment used to access the site of a procedure.

Permissible values include the following concept and its descendants:

Device (physical object) 49062001

Example:

Arthroscopic synovial biopsy (procedure)

METHOD Biopsy - action (qualifier value)

USING ACCESS DEVICE Arthroscope, device (physical object)

PROCEDURE SITE - DIRECT Structure of synovial tissue of joint (body structure)

2.7 Access

This attribute describes the route used to access the site of a procedure. It is used to distinguish open, closed, and percutaneous procedures. Permissible values include the following concept and its descendants:

Surgical access values (qualifier value) 309795001

Example:

Open removal of bile duct stent (procedure)

ACCESS Open approach-access (qualifier value)



2.8 Surgical approach

This attribute specifies the directional, relational, or spatial access to the site of a surgical procedure.. The domain for SURGICAL APPROACH is descendants of *Surgical procedure (procedure)* 387713003.

Permissible values include the following concept and its descendants:

Procedural approach (qualifier value) 103379005

Examples:

(1) *Intranasal ethmoidectomy (procedure)*

SURGICAL APPROACH *Intranasal approach (qualifier value)*

(2) *Abdominal hysterectomy (procedure)*

SURGICAL APPROACH *Abdominal approach (qualifier value)*

2.9 Direct substance

This attribute describes the *Substance* or *Pharmaceutical/Biologic product* on which the procedure's method directly acts.

Permissible values include the following concepts and their descendants:

Substance (substance) 105590001

Pharmaceutical/biologic product (product) 373873005 (When there is a choice, the use of *Substance* is preferred over *Product*.)

Example:

Injection of prostaglandin (procedure)

METHOD *Injection - action (qualifier value)*

DIRECT SUBSTANCE *Prostaglandin (substance)*

2.10 Priority

This attribute refers to the priority assigned to a procedure.

Permissible values include the following concept and its descendants:

Priorities (qualifier value) 272125009

Example:

Emergency cesarean section (procedure)

PRIORITY *Emergency (qualifier value)*

2.11 Has focus

This attribute specifies the *Clinical finding* or *Procedure* which is the focus of a procedure.

Permissible values include the following concepts and their descendants:



Clinical finding (finding) 404684003

Procedure (procedure) 71388002

Example:

Cardiac rehabilitation assessment (regime/therapy)

HAS FOCUS *Cardiac rehabilitation (regime/therapy)*

2.12 Has intent

This attribute specifies the intent of a procedure.

Permissible values include the following concept and its descendants:

Intents (nature of procedure values) (qualifier value) 363675004

Example:

Diagnostic bronchoscopy (procedure)

HAS INTENT *Diagnostic-procedure intent (qualifier value)*

2.13 Recipient category

This attribute specifies the type of individual or group upon which the action of the procedure is performed. For example, it can be used in blood banking procedures to differentiate whether the procedure was performed on the donor or the recipient of a blood product. In other words, RECIPIENT CATEGORY is Donor (person) if the subject of the record is the donor.

It is not used for a procedure where the subject of the procedure is someone other than the subject of record.

Permissible values include the following concepts and their descendants:

Person (person) 125676002

Family (social concept) 35359004

Community (social concept) 133928008

Group (social concept) 389109008

Donor for medical or surgical procedure (person) 105455006

Example:

Social service interview of family (procedure)

RECIPIENT CATEGORY *Family (social concept)*

2.14 Revision status

This attribute specifies whether a procedure is primary or a revision.

Permissible values include the following concepts and their descendants:



Primary operation (qualifier value) 261424001

Revision-value (qualifier value) 255231005

Part of multistage procedure (qualifier value) 257958009

Examples:

(1) *Primary repair of inguinal hernia (procedure)*

REVISION STATUS *Primary operation (qualifier value)*

(2) *Revision of knee arthroplasty (procedure)*

REVISION STATUS *Revision-value (qualifier value)*

2.15 Route of administration

This attribute allows representation of the route by which a procedure introduces a given substance into the body.

The domain for this attribute is the sub-hierarchy below *Administration of treatment via specific route (procedure)* 394898006.

Permissible values include the following concept and its descendants:

Route of administration value (qualifier value) 284009009

Example:

Inhaled drug administration (procedure)

ROUTE OF ADMINISTRATION *By inhalation (route) (qualifier value)*

2.16 Using substance

This attribute describes the *Substance* used to execute the action of a procedure, but it is not the substance on which procedure's method directly acts (the DIRECT SUBSTANCE).

Permissible values include the following concepts and their descendants:

Substance (substance) 105590001

Example:

Contrast radiography of esophagus (procedure)

METHOD *Radiographic imaging - action (qualifier value)*

PROCEDURE SITE - DIRECT *Esophageal structure (body structure)*

USING SUBSTANCE *Contrast media (substance)*

2.17 Using energy

This attribute describes the energy used to execute an action. USING ENERGY has been introduced because the new attribute USING DEVICE is now used only to represent the instrument or equipment used to execute the action. Unlike the attribute USING, which it replaces, USING DEVICE does not take values from the *physical force* hierarchy.



Permissible values include the following concepts and its descendants:

- *Physical force (physical force)* 78621006

Example:

Gamma ray therapy (procedure)

USING ENERGY *Gamma radiation (physical force)*



3 Measurement procedures

See section 5.6 below for a definition and full discussion of measurement procedures.

3.1 The measurement procedure model

Table 2.1: Approved Measurement Procedure attributes summary table

<i>Defining Attribute</i>	<i>Permissible Values (Concepts listed and their descendents)</i>
COMPONENT	<i>Substance</i> 105590001 <i>Cell structure</i> 4421005 <i>Observable entity</i> 363787002 <i>Organism</i> 410607006
PROPERTY	<i>Property of measurement</i> 118598001
HAS SPECIMEN	<i>Specimen</i> 123038009
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
MEASUREMENT METHOD	<i>Laboratory procedure categorized by method</i> 127789004

3.2 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)*

3.3 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



3.4 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

3.5 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

3.6 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

3.7 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



4 Attribute overlap or interaction

4.1 Method vs intent

Some methods intrinsically have intent stated in their name, such as "diagnostic surgical action".

5 Specific procedure types

5.1 Surgical procedure

A surgical procedure is defined as “a procedure that involves intentional non-transient alteration of structures of the body, and/or a procedure that necessarily involves cutting into the body.” From a practical standpoint, this definition is implemented to include all procedures defined by the METHOD attribute with a value of any action that is listed under “surgical action”.

- In SNOMED, “operation” is synonymous with “surgical procedure.”
- “Medical procedure” is a deprecated term, because of its clear lack of reproducible meaning. It might be considered to be defined as a procedure done by a physician, but even in this case, it would be deprecated on the basis that it is provider-specific (see Issues and Problems below). On the other hand, it seems quite clear (despite some dictionary definitions) that surgical procedures are *not* defined simply as procedures done by a surgeon; a surgeon can carry out many non-surgical actions (examining patients, prescribing, advising, etc). Even more important, a surgical procedure need not necessarily be performed by a surgeon; if a non-surgeon does a procedure that is surgical, it still remains a surgical procedure.

5.1.1 Operation vs. Procedure

While there may never be a complete consensus as to what constitutes a surgical procedure, the agreement has been to classify concepts as surgical procedures if their method is a surgical action based on the action hierarchy. In turn, the surgical action hierarchy distinguishes surgical from non-surgical actions based on the working definition above. Note the “or” in the sentence; actions that do not involve cutting or incision, but do involve the intentional non-transient alteration of anatomy, are still surgical.

Examples of non-surgical actions include fine-needle or brush biopsies, phlebotomy, aspiration, and closed reduction of dislocations - since they both do not significantly or non-transiently alter anatomy and do not necessarily involve cutting.

Examples of borderline actions that are currently classified as surgical include core needle biopsies - these are more invasive and result in more tissue removal than fine-needle biopsies - and centesis, on the theory that combining puncture with removal alters body structure.

Unresolved issue: fine-needle biopsy could be viewed as a kind of centesis, but the former is non-surgical and the latter is surgical. This appears inconsistent.

Sampling, in general, is not necessarily a surgical action. If what is intended is a sampling that involves surgical removal of part of something, then “surgical biopsy – action” should be the action specified.



5.2 Surgical Repair

The definition of surgical repair is “Restoring, to the extent possible, the natural anatomical structure, using a surgical action.” When we clearly distinguish the means by which a procedure is accomplished from the need for the procedure (modeled using the FOCUS attribute), and distinguish these from the objective or intended accomplishment, we can see that repair is clearly an objective or intended accomplishment, *not* a means (which can be suturing, transplanting, etc) *nor* a need (normal functioning, cosmetic appearance, pain relief, etc). Although restoring natural structure will be intended to restore natural function and appearance, functional restoration is not necessary for a procedure to be a repair. On the other hand, it is possible to do an operation intended to restore function without restoring structure (such as with surgery to allow attachment of prosthetic limb replacements after amputation) – and this type of surgery would not be strictly categorized as a repair. Since the current model does not have different attributes to distinguish the *objective* of a procedure from the *means* used to accomplish it, we continue to use METHOD to model both types of information. If the definition of a procedure requires both a *repair – action* and another action that is not a kind of repair, then two role groups should be used.

5.2.1 Plastic operation, -plasty, and plastic repair

The word “plastic” refers to reshaping, and operations that accomplish a repair (a structural restoration) often use the suffix “-plasty”. The term “plastic repair” also occurs, and in order for this not to be a redundancy, there must be a distinction between “plastic” and “repair.” The distinction can be found in the contrasting use of the terms “plastic” and “prosthetic”. A prosthetic repair uses external (non-body) materials to accomplish the structural restoration, while a plastic repair reshapes the body to accomplish the structural restoration. Plastic repairs therefore are distinguished from general repairs, and distinguished from prosthetic repairs.

The suffix “-plasty” is widely used in terms that apply to prosthetic repairs (such as in total hip arthroplasty), so we must interpret “-plasty” to mean any general repair (either prosthetic or plastic or other), and not necessarily just plastic repairs (which reshape existing tissues).

5.3 Endoscopy, endoscopic procedures

Endoscopic procedures are distinguished from endoscopy procedures. The chief distinction depends on the main action (METHOD). If the main action is inspection using an endoscope, this is an endoscopy. If the main action is some other value for METHOD that is carried out by gaining access to the procedure site via an endoscope, this is an endoscopic procedure, and it is modeled with USING ACCESS DEVICE to specify that the endoscope is used to access the site. The main action of an endoscopic procedure is not the action of inspection with the endoscope. Therefore, the action of inspecting using the endoscope is not modeled unless the FSN also specifies endoscopy or inspection. For procedures where the emphasis is on inspection using a device (e.g. endoscopy), the attribute USING DEVICE is used instead of USING ACCESS DEVICE.

5.4 Centesis procedures

Centesis may be defined as the act of puncturing a body cavity or space with a hollow needle and drawing out fluid. Each centesis procedure thus involves both a puncture action and a needle



aspiration action. It is correct to have two role groups for centesis procedures. One group has a METHOD equal to “puncture – action” and a PROCEDURE-SITE DIRECT equal to the structure being punctured. For thoracentesis, the direct site would be the pleura. The second role group has a METHOD equal to “aspiration – action” and has a PROCEDURE-SITE INDIRECT equal to the space being aspirated. For thoracentesis, the indirect site would be the pleural cavity. The value “*centesis – action*” should be retired and not used, since it is actually two different actions with different direct and indirect objects.

5.5 Transplantation and grafting

Transplantation and grafting have very similar meanings, but they are not the same. Some procedures are both transplantation and grafting. Some are grafting but not transplantation, and some are transplantation but not grafting.

Grafting includes procedures that are not transplantation: The noun “graft” might be defined as any free (unattached) tissue or organ for transplantation. However, over time the meaning has been extended to include artificial grafts and implants that are not biological in origin. On the other hand, “transplantation” has not acquired this extended meaning; all transplants consist of biological material. In the action hierarchy, grafting is defined as a kind of surgical introduction. Thus all procedures defined with the action “grafting – action” will be surgical procedures.

Transplantation includes procedures that are not grafting: The action “grafting” necessarily implies that the action by the performer of the deed involves attachment or fixation of the (biological or artificial) graft into its place in the recipient. Most transplantations also involve such attachment or fixation, but not all. Most notably, bone marrow and stem cell transplantation does not involve the action of attachment or fixation. Rather, the action or deed is merely infusion. The infused cells individually find their way to the bone marrow or other sites where conditions are right for their growth and differentiation.

In the action hierarchy, transplantation is not a kind of surgical action. If it were, then bone marrow transplantation would be a surgical procedure, but it clearly is not.

Summary: Procedures that involve the attachment or fixation of biological tissue are both kinds of grafting and kinds of transplantation. If the grafted material is not biological, then the procedure cannot be a type of transplantation. If the transplanted material is not attached or fixed in place, then the procedure cannot be a type of grafting.

5.6 Measurement procedures and laboratory procedures

Measurements are observations that designate the value of a property, quality or attribute that is inherent in the individual or population (or their specimens, by proxy), according to specified rules. Although measurement is generally considered to be the observation of a quantitative value for a quality or attribute, measurements need not necessarily result in a numeric or ordinal result. In other words, detection (detected/not detected) and identification (selection of one or more possibilities from a specified set by detecting their presence or absence) are considered types of measurement procedures. This is admittedly a broad definition, but does require that measurement procedures be done according to pre-determined rules and that they specify the property, quality or attribute that is being measured. Measurement can definitely be done by physical examination techniques as well as



by laboratory techniques, but “physical examination” by itself is not a kind of measurement. Of course, several of the routine procedures carried out during a physical examination involve measurements of properties such as height, weight, vital signs, range of motion, deep tendon reflexes, etc. However, the interpretation of primary observations as being “normal” or “abnormal” is not considered a kind of measurement, since normality is not an inherent property, quality or attribute that can be measured but rather a second-level interpretation of where the primary value lies relative to a range determined externally to the individual.

5.6.1 Laboratory procedures

The difference between a measurement and a laboratory measurement is difficult to reproducibly define. Common language convention allows the category “lab tests” to include procedures like “prothrombin time (PT or INR)”, even when the test is not performed in a laboratory. Diabetics routinely measure their blood glucose – are they doing a “lab test”? Bedside testing and intraoperative testing are expanding, and blurring the distinction between what is done in a laboratory and what is not. As a result, “measurement procedure” is to be preferred for naming procedures that measure all types of analytes. The term “lab test” should be regarded as a useful grouper for interface terminology, but not as a necessary definitional supertype of measurements that are ordinarily done in a hospital laboratory (since they might also be done in a non-laboratory setting).

Measurement procedure concepts that do not otherwise specify should be assumed to refer to the entire process of measurement, which may include obtaining an appropriate specimen, preparing the specimen, and carrying out the analysis and reporting the result. These procedure codes do not narrowly refer only to an intra-laboratory activity. In other words, unless otherwise specified, the tests are named primarily from the perspective of what is done for the patient (what is measured), rather than from the perspective of what each health care worker does to accomplish the task.

Likewise, non-measurement procedures involving patient specimens should be regarded as referring to the entire procedure that is done for that patient. The difference this makes in modeling is that we should not add an attribute-value pair that means “done in a laboratory” in order to define these procedures (not even as “necessarily also” conditions).

Examples:

Serum sodium measurement [104934005]: This procedure concept refers to a sequence of actions that may include obtaining the specimen (if necessary - but may not be if measured by an intravascular device), preparing the specimen, running the test, and reporting the result.

PAP test [119252009]: This concept refers to a sequence of actions including obtaining the specimen, making the smear, staining, screening, interpreting and reporting.

Preparation of cytologic smear from genital source [90226004]: This is the smear preparation only, which includes staining if staining is done, but excludes obtaining the specimen, examining the slide microscopically, interpreting the findings, or reporting.

5.7 Radiographic procedures

Radiographic imaging procedure [363680008] was created as the top of a hierarchy of imaging procedures utilizing x-rays. *Diagnostic radiologic examination* [38743002] had a synonym of “X-ray”, but



this code has been retired because it may have been interpreted more narrowly, in particular because of the possibly narrower interpretation of “radiologic” versus “radiographic”, and the possibly narrower interpretation of “diagnostic”. Nevertheless, the phrase “diagnostic radiography” is allowed in many of the FSNs of subtypes of *radiographic imaging procedure*.

5.7.1 Imaging guidance procedures

The “imaging guidance” aspect of procedures can be modeled using the existing attribute HAS INTENT. The concept *guidance intent (qualifier value)*, a child of *Intents (nature of procedure values) (qualifier value)*, will be created [July 2008] and will be the value for HAS INTENT for imaging guided procedures.

Example:

Computerized tomography guided biopsy of brain (procedure)

Role Group 1

METHOD: Biopsy - action (qualifier value)

PROCEDURE SITE-DIRECT: *Brain structure (body structure)*

Role Group 2

METHOD: *Computed tomography imaging - action (qualifier value)*

PROCEDURE SITE-DIRECT: *Brain structure (body structure)*

HAS INTENT: *Guidance intent (qualifier value)*

Computerized tomography guided biopsy of brain (procedure) would then be subsumed by *Biopsy of brain (procedure)* and by *Computerized axial tomography of brain (procedure)*.

5.8 Procedure on bone - Procedure on skeletal system

There are five anatomical concepts related to “bone”.

1. Bone (tissue): the tissue type that makes up bones.
2. Bone (organ): individual particular bones, such as femur, tibia, ulna, scaphoid, lunate, etc.
3. Skeletal system subdivision: groupings of bones taken together, such as spine, skull, bony pelvis.
4. Bone (system): the *pars ossea systematis skeletalis*, the bone part of the skeletal system
5. Skeletal system: the entire skeletal system, including both the bones and the part of the skeleton composed of cartilage.

Because bone (tissue) is part-of bone (organ), and bone (organ) is part-of bone (system), we can use bone (system) to define aggregate terms that involve bones. Since the skeletal system includes the bones and cartilage of the skeleton, it may be possible to have a procedure on the skeletal system that is not a procedure on bone.

[Note: For now, we have made “skeletal system subdivision” also a part-of bone (system). This may need to change if there are procedures on cartilaginous skeleton that involve skeletal system subdivisions.]



5.9 Repair of fistula – Closure of fistula

These are considered to have the same meaning, because *closure - action* is a kind of *repair – action*, and because repair of a fistula involves closing it. In other words, all fistula closures are auto-classified as kinds of repair procedures, and we model all fistula repairs using *closure – action*.

5.10 Biopsy and Excision

Biopsies, like other removals, can have two direct objects, one the morphology and the other the site. It is therefore alright to use *procedure site direct* for biopsies, even if subtypes might have a direct object that is a morphology.

5.10.1 Excisional – Incisional – ectomy, Excision, total excision, partial excision

These terms are sometimes very difficult to interpret. We have organized excisions of or from organs according to the following general structure:

Organ excision = any excisional act involving the organ (usually organ-ectomy is a synonym, but see next:)

Complete excision of *organ* (sometimes organ-ectomy)

Excisional biopsy of *entire organ* {lymph nodes, testis, ovaries}

Partial excision of *organ*

Excision of lesion from *organ* { may be partial or complete removal of lesion }

Incisional biopsy of *organ* = incisional biopsy of lesion of organ

Excisional biopsy of *organ structure*

{ excisional biopsy of lesion of organ, excisional biopsy of tissue of organ }

Biopsy

Open biopsy { biopsy done by open approach; usually is incisional }

Incisional biopsy

Excisional biopsy

Excisional biopsy (entire organ)

Excisional biopsy (lesion)

Notes on the structure:

- 1) "Organ excision" does not specify whether it is complete or partial, nor does it specify what is excised.
- 2) Sometimes, the -ectomy word is a synonym of complete removal; when it is, the full name will specify "complete organ-ectomy".
- 3) An excision is not necessarily a biopsy, nor are all biopsies excisions (e.g. brush biopsy).
- 4) "Incisional biopsy of organ" necessarily implies incision and removal of a lesion, and is by definition a partial excision, since the site is the organ, and an excision is done, but the entire lesion is not necessarily removed.
- 5) "Excisional biopsy of organ" generally means that *tissue* or a *lesion* or suspected lesion is necessarily entirely excised, not the entire organ, except in the case of small endocrine glands and lymph nodes, in which an excisional biopsy takes the entire gland.
- 6) An excisional biopsy of a lesion of an organ is a partial excision of (from) the organ. This is true even when small polyps are removed. Specifying "partial excision" does not differentiate between



those excisions that remove irreplaceable tissue and those that do not (e.g. a segmental resection vs polypectomy of intestines).

5.11 Immunization – Vaccination

Immunization may be accomplished by active immunization (introduction of a vaccine), or by passive immunization (introduction of immunoglobulin / antibodies). Vaccination, by definition, is the introduction of a vaccine, and is therefore synonymous with active immunization, since a vaccine is a substance that can induce active immunity. We have changed the preferred name of some terms that formerly said "immunization" to be "vaccination", where it is clear that vaccination was intended. In other cases, we have created a new subordinate term for vaccination, and left the original immunization term as a superordinate term to encompass both active and passive immunization procedures.

5.12 Division, incision, transection, bisection, and osteotomy

Division – action is defined as a subtype of *incision – action*. This does not necessarily mean that all procedure names that include the word “division” are necessarily to be modeled with METHOD = *division-action*.

The exception is those procedures where the “division” is accomplished using blunt dissection and not incision. For example, “division of adhesion” concepts should be modeled the same was as “lysis of adhesions” procedure concepts using *dissection - action*. Adhesions are broken down by blunt dissection, often without incising them, though in an open-world model this does not exclude procedures that may also involve division by incision.

The preferred name of the “division of adhesion” concepts can be changed to “lysis of adhesions” for the sake of consistency and to avoid the incorrect modeling that might occur from interpreting these divisions as necessarily being kinds of incision.

5.12.1 Transection and bisection

Transection is a division across the longitudinal axis of a structure. Bisection is division into two parts by cutting. The action concept *transection –action* is a subtype of *bisection – action*, which in turn is a subtype of *division – action*, and is also a subtype of *incision – action*.

This assumes that transection is accomplished by cutting.

5.12.2 Osteotomy

One definition of the word “osteotomy” is “cutting into or through a bone”. This creates three possible meanings in the terminology:

- 1) Cutting into a bone, regardless of whether the bone is divided thereby (general concept)
- 2) Cutting through a bone and dividing it
- 3) Cutting into a bone without cutting through it and therefore without dividing it (incision without division)

The first meaning, incision, is to be modeled using METHOD = incision – action, and PROCEDURE-SITE-DIRECT = bone structure (or subtypes).

The second meaning, division by cutting, is to be modeled using METHOD = *division – action*, and PROCEDURE-SITE-DIRECT = bone structure (or subtypes).



The third meaning, incision without division, does not appear to be needed. Those procedures that do not explicitly involve division can be modeled as simply incision. Any incision procedure that necessarily *must not* involve division (as opposed to *ordinarily would not* involve division) would have to remain primitive until such time as a negation operator is added to the logic repertoire.

Osteotomy - action (qualifier value) is regarded as ambiguous and should be (or remain) retired.

“Incision of bone” had a synonym of “incision of bone without division,” but it cannot retain this synonym and at the same time retain “division of bone” as its subtype. Therefore this synonym is retired as not valid.

5.13 Open reduction and internal fixation (ORIF)

This phrase includes two accomplishments (reduction and fixation) which are accomplished by two different means (open manipulation of the fracture, and insertion of an orthopedic fixation device). This provides a clear opportunity for general concept inclusion axioms (GCIs) in order to fully represent the meanings without imposing a heavy modeling burden on those who do post-coordination.

The simplest path is to say that open reduction of a fracture necessarily involves open manipulation of the fracture; and that internal fixation of a fracture necessarily involves the insertion of an orthopedic internal fixation device.

5.14 Encounter

An encounter is defined as an in-person meeting between a patient and a health care provider for the purpose of the provision of health care services to the patient. These are defined as kinds of procedure.

An “indirect encounter” is not actually an encounter, since there is no face-to-face meeting. Therefore “encounter” and “indirect encounter” are siblings in the procedure hierarchy.



6 Known issues and problems

6.1 METHOD and the Action hierarchy

The policy statement describing the METHOD attribute has not been completely applied. The values in the action hierarchy sometimes include approach, equipment, or physical forces. There is a plan to retire these values and remodel the concepts using existing procedure attributes, to avoid overlap. There are numerous methods in the action hierarchy for which there is little guidance on exactly how they should be applied. Examples include the actions: assisting, attention, checking, counseling, discussion, monitoring, preventive evaluation, management, take impression, testing, therapeutic evaluation, etc. Many of these have been discussed by the modeling team(s) and committees over the years, and it is a high priority to add the documentation of those discussions to this document.

6.2 Access

The Modeling Consistency Task Force (MCTF) and SNOMED Int'l Editorial Board recommended that ACCESS be retired and that all of the access information (open, closed, percutaneous) be modeled using new subtypes of the action hierarchy (cf issue document C00122). This has not yet happened, pending clearer guidance on assignment of open, closed and percutaneous modifiers to various actions.

6.3 Medical procedures

“Medical procedure” is ambiguous, since you don't know if it means:

- 1) procedure performed by a medical physician (as opposed to a surgical one)
- 2) procedure involving a medication
- 3) either 1 or 2 or both
- 4) some other meaning.

This was the reason we decided that medical procedure concepts should be retired, in favor of unambiguous FSNs like administration of medication, procedure performed by physician, etc. Clearly we haven't completed the retiring of these procedures. We should at least mark the ones we think are ambiguous, needing review.



7 Changes and historical notes

7.1 Surgical procedures in Clinical Terms version 3

The surgical and related procedure domains in Clinical Terms Version 3 was generated from the OPCS4-based Chapter 7 of Read Version 2 by the addition of new concepts during the Clinical Terms Project (CTP) and subsequent refinement.

7.2 ROUTE OF ADMINISTRATION added

This attribute was added in the January 2006 release to allow a procedure to be more fully modeled so that its definition includes the route of administration of a given substance.

7.3 USING DEVICE replaced USING

USING DEVICE replaced the attribute USING which was retired as of the January 2007 release. The retired attribute USING allowed values that included descendants of *Physical force (physical force)* 78621006 which are not actually devices. Additionally, the new DEVICE attributes are intended to clarify the inconsistency that existed over when to use the attribute USING versus ACCESS INSTRUMENT versus ACCESS, particularly for *Endoscopic procedures*.

7.4 ACCESS not used to model endoscopic route of access

As of the January 2007 release, ACCESS was no longer used to capture the fact that the route used to access a procedure was endoscopic. The information that was previously captured by ACCESS *Endoscopic approach-access (qualifier value)* is adequately captured with USING ACCESS DEVICE *Endoscope, device (physical object)*.

7.5 USING SUBSTANCE and USING ENERGY added

These attributes were introduced in the January 2007 release.

7.6 APPROACH retired

The attribute APPROACH was retired for the January 2008 releases because its use for non-surgical procedures was not reproducible