

Authoring SNOMED CT

Generic Authoring Principles

Penni Hernandez and Cathy Richardson
Senior Terminologists

Delivering

SNOMED CT

The global
language of
healthcare

Outline of Tutorial

- Welcome
- Examining a request
 - What's been requested
 - Does it belong in SNOMED CT
- Modeling a concept
 - Selecting the hierarchy
 - Creating descriptions
 - Relationships
 - Role/ Relationship Groups
 - Definitions

Outline of Tutorial

- Changing content
- Using a classifier
 - What is a classifier
 - Stated and inferred views
 - Primitive and fully defined
 - Inheritance
 - Benefits of a classifier
- Modeling Styles
 - Using the closest parent
 - Closest proximal primitive parent modeling
- Questions

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EXAMINING THE REQUEST

Examining a request: The background

- What is the request?
 - New concept, new synonym, modeling review, other
- What's the use case?
- Has supporting evidence been provided?
 - Source, currency
- Has a definition been provided?
- What analysis has been done?
 - Suggested parents and other defining relationships?
 - Suggested FSN and preferred term?
- Priority for inclusion
 - E.g. | Exposure to Ebola (event) |

Example of a good request

- Definition:** A patient speculated to have Ebola virus disease (EVD) based on symptomatology and history of exposure to the Ebola virus (this definition is based on the United States Centers for Disease Control and Prevention (CDC) criteria listed here: <http://www.cdc.gov/vhf/ebola/hcp/patient-management-us-hospitals.html>)
- Proposed Use:** To document Ebola virus related data elements in the electronic health record. All requests in this batch submission are elements derived from the CDC Algorithm for Evaluation of the Returned Traveler (<http://www.cdc.gov/vhf/ebola/pdf/ebola-algorithm.pdf>)
- Justification:** Necessary for documentation of CDC guidelines related to the Ebola virus epidemic. Denial will result in inadequate representation of important data elements in the patient record.



Parent Concept Ids

Parent Concept Id	Terminology	Preferred Term
473130003	SNOMED CT International	Suspected infectious disease (situation)

Descriptions

Description Type	Term
Preferred Term	Suspected Ebola virus disease
Synonym	Suspected Ebola hemorrhagic fever
Synonym	Suspected Ebola haemorrhagic fever
Fully Specified Name	Suspected Ebola virus disease (situation)

Notes

Note	Submitted By	Timestamp	Actions
A new concept has been added as requested. This response is subject to change until the time of release.	Kathleen Brown kbr@ihtsdo.org	Oct 24, 2014	
Proposed value for the Associated Finding attribute: 37109004 Ebola virus disease (disorder)	James T. Case james.case@mail.nih.gov	Oct 23, 2014	

Examining a request: Meaning/Clarity

- A request for the concept 'cold' comes in.
 - Do they want to say patient feels cold?
 - | Feeling cold (finding) |
 - Do they want to say patient has a cold?
 - | Common cold (disorder) |
 - Is it relating to the weather or environment?
 - | Cold environment (environment) |
 - | Cold weather (physical force) |
 - Does the patient have Chronic Obstructive Lung Disease?
 - | Chronic obstructive lung disease (disorder) |

Examining a request: Checking content

- Is the concept there but different terms are used?
 - Heart or cardiac
 - Neck or cervical
- Is the concept there but been retired?
 - Reason for retirement?
- Is there work happening in that area?
 - SNOMED CT-LOINC agreement
 - Working Groups
 - X with Y, X due to Y
 - Tracker items

Examining a request: Belong in SNOMED CT?

- Is the term URU
 - Useful – demonstrable use or applicable to health/health care
 - Reproducible- can used and understood in the same way by multiple people
 - Understandable- meaning understood by the average HCP
- Does it represent a class/category or an instance?
 - SNOMED CT codes name classes of things
 - E.g. Heart structure not Sam's heart
 - | Ileostomy set (physical object) | not Dr. Wang's ileostomy set

Examining a request: Belong in SNOMED CT?

- Classification derived phrases not accepted
 - NOS (not otherwise specified)
 - Hyperthyroidism NOS
 - NEC (not elsewhere classified)
 - Other specified coagulation defect
 - Unspecified
 - Unspecified asthma
 - Not mentioned/ not associated with
 - Anal sphincter tear complicating delivery, not associated with third-degree perineal laceration, postpartum
 - With or without
 - Peptic Ulcer with or without hemorrhage

Examining a request: Belong in SNOMED CT?

- International content:
 - Necessary for health information conformance and interoperability
 - Useful to more than one country
 - Meets the editorial guidelines
- Level of pre-coordination
 - Policy/guidelines acceptance
 - Too much leads to combinatorial explosion
 - | Patient involved in major incident associated with incendiary device (causing fire) (event) |

Examining a request: Belong in SNOMED CT?

- International, national or local content:
 - | Framingham coronary heart disease 10 year risk score adjusted to Joint British Societies 2 guidelines (assessment scale) |
 - | Local hospital anesthetic cream (product) |
 - | Avian influenza (disorder) |
 - | Diabetic educator (occupation) |

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MODELING A CONCEPT

Modeling a concept: Resources

Editorial Guide

July 2014

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- ▶ 7 Terming and Naming Conventions

[Document directory](#)

http://ihtsdo.org/fileadmin/user_upload/doc/en_us/eg.html

Modeling a concept: Resources

- The request
- Clinical resources
 - Clinicians
 - Professional bodies
 - Journal articles
 - Position statements
- Selected internet sites
 - Clinical sites
 - Avoid patient information sites

Modeling a concept: Resources

- Content development documentation

<https://csfe.aceworkspace.net/sf/docman/do/listDocuments/projects.ihtsdo/>

`docman.root.content_development_documents.content_project_tracker_document`

- Content tracker projects

https://csfe.aceworkspace.net/sf/tracker/do/listArtifacts/projects.ihtsdo/tracker.top_down_content_projects

- Other terminologists

Ensure the resource you use is current.

Modeling a concept: Which hierarchy?

- The semantic tag contributes to the meaning
 - Clinical Finding or Body Structure Hierarchy?
 - | Hematoma (morphologic abnormality) |
 - what the pathologist sees examining the tissues
 - | Hematoma (disorder) |
 - what the doctor diagnoses- clinical judgment
 - Clinical Finding or Qualifier Value
 - | Red color (qualifier value) |
 - a descriptor, adjectival modifier
 - | Red color (clinical finding) |
 - a morphological color finding

Modeling a concept: Findings and Disorders

Findings

- Normal or abnormal
- May exist at a single point in time
- Can not be temporally separate from the observation
- Can not be defined by an underlying pathological process that is present when the observation isn't

Disorders

- May be present as a propensity for an abnormal state to occur
- Must be abnormal
- Can not exist at a single point in time

Following current editorial guidelines.

Modeling a concept: Finding or Disorder?

Are these concepts findings or disorders?

- Decreased progesterone level
- Asthma
- Acquired pulmonary artery aneurysm
- Localized edema
- Type 1 diabetes mellitus well controlled

Modeling a concept: Context

Does your concept have context?

- Did it occur in the past?
 - | History of asthma |
- Is it planned?
 - | Appendectomy planned |
- Refer to someone other than the patient
 - | Family history of diabetes mellitus |
- State presence or absence
 - | Bowel sounds absent |

Following current editorial guidelines

Modeling a concept: Fully specified name

- The FSN uniquely describes the concept
- Most FSN's are in US English.
- Worded to capture meaning- not the 'common' way to say it
 - | Operation on aneurysm of carotid artery (procedure) |
- Unambiguous
 - Immunosuppression:

immunosuppressed or immunosuppressive therapy?

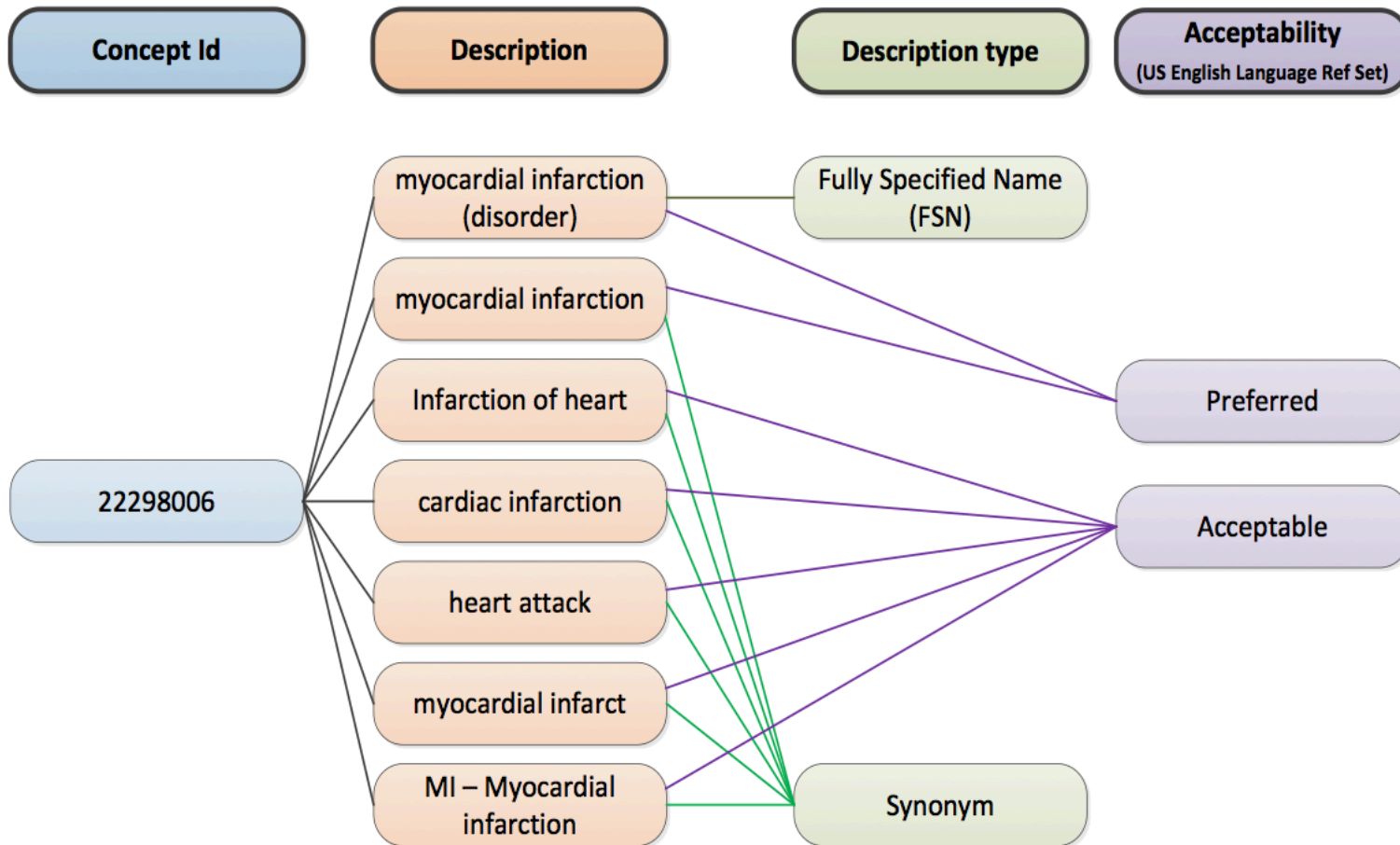
Modeling a concept: Fully specified name

- No acronyms
 - Computerized tomography not CT
- Ends with a semantic tag
 - | Appendectomy (procedure) |
- Follow the editorial guidelines
 - The FSN for a Clinical finding should name the morphologic abnormality before naming the site.

Modeling a concept: Synonym

- A way to represent the concept in a language or dialect, other than the FSN.
- Has the same meaning as the FSN
 - Should not be narrower
 - FSN: | Removal of device (procedure) |
 - SYN: | Removal and replacement of prosthetic device |
 - Should not be broader
 - FSN: | Sprain (morphologic abnormality) |
 - SYN: | Joint injury |
 - Near synonyms
 - More general is valid when context of use provides the meaning
 - Should to be marked as near synonymous (language reference set)
 - FSN: | Entire fundus uteri (body structure) |
 - SYN: | Fundus | in the context of obstetrics.

Modeling a concept: Synonym



Modeling a concept: Editorial Guidelines

Some terming and naming convention examples to consider:

- Singular rather than plural (except groupers)
 - | Disorder of lung | instead of | Disorder of lungs |
- Punctuation
 - Dashes, hyphens, apostrophes, colons
- Abbreviations- prohibited except specified exceptions
- Omit unnecessary articles such as “an” and “the”
 - | Neoplasm of respiratory tract | rather than | Neoplasm of the respiratory tract |

Modeling a concept: Relationships

A relationship is an association between concepts.

- Subtype: The IS A relationship
- Defining: The attributes (with an allowed value) specified by the concept model that are always true

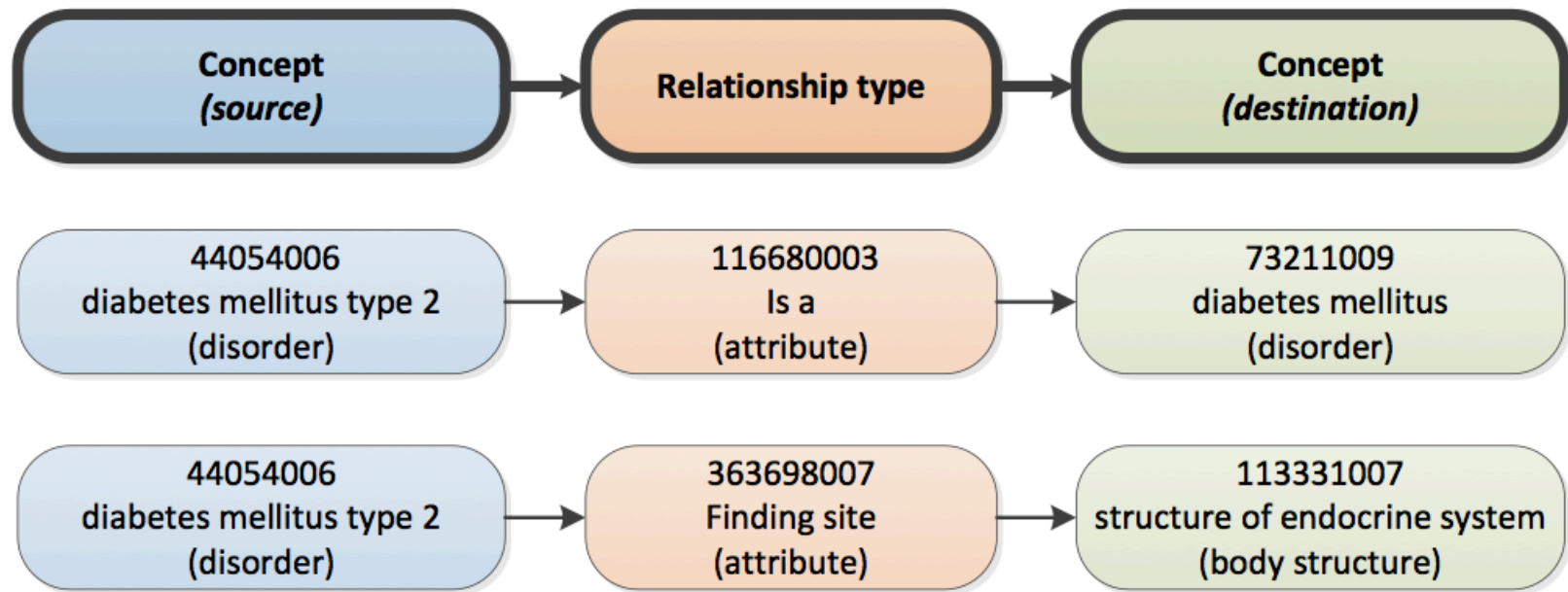
These relationships:

- provide the defining characteristics for a concept.
 - are used to logically define the concept in relation to other concepts
 - Are always true
-
- Historical: associates a retired concept to an active concept

Qualifying: a relationship that users may apply to refine a code.

Modeling a concept: Relationships

Examples of defining relationships



Modeling a concept: IS A relationships

Selecting parent concepts:

- Need to keep within the same top level hierarchy
- At least one parent, can have several
- Must always be true
- Parent concepts selection dependent on:
 - Concept – primitive or defined
 - Availability of a classifier
 - Defining attributes that can be modeled.

Modeling a concept: Defining Relationships

- Check the editorial guide on which attributes are allowed for the hierarchy you are placing the concept in.
 - Not all hierarchies have attributes.
- Each attribute has a range of allowable values.
 - Some values are for qualifying relationships only.
- Can not only sometimes be true.
 - | Pneumonia (disorder) | can not be defined by the CAUSATIVE AGENT | Virus (organism) | as bacteria can also cause pneumonia.

Modeling a concept: Relationships

Check the editorial guide for allowable attributes and values

Defining Attribute	Subsumed Attribute	Allowable Values
FINDING METHOD		Procedure 71388002 (<=)
FINDING INFORMER		Performer of method 420158005 (<<) Subject of record or other provider of history 419358007 (<<)

 **Note:**

Meaning of Allowable Values (*Range*) notations:

(<<) this code and *descendants*,

(<) *descendants* only,

(<=) *descendants* only (stated) except for supercategory groupers,

(<=) this code only,

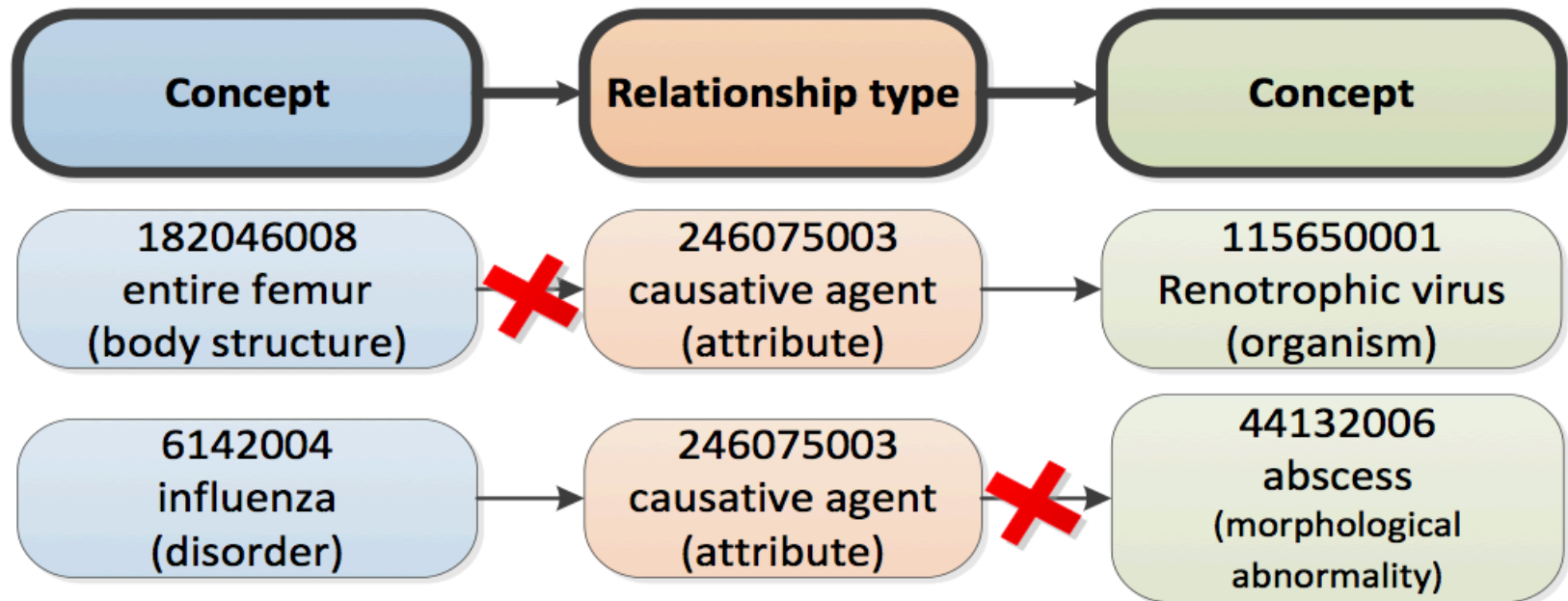
(< Q) *descendants* only when in a qualifying *Relationship*,

(< Q only) *descendants* only, and only allowed in a qualifying *Relationship*.

Modeling a concept: Relationships

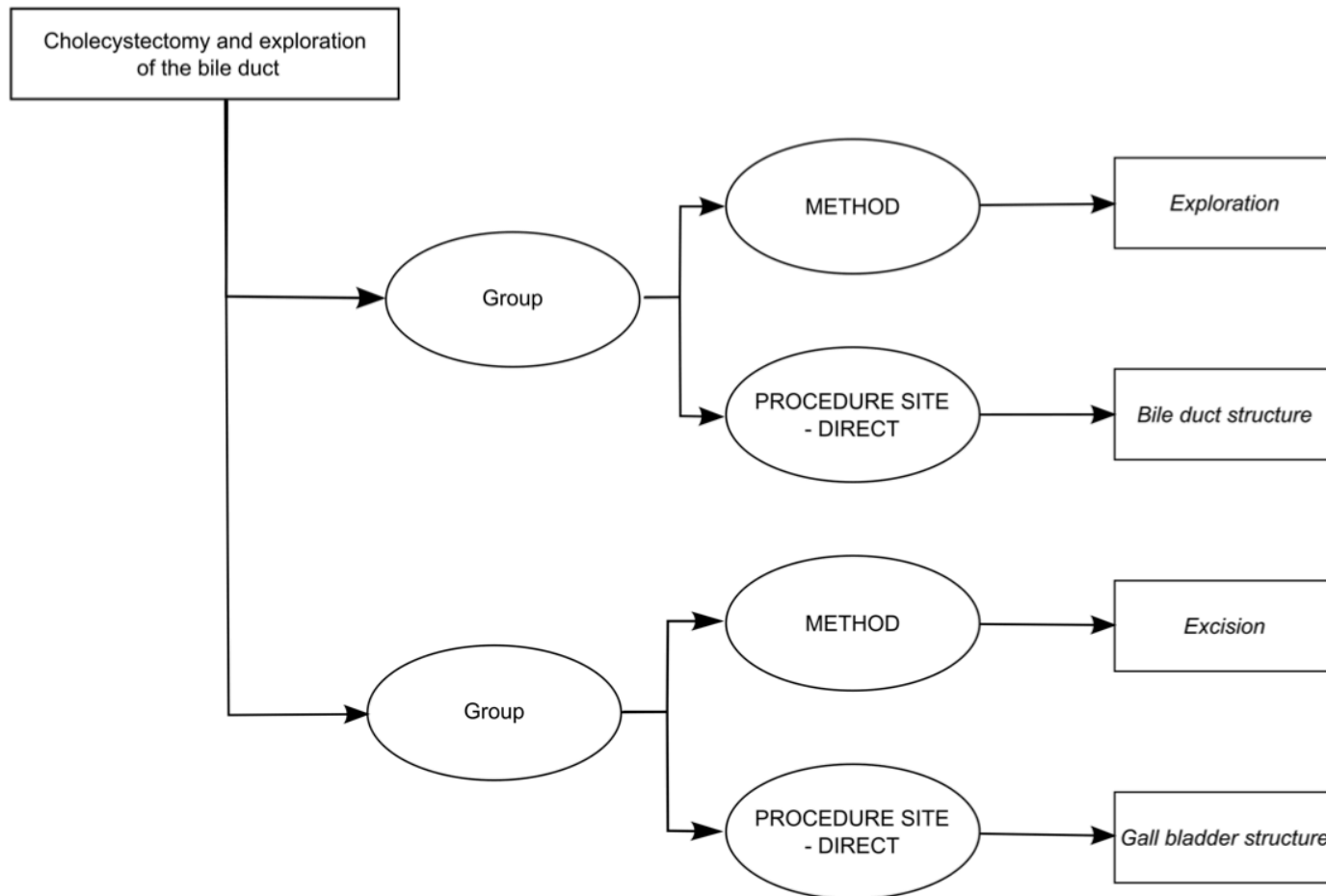
Do not use unapproved attributes or attributes from other hierarchies

Do not use values that are not allowed.



Modeling a concept: Relationship Groups

Two or more attributes and their respective values grouped together



Modeling a concept: Definitions

A textual description can be added to the concept.

The FSN remains the source of truth for meaning.

2 Allergic process (qualifier value)

concept:

primitive

descriptions:

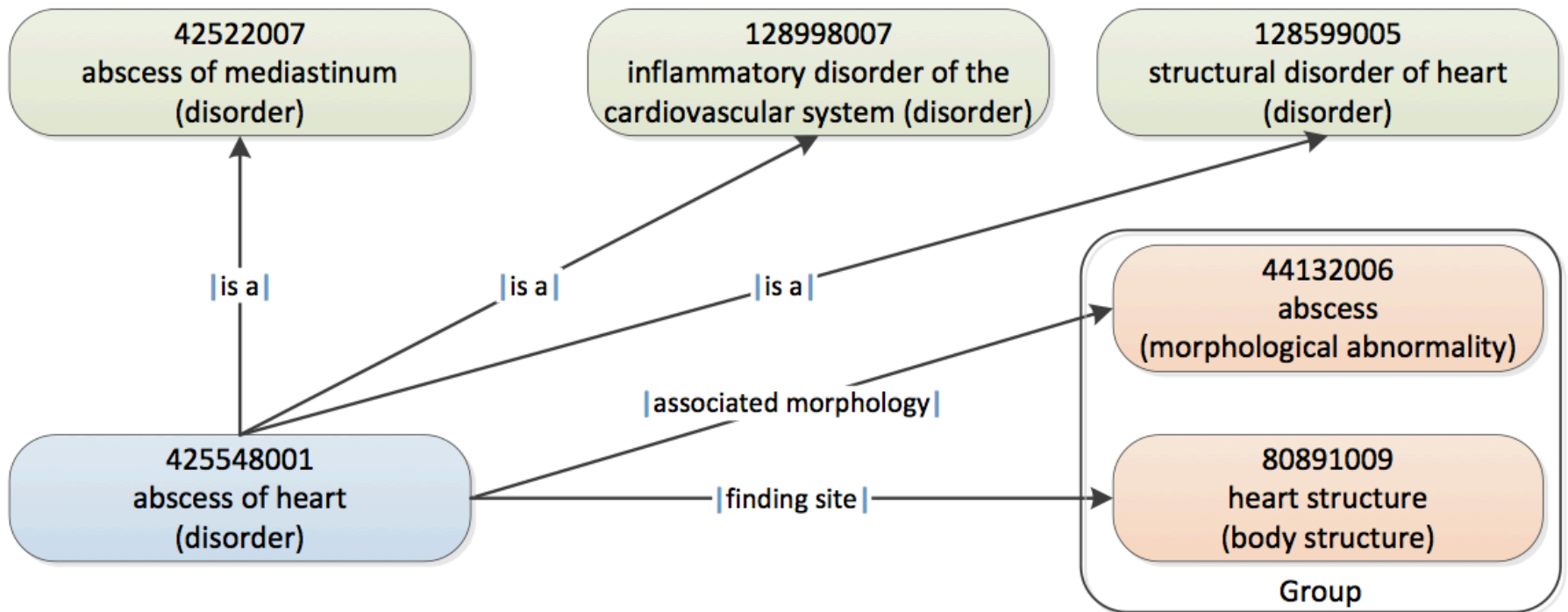
FSN	ci	Allergic process (qualifier value)	
SYN	ci	Allergic process	
DEF	Cs	A type of immune mediated hypersensitivity process that represents the underlying mechanism of allergic conditions.	

relationships:

Is a		Hypersensitivity process (qualifier value)	
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Modeling a concept: Relationships

Example of a modeled concept



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CHANGING A CONCEPT

Changing the FSN

- Minor changes only or concept must be retired
 - Capitalization
 - Punctuation
 - Spelling
 - Word order variation
 - Acronym expansion
 - Semantic type within a top level hierarchy
 - (Finding) to (Disorder)
 - Not permitted across top level hierarchies
- New description ID required
- Must not change meaning

Other changes

Synonym:

- Can add new synonyms
- Retire erroneous or outdated
- Can change acceptability for a language or dialect

Relationships

- Change or addition of parents
- Change or addition of defining attributes
- Change of attribute values

The concept does not need to be retired for these changes

Retiring a concept

- Concepts are retired not deleted.
- Concepts can be retired for several reasons:
 - Ambiguous
 - Duplicate
 - Erroneous
 - Outdated
 - Moved elsewhere

Management and location of retired content is impacted by the Release Format being used.

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CLASSIFIER EDITING

Modeling with a Classifier

- Stated
 - Exactly what is edited
 - Stated super-types and subtypes never change
- Closest Proximal Primitive
 - This is the closest parent in the hierarchy to the concept being modeled that is not fully defined.

Closest Proximal Primitive

- Pros –
 - Reduced maintenance of parent relationships
 - Increased, accuracy and breadth of super-types and subtypes
 - It's fun (when it works)

- Cons
 - May increase modeling time and complexity

- Both
 - Can cause you to uncover duplication
 - Can cause additional modeling to “fix” other concepts so that it classifies/infers correctly.

Primitive vs. Fully defined

- Some concepts cannot be fully represented
 - If a concept is primitive then the defining characteristics for that concept are incomplete.
 - Example:
 - |202264009|Contracture of multiple joints (disorder)|
- Strive for every concept to be fully defined
 - A concept is considered to be fully defined if its defining characteristics are sufficient to define it relative to its immediate supertype (s).
 - Example:
 - |Pulmonary nodule following infection by Coccidioides (disorder)|

Stated and Inferred Forms

- **Stated Form View:**
 - This is what is edited, stated parents never change, everything you see is stated.
- **Short Canonical/Normal Form View:**
 - All relationships are inferred. Short normal form is calculated after classification and includes the proximal primitive parent relationships with redundant parents removed. Any attributes/role groups that are present on the concept and not on the proximal primitive parents are also kept.

Clinical Findings Modeling

- If it is necessary to assign a primitive parent below disease, reevaluate the current modeling of that primitive parent to ensure that it cannot be fully defined before assigning it.
- Changes to the terminology over time may have occurred that now allow it to be defined, whereas when it was created it could not be, this is especially true when anatomy is involved.

Clinical Findings Modeling

- If following assignment of a primitive parent, the concept does not classify as expected, then you have not added sufficient defining relationships. These relationships can often be determined by looking at the relationships under the expected parent and adding them to the modeled concept
- For example: pathologic process, due to, finding site

Classification Errors

- Equivalence errors
 - Not sufficiently differentiated from parent
 - Often due to misplaced anatomy
 - Concept duplication

- Logic errors
 - Self reference

Modeling Primitive Concepts

- Assigning a proximal primitive parent and role group(s) vs.. assigning a fully defined parent
- Should you also model to the closest proximal primitive?
- If following assignment of a fully defined stated parent, the concept does not classify as expected, it is necessary to review the modeling of the fully defined parent and its ancestors to determine the reason it is not classifying properly.