2.1 Features of SNOMED CT

This section contains a high-level overview of SNOMED CT with some additional information in areas of direct relevance to subsequent chapters of this guide. For a more complete introduction to SNOMED CT see the SNOMED CT Starter Guide (http://snomed.org/sg) and for more detailed information refer to the SNOMED CT Document Library (http://snomed.org/doc).

SNOMED CT is a clinical terminology with global scope covering a wide range of clinical specialties, disciplines and requirements. As a result of its broad scope, one of the benefits of SNOMED CT is a reduction of specialty boundary effects that arise from use of different terminologies or coding systems by different clinicians or departments. This allows wider sharing and reuse of structured clinical information. Another benefit of SNOMED CT is that the same data can be processed and presented in ways that serve different purposes.

SNOMED CT allows a range of different options for immediate retrieval and subsequent reuse to address immediate and longer-term clinical requirements and the requirements of other users. The nature of SNOMED CT hierarchies allows information to be selectively retrieved and reused to meet different requirements at various levels of generalization (e.g. retrieval of subtypes of │Lung disorder│ or │bacterial infection│ would both include │Bacterial pneumonia│.

Scope

SNOMED CT has a broad scope of coverage. It includes concepts representing the wide range of types of information that need to be recorded in clinical records. As a result, practitioners from different disciplines and specialties can use SNOMED CT to record appropriate data at different stages in the delivery of patient care.

Components

SNOMED CT components consist of concepts, terms and relationships that enable effective representation of clinical information.

- *Concepts:* Every concept represents a unique clinical meaning, which is referenced using a unique, numeric and machine-readable SNOMED CT identifier. The identifier provides an unambiguous unique reference to each concept and does not have any ascribed human interpretable meaning.
- *Descriptions:* A set of textual descriptions are assigned to every concept. These provide the human readable form of a concept.
- *Relationships:* A relationship represents an association between two concepts. Relationships are used to logically define the meaning of a concept in a way that can be processed by a computer.
- These components are supported by **reference sets** (refsets). Refsets are resources that can be used to customize and configure the terminology for use in a particular country, organization, specialty or data entry situation.

Hierarchies

SNOMED CT concepts are related to one another within a subtype hierarchy. At the top of this hierarchy are general concepts referred to as top-level concepts. Clinically relevant concepts in SNOMED CT fall under one of the hierarchies shown in Table 2.1-1.

Table 2.1-1: Clinically Relevant SNOMED CT Hierarchies

404684003 | Clinical finding|
  71388002 | Procedure|
  363787002 | Observable entity|
  410607006 | Organism|
  123037004 | Body structure|
  373873005 | Pharmaceutical / biologic product|
	123038009 | Specimen|
	  105590001 | Substance|
	  260787004 | Physical object|
	  78621006 | Physical force|
	  362981000 | Qualifier value|
	  243796009 | Situation with explicit context|
		419891008 | Record artifact|
		  272379006 | Event|
		  254291000 | Staging and scales|
		  48176007 | Social context|
		  308916002 | Environment or geographical location|

Concept Model

SNOMED CT concepts are also related to one another by defining relationships which represent characteristics of the meaning of a concept. Each of these relationships represents the value of an attribute. SNOMED CT currently uses more than fifty defining attributes, each of which is identified by a concept.

The set of rules that defines the types of relationships permitted between concepts is referred to as the concept model. These rules specify the set of concepts to which an attribute can be applied (the 'domain' of the attribute) and the permitted set of values for each attribute (the 'range' of the attribute).

From the perspective of the overlaps between SNOMED CT and LOINC the most significant parts of the concept model are the subtypes of:

- 363787002 | Observable entity|
- 386053000 | Evaluation procedure|

However in addition to this, concept s from several other SNOMED CT concept model domains provide non-numeric values that can be applied to a range of tests represented by LOINC Terms.

Description Logic

SNOMED CT relationships are validated and normalized using description logic (DL). The use of DL ensures logical consistency in the formal computer processable definitions of SNOMED CT concepts. This includes generation of a subtype hierarchy that is consistent with all the defining relationships. As a result, SNOMED CT is able to support more complete and consistent meaning-based retrieval than a terminology, classification or code system that is not validated using a formal logic.

Expressions

SNOMED CT can represent clinical information by using concept identifiers as simple codes in a patient record or message. However, it is also possible to express more detailed information by combining concepts into a postcoordinated SNOMED CT expression.

SNOMED CT support of the postcoordination technique allows additional clinical detail to be represented if required. For example, | Pneumococcal pneumonia| has a | Finding site| of | Lung structure| , which can be refined to | Right upper lobe of lung| .

Postcoordination greatly increases the depth of detail that SNOMED CT can represent without having to include every possible specific site for every possible disorder via a concept. For example, the concept | Bacterial pneumonia| has a defining relationship specifying its | Causative agent| as | Bacteria| and this can be refined to | Streptococcus pneumoniae| .

SNOMED CT expressions are a structured combination of one or more concept identifiers used to represent a clinical idea in a logical manner, which is automatically processable. Expressions are represented using the SNOMED CT compositional grammar, which is a lightweight syntax for the representation of SNOMED CT expressions.

Description logic allows alternative representations of the same or similar information to be recognized and compared. For example, | Pneumococcal pneumonia| refined by | Finding site| | Right upper lobe of lung| can be computed to have the same meaning as | Right upper lobe pneumonia| refined by | Causative agent| | Streptococcus pneumoniae| .

Usage

SNOMED CT is widely recognizes as the leading global healthcare terminology. In more than 25 Member countries SNOMED CT can be used under a free license. SNOMED CT is also used in more than forty non Member countries with low cost licenses for usage. The up to date list of SNOMED International Members countries is shown at http://snomed.org/members.

Within the USA, SNOMED CT has been adopted for use in problem list and quality measures as part of the Centers for Medicare and Medicaid Services Electronic Health Record (EHR) "Meaningful Use" incentive program as specified in the Standards and Certification Criteria. SNOMED CT is also a core element in national EHR initiative in many other Member countries and is widely used in healthcare communication standards including HL7 and IHE.

Maintenance, Governance and Licensing

SNOMED CT is maintained by SNOMED International, a not-for-profit association that is owned and governed by its national Members.

The International Edition of SNOMED CT is licensed by SNOMED International and updates are distributed every six months. The tab delimited release files include versioning data that allows changes to be tracked and supports generation of views of any earlier release.

National Extension and Customization

SNOMED CT is designed to support national extensions that enable addition of local translations and/or dialect variants, without undermining the global representation of meaning using SNOMED CT concept identifiers. Extensions also allow addition of national or local content specific to a particular region or use case.

Customizations represented using the SNOMED CT reference set mechanism allow sharable configuration to address local, specialty or organizational requirements.