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Preface

Topics:

- Purpose (1.1)
- Who should read this guide? (1.2)
- Notation used in this document (1.3)
- Status (1.4)
- Additional information (1.5)
- Inventory of Documentation (1.6)
- Document History (1.7)
- Copyright Notice (1.8)
1.1. Purpose

This document describes the content, structure and terminology of SNOMED CT. It is intended to provide new as well as experienced users with an overview and illustrations of SNOMED CT’s capabilities and uses from a content perspective. As such, it explains the content and the principles used to model the terminology.

1.2. Who should read this guide?

The intended audience for the User Guide includes clinical personnel, business directors, software product managers, and project leaders who are involved in the acquisition, implementation and use of SNOMED CT and SNOMED CT enabled applications in their organisations. While an information technology background may be helpful, it is not required to benefit from this User Guide.

Technical professionals who support the implementation of SNOMED CT or who develop systems that will use SNOMED CT may find this guide helpful in providing a high-level overview of the terminology structure and content. However, for detailed technical guidance, technical professionals should consult the SNOMED CT Technical Reference Guide (TRG) and SNOMED CT Technical Implementation Guide (TIG), as well as other applicable technical documentation described in the Inventory of Documentation.

1.3. 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 are generally represented using the Fully Specified Name in mixed case formatted as in the following example:

Example: Peribronchial pneumonia (disorder)

SNOMED CT Attribute names are represented in all capital letters formatted as in the following example:

Example: FINDING SITE

1.4. Status

This guide contains parts and sections which differ in terms of the authority and status of their content. Each section of the guide is marked to indicate its publication type and status using the symbols shown in Table 1 and Table 2.

Table 1: Document Types

<table>
<thead>
<tr>
<th>Type Name and Description</th>
<th>Draft</th>
<th>Review</th>
<th>Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>A document or other resource that is intended to be authoritative. This includes specifications of SNOMED CT content and release files. Normative requirements for particular functions are also standards.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Guidance

A document or other resource that is intended to provide advice or suggest possible approaches to particular requirement or subject area.

### Table 2: Document Status

<table>
<thead>
<tr>
<th>Status</th>
<th>Name and Description</th>
<th>Standard</th>
<th>Guidance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
<td>Indicates that the document or resource is considered to be up-to-date and complete for the current release of SNOMED CT (indicated by an explicitly stated version date or by the publication date).</td>
<td><img src="image" alt="S" /></td>
<td><img src="image" alt="G" /></td>
</tr>
<tr>
<td>Review</td>
<td>Indicates that the document or resource has been released for review and comments from SNOMED CT users and other stakeholders. It is intended to be complete but has not been formally approved as a final version.</td>
<td><img src="image" alt="S" /></td>
<td><img src="image" alt="G" /></td>
</tr>
<tr>
<td>Draft</td>
<td>Indicates that the document or resource is a draft version. It may be incomplete and has not been approved in a final version.</td>
<td><img src="image" alt="S" /></td>
<td><img src="image" alt="G" /></td>
</tr>
</tbody>
</table>

This edition of the document is configured to use GB English.

The PDF version of this draft is formatted to be printed on A4 paper.

**Note:** This is one of a several large documents that are regularly revised by the IHTSDO. Therefore, for the sake of the environment, please think carefully before deciding to print the entire document.

### 1.5. Additional information

Further information about SNOMED CT is available by contacting IHTSDO:

**IHTSDO Contact Details:**

- **Web:**
  - [www.ihtsdo.org](http://www.ihtsdo.org)
- **Email:**
  - [support@ihtsdo.org](mailto:support@ihtsdo.org)
- **Address:**
  - IHTSDO Rued Langgaards Vej 7, 5te
  - DK-2300 Copenhagen S
  - Denmark
  - 
1.6. Inventory of Documentation

The following essential SNOMED CT documentation is currently available in both English and Spanish versions as part of the International Release of SNOMED CT from the International Health Terminology Standards Development Organisation (IHTSDO):

**SNOMED CT Technical Reference Guide (TRG)**

The TRG is intended for SNOMED CT implementers, such as software developers. The TRG assumes an information technology background. Clinical knowledge is not a prerequisite.

The TRG contains reference material related to the current Release Format 1 (RF1) international release of SNOMED CT and includes file layouts, field sizes, required values and their meanings, and high-level data diagrams. It can be used to install and use SNOMED CT.

**SNOMED CT Technical Implementation Guide (TIG)**

The TIG is intended for SNOMED CT implementers, such as software designers. The TIG assumes information technology and software development experience. Clinical knowledge is not required, although some background is helpful to understand the application context and needs.

The TIG contains guidelines and advice about the design of applications using SNOMED CT, and covers topics such as terminology services, entering and storing information, and migration of legacy information.

**SNOMED CT User Guide**

The User Guide is intended for clinical personnel, business directors, software product managers, and project leaders; information technology experience, though not necessary, can be helpful.

The User Guide is intended to explain SNOMED CT’s capabilities and uses from a content perspective. It explains the content and the principles used to model the terminology.

**Additional Documentation:** The following supplementary documentation is also included, in English only, as part of the International Release of SNOMED CT:

- User Guide
- Editorial Guide
- Technical Implementation Guide
- Technical Reference Guide
- Namespace Identifier Registry
- Developer Toolkit Guide

The following materials previously published in separate documents are now integrated as part of the Technical Implementation Guide.

- Technical Reference Guide (also published separately in July 2011)
- Namespace Identifier Guide
- Namespace Identifier Registry
- File Naming Convention
- RF2 Data Structures Specification
- RF2 Reference Set Specifications
- RF2 Update Guide
## 1.7. Document History

<table>
<thead>
<tr>
<th>Version</th>
<th>Notes</th>
</tr>
</thead>
</table>
| January 2006  | • Modified guide organisation and structure  
• Updated descriptions and examples for SNOMED CT attributes and hierarchies  
• Added overview of SNOMED CT structure and technology considerations  
• Revised glossary                                                                                                                                 |
| July 2006     | • Added section on the use of attributes for Event hierarchy  
• Updated Attributes used to define Clinical findings: modifications were made to use of SEVERITY, EPISODICITY and PATHOLOGICAL PROCESS.  
• Renamed Context-dependent category (context-dependent category) hierarchy to Situation with explicit context (situation)  
• Updated Attributes used to define Procedure concepts: added ROUTE OF ADMINISTRATION as an attribute |
| January 2007  | • Update to Attributes used to define Clinical findings: COURSE and ONSET were retired; CLINICAL COURSE was introduced  
• Update to Attributes used to define Procedure concepts  
• Retired USING and ACCESS INSTRUMENT and replaced with USING DEVICE and USING ACCESS DEVICE  
• Changes to ACCESS attribute  
• New attributes USING SUBSTANCE and USING ENERGY  
• New range for LATERALITY attribute  
• Changes to range for PROCEDURE SITE and FINDING SITE and SPECIMEN SOURCE TOPOGRAPHY  
• Added section on use of attribute for Physical object hierarchy  
• Updates to Examples                                                                                                                                      |
| July 2007     | • Updates to reflect transfer of IP to the International Health Terminology Standards Development Organisation  
• Removal of references to College of American Pathologists (CAP) derivative products  
• Information provided on anticipated changes to Attributes used to define Procedure concepts:  
  • ACCESS  
  • APPROACH  
• Changes to value for HAS DOSE FORM for Pharmaceutical / biologic products                                                                                       |
| January 2008  | • Changes to Attributes used to define Procedure concepts  
• New attribute SURGICAL APPROACH  
• Retired APPROACH  
• Changes to description for attribute RECIPIENT CATEGORY  
• Changes to the range for ASSOCIATED FINDING and additional guidance on the use of ASSOCIATED FINDING and ASSOCIATED PROCEDURE in post-coordinated expressions
<table>
<thead>
<tr>
<th>Version</th>
<th>Notes</th>
</tr>
</thead>
</table>
| July 2008     | • Changes to domain for Attribute ROUTE OF ADMINISTRATION  
                • Discussion on the References Table  
                • Update on [D], [M], [X], [V], [SO], [Q], and [EDTA] concepts in an appendix  
                • Discussion of Negation was added to an appendix                                                                                                                                                                                                                       |
| January 2009  | • Changes to the range for attributes in the ASSOCIATED WITH role hierarchy for precoordinated content  
                • Changes to the range for DIRECT SUBSTANCE for precoordinated content  
                • Clarification of the range for attributes in the PROCEDURE DEVICE role hierarchy  
                • Change to the range for SPECIMEN SOURCE IDENTITY                                                                                                                                                                                                                   |
| July 2009     | • Changes to the range of attributes that take an anatomical value:  
                • Changes to the range for FINDING-SITE  
                • Changes to the range for PROCEDURE SITE attributes  
                • Changes to the range for SPECIMEN SOURCE TOPOGRAPHY  
                • Changes to the range for INTERPRETS and HAS INTERPRETATION  
                • Changes to the range for PATHOLOGICAL PROCESS  
                • Changes to the domain for the six attributes previously identified for use with Measurement procedures  
                • Changes to the range for LATERALITY                                                                                                                                                                                                                           |
| October 2009  | • Updated presentation of attribute ranges (allowable values) to reflect machine-readable concept model work  
                • Changed method of generating document from MS Word to DITA  
                • Overall appearance change and revised order of front matter  
                • Revised figures and diagrams so they can be shared SVG images  
                • Added appendix "Changes and historical notes"  
                • Changed "Role hierarchies" to "Attribute hierarchies"  
                • Updated and clarified wording in several sections                                                                                                                                                                                                         |
| January 2010  | • Added information about the metadata hierarchy and related changes, which are part of the January 2010 Technology Previews and will be incorporated into a future International Release  
                • Added paragraph on allowable domains in post-coordinated expressions  
                • Revised several glossary entries and aligned them to be identical with Technical Reference Guide glossary entries  
                • Expanded scope of User Guide to include new editorial policies that are currently being implemented in the International Release, but with which the terminology may not yet be fully compliant  
                • Improved formatting and layout of the DITA-generated document                                                                                                                                                                                                 |
| July 2010     | • Updated information about the metadata hierarchy and related changes that will support implementation of the RF2 release format  
                • Incorporated formatting changes and example changes resulting from integrating the work on the Technical Implementation Guide  
                • Removed outdated historical sections from the appendix regarding the original merger of SNOMED and the Read Codes and content development processes; for current information about quality processes and content development procedures, users should refer to updated materials from the various IHTSDO Committees.                                                                                   |
### 1.8. Copyright Notice

**Copyright Notice:**

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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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Chapter 2

Overview

Topics:

- *What is SNOMED CT?* (2.1)
- *SNOMED CT uses* (2.2)
- *Current content scope* (2.3)
2.1. What is SNOMED CT?

SNOMED Clinical Terms (SNOMED CT) is a comprehensive clinical terminology that provides clinical content and expressivity for clinical documentation and reporting. It can be used to code, retrieve, and analyse clinical data. SNOMED CT resulted from the merger of SNOMED Reference terminology (SNOMED RT) developed by the College of American Pathologists (CAP) and Clinical Terms Version 3 (CTV3) developed by the National Health Service (NHS) of the United Kingdom. The terminology is comprised of concepts, terms and relationships with the objective of precisely representing clinical information across the scope of health care. Content coverage is divided into hierarchies, which include:

Table 3: Top Level Concepts

<table>
<thead>
<tr>
<th>Clinical finding</th>
<th>Physical force</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procedure</td>
<td>Event</td>
</tr>
<tr>
<td>Observable entity</td>
<td>Environment or geographical location</td>
</tr>
<tr>
<td>Body structure</td>
<td>Social context</td>
</tr>
<tr>
<td>Organism</td>
<td>Situation with explicit context</td>
</tr>
<tr>
<td>Substance</td>
<td>Staging and scales</td>
</tr>
<tr>
<td>Pharmaceutical / biologic product</td>
<td>Physical object</td>
</tr>
<tr>
<td>Specimen</td>
<td>Qualifier value</td>
</tr>
<tr>
<td>Special concept</td>
<td>Record artifact</td>
</tr>
<tr>
<td>Linkage concept</td>
<td></td>
</tr>
</tbody>
</table>

2.2. SNOMED CT uses

Health care software applications focus on collection of clinical data, linking to clinical knowledge bases, information retrieval, as well as data aggregation and exchange. Information may be recorded in different ways at different times and sites of care.

Standardised information improves analysis. SNOMED CT provides a standard for clinical information. Software applications can use the concepts, hierarchies, and relationships as a common reference point for data analysis. SNOMED CT serves as a foundation upon which health care organisations can develop effective analysis applications to conduct outcomes research, evaluate the quality and cost of care, and design effective treatment guidelines.

Standardised terminology can provide benefits to clinicians, patients, administrators, software developers and payers. A clinical terminology can aid in providing health care providers with more easily accessible and complete information pertaining to the health care process (medical history, illnesses, treatments, laboratory results, etc.) and thereby result in improved patient outcomes. A clinical terminology can allow a health care provider to identify patients based on certain coded information in their records, and thereby facilitate follow-up and treatment.

2.3. Current content scope

The terminology domains covered by SNOMED include:

- Clinical findings, including disorders
- Procedures, broadly defined as including all health related activities such as history taking, physical examination, testing, imaging, surgical procedures, disease-specific training and education, counseling, and so forth.
• Observable entities which, when given a value, provide a specific finding or assertion about health-related information. Examples include the names of lab tests, physical exam tests, dates of significant events, and so forth.

• Anatomy, morphology, and other body structures

• Chemicals and other substances of relevance to health and health care, including generic drug ingredient names, generic drug products (virtual medicinal products)

• Generic physical devices relevant to health care, or to broad categories of injury or accident

• Organisms relevant to health and health care of humans and animals

• Other aetiologies of disease, including external forces, harmful events, accidents, genetic abnormalities,

• Functions and activities

• Social contexts relevant to health, including general categories of status of employment, education, housing, care provision, family relationships, and so forth.

• Types of clinical records, documents, certificates and other records and record components relevant to health care.

• Staging, scales, classifications, and other miscellaneous health information

• Attributes and values necessary to organise and structure the terminology

**Note:** Non-human and human concepts: There have been errors in implementing SNOMED CT where non-human concepts have mistakenly been included in published value sets intended for human-only use. It is a mistake to assume that SNOMED CT applies to human medicine only. Many codes are applicable to both human and non-human subjects. Some codes are applicable to non-human subjects only, and these non-human codes are identified in the non-human subset provided with the International Release. For human-only applications, the non-human subset can be removed.
Chapter 3

Basic Components of SNOMED CT

Topics:

- Concepts (3.1)
- Descriptions (3.2)
- Relationships (3.3)
3.1. Concepts

In the context of this document, a “concept” is a clinical meaning identified by a unique numeric identifier (ConceptId) that never changes. Concepts are represented by a unique human-readable Fully Specified Name (FSN). The concepts are formally defined in terms of their relationships with other concepts. These logical definitions give explicit meaning which a computer can process and query on. Every concept also has a set of terms that name the concept in a human-readable way.

3.1.1. Concept granularity

The meaning represented by a Concept can be general (for example | procedure |), specific (for example | excisional biopsy of lymph node |) or somewhere in between (for example | biopsy of lymph node |).

- More specific Concepts:
  - Have finer granularity (more granular);
  - Represent clinical detail.
- More general Concepts:
  - Have coarser granularity (less granular);
  - Represent less clinical detail;
  - Aggregate similar Concepts.

Support for multiple levels of granularity allows SNOMED CT to be used to represent clinical data at a level of detail that is appropriate to a range of different uses.

Concepts with different levels of granularity are linked to one another by | is a | relationships. This enables appropriate aggregation of specific information within less detailed categories.
3.1.2. Concept identifiers

Each SNOMED CT Concept has a permanent unique numeric identifier which is known as the ConceptId.

The sequence of digits in a ConceptId does not convey any information about the meaning or nature of the Concept. The meaning of Concept is represented in human-readable forms by Descriptions and in a computer processable form by Relationships with other Concepts.

The advantages of meaningless identifiers include:

- Identifier permanence without undermining interpretation:
  - In contrast, to maintain consistency, a meaningful code may need to change to reflect revised understanding of the nature of a disorder.

- Enabling multiple aspects of meaning to be represented in the same way:
  - A meaningful code can only represent part of meaning of a complex concept. For example, staphylococcal pneumonia is an infection, a respiratory disorder and a disorder caused by staphylococcus but only one of these aspects can be represented by a code based hierarchy. Thus in the ‘J’ in the ICD10 code ‘J152: Pneumonia due to staphylococcus’ represents that fact that this is a respiratory disorder but does not represent the fact that it is an infection (codes starting with ‘A’) or that it is due to staphylococcus (‘A490: Staphylococcal infection, unspecified’).

- No artificial limitation on concept granularity:

---

1 The use of meaningless identifiers differs from the approach taken by some other coding systems and classifications. For example, the first character of an ICD10 code indicates the general classification that it falls within.
Typical approaches to meaningful coding impose limits on both the number of levels of specificity (i.e. the length of the code) and the number of options at each level (i.e. the number of different symbols that can be used in each character position).

3.2. Descriptions

Concept descriptions are the terms or names assigned to a SNOMED CT concept. “Term” in this context means a phrase used to name a concept. A unique DescriptionId identifies a description. Multiple descriptions might be associated with a concept identified by a ConceptId.

Example:

Some of the descriptions associated with ConceptId 22298006:

- Fully Specified Name: |Myocardial infarction (disorder)| DescriptionId 751689013
- Preferred term: Myocardial infarction DescriptionId 37436014
- Synonym: Cardiac infarction DescriptionId 37442013
- Synonym: Heart attack DescriptionId 37443015
- Synonym: Infarction of heart DescriptionId 37441018

Each of the above descriptions has a unique DescriptionId, and all of these descriptions are associated with a single Concept (and the single ConceptId 22298006).

3.2.1. Types of descriptions

3.2.1.1. Fully Specified Name

Each concept has one Fully Specified Name (FSN) intended to provide an unambiguous way to name a concept. The purpose of the FSN is to uniquely describe a concept and clarify its meaning. The FSN is not a commonly used term or natural phrase and would not be expected to appear in the human-readable representation of a clinical record.

Example:

| Hematoma (morphologic abnormality) | is the FSN of the concept that represents the “hematoma” that a pathologist sees at the tissue level. In contrast, | Hematoma (disorder) | is the FSN of the concept that represents the clinical diagnosis that a clinician makes when they decide that a person has a “hematoma”.

3.2.1.2. Preferred Term

Each concept has one Preferred Term in a given language dialect. The Preferred Term is a common word or phrase used by clinicians to name that concept.

Example: the concept 54987000 | repair of common bile duct (procedure) | has the Preferred Term | choledochoplasty | to represent a common name clinicians use to describe the procedure.

Note: Unlike the Fully Specified Name (FSN) the Preferred Terms need not be unique. Occasionally, the Preferred Term for one concept may also be a Synonym or the Preferred Term for a different concept. Interpretation in these cases will depend on context of use.
Example:
- Cold sensation quality (qualifier value) has a preferred term of “Cold”;
- Common cold (disorder) also has a synonym of “Cold”.

In both cases, “cold” represents a common clinical phrase used to capture the meaning of the concept.

Note: Selection of one term over another as “preferred” in a given language dialect depends entirely on whose preferences are being expressed. Different users are likely to have different preferences, and implementers are encouraged to select or create terms that properly represent the concept and meet the preferences of users. There is no expectation that the Preferred Term distributed with a given language dialect will meet all use cases; nor is there anything sacrosanct about the term. The U.S. English Preferred Term is not guaranteed to have any special status relative to other terms. Rather, it is merely one term that properly represents the concept and can be used as a starting point.

3.2.1.3. Synonym
A synonym represents a term, other than the FSN or Preferred Term, that can be used to represent a concept in a particular language or dialect.

Example: Synonyms of the concept 22298006 | myocardial infarction (disorder) | in English include:
- cardiac infarction | (Description.id: 37442013);
- heart attack | (Description.id: 37443015);
- infarction of heart | (Description.id: 37441018).

The Preferred Term for this concept in English is: | myocardial infarction | (Description.id: 37436014).

Note: Synonyms, like Preferred Terms, are not required to be unique.

3.3. Relationships
Relationships link concepts in SNOMED CT. There are four types of relationships that can be assigned to concepts in SNOMED CT:
- Defining
- Qualifying
- Historical
- Additional

The relationships addressed in this section are known as “defining” relationships which are used to model concepts and create their logical definitions.

3.3.1. Relationships and concept definitions
Each concept in SNOMED CT is logically defined through its relationships to other concepts.

Every active SNOMED CT concept (except the SNOMED CT Concept Root concept) has at least one is a relationship to a supertype concept.

| is a | relationships and defining attribute relationships are known as the defining characteristics of SNOMED CT concepts. They are considered defining because they are used to logically represent a concept by establishing its relationships with other concepts. This is accomplished by establishing | is a | relationships with one or more defining concepts (called supertypes) and modeling the difference with those supertypes through defining attributes.

Example: | Fracture of tarsal bone (disorder) | is defined as:
- | is a | subtype of | Fracture of foot (disorder) |
• and has | finding site | | Bone structure of tarsus (body structure) |
• and has | associated morphology | | Fracture (morphologic abnormality) |

Note: A relationship is assigned only when that relationship is always known to be true.

Example: Group A Streptococcus causes most cases of Streptococcal pharyngitis. However, a small percentage of these cases are caused by other species of Streptococcus. Therefore, it would be incorrect to define | Streptococcal sore throat (disorder) | as having | causative agent | | Streptococcus pyogenes (organism) |. Instead it is correctly defined as having the more general | causative agent | | Genus Streptococcus (organism) |.

3.3.2. IS A relationships

| is a | relationships are also known as “Supertype - Subtype relationships” or “Parent - Child relationships”.
| is a | relationships are the basis of SNOMED CT's hierarchies, as illustrated below.

Figure 2: Example IS A hierarchy

A concept can have more than one | is a | relationship to other concepts. In that case, the concept will have parent concepts in more than one sub-hierarchy of a top-level hierarchy. Subtype relationships can be multi-hierarchical.

Figure 3: Example IS A relationships
3.3.3. Attribute relationships

An attribute Relationship is an association between two concepts that specifies a defining characteristic of one of the concepts (the source of the Relationship). Each Attribute Relationship has a name (the type of Relationship) and a value (the destination of the Relationship). For example

The combination of the attribute Relationships and | is a | relationships associated with a concept represent the logical definition of that concept. The logical concept definition includes one or more supertypes (represented by | is a | relationships), and a set of defining Attributes that differentiate it from the other concept definitions.

Example:

Since pneumonia is a disorder of the lung, the logical definition of the concept | Pneumonia (disorder) | in SNOMED CT includes the following Relationship. The Attribute | Finding site | is assigned the value | Lung structure (body structure) |.

- | Finding site | = | Lung structure (body structure) |

The full definitions of the concepts | Pneumonia (disorder) |, | Infective pneumonia (disorder) | and | Bacterial pneumonia (disorder) | are shown below. Each line represents a defining Attribute with a value.

- | is a | = | pneumonitis |
- , | is a | = | lung consolidation |
- , { | associated morphology | = | inflammation |
- , | associated morphology | = | consolidation |
- , | finding site | = | lung structure |

Figure 4: Definition of |Pneumonia (disorder)|

- | is a | = | infectious disease of lung |
- , | is a | = | pneumonia |
- , | pathological process | = | infectious process |
- , { | associated morphology | = | inflammation |
- , | associated morphology | = | consolidation |
- , | finding site | = | lung structure |

Figure 5: Definition of |Infective pneumonia (disorder)|

- | is a | = | bacterial lower respiratory infection |
- , | is a | = | infective pneumonia |
- , | causative agent | = | bacteria |
- , | pathological process | = | infectious process |
- , { | associated morphology | = | inflammation |
- , | associated morphology | = | consolidation |
- , | finding site | = | lung structure |

Figure 6: Definition of |Bacterial pneumonia (disorder)|

Figure 7 illustrates some of these Relationships graphically. | is a | Relationships relate a concept to more general concepts of the same type. In contrast, Attribute Relationships (such as | Finding site | and | Causative agent |) relate a concept to relevant values in other branches of the subtype hierarchy.
Figure 7: Illustration of Defining Relationships
Chapter 4

Attributes Used in SNOMED CT

Topics:

- Introduction (4.1)
- Attribute Hierarchies in SNOMED CT (4.2)
- Attributes used to define Clinical Finding concepts (4.3)
- Attributes used to define Procedure concepts (4.4)
- Attributes used to define Evaluation Procedure concepts (4.5)
- Attributes used to define Specimen concepts (4.6)
- Attributes used to define Body structure concepts (4.7)
- Attributes used to define Pharmaceutical/Biologic Product concepts (4.8)
- Attributes used to define Situation with Explicit Context concepts (4.9)
- Attributes used to define Event concepts (4.10)
- Attributes used to define Physical Object concepts (4.11)
- Relationship Groups in SNOMED CT (4.12)

This part of the guide provides an overview of the defining attributes used by the SNOMED CT concept model. Further details are provided in the chapters dedicated to each hierarchy.
4.1. Introduction

*SNOMED CT* currently uses over 50 defining attributes to model *concept* definitions.

Each *SNOMED CT* attribute can usually be applied to one *hierarchy* and for a few attributes to more than one *hierarchy*. The *hierarchy* or hierarchies to which an attribute can be applied are referred to as the “domain” of the attribute. Each attribute can be given a limited set of values; this set of values is called the “range” of the attribute.

4.1.1. Domain

The *Domain* is the *hierarchy* to which a specific attribute can be applied.

The *Domain* of the attribute | ASSOCIATED MORPHOLOGY | is the | Clinical finding | hierarchy.

A | Procedure | cannot have an | ASSOCIATED MORPHOLOGY |.

A | Procedure | has a | PROCEDURE MORPHOLOGY |.

4.1.2. Allowable domains in post-coordinated expressions

The *concept model* provides *constraints* for attributes that are used as defining *relationships*, both in distributed *SNOMED CT* content (so-called pre-coordinated definitions) and in *post-coordinated expressions*, as described in the document *Abstract Logical Models and Representational Forms* (available at [www.ihtsdo.org/our-standards/technical-documents/](http://www.ihtsdo.org/our-standards/technical-documents/)). The domain (or starting *concept*) to which qualifying *relationships* are applied in *post-coordinated expressions* may be more general than the domain of defining *relationships* defined in the *concept model*, as long as the resulting *post-coordinated concept expression* as a whole satisfies the *concept model constraints*.

For example, the *concept model constraint* for | SURGICAL APPROACH | requires that its domain be | Surgical procedure (procedure) | 387713003. When | SURGICAL APPROACH | is used in a qualifying *relationship* in *post-coordinated expressions*, the starting domain may be a general procedure, if the resulting expression satisfies the *concept model constraint*. In other words, when | SURGICAL APPROACH | is added to a general procedure as a qualifying *relationship*, the *post-coordinated expression* should also have a *METHOD* with a value of | Surgical action (qualifier value) | or one of its *subtypes*, so that the resulting *concept* becomes a *subtype* of | Surgical procedure (procedure) |.

4.1.3. Range

The *Range* is the set of values allowed for each attribute.

For example, the *Range* for | ASSOCIATED MORPHOLOGY | is | Morphologically abnormal structure (morphologic abnormality) | and its *descendants*, and the *Range* for | FINDING SITE | is | Anatomical or acquired body structure (body structure) | and its *descendants* in the | Body structure | *hierarchy*. 
The domain for the FINDING SITE attribute is the Clinical finding hierarchy. In the above example, the attribute FINDING SITE has the value Lung structure (body structure). Lung structure (body structure) is found in the Anatomical structure (body structure) subhierarchy which is in the allowed range for FINDING SITE.

Defining attributes in SNOMED CT are assigned to the hierarchies where retrieval of clinical data is most useful and relevant (e.g., Procedure, Clinical finding, Pharmaceutical / biologic product, Situation with explicit context, Event, Specimen and Physical object). In addition, LATERALITY is a defining attribute applied to Body structure concepts. Other hierarchies, such as Social context, Substance, Organism, and Observable entity, are not assigned attributes and instead are considered supporting hierarchies. Concepts from the supporting hierarchies can serve as the attribute values for the concept definitions of the main hierarchies.

This section describes the approved attributes used in SNOMED CT. There are many other attributes in SNOMED CT, subtypes of Unapproved attribute (attribute), which have not yet been evaluated thoroughly and approved for use.

4.2. Attribute Hierarchies in SNOMED CT

Selected SNOMED CT attributes have a hierarchical relationship to one another known as “attribute hierarchies”. In an attribute hierarchy, one general attribute is the parent of one or more specific subtypes of that attribute. Concepts defined using the more general attribute can inherit concepts modelled with the more specific subtypes of that attribute.

4.2.1. Attribute hierarchies used in modeling Procedures

Three groups of attributes are organised 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 specialised by the attributes USING DEVICE and USING ACCESS DEVICE.

PROCEDURE DEVICE attribute hierarchy:
- PROCEDURE DEVICE
  - DIRECT DEVICE
  - INDIRECT DEVICE
  - USING DEVICE
  - USING ACCESS DEVICE
4.2.2. Attribute hierarchy used in modeling Clinical Findings

| ASSOCIATED WITH | attribute hierarchy:
- | ASSOCIATED WITH |
  - | AFTER |
  - | DUE TO |
  - | CAUSATIVE AGENT |

4.3. Attributes used to define Clinical Finding concepts

Table 4: Approved Clinical Finding attributes summary

<table>
<thead>
<tr>
<th>Defining Attribute</th>
<th>Subsumed Attribute</th>
<th>Allowable Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>[FINDING SITE]</td>
<td>[Anatomical or acquired body structure] 442083009 (&lt;&lt;)</td>
<td></td>
</tr>
<tr>
<td>[ASSOCIATED MORPHOLOGY]</td>
<td>[Morphologically abnormal structure] 49755003 (&lt;&lt;)</td>
<td></td>
</tr>
<tr>
<td>Defining Attribute</td>
<td>Subsumed Attribute</td>
<td>Allowable Values</td>
</tr>
<tr>
<td>-------------------------</td>
<td>--------------------------</td>
<td>----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>[ASSOCIATED WITH]</td>
<td></td>
<td>[Clinical Finding] 404684003 (&lt;&lt;)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Procedure] 71388002 (&lt;&lt;)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Event] 272379006 (&lt;&lt;)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Organism] 410607006 (&lt;&lt;)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Substance] 105590001 (&lt;&lt;)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Physical object] 260787004 (&lt;&lt;)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Physical force] 78621006 (&lt;&lt;)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Pharmaceutical / biologic product] 373873005 (&lt;&lt; Q only)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[SNOMED CT Concept] 138875005 (==)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Organism] 410607006 (&lt;&lt;)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Substance] 105590001 (&lt;&lt;)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Physical object] 260787004 (&lt;&lt;)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Physical force] 78621006 (&lt;&lt;)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Pharmaceutical / biologic product] 373873005 (&lt;&lt; Q only)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[SNOMED CT Concept] 138875005 (==)</td>
</tr>
<tr>
<td>[CAUSATIVE AGENT]</td>
<td></td>
<td>[Clinical Finding] 404684003 (&lt;=)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Event] 272379006 (&lt;=)</td>
</tr>
<tr>
<td>[DUE TO]</td>
<td></td>
<td>[Clinical Finding] 404684003 (&lt;=)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Event] 272379006 (&lt;=)</td>
</tr>
<tr>
<td>[AFTER]</td>
<td></td>
<td>[Clinical Finding] 404684003 (&lt;&lt;)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Procedure] 71388002 (&lt;&lt;)</td>
</tr>
<tr>
<td>[SEVERITY]</td>
<td></td>
<td>[Severities] 272141005 (&lt;&lt;)(&lt; Q)</td>
</tr>
<tr>
<td>[CLINICAL COURSE]</td>
<td></td>
<td>[Courses] 288524001 (&lt;=)(&lt; Q)</td>
</tr>
<tr>
<td>[EPISODICITY]</td>
<td></td>
<td>[Episodocities] 288526004 (&lt;&lt;)(&lt; Q)</td>
</tr>
<tr>
<td>[INTERPRETS]</td>
<td></td>
<td>[Observable entity] 363787002 (&lt;&lt;)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Laboratory procedure] 108252007 (&lt;&lt;)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Evaluation procedure] 386053000 (&lt;&lt;)</td>
</tr>
<tr>
<td>[HAS INTERPRETATION]</td>
<td></td>
<td>[Findings values] 260245000 (&lt;&lt;)</td>
</tr>
<tr>
<td>[PATHOLOGICAL PROCESS]</td>
<td></td>
<td>[Autoimmune] 263680009 (==)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Infectious process] 441862004 (&lt;&lt;)</td>
</tr>
<tr>
<td>[HAS DEFINITIONAL MANIFESTATION]</td>
<td></td>
<td>[Clinical finding] 404684003 (&lt;&lt;)</td>
</tr>
<tr>
<td>[OCCURRENCE]</td>
<td></td>
<td>[Periods of life] 282032007 (&lt;=)</td>
</tr>
<tr>
<td>[FINDING METHOD]</td>
<td></td>
<td>[Procedure] 71388002 (&lt;=)</td>
</tr>
<tr>
<td>Defining Attribute</td>
<td>Subsumed Attribute</td>
<td>Allowable Values</td>
</tr>
<tr>
<td>--------------------</td>
<td>--------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>[FINDING INFORMER]</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Performer of method</td>
<td>420158005 (&lt;&lt;)</td>
</tr>
<tr>
<td></td>
<td>Subject of record</td>
<td>419358007 (&lt;&lt;)</td>
</tr>
<tr>
<td></td>
<td>or other provider</td>
<td></td>
</tr>
<tr>
<td></td>
<td>of history</td>
<td></td>
</tr>
</tbody>
</table>

**Note:**
Meaning of Allowable Values (*Range*) notations:

- (<<) this code and descendants,
- (>) descendants only,
- (<=) descendants only (stated) except for supercategory groupers,
- (==) this code only,
- (< Q) descendants only when in a qualifying relationship,
- (< Q only) descendants only, and only allowed in a qualifying relationship.

**Note:** See also *Clinical finding (5.2).*

### 4.3.1. FINDING SITE

This attribute specifies the body site affected by a condition.

**Table 5: Permissible values for FINDING SITE**

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kidney disease (disorder)</td>
<td>442083009 (&lt;&lt;)</td>
</tr>
<tr>
<td>Kidney structure (body structure)</td>
<td></td>
</tr>
<tr>
<td>Appendicitis (disorder)</td>
<td>49755003 (&lt;&lt;)</td>
</tr>
<tr>
<td>Appendix structure (body structure)</td>
<td></td>
</tr>
</tbody>
</table>

### 4.3.2. ASSOCIATED MORPHOLOGY

This attribute specifies the morphologic changes seen at the tissue or cellular level that are characteristic features of a disease.

**Table 6: Permissible values for ASSOCIATED MORPHOLOGY**

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bone marrow hyperplasia (disorder)</td>
<td>49755003 (&lt;&lt;)</td>
</tr>
<tr>
<td>Hyperplasia (morphologic abnormality)</td>
<td></td>
</tr>
<tr>
<td>Pancreatitis (disorder)</td>
<td>49755003 (&lt;&lt;)</td>
</tr>
<tr>
<td>Inflammation (morphologic abnormality)</td>
<td></td>
</tr>
</tbody>
</table>
4.3.3. ASSOCIATED WITH

This attribute asserts an interaction between two concepts beyond simple co-occurrence in the patient. [ASSOCIATED WITH] represents a clinically relevant association between concepts without either asserting or excluding a causal or sequential relationship between the two.

Table 7: Permissible values for ASSOCIATED WITH

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Clinical Finding</td>
</tr>
<tr>
<td></td>
<td>Procedure</td>
</tr>
<tr>
<td></td>
<td>Event</td>
</tr>
<tr>
<td></td>
<td>Organism</td>
</tr>
<tr>
<td></td>
<td>Substance</td>
</tr>
<tr>
<td></td>
<td>Physical object</td>
</tr>
<tr>
<td></td>
<td>Physical force</td>
</tr>
<tr>
<td></td>
<td>Pharmaceutical / biologic product</td>
</tr>
<tr>
<td></td>
<td>SNOMED CT Concept</td>
</tr>
</tbody>
</table>

[ASSOCIATED WITH] subsumes the following, more specific, attributes in what is called an attribute hierarchy (explained in Attribute Hierarchies in SNOMED CT (4.2)):

- |AFTER|
- |DUE TO|
- |CAUSATIVE AGENT|

4.3.4. AFTER

This attribute is used to model concepts in which a clinical finding occurs after another clinical finding or procedure. Neither asserting nor excluding a causal relationship, it instead emphasises a sequence of events.

Table 8: Permissible values for AFTER

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Clinical Finding</td>
</tr>
<tr>
<td></td>
<td>Procedure</td>
</tr>
</tbody>
</table>

This example can be paraphrased as: “every post-viral disorder occurs after some viral disease”.

4.3.5. DUE TO

This attribute is used to relate a Clinical finding directly to its cause. If a clinical finding merely predisposes to or worsens another disorder, rather than causing it directly, then the more general attribute | ASSOCIATED WITH | is used instead.
Table 9: Permissible values for DUE TO

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Clinical Finding] 404684003 (&lt;=)</td>
<td>[Cheilitis due to atopic dermatitis (disorder)]</td>
</tr>
<tr>
<td>[Event] 272379006 (&lt;=)</td>
<td>- [IS A] [Cheilitis (disorder)]</td>
</tr>
<tr>
<td></td>
<td>- [DUE TO] [Atopic dermatitis (disorder)]</td>
</tr>
</tbody>
</table>

### 4.3.6. CAUSATIVE AGENT

This attribute identifies the direct causative agent of a disease. It does not include vectors, e.g. a mosquito that transmits malaria.

Table 10: Permissible values for CAUSATIVE AGENT

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Organism] 410607006 (&lt;=)</td>
<td>[Bacterial endocarditis (disorder)]</td>
</tr>
<tr>
<td>[Substance] 105590001 (&lt;=)</td>
<td>- [CAUSATIVE AGENT] [Superkingdom Bacteria (organism)]</td>
</tr>
<tr>
<td>[Physical object] 260787004 (&lt;=)</td>
<td></td>
</tr>
<tr>
<td>[Physical force] 78621006 (&lt;=)</td>
<td></td>
</tr>
<tr>
<td>[Pharmaceutical / biologic product] 373873005 (&lt;&lt; Q only)</td>
<td></td>
</tr>
<tr>
<td>[SNOMED CT Concept] 138875005 (==)</td>
<td></td>
</tr>
<tr>
<td>[Electrical burn of skin (disorder)]</td>
<td></td>
</tr>
<tr>
<td>- [CAUSATIVE AGENT] [Electricity (physical force)]</td>
<td></td>
</tr>
</tbody>
</table>

### 4.3.7. SEVERITY

This attribute is used to subclass a |Clinical finding| concept according to its severity; however, caution is encouraged because this use is said to be relative. By relative, it is meant that it is incorrect to assume that the same degree of disease intensity or hazard is implied for all |Clinical finding| to which this attribute is applied. There are three reasons.

First, "severe" could be interpreted differently depending on what other values are available to choose for severity. Thus severity is relative to the other values in the value set presented to users. Consider the different meaning of severity in each of the following three sets of values:

- mild / moderate / severe
- minimal / mild / moderate / severe / very severe
- mild / mild to moderate / moderate / moderate to severe / severe / life threatening / fatal

Second, the severity is defined relative to the expected degree of intensity or hazard of the |Clinical finding| that is being qualified. A common cold has a baseline intensity or hazard much less than that of a more serious disease like lupus erythematosus or pneumonia; thus a severe cold might be considered less intense or hazardous than a mild pneumonia.

Third, some disorders that are life-threatening do not ordinarily have a severity assigned to them. Cancer, for example, is generally not subclassed according to mild, moderate and severe types, but rather is subclassed according to stage or grade.

For these reasons, the |SEVERITY| attribute cannot be relied on to retrieve all |Clinical finding| with serious or life-threatening import. Nevertheless, it is still useful for subclassing certain concepts and differentiating...
between different severities of a single disorder. SEVERITY is not used to model any concepts pre-coordinated in the International Release but it can still be used in post-coordination as a qualifier.

Table 11: Permissible values for SEVERITY

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Severities</td>
</tr>
</tbody>
</table>

4.3.8. CLINICAL COURSE

This attribute is used to represent both the course and onset of a disease. Many conditions with an acute (sudden) onset also have an acute (short duration) course. Few diseases with a chronic (long-term) course would need to have their onset sub-divided into rapid or gradual subtypes, and thus there is no clear need for separating the rapidity of onset from the duration of a disease; based on testing by implementers and modelers, a single attribute with values that combine these meanings has clearly been more reproducible and useful than two attributes that attempt to separate the meanings.

Table 12: Permissible values for CLINICAL COURSE

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Courses</td>
</tr>
<tr>
<td>•</td>
<td>CLINICAL COURSE</td>
</tr>
<tr>
<td>•</td>
<td>CLINICAL COURSE</td>
</tr>
</tbody>
</table>

The word acute has more than one meaning, and the meanings are often overlapping or unclear. The word acute may imply rapid onset, short duration, or high severity; in some circumstances it might be used to mean all of these. For morphological terms it may also imply the kind of morphology associated with the speed of onset. |Acute inflammation (morphologic abnormality)| does not necessarily have CLINICAL COURSE |Sudden onset AND/OR short duration |, but rather implies polymorphonuclear infiltration; likewise |Chronic inflammation (morphologic abnormality)| implies mononuclear cell infiltration, not necessarily a chronic course, although inflammation with a chronic course is highly correlated with a lymphocytic infiltration.

4.3.9. EPISODICITY

|EPISODICITY| is used to represent episodes of care provided by a physician or other care provider, typically a general practitioner, not episodes of disease experienced by the patient. See EPISODICITY no longer modelled in active content (7.1), regarding the origin of the attribute. For example, asthma with |EPISODICITY|=| first episode | represents the first time the patient presents to their health care provider with asthma. EPISODICITY is not used to model any concepts pre-coordinated in the International Release but it can still be used in post-coordination as a qualifier.

Table 13: Permissible values for EPISODICITY

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Episodicities</td>
</tr>
</tbody>
</table>
4.3.10. INTERPRETS

This attribute refers to the entity being evaluated or interpreted, when an evaluation, interpretation or “judgement” is intrinsic to the meaning of a concept. This attribute is usually grouped with the | HAS INTERPRETATION | attribute.

Table 14: Permissible values for INTERPRETS

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observable entity 363787002 (&lt;&lt;)</td>
<td>Decreased muscle tone (finding)</td>
</tr>
<tr>
<td>Laboratory procedure 108252007 (&lt;&lt;)</td>
<td>• INTERPRETS</td>
</tr>
<tr>
<td>Evaluation procedure 386053000 (&lt;&lt;)</td>
<td>• HAS INTERPRETATION</td>
</tr>
<tr>
<td>Abnormal glucose level (finding)</td>
<td>• INTERPRETS</td>
</tr>
<tr>
<td></td>
<td>• HAS INTERPRETATION</td>
</tr>
</tbody>
</table>

Note: For concepts in the Measurement finding subhierarchy, the value for | INTERPRETS | should be an Evaluation procedure or a Laboratory procedure rather than an Observable entity.

4.3.11. HAS INTERPRETATION

This attribute is grouped with the attribute |INTERPRETS|, and designates the judgement aspect being evaluated or interpreted for a concept (e.g., presence, absence, degree, normality, abnormality, etc.).

Table 15: Permissible values for HAS INTERPRETATION

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Findings values 260245000 (&lt;&lt;)</td>
<td>Decreased muscle tone (finding)</td>
</tr>
<tr>
<td></td>
<td>• INTERPRETS</td>
</tr>
<tr>
<td></td>
<td>• HAS INTERPRETATION</td>
</tr>
<tr>
<td>Abnormal glucose level (finding)</td>
<td>• INTERPRETS</td>
</tr>
<tr>
<td></td>
<td>• HAS INTERPRETATION</td>
</tr>
</tbody>
</table>

4.3.12. PATHOLOGICAL PROCESS

This attribute provides information about the underlying pathological process for a disorder, but only when the results of that process are not structural and cannot be represented by the |ASSOCIATED MORPHOLOGY| attribute.

The values |Infectious process (qualifier value)| and its subtype |Parasitic process (qualifier value)| are included in the range for |PATHOLOGICAL PROCESS|. These were added to accommodate the change...
in the *modeling of concepts* in the |Infectious disease (disorder)| subhierarchy where the infectious aspect of the disease is represented using |PATHOLOGICAL PROCESS|.

### Table 16: Permissible values for PATHOLOGICAL PROCESS

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Autoimmune</td>
</tr>
<tr>
<td></td>
<td>Infectious process</td>
</tr>
<tr>
<td></td>
<td>Disease caused by parasite (disorder)</td>
</tr>
</tbody>
</table>

Pathological process must not be used for values that could overlap with |ASSOCIATED MORPHOLOGY|. Inflammatory processes result in inflammation (by definition), but these disorders should be defined using their morphology.

### 4.3.13. HAS DEFINITIONAL MANIFESTATION

This attribute links disorders to the manifestations (observations) that define them. It can only be applied to disorders.

### Table 17: Permissible values for HAS DEFINITIONAL MANIFESTATION

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Clinical finding</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 4.3.14. OCCURRENCE

This attribute refers to the specific period of life during which a condition first presents. Multiple values of |OCCURRENCE| for a single concept are not desirable, and these will be addressed in a future release. This does not mean the condition cannot persist beyond the period of life in which it first presents.

### Table 18: Permissible values for OCCURRENCE

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Periods of life</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 4.3.15. FINDING METHOD

This attribute specifies the means by which a clinical finding was determined. This attribute is frequently used in conjunction with |FINDING INFORMER|. Findings that specify that they were determined by
examination of the patient (e.g. |On examination - ankle clonus (finding)|) should have a value for both |FINDING METHOD| and |FINDING INFORMER|.

Table 19: Permissible values for FINDING METHOD

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Procedure</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>•</td>
</tr>
</tbody>
</table>

4.3.16. FINDING INFORMER

This attribute specifies the person or other entity from which the clinical finding information was obtained. This attribute is frequently used in conjunction with |FINDING METHOD|.

Table 20: Permissible values for FINDING INFORMER

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Performer of method</td>
</tr>
<tr>
<td></td>
<td>Subject of record or other provider of history</td>
</tr>
<tr>
<td></td>
<td>•</td>
</tr>
<tr>
<td></td>
<td>•</td>
</tr>
</tbody>
</table>

It is accepted that an information model should permit identification of a particular individual who provides information; |FINDING INFORMER| is not about the particular individual. It is about the category or type of informer, which is used to differentiate self-reported symptoms from provider-observed signs. Granted, this permits inclusion of epistemology-loaded terms (cf. Bodenreider el al., FOIS 2004), but health care is full of such terms, and they are (or at least can be) understandable, reproducible and useful.

4.4. Attributes used to define Procedure concepts

Table 21: Approved Procedure attributes summary

<table>
<thead>
<tr>
<th>Defining Attribute</th>
<th>Subsumed Attribute</th>
<th>Allowable Values</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PROCEDURE SITE</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Procedure site - Direct</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Procedure site - Indirect</td>
<td></td>
</tr>
<tr>
<td>Defining Attribute</td>
<td>Subsumed Attribute</td>
<td>Allowable Values</td>
</tr>
<tr>
<td>--------------------</td>
<td>--------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>[PROCEDURE MORPHOLOGY]</td>
<td>Morphologically abnormal structure</td>
<td>49755003 (&lt;&lt;)</td>
</tr>
<tr>
<td></td>
<td>Direct morphology</td>
<td>Morphologically abnormal structure</td>
</tr>
<tr>
<td></td>
<td>Indirect morphology</td>
<td>Morphologically abnormal structure</td>
</tr>
<tr>
<td>[METHOD]</td>
<td>Action</td>
<td>129264002 (&lt;&lt;)</td>
</tr>
<tr>
<td>[PROCEDURE DEVICE]</td>
<td>Device</td>
<td>49062001 (&lt;&lt;)</td>
</tr>
<tr>
<td></td>
<td>[DIRECT DEVICE]</td>
<td>Device</td>
</tr>
<tr>
<td></td>
<td>[INDIRECT DEVICE]</td>
<td>Device</td>
</tr>
<tr>
<td></td>
<td>[USING DEVICE]</td>
<td>Device</td>
</tr>
<tr>
<td></td>
<td>[USING ACCESS DEVICE]</td>
<td>Device</td>
</tr>
<tr>
<td>[ACCESS]</td>
<td>Surgical access values</td>
<td>309795001 (&lt;=)(&lt; Q)</td>
</tr>
<tr>
<td>[DIRECT SUBSTANCE]</td>
<td>Substance</td>
<td>105590001 (&lt;&lt;)</td>
</tr>
<tr>
<td></td>
<td>Pharmaceutical / biologic product</td>
<td>373873005 (&lt;&lt;)</td>
</tr>
<tr>
<td>[PRIORITY]</td>
<td>Priorities</td>
<td>272125009 (&lt;=)(&lt; Q)</td>
</tr>
<tr>
<td>[HAS FOCUS]</td>
<td>Clinical finding</td>
<td>404684003 (&lt;&lt;)</td>
</tr>
<tr>
<td></td>
<td>Procedure</td>
<td>71388002 (&lt;&lt;)</td>
</tr>
<tr>
<td>[HAS INTENT]</td>
<td>Intents (nature of procedure values)</td>
<td>363675004 (&lt;=)</td>
</tr>
<tr>
<td>[RECIPIENT CATEGORY]</td>
<td>Person</td>
<td>125676002 (&lt;&lt;)</td>
</tr>
<tr>
<td></td>
<td>Family</td>
<td>35359004 (&lt;&lt;)</td>
</tr>
<tr>
<td></td>
<td>Community</td>
<td>133928008 (&lt;&lt;)</td>
</tr>
<tr>
<td></td>
<td>Donor for medical or surgical procedure</td>
<td>105455006 (&lt;&lt;)</td>
</tr>
<tr>
<td></td>
<td>Group</td>
<td>389109008 (&lt;&lt;)</td>
</tr>
<tr>
<td>[REVISION STATUS]</td>
<td>Primary operation</td>
<td>261424001 (&lt;&lt;)</td>
</tr>
<tr>
<td></td>
<td>Revision - value</td>
<td>255231005 (&lt;&lt;)</td>
</tr>
<tr>
<td></td>
<td>Part of multistage procedure</td>
<td>257958009 (&lt;&lt;)</td>
</tr>
<tr>
<td>[ROUTE OF ADMINISTRATION]</td>
<td>Route of administration value</td>
<td>284009009 (&lt;&lt;)</td>
</tr>
<tr>
<td>[SURGICAL APPROACH]</td>
<td>Procedural approach</td>
<td>103379005 (&lt;=)(&lt; Q)</td>
</tr>
</tbody>
</table>
### Allowable Values

<table>
<thead>
<tr>
<th>Defining Attribute</th>
<th>Subsumed Attribute</th>
<th>Allowable Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>[USING ENERGY]</td>
<td>Physical force</td>
<td>78621006 (&lt;)</td>
</tr>
<tr>
<td>[USING SUBSTANCE]</td>
<td>Substance</td>
<td>105590001 (&lt;)</td>
</tr>
</tbody>
</table>

**Note:**

Meaning of Allowable Values (*Range*) notations:

- (<>) this code and descendants,
- (<) descendants only,
- (<=) descendants only (stated) except for supercategory groupers,
- (==) this code only,
- (< Q) descendants only when in a qualifying relationship,
- (< Q only) descendants only, and only allowed in a qualifying relationship.

**Note:**

Attributes should 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 utilise two or more procedure codes that are placed into an appropriately structured information model.

**Note:** See also Procedure (5.3).

### 4.4.1. PROCEDURE SITE

The [PROCEDURE SITE] attribute describes the body site acted on or affected by a procedure. This attribute subsumes, in an attribute hierarchy (see Attribute Hierarchies in SNOMED CT (4.2)), 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, tumours, 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].

#### Table 22: Permissible values for PROCEDURE SITE

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Anatomical or acquired body structure] 442083009 (&lt;&gt;)</td>
<td>[Procedure on colon (procedure)]</td>
</tr>
<tr>
<td></td>
<td>• [PROCEDURE SITE] [colon structure (body structure)]</td>
</tr>
</tbody>
</table>

Procedures need not necessarily be categorised 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 modelled using |PROCEDURE SITE|, rather than the more specific direct and indirect site attributes (see below).

4.4.1.1. PROCEDURE SITE DIRECT

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

Table 23: Permissible values for PROCEDURE SITE DIRECT

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Anatomical or acquired body structure</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Biopsy of femur (procedure)</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.4.1.1.1. 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 tumour (including metastatic tumours), 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 modelled 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 modelled 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.

4.4.1.2. 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 |Arm implantation (procedure)| (meaning implantation of something into the arm), since the thing implanted could be either a device or a substance (material).
Table 24: Permissible values for PROCEDURE SITE INDIRECT

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anatomical or acquired body structure</td>
<td>Removal of catheter from brachial vein (procedure)</td>
</tr>
<tr>
<td>(&lt;&lt;)</td>
<td>- METHOD</td>
</tr>
<tr>
<td></td>
<td>- DIRECT DEVICE</td>
</tr>
<tr>
<td></td>
<td>- Procedure site - Indirect</td>
</tr>
<tr>
<td>Removal of calculus of urinary bladder (procedure)</td>
<td>Removal of calculus of urinary bladder (procedure)</td>
</tr>
<tr>
<td>- METHOD</td>
<td>Removal - action (qualifier value)</td>
</tr>
<tr>
<td></td>
<td>- DIRECT MORPHOLOGY</td>
</tr>
<tr>
<td></td>
<td>- Procedure site - Indirect</td>
</tr>
</tbody>
</table>

4.4.2. PROCEDURE 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.

Table 25: Permissible values for PROCEDURE MORPHOLOGY

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morphologically abnormal structure</td>
<td>49755003</td>
</tr>
<tr>
<td>(&lt;&lt;)</td>
<td></td>
</tr>
</tbody>
</table>

Haematoma, 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.

4.4.2.1. DIRECT MORPHOLOGY

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

Table 26: Permissible values for DIRECT MORPHOLOGY

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morphologically abnormal structure</td>
<td>Excision of benign neoplasm (procedure)</td>
</tr>
<tr>
<td>(&lt;&lt;)</td>
<td>- METHOD</td>
</tr>
<tr>
<td></td>
<td>- DIRECT MORPHOLOGY</td>
</tr>
</tbody>
</table>
4.4.2. 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).

Table 27: Permissible values for INDIRECT MORPHOLOGY

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morphologically abnormal structure 49755003</td>
<td>Removal of mesh from wound (procedure)</td>
</tr>
<tr>
<td></td>
<td>• METHOD</td>
</tr>
<tr>
<td></td>
<td>• DIRECT DEVICE</td>
</tr>
<tr>
<td></td>
<td>• INDIRECT MORPHOLOGY</td>
</tr>
</tbody>
</table>

4.4.3. 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).

Table 28: Permissible values for METHOD

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Action 129264002</td>
<td>Incision of ureter (procedure)</td>
</tr>
<tr>
<td></td>
<td>• METHOD</td>
</tr>
<tr>
<td></td>
<td>• Procedure site - Direct</td>
</tr>
</tbody>
</table>

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 verbs direct and indirect objects are specified by the site, morphology, device, substance or energy attributes (below) that are grouped with it.

4.4.4. PROCEDURE 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.

Table 29: Permissible values for PROCEDURE DEVICE

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device 49062001</td>
<td>Catheter procedure (procedure)</td>
</tr>
<tr>
<td></td>
<td>• PROCEDURE DEVICE</td>
</tr>
</tbody>
</table>

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.

**Note:** The permissible values for attributes in the |PROCEDURE DEVICE| role hierarchy include | Device (physical object) | and its descendants. However, there are a limited number of products in SNOMED CT which are devices that also deliver drugs. These concepts descend from | Drug-device combination product (product) | which is a descendant of both | Device (physical object) | and | Pharmaceutical / biologic product (product)|. Therefore, although they carry the hierarchy tag of (product), they are valid values for attributes in the | PROCEDURE DEVICE | role hierarchy.

**Example:**

<table>
<thead>
<tr>
<th>Removal of drug coated stent (procedure)</th>
</tr>
</thead>
<tbody>
<tr>
<td>•</td>
</tr>
<tr>
<td>•</td>
</tr>
</tbody>
</table>

### 4.4.4.1. DIRECT DEVICE

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

**Table 30: Permissible values for DIRECT DEVICE**

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device 49062001 (&lt;&lt;)</td>
<td>Removal of arterial stent (procedure)</td>
</tr>
<tr>
<td></td>
<td>• METHOD</td>
</tr>
<tr>
<td></td>
<td>• DIRECT DEVICE</td>
</tr>
</tbody>
</table>

### 4.4.4.2. 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.

**Table 31: Permissible values for INDIRECT DEVICE**

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device 49062001 (&lt;&lt;)</td>
<td>Excision of vegetations from implanted mitral valve (procedure)</td>
</tr>
<tr>
<td></td>
<td>• METHOD</td>
</tr>
<tr>
<td></td>
<td>• DIRECT MORPHOLOGY</td>
</tr>
<tr>
<td></td>
<td>• INDIRECT DEVICE</td>
</tr>
<tr>
<td></td>
<td>• Procedure site - Indirect</td>
</tr>
</tbody>
</table>

**Note:**

In the above example, 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|. 
Note:
The attribute |INDIRECT DEVICE| is infrequently needed. When using this attribute, a second look is advisable to be sure it is needed.

4.4.4.3. USING DEVICE
This attribute refers to the instrument or equipment utilised 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|.

Table 32: Permissible values for USING DEVICE

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device 49062001 (&lt;=)</td>
<td>Core needle biopsy of larynx (procedure)</td>
</tr>
<tr>
<td></td>
<td>• METHOD</td>
</tr>
<tr>
<td></td>
<td>• USING DEVICE</td>
</tr>
<tr>
<td></td>
<td>• Procedure site - Direct</td>
</tr>
</tbody>
</table>

4.4.4.4. USING ACCESS DEVICE
This attribute specifies the instrument or equipment used to access the site of a procedure.

Table 33: Permissible values for USING ACCESS DEVICE

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device 49062001 (&lt;=)</td>
<td>Arthroscopic synovial biopsy (procedure)</td>
</tr>
<tr>
<td></td>
<td>• METHOD</td>
</tr>
<tr>
<td></td>
<td>• USING ACCESS DEVICE</td>
</tr>
<tr>
<td></td>
<td>• Procedure site - Direct</td>
</tr>
</tbody>
</table>

4.4.5. ACCESS
This attribute describes the route used to access the site of a procedure. It is used to distinguish open, closed, and percutaneous procedures.

Table 34: Permissible values for ACCESS

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgical access values 309795001 (&lt;=)(&lt; Q)</td>
<td>Open removal of bile duct stent (procedure)</td>
</tr>
<tr>
<td></td>
<td>• ACCESS</td>
</tr>
</tbody>
</table>
4.4.6. DIRECT SUBSTANCE

This attribute describes the |Substance| or |Pharmaceutical / biologic product| on which the procedure’s method directly acts.

Table 35: Permissible values for DIRECT SUBSTANCE

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Injection of prostaglandin (procedure)</td>
</tr>
<tr>
<td></td>
<td>•</td>
</tr>
<tr>
<td></td>
<td>•</td>
</tr>
</tbody>
</table>

Note: As an editorial policy, in the distribution form of the International Release, |Pharmaceutical / biologic product (product)| and its descendants are not used as values for | DIRECT SUBSTANCE |

4.4.7. PRIORITY

This attribute refers to the priority assigned to a procedure.

Table 36: Permissible values for PRIORITY

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Emergency cesarean section (procedure)</td>
</tr>
<tr>
<td></td>
<td>•</td>
</tr>
</tbody>
</table>

4.4.8. HAS FOCUS

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

Table 37: Permissible values for HAS FOCUS

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cardiac rehabilitation assessment (procedure)</td>
</tr>
<tr>
<td></td>
<td>•</td>
</tr>
</tbody>
</table>

4.4.9. HAS INTENT

This attribute specifies the intent of a procedure.

Table 38: Permissible values for HAS INTENT

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Diagnostic bronchoscopy (procedure)</td>
</tr>
<tr>
<td></td>
<td>•</td>
</tr>
</tbody>
</table>
4.4.10. 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 for medical or surgical procedure (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.

**Table 39: Permissible values for RECIPIENT CATEGORY**

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Person</td>
</tr>
<tr>
<td></td>
<td>Family</td>
</tr>
<tr>
<td></td>
<td>Community</td>
</tr>
<tr>
<td></td>
<td>Donor for medical or surgical procedure</td>
</tr>
<tr>
<td></td>
<td>Group</td>
</tr>
</tbody>
</table>

4.4.11. REVISION STATUS

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

**Table 40: Permissible values for REVISION STATUS**

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Primary operation</td>
</tr>
<tr>
<td></td>
<td>Revision - value</td>
</tr>
<tr>
<td></td>
<td>Part of multistage procedure</td>
</tr>
<tr>
<td></td>
<td>Revision of knee arthroplasty (procedure)</td>
</tr>
</tbody>
</table>

4.4.12. 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 substance via specific route (procedure)| 433590000.

**Table 41: Permissible values for ROUTE OF ADMINISTRATION**

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Route of administration value</td>
</tr>
<tr>
<td></td>
<td>ROUTE OF ADMINISTRATION</td>
</tr>
</tbody>
</table>
4.4.13. 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.

Table 42: Permissible values for SURGICAL APPROACH

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procedural approach</td>
<td>103379005 (&lt;=)(&lt; Q)</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.4.14. USING SUBSTANCE

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

Table 43: Permissible values for USING SUBSTANCE

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Substance</td>
<td>105590001 (&lt;&lt;)</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.4.15. 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.

Table 44: Permissible values for USING ENERGY

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical force</td>
<td>78621006 (&lt;&lt;)</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4.4.16. 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.

4.5. Attributes used to define Evaluation Procedure concepts

Table 45: Approved Evaluation Procedure attributes summary

<table>
<thead>
<tr>
<th>Defining Attribute</th>
<th>Allowable Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>[HAS SPECIMEN]</td>
<td></td>
</tr>
<tr>
<td>[COMPONENT]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>[TIME ASPECT]</td>
<td></td>
</tr>
<tr>
<td>[PROPERTY]</td>
<td></td>
</tr>
<tr>
<td>[SCALE TYPE]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>[MEASUREMENT METHOD]</td>
<td></td>
</tr>
</tbody>
</table>

Note:
Meaning of Allowable Values (Range) notations:

(<=) this code and descendants,
(<) descendants only,
(<=) descendants only (stated) except for supercategory groupers,
(==) this code only,
(< Q) descendants only when in a qualifying relationship,
(< Q only) descendants only, and only allowed in a qualifying relationship.
4.5.1. HAS SPECIMEN

This attribute specifies the type of specimen on which a measurement or observation is performed.

Table 46: Permissible values for HAS SPECIMEN

<table>
<thead>
<tr>
<th>Attribute Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen 123038009 (&lt;=)(&lt; Q)</td>
</tr>
</tbody>
</table>

4.5.2. COMPONENT

This attribute refers to what is being observed or measured by a procedure.

Table 47: Permissible values for COMPONENT

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Substance 105590001 (&lt;=)(&lt; Q)</td>
<td>Protein measurement (procedure)</td>
</tr>
<tr>
<td>Observable entity 363787002 (&lt;=)(&lt; Q)</td>
<td>COMPONENT</td>
</tr>
<tr>
<td>Cell structure 4421005 (&lt;=)(&lt; Q)</td>
<td></td>
</tr>
<tr>
<td>Organism 410607006 (&lt;=)(&lt; Q)</td>
<td></td>
</tr>
</tbody>
</table>

4.5.3. TIME ASPECT

This attribute specifies temporal relationships for a measurement procedure.

Table 48: Permissible values for TIME ASPECT

<table>
<thead>
<tr>
<th>Attribute Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time frame 7389001 (&lt;=)(&lt; Q)</td>
</tr>
</tbody>
</table>

4.5.4. PROPERTY

This attribute specifies the kind of property being measured (e.g. concentration).

Table 49: Permissible values for PROPERTY

<table>
<thead>
<tr>
<th>Attribute Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Property of measurement 118598001 (&lt;=)(&lt; Q)</td>
</tr>
</tbody>
</table>

4.5.5. SCALE TYPE

This attribute refers to the scale of the result of an observation of a diagnostic test (i.e. quantitative, qualitative, semi-quantitative).
### 4.5.6. MEASUREMENT METHOD

This attribute specifies the method by which a procedure is performed.

**Table 51: Permissible values for MEASUREMENT METHOD**

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Laboratory procedure categorized by method</td>
<td>127789004 (&lt;=)</td>
</tr>
</tbody>
</table>

For measurement procedures, the attribute |METHOD| is given the value |Measurement - action (qualifier value)|. The attribute | MEASUREMENT METHOD | can be used to provide additional specificity.

### 4.6. Attributes used to define Specimen concepts

**Table 52: Approved Specimen attributes summary**

<table>
<thead>
<tr>
<th>Defining Attribute</th>
<th>Allowable Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>[SPECIMEN PROCEDURE]</td>
<td></td>
</tr>
<tr>
<td>[SPECIMEN SOURCE TOPOGRAPHY]</td>
<td></td>
</tr>
<tr>
<td>[SPECIMEN SOURCE MORPHOLOGY]</td>
<td></td>
</tr>
<tr>
<td>[SPECIMEN SUBSTANCE]</td>
<td></td>
</tr>
<tr>
<td>[SPECIMEN SOURCE IDENTITY]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Note:
Meaning of Allowable Values (Range) notations:

(<<) this code and descendants,
(<) descendants only,
(<=) descendants only (stated) except for supercategory groupers,
(==) this code only,
(< Q) descendants only when in a qualifying relationship,
(< Q only) descendants only, and only allowed in a qualifying relationship.

Note: See also Specimen (5.10).

4.6.1. SPECIMEN PROCEDURE
This attribute identifies the procedure by which a specimen is obtained.

Table 53: Permissible values for SPECIMEN PROCEDURE

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Urine specimen obtained by clean catch procedure (specimen)</td>
</tr>
<tr>
<td>(&lt;&lt;)</td>
<td>SPECIMEN PROCEDURE</td>
</tr>
<tr>
<td>(&lt;)</td>
<td>SPECIMEN PROCEDURE</td>
</tr>
<tr>
<td></td>
<td>Specimen from stomach obtained by total gastrectomy (specimen)</td>
</tr>
<tr>
<td></td>
<td>SPECIMEN PROCEDURE</td>
</tr>
</tbody>
</table>

4.6.2. SPECIMEN SOURCE TOPOGRAPHY
This attribute specifies the body site from which a specimen is obtained.

Table 54: Permissible values for SPECIMEN SOURCE TOPOGRAPHY

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cervix cytologic material (specimen)</td>
</tr>
<tr>
<td>(&lt;&lt;)</td>
<td>SPECIMEN SOURCE TOPOGRAPHY</td>
</tr>
<tr>
<td></td>
<td>Omentum biopsy sample (specimen)</td>
</tr>
<tr>
<td></td>
<td>SPECIMEN SOURCE TOPOGRAPHY</td>
</tr>
</tbody>
</table>

4.6.3. SPECIMEN SOURCE MORPHOLOGY
This attribute names the morphologic abnormality from which a specimen is obtained.
Table 55: Permissible values for SPECIMEN SOURCE MORPHOLOGY

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Morphologically abnormal structure</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Specimen from wound abscess (specimen)</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.6.4. SPECIMEN SUBSTANCE

This attribute names the type of substance of which a specimen is comprised.

Table 56: Permissible values for SPECIMEN SUBSTANCE

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Substance</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pancreatic fluid specimen (specimen)</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.6.5. SPECIMEN SOURCE IDENTITY

This attribute names the type of individual, group, or physical location from which a specimen is collected.

Table 57: Permissible values for SPECIMEN SOURCE IDENTITY

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Person</td>
</tr>
<tr>
<td></td>
<td>Family</td>
</tr>
<tr>
<td></td>
<td>Community</td>
</tr>
<tr>
<td></td>
<td>Device</td>
</tr>
<tr>
<td></td>
<td>Environment</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.7. Attributes used to define Body structure concepts

Just one attribute is used in Anatomy, namely, | Laterality | .

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4.7.1. LATERALITY

This attribute provides information on whether a body structure is left, right, bilateral or unilateral. It is applied only to bilaterally symmetrical body structures which exist on opposite sides of the body.

Table 58: Permissible values for LATERALITY

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Side</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Permissible values for this attribute include the descendants of the concept listed, except for super category grouper concepts.

4.8. Attributes used to define Pharmaceutical/Biologic Product concepts

Table 59: Approved Pharmaceutical/Biologic Product attributes summary

<table>
<thead>
<tr>
<th>Defining Attribute</th>
<th>Allowable Values</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HAS ACTIVE INGREDIENT</td>
</tr>
<tr>
<td></td>
<td>HAS DOSE FORM</td>
</tr>
</tbody>
</table>

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

Note: See also Pharmaceutical/biologic product (5.9).

4.8.1. HAS ACTIVE INGREDIENT

This attribute indicates the active ingredient of a drug product, linking the |Pharmaceutical / biologic product| hierarchy to the | Substance | hierarchy.

Table 60: Permissible values for HAS ACTIVE INGREDIENT

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Substance</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4.8.2. HAS DOSE FORM
This attribute specifies the dose form of a product.

Table 61: Permissible values for HAS DOSE FORM

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Type of drug preparation] 105904009 (&lt;&lt;)</td>
<td>[Digoxin 0.1mg capsule (product)]</td>
</tr>
<tr>
<td></td>
<td>• [HAS DOSE FORM] [Oral capsule (qualifier value)]</td>
</tr>
</tbody>
</table>

4.9. Attributes used to define Situation with Explicit Context concepts

Table 62: Approved Situation attributes summary

<table>
<thead>
<tr>
<th>Defining Attribute</th>
<th>Allowable Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ASSOCIATED FINDING]</td>
<td>[Clinical finding] 404684003 (&lt;=)(&lt; Q)</td>
</tr>
<tr>
<td></td>
<td>[Event] 272379006 (&lt;=)(&lt; Q)</td>
</tr>
<tr>
<td></td>
<td>[Observable entity] 363787002 (&lt;= Q only)</td>
</tr>
<tr>
<td></td>
<td>[Link assertion] 416698001 (&lt;= Q only)</td>
</tr>
<tr>
<td></td>
<td>[Procedure] 71388002 (&lt;= Q only)</td>
</tr>
<tr>
<td>[FINDING CONTEXT]</td>
<td>[Finding context value] 410514004 (&lt;=)(&lt; Q)</td>
</tr>
<tr>
<td>[ASSOCIATED PROCEDURE]</td>
<td>[Procedure] 71388002 (&lt;=)(&lt; Q)</td>
</tr>
<tr>
<td></td>
<td>[Observable entity] 363787002 (&lt;= Q only)</td>
</tr>
<tr>
<td>[PROCEDURE CONTEXT]</td>
<td>[Context values for actions] 288532009 (&lt;=)(&lt; Q)</td>
</tr>
<tr>
<td>[TEMPORAL CONTEXT]</td>
<td>[Temporal context value] 410510008 (&lt;=)(&lt; Q)</td>
</tr>
<tr>
<td>[SUBJECT RELATIONSHIP CONTEXT]</td>
<td>[Person] 125676002 (&lt;=)(&lt; Q)</td>
</tr>
</tbody>
</table>

Note:
Meaning of Allowable Values (Range) notations:

(<<) this code and descendants,
(<) descendants only,
(<=) descendants only (stated) except for supercategory groupers,
(==) this code only,
(< Q) descendants only when in a qualifying relationship,
(< Q only) descendants only, and only allowed in a qualifying relationship.

Note: See also Situation with explicit context (5.4).
4.9.1. Context

The meaning conveyed by a SNOMED CT code in a medical record is affected by the context in which it is recorded. For instance, the code for "breast cancer" might be used to indicate a family history of breast cancer, a past history of breast cancer, or a current diagnosis of breast cancer. Each of these three meanings differs in regard to the context in which breast cancer is being described. Family history of breast cancer refers to breast cancer occurring in a family member of a patient. Past history of breast cancer indicates that the breast cancer occurred in the patient, at some time in the past, and it is not necessarily present now. Current diagnosis of breast cancer indicates that the breast cancer is present now, and in this patient. These differences are important for data retrieval, because it would be incorrect when searching for patients with breast cancer to retrieve those who merely have a family history of breast cancer.

4.9.2. Default Context

When a SNOMED CT code appears in a record without any explicitly stated context, that code is considered to have a default context. The default is "soft" in that it can be over-ridden by information carried in the structure of the record or its information model.

The default context for a clinical finding code implies that the finding has actually occurred (vs. being absent), that it applies to the subject of the record (the patient), and that it is occurring currently or occurred at a past time that is given by a date-time record linked to the code.

The default context for a procedure code implies that the procedure was completed, that it was performed on the subject of the record (the patient), and that it was done at the present time or in the past at a time that is given by a date-time record linked to the code.

4.9.3. Axis Modifiers

The six attributes used to define situation codes permit explicit (rather than default) representation of various contexts. These attributes can change the meaning of a clinical finding or procedure code in a way that changes the hierarchy (or "axis") of the code from |Clinical finding| or |Procedure| to |Situation with explicit context|. The resulting modified meaning is not a subtype of the original meaning of the code, and therefore the axis-modifying attributes are not used to qualify the code, but instead are used to qualify a "situation" code.

For instance, if |Fine needle biopsy (procedure)| is given the non-context modifying attribute |Procedure site - Direct| and a value of |Urinary bladder structure (body structure)|, the resulting concept |Fine needle biopsy of urinary bladder (procedure)| is still a subtype of the original concept |Fine needle biopsy (procedure)|.

However, the concept |Urine protein test not done (situation)| uses the context-modifying attribute |PROCEDURE CONTEXT| and a value of |Not done (qualifier value)|, and the resulting concept is not a subtype of |Urine protein test (procedure)|. Its axis (hierarchy) has been modified.

4.9.4. Overview of context attributes

Of the six attributes applied to concepts in the |Situation with explicit context| hierarchy, two are used only in representing the context in which a |Clinical finding| is recorded, ( |ASSOCIATED FINDING| and |FINDING CONTEXT|); two are used only in representing the context in which a |Procedure| is recorded ( |ASSOCIATED PROCEDURE| and |PROCEDURE CONTEXT|); and two attributes are used in representing the context of both |Procedure| and |Clinical finding| ( |SUBJECT RELATIONSHIP CONTEXT| and |TEMPORAL CONTEXT|).

4.9.5. ASSOCIATED FINDING

This attribute links concepts in the |Situation with explicit context| hierarchy to their related |Clinical finding|. It specifies the |Clinical finding| concept whose context is being modified.
Table 63: Permissible values for ASSOCIATED FINDING

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>преClinical finding</td>
<td>404684003 (&lt;=)(&lt; Q)</td>
</tr>
<tr>
<td>Event</td>
<td>272379006 (&lt;=)(&lt; Q)</td>
</tr>
<tr>
<td>Observable entity</td>
<td>363787002 (&lt; Q only)</td>
</tr>
<tr>
<td>Link assertion</td>
<td>416698001 (&lt; Q only)</td>
</tr>
<tr>
<td>Procedure</td>
<td>71388002 (&lt; Q only)</td>
</tr>
</tbody>
</table>

Note:

When |ASSOCIATED FINDING| is used in post-coordinated expressions, its range is broader than when used in distributed content. |ASSOCIATED FINDING| must not reference concepts that already have pre-coordinated context themselves.

For example, the following definition uses |FH: Thyroid disorder| incorrectly:

History of thyroid disease in father:

- |SUBJECT RELATIONSHIP CONTEXT|=| father |
- |ASSOCIATED FINDING|=|FH: Thyroid disorder|.

The following is the correct definition:

History of thyroid disease in father:

- |SUBJECT RELATIONSHIP CONTEXT|=| father |
- |ASSOCIATED FINDING|=| thyroid disease |.

4.9.6. FINDING CONTEXT

The FINDING CONTEXT attribute is used to represent a situation in which a Clinical finding is known or unknown, and if known, whether it is present, absent, or uncertain (possible); and also to express the meaning that the finding is not actual but instead an anticipated or possible future finding.

Table 64: Permissible values for FINDING CONTEXT

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finding context value</td>
<td>410514004 (&lt;=)(&lt; Q)</td>
</tr>
<tr>
<td></td>
<td>• ASSOCIATED FINDING</td>
</tr>
<tr>
<td></td>
<td>• FINDING CONTEXT</td>
</tr>
</tbody>
</table>

4.9.7. ASSOCIATED PROCEDURE

This attribute links concepts in the |Situation with explicit context hierarchy to concepts in the |Procedure hierarchy for which there is additional specified context.
Table 65: Permissible values for ASSOCIATED PROCEDURE

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procedure</td>
<td>71388002 (&lt;=)(&lt; Q)</td>
</tr>
<tr>
<td>Observable entity</td>
<td>363787002 (&lt; Q only)</td>
</tr>
<tr>
<td></td>
<td>Operative procedure planned (situation)</td>
</tr>
<tr>
<td></td>
<td>• ASSOCIATED PROCEDURE</td>
</tr>
</tbody>
</table>

4.9.8. PROCEDURE CONTEXT

This attribute indicates the degree of completion, or status, of a Procedure, as well as its various possible future states prior to its being initiated or completed.

Table 66: Permissible values for PROCEDURE CONTEXT

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Context values for actions</td>
<td>288532009 (&lt;=)(&lt; Q)</td>
</tr>
<tr>
<td></td>
<td>Operative procedure planned (situation)</td>
</tr>
<tr>
<td></td>
<td>• ASSOCIATED PROCEDURE</td>
</tr>
<tr>
<td></td>
<td>• PROCEDURE CONTEXT</td>
</tr>
</tbody>
</table>

4.9.9. TEMPORAL CONTEXT

This attribute indicates the time of occurrence of the situation, indicating whether the procedure or finding that it represents is actual and therefore occurred in the present, in the past, or at a specified time; or that it is planned or expected, that is, temporally located in the future. The most general value is simply Current or past (actual), meaning that the concept was actual (not planned or expected), but not specifying anything further about its time. The word "specified" in the TEMPORAL CONTEXT values means that there is a date-time stamp associated with the code in the record, that gives a date and/or time, as a point and/or interval, that applies to the concept.

Table 67: Permissible values for TEMPORAL CONTEXT

<table>
<thead>
<tr>
<th>Attribute Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temporal context value</td>
<td>410510008 (&lt;=)(&lt; Q)</td>
</tr>
<tr>
<td></td>
<td>History of - hematuria (situation)</td>
</tr>
<tr>
<td></td>
<td>• ASSOCIATED FINDING</td>
</tr>
<tr>
<td></td>
<td>• TEMPORAL CONTEXT</td>
</tr>
</tbody>
</table>

4.9.10. SUBJECT RELATIONSHIP CONTEXT

This attribute is used to specify the subject of the Clinical finding or Procedure being recorded, in relation to the subject of the record. In the example below, the subject of the record is the patient and the subject who smokes is the patient's father.
Table 68: Permissible values for SUBJECT RELATIONSHIP CONTEXT

<table>
<thead>
<tr>
<th>Concept</th>
<th>Values</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Person] 125676002 $(\leq)$ $(&lt; Q)$</td>
<td>Father smokes (situation)</td>
<td>・ ASSOCIATED FINDING Smoker (finding)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>・ SUBJECT RELATIONSHIP CONTEXT Father of subject (person)</td>
</tr>
</tbody>
</table>

4.10. Attributes used to define Event concepts

Table 69: Approved Event attributes summary

<table>
<thead>
<tr>
<th>Defining Attribute</th>
<th>Subsumed Attribute</th>
<th>Allowable Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ASSOCIATED WITH]</td>
<td></td>
<td>[Clinical Finding] 404684003 $(\ll)$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Procedure] 71388002 $(\ll)$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Event] 272379006 $(\ll)$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Organism] 410607006 $(\ll)$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Substance] 105590001 $(\ll)$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Physical object] 260787004 $(\ll)$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Physical force] 78621006 $(\ll)$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Pharmaceutical / biologic product] 373873005 $(\ll Q$ only)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SNOMED CT Concept 138875005 $(\equiv)$</td>
</tr>
<tr>
<td>[CAUSATIVE AGENT]</td>
<td></td>
<td>[Organism] 410607006 $(\ll)$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Substance] 105590001 $(\ll)$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Physical object] 260787004 $(\ll)$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Physical force] 78621006 $(\ll)$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Pharmaceutical / biologic product] 373873005 $(\ll Q$ only)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SNOMED CT Concept 138875005 $(\equiv)$</td>
</tr>
<tr>
<td>[DUE TO]</td>
<td></td>
<td>[Clinical Finding] 404684003 $(\leq)$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Event] 272379006 $(\leq)$</td>
</tr>
<tr>
<td>[AFTER]</td>
<td></td>
<td>[Clinical Finding] 404684003 $(\ll)$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Procedure] 71388002 $(\ll)$</td>
</tr>
<tr>
<td>[OCCURRENCE]</td>
<td></td>
<td>[Periods of life] 282032007 $(&lt;)$</td>
</tr>
</tbody>
</table>

Note:
Meaning of Allowable Values (Range) notations:
$(\ll)$ this code and descendants,
(<=) descendants only, (<=) descendants only (stated) except for supercategory groupers, (==) this code only, (< Q) descendants only when in a qualifying relationship, (< Q only) descendants only, and only allowed in a qualifying relationship.

For guidance and examples on the use of these attributes and value ranges to define events, see the section on clinical findings.

**Note:** See also *Event (5.13).*

### 4.11. Attributes used to define Physical Object concepts

**Table 70: Approved Physical Object attributes summary**

<table>
<thead>
<tr>
<th>Defining Attribute</th>
<th>Allowable Values</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HAS ACTIVE INGREDIENT</td>
</tr>
</tbody>
</table>

**Note:**

Allowable values for this attribute includes the concept listed and its descendants.

A limited number of concepts (e.g. drug-eluting stents) reside in the *Pharmaceutical/biologic product hierarchy* and the *Physical object hierarchy*. These concepts are all under [Drug-device combination product (product)]. This is the domain of [HAS ACTIVE INGREDIENT] within the *Physical Object hierarchy*. Editorial policies for the use of other attributes in the *Physical object hierarchy* generally, outside this particular domain, have yet to be established.

**Note:** See also *Physical object (5.11).*

### 4.12. Relationship Groups in SNOMED CT

Multiple attributes and their values can be grouped together into “Relationship groups” to add clarity to concept definitions. A Relationship group combines an attribute-value pair with one or more other attribute-value pairs. Relationship groups originated to add clarity to | Clinical finding | concepts which require multiple | ASSOCIATED MORPHOLOGY | attributes and multiple | FINDING SITE | attributes and to | Procedure | which require multiple | METHOD | attributes and multiple | PROCEDURE SITE | attributes. However, Relationship groups are not limited to | Clinical finding | and | Procedure | concepts.

In the case of | Procedure |, Relationship groups generally associate the correct method with the correct site. In the example below, the Relationship groups clarify that there is exploration of the bile duct, and excision of the gall bladder. Without Relationship groups, the four attributes would be ungrouped and it would be unclear whether the excision was of the bile duct or of the gall bladder.
Figure 9: Example Cholecystectomy and exploration of bile duct
## Hierarchies

### Topics:
- Summary of Top Level Hierarchies (5.1)
- Clinical finding (5.2)
- Procedure (5.3)
- Situation with explicit context (5.4)
- Observable entity (5.5)
- Body structure (5.6)
- Organism (5.7)
- Substance (5.8)
- Pharmaceutical/biologic product (5.9)
- Specimen (5.10)
- Physical object (5.11)
- Physical force (5.12)
- Event (5.13)
- Environments and geographic locations (5.14)
- Social context (5.15)
- Staging and scales (5.16)
- Qualifier value (5.17)
- Special concept (5.18)
- Record artefact (5.19)
- Core metadata concept (5.20)
- Foundation metadata concept (5.21)
- Linkage concept (5.22)

**SNOMED CT concepts** are organised into hierarchies. There are two special Codes referred to as the Root Concept Code and the Root Metadata Code. They are at the "root" of the two hierarchies that contain all Concept Codes in SNOMED CT. The root named "SNOMED CT Concept" subsumes (is the supertype of) the top-level concepts and all the concepts beneath them (their subtypes), and the root named "SNOMED CT Model component" subsumes all the metadata components. As the hierarchies are descended, the concepts within them become increasingly specific (or granular). A brief description of the content in each hierarchy is given below.

**Note:** The Root Metadata Code and the hierarchy under it have been included in a technology preview release, but have been omitted from the official January 2010 International Release of SNOMED CT. The technology preview provides SNOMED CT in a new release format, called Release Format 2 (RF2), as a draft for trial use.

**Subtype** (or “child”) concepts are the descendant concepts of Supertype (or “parent”) concepts.

**Example:** Streptococcal arthritis (disorder) is a subtype of Bacterial arthritis (disorder).

Supertype concepts are the ancestor concepts of Subtype concepts.

**Example:** Bacterial arthritis (disorder) is a supertype of Streptococcal arthritis (disorder).
5.1. Summary of Top Level Hierarchies

5.1.1. Top Level Concepts

Table 71: Top Level Concepts

| Physical force | Event |
| Environment or geographical location | Social context |
| Situation with explicit context | Staging and scales |
| Physical object | Qualifier value |
| Record artifact |

| Clinical finding | Procedure |
| Observable entity | Body structure |
| Organism | Substance |
| Pharmaceutical / biologic product | Specimen |
| Special concept | Linkage concept |

5.1.2. Top Level Metadata

Table 72: Top Level Metadata

| Core metadata concept |
| Foundation metadata concept |

5.2. Clinical finding

Concepts in this hierarchy represent the result of a clinical observation, assessment or judgement, and include both normal and abnormal clinical states.

Examples of Clinical finding concepts:

• Clear sputum (finding) | ;
• Normal breath sounds (finding) | ;
• Poor posture (finding) | .

The Clinical finding hierarchy contains the sub-hierarchy of Disease. Concepts that are descendants of Disease (or disorders) are always and necessarily abnormal clinical states. Multi-axial subtype hierarchies allow diseases to be subtypes of other disorders as well as subtypes of findings.

Examples of Disease concepts:

• Tuberculosis (disorder) | ;
• non-Hodgkin's lymphoma (disorder) | .

Note: See also Attributes used to define Clinical Finding concepts (4.3).
5.3. Procedure

| Procedure | concepts represent activities performed in the provision of health care. This hierarchy represents a broad variety of activities, including but not limited to, invasive procedures (e.g. | Excision of intracranial artery (procedure) |), administration of medicines (e.g. | Pertussis vaccination (procedure) |), imaging procedures (e.g. | Ultrasonography of breast (procedure) |), education procedures (e.g. | Low salt diet education (procedure) |), and administrative procedures (e.g. | Medical records transfer (procedure) |).

**Examples of Procedure concepts:**

- | Removal of urethral catheter (procedure) | ;
- | Intravenous steroid injection (procedure) | ;
- | Irrigation of oral wound (procedure) | ;
- | Appendectomy (procedure) | .

**Note:** See also *Attributes used to define Procedure concepts (4.4).*

5.4. Situation with explicit context

*Concepts in the | Procedure | and |Clinical finding| hierarchies (given the appropriate record structure) can be used in a clinical record to represent:

- Conditions and procedures that have not yet occurred (e.g. | Endoscopy arranged (situation) |);
- Conditions and procedures that refer to someone other than the patient (e.g. | Family history: Diabetes mellitus (situation) |, | Discussed with next of kin (situation) |);
- Conditions and procedures that have occurred at some time prior to the time of the current entry in the record (e.g. | History of - aortic aneurysm (situation) |, | History of - splenectomy (situation) |).

In each of these examples, clinical context is specified. The second example, in which someone other than the patient is the focus of the concept, could be represented in an application or record structure by combining a header term Family history with the value Diabetes. The specific context (in this case, family history) would be represented using the record structure. In this case, the pre-coordinated context-dependent concept | Family history: Diabetes mellitus (situation) | would not be used because the information model has already captured the family history aspect of the diabetes.

*Concepts in the | Procedure | and |Clinical finding| hierarchy have a default context of the following:

- The procedure has actually occurred (versus being planned or cancelled) or the finding is actually present (versus being ruled out, or considered);
- The procedure or finding being recorded refers to the patient of record (versus, for example, a family member);
- The procedure or finding is occurring now or at a specified time (versus some time in the past).

In addition to using the record structure to represent context, there is sometimes a need to override these defaults and specify a particular context using the formal logic of the terminology. For that reason, SNOMED CT has developed a context model to allow users and/or implementers to specify context using the terminology, without depending on a particular record structure. The | Situation with explicit context | hierarchy and various attributes assigned to concepts in this hierarchy accomplish this.

**Examples of Situation with explicit context concepts:**

- | Family history: Myocardial infarction (situation) | ;
- | No family history of stroke (situation) | ;
- | Nasal discharge present (situation) | ;
- | Suspected epilepsy (situation) | .

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5.5. Observable entity

Concepts in this hierarchy can be thought of as representing a question or procedure which can produce an answer or a result. For instance, "Left ventricular end-diastolic pressure (observable entity)" could be interpreted as the question, "What is the left ventricular end diastolic pressure?" or "What is the measured left ventricular end-diastolic pressure?"

Observables are entities that could be used to code elements on a checklist or any element where a value can be assigned. "Color of nail (observable entity)" is an observable. "Gray nails (finding)" is a finding.

One use for observable entity in a clinical record is to code headers on a template. For example, "Gender (observable entity)" could be used to code a section of a template titled "Gender" where the user would choose "male" or "female". "Female gender" would then constitute a finding.

Note: See also Attributes used to define Evaluation Procedure concepts (4.5).

5.6. Body structure

Body structure concepts include normal as well as abnormal anatomical structures. Normal anatomical structures can be used to specify the body site involved by a disease or procedure.

Examples of Body structure concepts:

- Mitral valve structure (body structure);
- Uterine structure (body structure).

Morphologic alterations from normal body structures are represented in the sub-hierarchy Body structure, altered from its original anatomical structure (morphologic abnormality).

Examples of Body Structure, altered from its original anatomical structure concepts:

- Adenosarcoma (morphologic abnormality);
- Polyp (morphologic abnormality).

Note: See also Attributes used to define Body structure concepts (4.7).

5.7. Organism

This hierarchy includes organisms of significance in human and animal medicine. Organisms are also used in modeling the causes of diseases in SNOMED CT. They are important for public health reporting of the causes of notifiable conditions and for use in evidence-based infectious disease protocols in clinical decision support systems. Sub-hierarchies of organism include, but are not limited to: Animal (organism), Microorganism (organism), Kingdom Plantae (organism).

Examples of Organism concepts:

- Streptococcus pyogenes (organism);
- Texon cattle breed (organism);
- Bacillus anthracis (organism);
- Lichen (plant) (organism).
5.8. Substance

The Substance hierarchy contains concepts that can be used for recording active chemical constituents of drug products, food and chemical allergens, adverse reactions, toxicity or poisoning information, and physicians and nursing orders. Concepts from this hierarchy represent general substances and chemical constituents of |Pharmaceutical/ biologic product| which are in a separate hierarchy. However, sub-hierarchies of |Substance| also include but are not limited to: |Body substance| (concepts to represent body substances); |Dietary substance|; |Diagnostic substance|.

Examples of Substance concepts:
- Insulin (substance)
- Methane (substance)
- Chromatin (substance)
- Dental porcelain material (substance)
- Albumin (substance)
- Endorphin (substance)
- Acetaminophen (substance).

5.9. Pharmaceutical/biologic product

The Pharmaceutical/biologic product hierarchy is separate from the Substance hierarchy. This hierarchy was introduced as a top-level hierarchy in order to clearly distinguish drug products (products) from their chemical constituents (substances).

It contains concepts that represent the multiple levels of granularity required to support a variety of uses cases such as computerised provider order entry (CPOE), e-prescribing, decision support and formulary management. The levels of drug products represented in the International Release include Virtual Medicinal Product (VMP), Virtual Therapeutic Moiety (VTM), and Product Category. Additionally, US and UK drug extensions have been developed, which represent Actual Medicinal Products (AMPs).

Note: See also Attributes used to define Pharmaceutical/Biologic Product concepts (4.8).

5.9.1. Virtual Medicinal Product (VMP)

The most granular level is the Virtual Medicinal Product (VMP). The VMP is a representation at the level of generality that would appear on a physician's prescription. The product name, strength, and dose form are all represented in the Fully Specified Name. This level can be used to support providers with drug ordering in CPOE and e-prescribing use cases.

Example: | Diazepam 5mg tablet (product) |
- (Name, Strength, Dose form).

5.9.2. Virtual Therapeutic Moiety (VTM)

The Virtual Therapeutic Moiety (VTM) level represents a more general level of granularity than the VMP level. VTMs include the product name but not formulation, dose or strength in the Fully Specified Name. The HAS ACTIVE INGREDIENT attribute (which relates the product to the Substance it contains) can be assigned to this level or to any of the subtypes of this level.

Example: | Diazepam (product) |
All Virtual Medicinal Products (VMP) have a direct link to the Virtual Therapeutic Moiety (VTM) via an relationship.

![Diagram of VTP, VTM, and VMP relationships](image)

Figure 10: Example

There are additional levels in the Pharmaceutical / biologic product hierarchy that provide structure and organisation. For example, some subtypes of VTM contain only Dose form information and not Strength.

Example: Concept with granularity between that of a VTM and VMP:
- Parenteral form epinephrine (product):
  - (Dose form, Name).

### 5.9.3. Product category

A Product category concept supports a group of Pharmaceutical / biologic product related by their functionality mechanism of action or therapeutic use. Product category concepts typically describe common drug categories used in prescribing.

Examples of Product category concepts:
- Sex hormone product (product);
- Mineralocorticoid preparation (product);
- beta-Blocking agent (product);
- Tissue plasminogen activator preparation (product).

### 5.9.4. Actual Medicinal Products (AMPs)

Actual Medicinal Products can be represented in extensions. The AMP represents the single unit dose of a medicinal product that is (or has been) made or marketed by a specific manufacturer (trademarked brand name pharmaceutical products). Its description requires product name, strength, dosage form, flavour (where applicable) and manufacturer, but it does not include explicit information about packaging.

Because AMP concepts contain brand and country-specific information, they are not represented within the International Release of SNOMED CT, but may instead exist within an identified domain extension.
(contact your IHTSDO National Release for further information). Actual Medicinal Products in an extension have a direct link to their virtual equivalent in the International Release via the is a relationship.

**Example:**

```
Sertraline 50mg tablet (product)  VMP found in the International Release

IS A

Zoloft 50mg tablet (product)  AMP found in the extension
```

All concepts in the Pharmaceutical / biologic product hierarchy have a FSN tag of “(product)” regardless of their level of granularity.
Figure 11: Pharmaceutical/Biologic Product hierarchy structure
5.10. Specimen

The Specimen hierarchy contains concepts representing entities that are obtained (usually from a patient) for examination or analysis. Specimen concepts can be defined by attributes which specify: the normal or abnormal body structure from which they are obtained; the procedure used to collect the specimen; the source from which it was collected; and the substance of which it is comprised.

Examples of Specimen concepts:
- Specimen from prostate obtained by needle biopsy (specimen);
- Urine specimen obtained by clean catch procedure (specimen);
- Calculus specimen (specimen);
- Cerebroventricular fluid cytologic material (specimen).

Note: See also Attributes used to define Specimen concepts (4.6).

5.11. Physical object

Concepts in the Physical object hierarchy include natural and man-made objects. One use for these concepts is modeling procedures that use devices (e.g. catheterisation).

Examples of Physical object concepts:
- Military vehicle (physical object);
- Implant, device (physical object);
- Artificial kidney, device (physical object);
- Latex rubber gloves (physical object);
- Book (physical object);
- Pressure support ventilator (physical object);
- Vena cava filter (physical object).

Note: See also Attributes used to define Physical Object concepts (4.11).

5.12. Physical force

The concepts in the Physical force hierarchy are directed primarily at representing physical forces that can play a role as mechanisms of injury.

Examples of Physical force concepts:
- Spontaneous combustion (physical force);
- Alternating current (physical force);
- Friction (physical force).

5.13. Event

The Event hierarchy includes concepts that represent occurrences (excluding procedures and interventions).

Examples of Event concepts:
5.14. Environments and geographic locations

The environment or geographical location hierarchy includes types of environments as well as named locations such as countries, states, and regions.

Examples of Environments and geographic locations concepts:

- Canary islands (geographic location);
- California (geographic location);
- Rehabilitation department (environment);
- Intensive care unit (environment).

5.15. Social context

The social context hierarchy contains social conditions and circumstances significant to healthcare. Content includes such areas as family status, economic status, ethnic and religious heritage, lifestyle, and occupations. These concepts represent social aspects affecting patient health and treatment. Some sub-hierarchies of social context and concepts typical of those sub-hierarchies are shown in the following examples.

Examples:

- Ethnic group (ethnic group):
  - Afro-Caribbean (ethnic group);
  - Estonians (ethnic group).
- Occupation (occupation):
  - Bank clerk (occupation);
  - Carpenter, general (occupation).
- Person (person):
  - Employer (person);
  - Boyfriend (person);
  - Caregiver (person).
- Religion/philosophy (religion/philosophy):
  - Hinduism (religion/philosophy);
  - Orthodox Christian religion (religion/philosophy).
- Economic status (social concept):
  - Middle class economic status (social concept).
5.16. Staging and scales

This hierarchy contains such sub-hierarchies as | Assessment scales (assessment scale) |, which names assessment scales; and | Tumor staging (tumor staging) |, which names tumour staging systems.

Examples of Assessment scales (assessment scale) concepts:

- | Glasgow coma scale (assessment scale) |
- | Stanford Binet intelligence scale (assessment scale) |

Examples of Tumour staging (tumour staging) concepts:

- | International Federation of Gynecology and Obstetrics (FIGO) staging system of gynecological malignancy (tumor staging) |
- | Dukes staging system (tumor staging) |

5.17. Qualifier value

The hierarchy contains some of the concepts used as values for SNOMED CT attributes that are not contained elsewhere in SNOMED CT. Such a code may be used as the value of an attribute in a defining Relationship in pre-coordinated definitions, and/or as the value of an attribute in a qualifier in a post-coordinated expression. However, the values for attributes are not limited to this hierarchy and are also found in hierarchies other than | Qualifier value |.

For example, the value for the attribute | LATERALITY | in the concept shown below is taken from the | Qualifier value | hierarchy:

- | Left kidney structure | | LATERALITY | | Left |

However, the value for the attribute | FINDING SITE | in the concept shown below is taken from the | Body structure | hierarchy, not the | Qualifier value | hierarchy.

- | Pneumonia | | FINDING SITE | | Lung structure |

Examples of Qualifier value concepts:

- | Unilateral |
- | Left |
- | Puncture - action |

5.18. Special concept

The Top Level Concept Code | Special concept | and its subclass codes provide a place for concept codes that are no longer active in the terminology.

The subclasses of | Special concept | are:

- | Navigational concept |
- | Inactive concept |

5.18.1. Navigational concept

These concept codes are to be used only as nodes in a Navigation Subset. They are not suitable for data recording or aggregation.

The subclasses of | Navigational concept | have the following characteristics:
• They have no subtypes;
• They have no supertypes other than Navigational concept;
• They may be associated with other concept codes by the use of Navigation Links.

5.18.2. Inactive concept

These concept codes are no longer current within SNOMED CT and should not be used for encoding data. There is one hierarchical level which consists of these subclasses:

• | Reason not stated |
• | Duplicate |
• | Outdated |
• | Ambiguous |
• | Erroneous |
• | Limited |
• | Moved elsewhere |

Each inactive concept code falls into one of these seven subclasses based upon its ConceptStatus value of 1, 2, 3, 4, 5, 6, or 10. There is no further subclassing of inactive concepts. Note that concept codes with a ConceptStatus value of 6 (Limited) were formerly considered active, but are now inactive and are included in the inactive hierarchy. This also means that the former confusing distinction between “active” and “current” no longer is required. “Active” and “current” now mean the same thing, and “inactive” and “non-current” also now mean the same thing.

5.18.3. Namespace concept

Each of these concepts has an integer terms which is an assigned Extension namespace identifier.

Note: In Release Format 2, 370136006 | Namespace concept (namespace concept) | is a subtype of | SNOMED CT model component |.

5.19. Record artefact

A Record artifact is an entity that is created by a person or persons for the purpose of providing other people with information about events or states of affairs. In general, a record is virtual, that is, it is independent of its particular physical instantiation(s), and consists of its information elements (usually words, phrases and sentences, but also numbers, graphs, and other information elements). A Record artifact need not be complete reports or complete records. They can be parts of larger Record artifacts. For example, a complete health record is a Record artifact that also may contain other Record artifacts in the form of individual documents or reports, which in turn may contain more finely granular Record artifact such as sections and even section headers.

5.20. Core metadata concept

Subtypes of Core metadata concept provide structural information required to supports International Release data. This supporting information includes sets of enumerated values that apply to attributes of concepts, descriptions and relationships.
5.21. Foundation metadata concept

Subtypes of the Foundation metadata concept provide supporting metadata and structural information for derivative release structures including Reference Sets.

5.22. Linkage concept

Linkage concept codes are intended to link two or more other codes to each other to express compositional meanings. All concept codes that can be used as a Relationship Type are included under Linkage concept. The ones approved for use are the Concept Model Attributes. Implementation guidance is as yet quite limited for the other Linkage concept codes. Use of them should be regarded as non-standard, tentative and experimental, requiring extra care.

The Linkage concept hierarchy contains the sub-hierarchies:

- Link assertion
- Attribute

Note: For the RF2 release format, Linkage concept will no longer be a top level hierarchy, but will instead become a subclass of SNOMED CT model component.

5.22.1. Link assertion

The Link assertion sub-hierarchy enables the use of SNOMED CT concepts in HL7 statements that assert relationships between statements. Currently this content supports the UK NHS Connecting for Health requirements for encoding of Statement relationships for the implementation of HL7 Version 3 messaging in the UK realm.

Examples of Link assertion concepts:

- Has reason
- Has explanation

5.22.2. Attribute

Concepts that descend from this sub-hierarchy are used to construct relationships between two SNOMED CT concepts, since they indicate the relationship type between those concepts. Some attributes (relationship types) can be used to logically define a concept (defining attributes). This sub-hierarchy also includes non-defining attributes (like those used to track historical relationships between concepts) or attributes that may be useful to model concept definitions but which have not yet been used in modelling pre-coordinated concepts in SNOMED CT.

Examples of Defining attributes:

- is a
- Concept model attribute
  - Laterality
  - Procedure site
  - Finding site
  - Associated morphology

Examples of Non-defining attributes:

- Concept history attribute
'• | REPLACED BY |
• | SAME AS |
• | Unapproved attribute |
  • | Relieved by |
  • | Has assessment |
Chapter 6

Structure and Technology Considerations

Topics:

- **SNOMED CT tables** (6.1)
- **History** (6.2)
- **SNOMED CT Subsets** (6.3)
- **Cross Mappings** (6.4)
- **Extensions** (6.5)
- **SNOMED CT applications and services** (6.6)

The structure and technology behind SNOMED CT enables organisations to implement it and integrate it into their own clinical and business processes and applications. SNOMED CT offers additional capabilities to facilitate customisation of an implementation to meet the unique requirements of an organisation.

This section provides an introduction to SNOMED CT structure and technology, highlighting its core and extended capabilities. This overview is intended to provide project managers and others involved with SNOMED CT implementations a better understanding of technology requirements and support considerations for SNOMED CT implementation and maintenance. Topics addressed include:

- SNOMED CT data structure: SNOMED CT data components and their relationships, including the core table structure, as well as:
  - History
  - Subsets
  - Cross Mapping
  - Extensions

- SNOMED CT applications and services

Detailed information for each topic is available in the **SNOMED CT Technical Reference Guide** (TRG), **SNOMED CT Technical Implementation Guide** (TIG) and the **SNOMED CT Developer Toolkit**. See **Inventory of Documentation** (1.6) for descriptions of the content and target audiences for each available document.
6.1. SNOMED CT tables

SNOMED CT is distributed as a set of tab-delimited text files that can be imported into a relational database. The three tables shown below, the Concepts table, the Descriptions table, and the Relationships table, are commonly referred to as the "core" tables.

The association of a set of Descriptions and a set of Relationships to each Concept is implemented using the ConceptId which is the primary or foreign key in the three tables.

<table>
<thead>
<tr>
<th>Relationship</th>
<th>Concept</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-RelationshipId</td>
<td>-ConceptId</td>
<td>-DescriptionID</td>
</tr>
<tr>
<td>-ConceptID1</td>
<td>-ConceptStatus</td>
<td>-DescriptionStatus</td>
</tr>
<tr>
<td>-RelationshipType</td>
<td>-FullySpecifiedName</td>
<td>-ConceptID</td>
</tr>
<tr>
<td>-ConceptID2</td>
<td>-CTV3ID</td>
<td>-Term</td>
</tr>
<tr>
<td>-CharacteristicType</td>
<td>-SNOMEDID</td>
<td>-DescriptionType</td>
</tr>
<tr>
<td>-Refinability</td>
<td>-IsPrimitive</td>
<td>-InitialCapitalStatus</td>
</tr>
<tr>
<td>-RelationshipGroup</td>
<td></td>
<td>-LanguageCode</td>
</tr>
</tbody>
</table>

Figure 12: SNOMED CT table structure

6.1.1. The Concepts Table

The Concepts Table contains all the concepts in SNOMED CT. Each concept is represented by one row of the table. Each row of the Concepts Table contains the following fields:

- SNOMED CT concepts are identified by their ConceptIds, and all information about a SNOMED CT concept is ultimately linked to the ConceptId. ConceptId is the primary key of the Concepts Table.
- The SNOMED RT or CTV3 identifier equivalent to a SNOMED CT concept at the time when it originated from those terminologies or, where a new concept was or has subsequently been created only in SNOMED CT, a character string compliant with SNOMED RT/CTV3 identifier construction rules but that is not a legitimate identifier in either. However, changes in SNOMED CT or its contributing schemes after a concept was incorporated (e.g. code retirement) mean that the CTV3ID and SNOMEDID fields can not in the general case be relied upon for mapping to and from either CTV3 or SNOMED RT; alternative derivative products are required.
- The FullySpecifiedName field appears in both the Concepts Table and the Descriptions Table. In the Concepts Table, it serves to provide a human-readable name for each concept.
- The ConceptStatus field indicates whether a concept is in active use or retired. This field flags concepts that have been retired so that data encoded with these concepts can be properly accessed and retrieved long after it has been coded.
- The IsPrimitive field indicates whether or not a concept has been flagged as primitive during the modelling process. This flag can be useful in advanced applications that take advantage of the description logic features of SNOMED CT (A more detailed description of fully defined and primitive concepts can be found in User Guide Glossary).

6.1.2. The Descriptions Table

This table relates the various terms used to name a single SNOMED CT concept. The Descriptions Table includes the following fields:

- DescriptionId: Each description has a unique DescriptionId, which serves as the primary key of this table.
- DescriptionType: This field indicates if the description is one of three types:
• The **Fully Specified Name** (FSN): A term that uniquely and unambiguously identifies each concept in a human-readable way, just as the **ConceptId** uniquely identifies each term in a machine-readable way. There is only one Fully Specified Name for each concept in each edition.

• The **Preferred Term**: Intended to represent the common way a concept is expressed in natural language by clinicians. In many cases it is a shortened version of the Fully Specified Name.

• **Synonyms**: Other terms that can be used to name a concept. The large numbers of synonyms in SNOMED CT provide flexibility of expression.

• **LanguageCode**: This field in the Descriptions Table associates each description with a particular language or dialect, such as UK English, Spanish, etc.

### 6.1.3. The Relationships Table

This table contains the relationships between SNOMED CT concepts. A Relationship in the table is stored as a combination of three concepts in the order: ConceptId1 RelationshipType ConceptId2. This is represented in the table by the following fields:

• **RelationshipId**: The RelationshipId uniquely identifies each set of three concepts in a relationship, and serves as the primary key of this table.

• **ConceptId1**: The first concept in the relationship.

• **RelationshipType**: This is the type of relationship (either the IS A relationship or an attribute or a Historical or Additional relationship) that exists between two concepts.

• **ConceptId2**: The target concept in the relationship. Either the Parent concept in an IS A relationship or the concept that represents the value assigned in an attribute relationship.

The most common **RelationshipType** used in SNOMED is the IS A relationship (a.k.a. subsumption relationship, hierarchical relationship, supertype-subtype relationship, or parent-child relationship). When an IS A relationship is listed in the Relationships Table, it indicates that Concept1 is a subtype of Concept2.

See the *Technical Reference Guide* for more information about SNOMED CT tables.
6.2. History

The content of SNOMED CT evolves with each release. The types of changes made include new Concepts, new Descriptions, new Relationships between Concepts, new Cross Maps, and new Subsets, as well as updates and retirement of any of these Components. Drivers of these changes include changes in understanding of health and disease processes; introduction of new drugs, investigations, therapies and procedures; and new threats to health, as well as proposals and work provided by SNOMED users.

6.2.1. History Mechanism

The history mechanism involves the following tables:

- Component History Table
- References Table

The Component History Table includes any changes to SNOMED CT Components (Concepts, Descriptions, Subsets, Cross Maps). “Significant” changes generally require retirement of the component and addition of replacement component(s). The retirement and addition are recorded in the history records. Changes designated as minor require only a history record to record the change.

The References Table provides a reference from an inactive SNOMED CT component (Concept moved to an Extension, Description, Subset or Cross Map Set) to a component that is current for the Release in which the first component is made inactive. The type of reference indicates the nature of the relationship between the two components. This is similar to the information that historical relationships provide for inactive Concepts.
6.3. SNOMED CT Subsets

A Subset refers to a set of Concepts, Descriptions, or Relationships that are appropriate to a particular language, dialect, country, specialty, organisation, user or context.

In its simplest form, the Subset Mechanism is a list of SNOMED identifiers (SCTIDs). Each SCTID refers to one component of SNOMED CT, that is, a member of the Subset (called a Subset Member). As an analogy, think of SNOMED CT as a book. A Subset is like an index entry pointing to a set of pages relevant to a particular topic.

The Subset Mechanism may be used to derive tables that contain only part of SNOMED CT. In some cases, these derived tables may also be centrally distributed (e.g. a release table containing only Descriptions for a particular International Edition).

A Subset is a value-added feature of SNOMED CT. Subsets provide important information for the use and implementation of SNOMED CT. The fact that a SNOMED CT Component belongs to a particular subset provides information above and beyond the Component itself.

SNOMED CT is a large terminology and subsets can define portions of the terminology for use by specific audiences. For example, a UK dialect subset for English may direct the user to descriptions for UK terms rather than all descriptions for English.

Subsets may also be used to specify simplified or shortened hierarchies for browsing, sometimes called "navigation hierarchies".

Note that it is up to the implementer to determine if a subset is used dynamically or statically, and whether the subset contents are given precedence or used exclusively. Refer to the SNOMED CT Technical Implementation Guide for more information.

Note that Subsets are not necessarily mutually exclusive. The contents of Subsets may overlap.

6.3.1. Subset table and file structures

A common file structure is used for all Subsets. This approach simplifies the release structure and installation process for all SNOMED users.

Subsets are released using two tables:

- Subsets Table
  - Each row in this table describes one release of a Subset.
  - This table includes SNOMED CT Subsets that are packaged together in the Subset Members table.

- Subset Members Table
  - Each row in this table represents one member of a Subset.
  - The member may be a Concept or a Description.
  - One or more Subsets may be packaged together in this table.

6.4. Cross Mappings

Cross Mappings enable SNOMED CT to effectively reference other terminologies and classifications. Each cross map matches SNOMED CT concepts with another coding scheme that is called the "target scheme". The Cross Mapping mechanism enables the distribution of Cross Maps from SNOMED Clinical Terms in a common structure.

The cross mapping structure enables:

- Automatic mapping from one SNOMED CT Concept to a single appropriate matching code in the Target Scheme.
• Automatic mapping from one SNOMED CT Concept to a single collection of codes in a Target Scheme that together represent the same Concept.
• Manual choice from a set of options for mapping a SNOMED CT Concept to a Target Scheme with several possible ways of representing the same or similar Concepts (For Future Use).

The cross mapping structure does not enable:
• Mapping from post-coordinated collections of SNOMED CT Concepts to a single Target Code or a specific collection of Target Codes (e.g. mapping a combination of a disorder qualified by severity or a procedure qualified by urgency).
• Mapping from multiple fields in a patient record to a specific Target Code that represents a combination of characteristics (e.g. mapping a combination of a disorder, procedure and the age and sex of the patient to a single group code).

This structure is based on the practical experience of the Cross Mapping tables of Clinical Terms Version 3 (CTV3), one of SNOMED CT's source terminologies.

6.4.1. Cross Mapping tables
The SNOMED CT structure to support Cross Mapping includes three tables:
• Cross Map Sets Table: Each row in this table represents a Target Scheme for which Cross Maps are available.
• Cross Maps Table: Each row in this table represents one option for mapping a SNOMED CT Concept to a target code or set of codes in the Target Scheme.
• Cross Map Targets Table: Each row in this table represents a code or set of codes in the Target Scheme, which provides a mapping for one or more SNOMED CT Concepts.

6.5. Extensions
SNOMED CT is a deep and detailed clinical terminology with a broad scope. However, some groups of users will need additional Concepts, Descriptions or Subsets to support national, local or organisational needs.

The Extension mechanism is a structure that enables authorised organisations to add Concepts, Descriptions, Relationships and Subsets to complement the core content of the SNOMED CT International Release. One example of the Extension mechanism is for extensibility of SNOMED CT for the specialised terminology needs of an organisation.

Goals of Extensions are to:
• Provide a structure where these Extensions maintain unique identification across organisations for data transmission and sharing, but share a common structure for ease in application development, and so that subsets can be constructed over a combination of International Release and extension content.
• Define a structure so that it is easy to submit, include, use, and migrate terminology developed as part of an extension into the International Release content.

When content overlaps the scope of SNOMED CT, it should be submitted to your IHTSDO National Release Centre for consideration, so that other SNOMED CT users can also take advantage of this work. Using the extension structure can also help organisations transfer responsibility for terminology to the IHTSDO or to another organisation, subject to the terms of the Affiliate Licence.

6.6. SNOMED CT applications and services
SNOMED Clinical Terms is a terminological resource that can serve many roles in healthcare software applications. The IHTSDO supplies content that can be loaded into these applications, but it does NOT supply any of the software itself.
User requirements for these software applications will vary according to way in which they are used. Healthcare software applications usually address a particular set of requirements associated with one or more clinical and/or business processes. Detailed requirements for integrating SNOMED CT into a particular application inevitably depend upon intended uses, the perceptions of users and the technical environments in which they are implemented.

The following examples illustrate a few possible types of implementation:

- A SNOMED CT enabled clinical record system incorporating clinical data entry, decision support, links to knowledge bases, sophisticated analysis, order-report message interfaces, support for record communication or sharing, etc.
- A data warehouse storing and analysing records expressed with SNOMED CT encoded concepts.
- A diagnostic departmental system sending reports that include SNOMED CT encoded concepts to other systems.
- A hand-held data collection device used for input of a limited range of frequently used coded concepts.
- A decision support system using SNOMED CT concepts to represent guidelines and protocols for distribution to other systems.
- A system designed to enable the creation of queries for use in analysis of data held by various other systems, some of which contain SNOMED CT encoded data.
- A coding system mapping SNOMED CT encoded concepts (entered manually or read from an electronic record) to administrative groupings or classifications such as DRGs or ICD10.
- A system designed to support design and/or implementation of messages that convey specified information using a specified set of SNOMED CT concept identifiers.

The *SNOMED CT Technical Implementation Guide* (TIG) provides information and guidance for software professionals responsible for designing, developing and implementing SNOMED CT enabled software applications. The TIG describes the technical requirements and design issues for integrating SNOMED CT into new and existing applications.
Chapter 7

Changes and historical notes

Topics:

- **EPISODICITY no longer modelled in active content (7.1)**
- **ONSET and COURSE retired (7.2)**
- **Dose form values moved (7.3)**
- **Renaming the context/situation hierarchy (7.4)**
- **Domain change for measurement/evaluation attributes (7.5)**
- **Move of findings to events (7.6)**
7.1. EPISODICITY no longer modelled in active content

|EPISODICITY| originated in the National Health Service Clinical Terms Version 3 where it was used not to specify the first episode of a disease for a patient but rather, the first time a patient presented to their general practitioner (GP) for a particular disorder. A first episode of asthma was not intended to represent the first time a patient had asthma, but rather the first time a patient presented to their GP with asthma. |EPISODICITY| has been removed from existing concepts and is no longer used in pre-coordinated definitions. It can still be used in post-coordination as a qualifier.

7.2. ONSET and COURSE retired

In earlier releases, there were two attributes named |ONSET| and |COURSE|. These were retired because they could not be used reproducibly. While |ONSET| was intended to specify the rapidity of onset or the temporal pattern of presentation for a given condition, it was easily confused with the attribute |COURSE| used to represent the duration of a condition. There was not consistent agreement between observers making this distinction.

7.3. Dose form values moved

The concept 105904009 |Type of drug preparation (product)| and its subtypes were moved to the Qualifier value hierarchy as of the July 2007 release. 105904009 |Type of drug preparation (qualifier value)| better represents these concepts because they are not products.

7.4. Renaming the context/situation hierarchy

The hierarchy named 243796009 |situation with explicit context (situation)| was called |context-dependent category| until the July 2006 release. The hierarchy was renamed to better describe the meanings in this hierarchy.

7.5. Domain change for measurement/evaluation attributes

In releases prior to July 2009, six attributes were approved for use for |measurement procedure| only. For the July 2009 release, the domain for these attributes was expanded to |evaluation procedure|. See Measurement procedures and laboratory procedures (8.3) for a definition and full discussion of |evaluation procedure| and |measurement procedure|.

7.6. Move of findings to events

In January 2006, a number of concepts from the |Clinical finding| hierarchy were moved to the Event hierarchy. The attributes used to define those concepts when they were descendants of |Clinical finding| were retained after the concepts were moved to the Event hierarchy. Additional editorial policies for the use of attributes in the Event hierarchy have yet to be established.
Chapter 8

Miscellaneous Topics

Topics:

- Terms Prefaced with Symbols (8.1)
- Negation (8.2)
- Measurement procedures and laboratory procedures (8.3)
- Structure of the SNOMED Clinical Terms Identifier (SCTID) (8.4)
8.1. Terms Prefaced with Symbols

There are some terms in SNOMED CT that are prefaced with a symbol in square brackets. These concept codes were inherited from CTV3 and were used to facilitate mapping to ICD-10. They have all been retired by moving them to the UK NHS extension, and are not recommended for use in clinical records.

Explanations of these term prefixes are as follows:

Table 73: Term Preface Symbols

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>[X]</td>
<td>Terms starting with [X] were initially used in the Read codes in the 1995 release, in order to identify ICD-10 terms that were not present in ICD-9.</td>
</tr>
<tr>
<td>[D]</td>
<td>Terms starting with [D] are also from CTV3, and identify terms contained in ICD-9 Chapter XVI 'Symptoms signs and ill-defined conditions' and ICD-10 Chapter XVIII 'Symptoms signs and abnormal clinical and laboratory findings, not elsewhere classified'. The [D] meant that in CTV3 the code was intended for use in a diagnosis field in the record, even though the term meaning is not a kind of disease.</td>
</tr>
<tr>
<td>[V]</td>
<td>A term starting with [V] identifies concept codes derived from ICD-9 'Supplementary classification of factors influencing health status and contact with health services (V codes)', and ICD-10 Chapter XXI 'Factors influencing health status and contact with health services (Z codes)'.</td>
</tr>
<tr>
<td>[Q]</td>
<td>A term starting with [Q] identifies temporary qualifying terms inherited from CTV3.</td>
</tr>
</tbody>
</table>

8.2. Negation

The meaning of some concept codes in SNOMED CT depends conceptually on negation (e.g. absence of X, lack of X, unable to do X etc).
8.2.1. Negation and Context

The hierarchy is intended to manage this kind of semantic situation. The concept model allows a concept code in the hierarchy to be related to the Clinical finding about which context is asserted. For example, Absence of nausea and vomiting (situation) is modelled as a Situation with explicit context in which the finding of Nausea and vomiting (disorder) is absent.

The inclusion of negated meanings introduces complications into query formulation, machine classification, and reasoning tasks. The inclusion of a NOT logical operator into the SNOMED CT compositional model could simplify modeling of negated meanings. The current release of SNOMED CT does not directly support classification using this operator, but some modeling formalisms in current use today (including database formalisms, Description Logic formalisms) include a NOT operator as a fundamental modeling primitive.

8.2.2. Known Problems with Negation

There is still work to be done in moving all appropriate concept codes to the hierarchy. In particular, many negated meanings are still represented by concept codes that are under a Clinical finding parent. In the July 2008 release, a significant number of subtypes of Functional finding (finding) were changed from primitive to sufficiently defined. Sufficiently defining some concept codes in this subhierarchy (e.g. Unable to stand (finding), and Does not retract tongue (finding)) resulted in incorrect subsumption related to negation. For example Does not retract tongue (finding) autoclassifies as a subtype of Does not move tongue (finding); with correct representation of negation, the subtype relationship would be inverted, so that Does not move tongue (finding) would imply Does not retract tongue (finding). While this negated content ultimately needs to be moved to the hierarchy, the incorrect direction of subsumption relations for negated meanings also occurs in the hierarchy.

This is a limitation of the classifier currently being used, rather than a fundamental limitation of the concept model. The classifier will currently place concept codes in the wrong subsumption relationship when they are negated. As another example, it will infer that Adnexal tenderness absent (situation) Is a Tenderness absent (situation). This is an incorrect direction of subsumption and needs to be reversed. To achieve the correct inferences in queries and reasoning systems, the classifier will currently place concept codes with a finding context of known absent or subtypes thereof should have their Is a relationships reinterpreted by reversing the Concept1 and Concept2 of the is a relationships. This is a temporary fix, and will be addressed systematically in a future release so that such ad hoc solutions will not be necessary.

8.3. 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.

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8.4. Structure of the SNOMED Clinical Terms Identifier (SCTID)

8.4.1. SCTID Data Type

The **SCTID** data type is a 64-bit integer, which is subject to the following constraints:

- Only positive integer values are permitted;
- The minimum permitted value is 100,000 (6 digits);
- The maximum permitted value is 999,999,999,999,999,999 (18-digits);
- As a result of rules for the partition-identifier and check-digit, many integers within this range are not valid **SCTIDs**.

8.4.2. SCTIDs and Extensions

If the partition-identifier indicates that the **SCTID** is part of an Extension the next seven-digits (from the right) are a namespace -identifier (see **SCTID for an Extension Component**). Namespace -identifiers are allocated to organisations which are authorised to issue Extensions. They enable unique **SCTIDs** to be issued by many organisations and allow each **SCTID** to be traced to an authorised originating organisation.

![Figure 14: SCTID for an Extension Component](image)

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Chapter 9

Editorial Guide Glossary

Topics:

• Attribute (9.1)
• Attribute value pair (9.2)
• Browser (9.3)
• Check digit (9.4)
• Component (9.5)
• Concept (9.6)
• Concept equivalence (9.7)
• ConceptId (9.8)
• Concepts table (9.9)
• Core Table (9.10)
• Cross map (9.11)
• CTV3ID (9.12)
• Description (9.13)
• DescriptionId (9.14)
• Descriptions table (9.15)
• Dialect (9.16)
• Enabled application (9.17)
• Extension (9.18)
• Fully defined (9.19)
• Fully specified name (9.20)
• Hierarchy (9.21)
• History mechanism (9.22)
• SNOMED CT Identifier (9.23)
• International release (9.24)
• Language (9.25)
• Language subset (9.26)
• Mapping mechanism (9.27)
• Modeler (9.28)
• Modeling (9.29)
• NamespaceId (9.30)
• PartitionId (9.31)
• Postcoordinated expression (9.32)
• Precoordinated expression (9.33)
• Primitive (9.34)
• Qualifying characteristic (9.35)
• Realm (9.36)
• Relationship (9.37)
• Relationship type (9.38)
• RelationshipId (9.39)
• Relationships table (9.40)
• SNOMED CT Release (9.41)
• Root concept (9.42)
• Root metadata concept (9.43)
• SNOMED (9.44)
• SNOMED Clinical Terms (9.45)
• Sufficiently defined (9.46)
• Subset (9.47)
• Synonym (9.48)
• Top level concept code (9.49)
• Top level metadata code (9.50)
9.1. Attribute

An attribute represents a characteristic of the meaning of a concept or the nature of a refinement.

**Note:** An attribute has a name which is represented by a concept. All the concepts that can be used to name attributes are subtypes of the concept |concept model attribute|. An attribute is assigned a value (attribute value pair) when used in the definition of a concept or in a post-coordinated expression. The permitted attribute values (range) for an attribute depend on the attribute name and on the domain of the concept being refined.

**Example:** Finding site

| Concept Model Attribute | Relationship Type | Role |

9.2. Attribute value pair

An attribute-value pair is made up of an attribute name and an attribute value. Attribute value pairs allow additional types of information to be represented in a generic way without altering the underlying structure or information model. **SNOMED CT relationships** are use attribute value pairs to represent relationships using one concept identifier as an attribute name (the relationship type) and another concept identifier as the value. Similarly each refinement in a post-coordinated expression consists of an attribute name and a value each of which is expressed as a concept identifier.

9.3. Browser

A computer application or software tool used for exploring and searching terminology content. A typical **SNOMED CT browser** can locate concepts and descriptions by identifiers and by searching the text of description terms. Various views of located concepts may be displayed including the set of related descriptions, the hierarchical relationships and other defining relationships.

**SNOMED CT browser**

9.4. Check digit

The check-digit is the final (rightmost) digit of the **SNOMED CT Identifier** (SCTID). It can be used to check the validity of SCTIDs. Clinical information systems can use the check-digit to identify SNOMED CT codes that have been entered incorrectly (typo errors, etc). It is calculated using the Verhoeff algorithm.

9.5. Component

Refers to any item identified by an **SCTID** in the main body of SNOMED CT, or in an authorised Extension. The partition identifier indicates the type of component referred to by that SCTID. Each component is a uniquely identifiable instance of one of the following:
9.6. Concept

A clinical idea to which a unique ConceptId has been assigned.

The term concept may also be used informally with the following meanings:

- The concept identifier, which is the key of the Concepts Table (in this case it is less ambiguous to use the term "conceptId" or "concept code");
- The real-world referent(s) of the ConceptId, that is, the class of entities in reality which the ConceptId represents (in this case it is less ambiguous to use the term "meaning" or "code meaning").

9.7. Concept equivalence

Equivalence is the state of two SNOMED CT concept codes or post-coordinated expressions having the same meaning. Concept equivalence can occur when a post-coordinated expression has the same meaning as a pre-coordinated concept code; or when two different post-coordinated expressions have the same meaning.

9.8. ConceptId

A SNOMED CT Identifier that uniquely identifies a Concept (meaning).

Example: For the meaning named | Pneumonia (disorder) |, the ConceptId is 233604007.

Note: Field name in SNOMED CT Release Format 1

9.9. Concepts table

A table that includes all SNOMED CT concept codes. Each concept code is represented by a single row.

Note: Component Table name in SNOMED CT Release Format 1

9.10. Core Table

A table used to represent on the main SNOMED CT components (concepts, descriptions and relationships).
Note: The term "core" has also been used to refer to the content of the SNOMED CT International Release.

SNOMED CT core
Core table
SNOMED CT core table
SNOMED CT core file
Core file

9.11. Cross map

A Cross Map is a reference from a Concept code to a Cross Map Target. Each Cross Map is represented as a row in the Cross Maps Table. It links a single SNOMED CT concept code to one or more codes in a target classification (such as ICD-9-CM) or terminology. A Concept code may have a single Cross Map or a set of alternative Cross Maps.

9.12. CTV3ID

A five-character code allocated to a meaning or term in Clinical Terms Version 3 (CTV3, previously known as Read Codes). Each row in the SNOMED CT concepts table has a field for the corresponding concept code from CTV3.

Note: Field name in SNOMED CT Release Format 1

Note: The CTV3ID and SNOMEDID fields are no longer supported in Release Format 2. Instead a Simple map (reference set) is used to document the link between legacy codes and SNOMED CT.

Note: The CTV3ID field should no longer be relied upon for mapping to and from the Read Codes. Additional mapping work in the UK identified some anomalies and resulted development of more flexibility table for Read Code Mapping.

9.13. Description

A human-readable phrase or name (Term) associated with a particular SNOMED CT concept code. Each of the descriptions in SNOMED CT is given a separate row in the Descriptions Table. Each Description is assigned a unique DescriptionId and connects a Term and a Concept.

SNOMED CT description

9.14. DescriptionId

A SNOMED CT Identifier that uniquely identifies a Description.

Note: Field name in SNOMED CT Release Format 1
9.15. **Descriptions table**

A data table consisting of rows, each of which represents a *Description.*

**Note:** Component Table name in SNOMED CT Release Format 1

9.16. **Dialect**

A *language* modified by the vocabulary and grammatical conventions applied to the *language* of a particular geographical or cultural environment.

9.17. **Enabled application**

A software application designed to support the use of *SNOMED CT.*

- SNOMED CT enabled application
- SNOMED enabled application
- SNOMED CT application
- SNOMED application

9.18. **Extension**

A data table or set of data tables that is created in accordance with the structures and authoring guidelines applicable to *SNOMED CT.* An *extension* is ordinarily edited, maintained and distributed by an organisation other than the *IHTSDO.* *Components* in *extensions* are identified using *extension SCTIDs,* which are structured to ensure that they do not collide with other *SCTIDs,* and can be traced to an authorised originator.

- SNOMED CT extension

9.19. **Fully defined**

See *Sufficiently defined.*

9.20. **Fully specified name**

A *term* unique among *active Descriptions* in *SNOMED CT* that names the meaning of a *Concept* code in a manner that is intended to be unambiguous and stable across multiple contexts.

**Note:** Field name in SNOMED CT Release Format 1
9.21. Hierarchy

An ordered organisation of concept codes linked together through is a relationship. Concept codes linked to their more general parent concept codes directly above them in a hierarchy. Concept codes with more general meanings are usually presented as being at the top of the hierarchy and then at each level down the hierarchy code meanings become increasingly more specific or specialised. Formally, a hierarchy is represented as a directed acyclic graph.

9.22. History mechanism

The history mechanism is the information distributed with SNOMED CT designed to track the history of changes to its logic definitions and descriptions. The history mechanism is supported by two distribution tables:

- Component History Table
- References Table

9.23. SNOMED CT Identifier

A unique integer Identifier applied to each SNOMED CT component (Concept, Description, Relationship, Subset, etc.). The SCTID includes an item Identifier, a check-digit and a partition identifier. Depending on the partition identifier it may also include a namespace identifier.

SNOMED CT identifier

SCTID

9.24. International release

The set of release files provided on a specified release date, to represent the part of the content of SNOMED CT that forms the common foundation to the terminology available to all IHTSDO Members and Affiliates.

Notes:

1. The International release, provided by the IHTSDO, may be supplemented by Extension releases provided by IHTSDO Members and Affiliates to meet additional national, local and organisational requirements.
2. See also International edition which refers to the same general content, without specifying a particular release date.

SNOMED CT International release

SNOMED CT International edition

9.25. Language

For purposes of SNOMED CT translations, a language is a vocabulary and grammatical form that has been allocated an ISO639-1 language code. See also dialect.
9.26. Language subset

SNOMED CT can be translated into virtually any human language or dialect. These translations attach new language-specific terms as descriptions of existing concept codes and may also use existing descriptions if translation is not necessary. A language subset is a set of references to the descriptions that are members of a language edition of SNOMED CT. Additionally, data in the language subset specifies the DescriptionType of each description (Fully Specified Name, Preferred Term or Synonym).

9.27. Mapping mechanism

A set of data structures for representing cross-links to other terminologies and classifications. The Mapping Mechanism data structures are distributed as three tables:

- Cross Map Sets Table
- Cross Maps Table
- Cross Map Targets Table

9.28. Modeler

A person who directly edits the logic definitions and other structures of the terminology. Also sometimes called Clinical Editor or Terminology Manager.

SNOMED CT modeler

Modeller

SNOMED CT author

9.29. Modeling

The process of editing logic definitions to reflect the meaning intended by the fully specified name.

SNOMED CT modeling

Modelling

SNOMED CT authoring

9.30. Namespaceld

A Namespace is a defined set of values from which SCTIDs are assigned to new SNOMED CT components created by a particular organisation. The Namespaceld is a seven digit number allocated by the IHTSDO to an organisation that is permitted to maintain a SNOMED CT Extension. The Namespaceld forms part of the SCTID allocated every component in an Extension and thus prevents collision between SCTIDs issued by different organisations. The Namespaceld indicates the provenance of each SNOMED CT component.

Note: The SCTIDs assigned to components in the International Release do not have a Namespaceld as they are allocated from a special International Namespace, indicated by the partition identifier portion of the SCTID
9.31. PartitionId
A pair of digits that indicate whether an SCTID identifies a Concept, Description, Relationship, Subset, History, or Extension component. The partition-identifier consists of the second and third digits from the right of the SCTID.

Partition id
Partition identifier

9.32. Postcoordinated expression
Representation of a clinical meaning using a combination of two or more concept identifiers is referred to as a post-coordination. Some clinical meanings may be represented in several different ways. SNOMED CT technical specifications include guidance for transforming logical expressions to a common canonical form.

Example: SNOMED CT includes the following concepts:

- Fracture of bone (conceptId=125605004)
- FINDING SITE (conceptId= 363698007)
- Bone structure of femur (conceptId= 181255000)

SNOMED CT also includes a pre-coordinated concept for this disorder: Fracture of femur (conceptId= 71620000)

It is possible to represent | fracture of femur | in different ways:

- 71620000 (pre-coordinated expression)
- 125605004 : 363698007 = 181255000 (post-coordinated expression)

9.33. Precoordinated expression
Representation of a clinical meaning using a single concept identifier is referred to as a pre-coordination. In contrast, expressions that contain two or more references to concept identifiers are said to be post-coordinated.
9.34. Primitive

An expression, which may be just a single concept code, is primitive when its logic definition does not sufficiently express its meaning so that its subtypes can be computably recognised. A concept code’s logic definition is made up of its defining relationships to other concept codes, via attributes and is a relationships. Primitive concept codes also do not have the defining relationships that would be needed to computably distinguish them from their parent or sibling concepts. For example, if the Concept "Red sports car" is defined as [is a=car] + [colour =red] this is Primitive but the same definition applied to the Concept "Red car" is sufficiently defined.

9.35. Qualifying characteristic

An attribute-value relationship associated with a concept code to indicate to users that it may be applied to refine the meaning of the code. The set of qualifying relationships provide syntactically correct values that can be presented to a user for post-coordination. Example: ‘Revision status’ = ‘First revision’ is a possible qualifying characteristic of ‘Hip replacement’. A qualifying characteristic is contrasted with a defining characteristic. It is referred to in CTV3 as a ‘Qualifier.’

9.36. Realm

A sphere of authority, expertise, or preference that influences the range of components required, or the frequency with which they are used. A Realm may be a nation, an organisation, a professional discipline, a specialty, or an individual user.

9.37. Relationship

An association between two Concepts (each identified by a ConceptId). The nature of the association is indicated by a RelationshipType. Each Relationship is represented by a row in the Relationships Table.

SNOMED CT relationship

9.38. Relationship type

The nature of a Relationship between two Concepts. Relationship Types are represented in SNOMED CT by Concept codes. In the Relationships Table, the RelationshipType field contains the ConceptId for the concept in SNOMED CT that forms the relationship between two other concepts (ConceptId1 and ConceptId2). For
defining and qualifying relationships, the Relationship Type is an Attribute code. RelationshipType should not be confused with CharacteristicType.

Note: Field name in SNOMED CT Release Format 1

9.39. RelationshipId

A SNOMED CT Identifier that uniquely identifies a Relationship. RelationshipId is the key of the Relationships Table. Each row in the Relationships Table represents a relationship triplet (ConceptId1 RelationshipType - ConceptId2).

Note: Field name in SNOMED CT Release Format 1

9.40. Relationships table

A data table consisting of rows, each of which represents a Relationship.

Note: Component Table name in SNOMED CT Release Format 1

9.41. SNOMED CT Release

The content of SNOMED CT or an internally consistent part of SNOMED CT (such as an Extension) provided to licensees at a particular point in time.

Release Version

SNOMED CT Edition

9.42. Root concept

The single concept that is at the top of the | SNOMED CT Concept | hierarchy.

9.43. Root metadata concept

The single concept that is at the top of the | SNOMED CT Model Component (metadata) | hierarchy.

Note: Most of the data in the metadata hierarchy is only relevant to Release Format 2. Therefore, this concept may not be present in some Release Format 1 files.

Root metadata code

9.44. SNOMED

An acronym for the Systematized Nomenclature of Medicine originally developed by the College of American Pathologists and now owned and maintained by the IHTSDO. SNOMED Clinical Terms is the most recent version of this terminology. It was preceded by SNOMED RT and SNOMED International.
9.45. SNOMED Clinical Terms

SNOMED CT is a clinical terminology maintained and distributed by the IHTSDO. It is considered to be the most comprehensive, multilingual healthcare terminology in the world. It was created as a result of the merger of SNOMED RT and NHS Clinical Terms Version 3.

SNOMED CT

9.46. Sufficiently defined

A concept is sufficiently defined if its logic definition is sufficient to computably recognise (automatically subsume) all its subtypes. The logic definition must also differentiate the concept from its immediate supertype(s). A concept which is not sufficiently defined is primitive. For example, if the concept ‘Red car’ is defined as [is a=car] and [ colour =red] it is sufficiently defined but the same definition applied to the Concept ‘Red sports car’ is primitive.

9.47. Subset

A group of components (e.g. Concepts, Descriptions or Relationships) that share a specified common characteristic or common type of characteristic. Subsets represent information that affects the way the components are displayed or otherwise accessible within a particular realm, specialty, application or context.

9.48. Synonym

A Term that is an acceptable alternative to the Preferred Term as a way of expressing a Concept. Synonyms allow representations of the various ways a concept may be described. Synonyms and Preferred Terms (unlike FSNs) are not necessarily unique. More than one concept might share the same Preferred term or Synonym

9.49. Top level concept code

A Concept Code that is directly related to the Root Concept Code by a single Relationship of the Relationship Type | is a |. All Concept Codes (except for metadata concepts) are descended from at least one Top-Level Concept Code via at least one series of Relationships of the Relationship Type" | Is a | ".

9.50. Top level metadata code

A Concept Code that is directly related to the Root Metadata Code by a single Relationship of the Relationship Type | is a |. All Metadata Concept Codes are descended from at least one Top-Level Metadata Concept Code via at least one series of Relationships of the Relationship Type" | Is a | ".

Note: Most of the data in the metadata hierarchy is only relevant to Release Format 2. Therefore, this concept may not be present in Release Format 1 files.
Chapter 10

SNOMED CT Background

Topics:

• Acknowledgments of Contributors to SNOMED CT (10.1)
10.1. Acknowledgments of Contributors to SNOMED CT®

SNOMED CT was originally created by the College of American Pathologists.

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 the Read Codes Version 3, which was created on behalf of the U.K. Department of Health and is Crown copyright.

The IHTSDO also acknowledges the contributions of:

- The American Academy of Ophthalmology, for the ophthalmology-related portions of this work.
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- NANDA®: North American Nursing Diagnosis Association Taxonomy II, copyright 2005-2008, NANDA International. All rights reserved.
- The Perioperative Nursing Data Set® (PNDS), copyright 2002, AORN, Inc. All rights reserved.
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