



[snomed.org](https://snomed.org)



[x.com/SnomedCT](https://x.com/SnomedCT)



[linkedin.com/company/ihtsdo](https://linkedin.com/company/ihtsdo)



[youtube.com/@snomedct](https://youtube.com/@snomedct)

# SNOMED CT Trends and Latest Developments 2024

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Last Updated:  
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# Agenda

- Collaborations with other standards
- Advice and content updates from Clinical Reference Groups
- Implementation demonstrations and best practices
- Free open-source tooling





# SNOMED and LOINC

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Updates from the  
Collaboration Project

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SNOMED &  
other standards

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# LOINC Extension

- A new cooperative agreement was signed between the Regenstrief Institute (RII) and SNOMED International (IHTSDO) in October 2022.
- The organizations agreed to work together to minimize duplication between LOINC and SNOMED CT and to enhance the ability of stakeholders to use the two terminologies together.
- A primary aim of the agreement is to create an extension of SNOMED CT for the LOINC terminology.





# LOINC Extension October 2023 Preview

- This preview contains **23,835** Laboratory LOINC Terms modeled using the SNOMED CT observable entity model
- All of the LOINC concepts in the preview are subclasses of [363787002 |Observable entity \(observable entity\)|](#) in SNOMED CT
- Areas of content specifically excluded from this preview:
  - LOINC Terms that include divisors, such as Protein/Creatinine [Ratio] in Urine
  - LOINC Terms considered a calculated or derived observable, such as Anion gap in Blood
  - Panels
  - Veterinary specific LOINC Terms
  - LOINC Terms that have a status of "Discouraged," "Trial," and "Deprecated"
  - All other domains of LOINC including clinical documents, surveys, etc.

**New preview planned for late 2024!**



# LOINC Extension Example

<https://loincsnomed.org/>

**Parents**

- > ☰ Substance concentration of glucose in blood at point in time (observable entity)
- > ☰ Substance concentration of glucose in body fluid at point in time (observable entity)

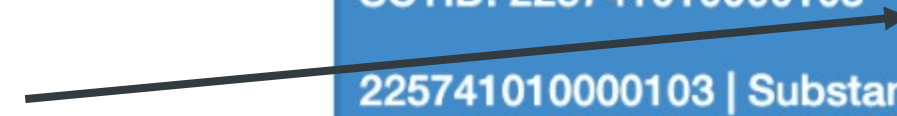
☰ **Substance concentration of glucose in arterial blood at point in time (observable entity)** ☆ ↗

SCTID: 22574101000103 **LOINC Code System: 39481-7**

22574101000103 | Substance concentration of glucose in arterial blood at point in time (observable entity) |

- en Substance concentration of glucose in arterial blood at point in time (observable entity)
- en Substance concentration of glucose in arterial blood at point in time
- en Glucose [Moles/volume] in Arterial blood
- en Glucose:SCnc:Pt:BldA:Qn

Alternative Identifier



Property → Substance concentration (property)

Component → Glucose

Time aspect → Single point in time

Direct site → Arterial blood specimen

Scale type → Quantitative

Aligned Observable - LOINC models

**Children (0)**

No children



# SNOMED and the IPS

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SNOMED role in the  
International Patient  
Summary

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SNOMED &  
other standards

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# The IPS Terminology

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Lorem ipsum dolor sit amet, consectetur adipiscing elit. Aenean commodo ligula eget dolor. Aenean massa. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus.



# About the IPS



Provides a **healthcare summary** for an individual at the point of care, at a point in time



Minimal and non-exhaustive



Specialty-agnostic and condition-independent, but still clinically relevant



Designed to be simple and implementable



Usable anytime, in any place, by anyone



**Multi-beneficiaries:** individuals, healthcare providers, governments, society



# SNOMED CT Resources for IPS

## SNOMED CT HL7 IPS Free set

A freely available flat-list of SNOMED CT terms.

Harmonized with, and supports the contents of the HL7 International Patient Summary and artifacts and CEN's European Standard for the Patient Summary value sets

## SNOMED CT IPS Reference Set

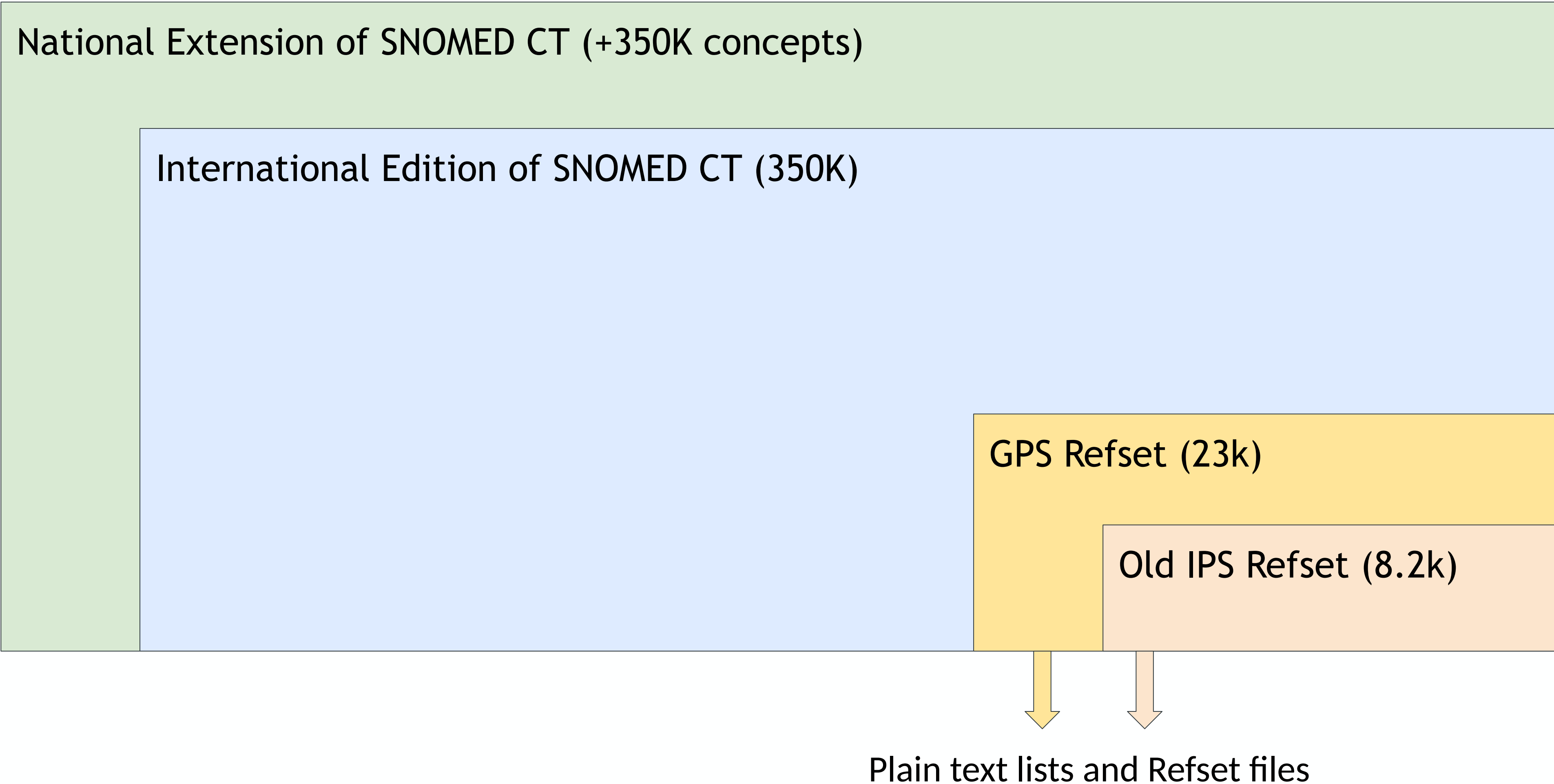
The Free set published in SNOMED CT RF2 specification for Members & Affiliates

## IPS Terminology

NEW SNOMED CT resource to provide implementers with an open product that can be used in healthcare solutions using the power of SNOMED CT through its query language and hierarchies



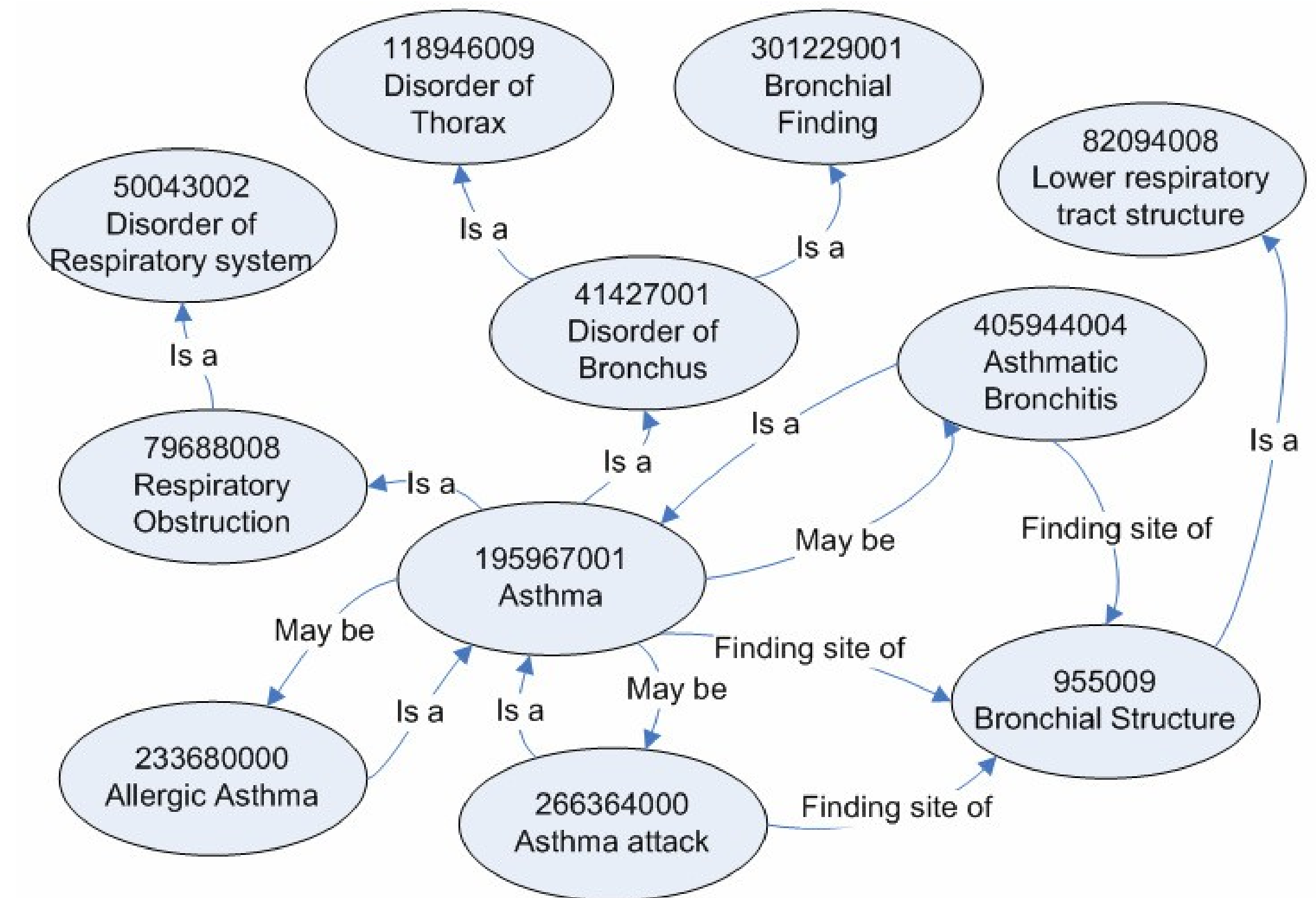
# SNOMED CT and the IPS





# The IPS Terminology

- Using lists difficult implementation, as it is not possible to run ECL over a plain list
- The IPS Terminology is a sub-ontology based on the IPS Refset
  - Adds concepts for attribute, values, and some ancestors or groupers
  - Compatible with terminology servers
  - Compatible with ECL
  - **15k concepts**
- It's a **free alternative** to the standard SNOMED CT Edition, with advanced features derived from the ontology, **only to be used in non-member countries**
- **Member countries can use the IPS refset** included in the international edition to **communicate with non-member countries**



<https://ips-browser.snomedtools.org>



# The IPS Terminology Browser

IPS Terminology Browser https://ips-browser.snomedtools.org

Taxonomy Search Favorites Refset Concept Details Expression Constraint Queries

**Taxonomy** 🕒 ↻

Inferred view Language: FSN in US Descendants Count: On

- ▼ ● SNOMED CT Concept (SNOMED RT+CTV3) 15934
  - ▶ ● Body structure (body structure) 1825
  - ▶ ● Clinical finding (finding) 6713
  - ▶ ● Event (event) 114
  - ▶ ● Observable entity (observable entity) 282
  - ▶ ● Organism (organism) 1609
  - ▶ ● Pharmaceutical / biologic product (product) 1622
  - ▶ ● Physical force (physical force) 12
  - ▶ ● Physical object (physical object) 190
  - ▶ ● Procedure (procedure) 1108
  - ▶ ● Qualifier value (qualifier value) 394
  - ▶ ● Situation with explicit context (situation) 214
  - ▶ ● SNOMED CT Model Component (metadata) 108
  - ▶ ● Social context (social concept) 9
  - ▶ ● Special concept (special concept) 2
  - ▶ ● Specimen (specimen) 129
  - ▶ ● Substance (substance) 1590

**Concept Details**

Summary Details Diagram Expression Refsets Members History

**Parents**  
No parents

● **SNOMED CT Concept (SNOMED RT+CTV3)** ☆ ↻

SCTID: 138875005

138875005 | SNOMED CT Concept (SNOMED RT+CTV3) |

*en* SNOMED CT Concept (SNOMED RT+CTV3)

*en* SNOMED CT Concept

*en* SNOMED CT has been created by combining SNOMED RT and a computer-based nomenclature and classification known as Read Codes Version 3, which was created on behalf of the U.K. Department of Health.

*en* SNOMED Clinical Terms version: 20220731 [R] (July 2022 Release)

*en* © 2002-2022 International Health Terminology Standards Development Organisation (IHTSDO). All rights reserved. SNOMED CT®, was originally created by The College of American Pathologists. "SNOMED" and "SNOMED CT" are registered trademarks of the IHTSDO.

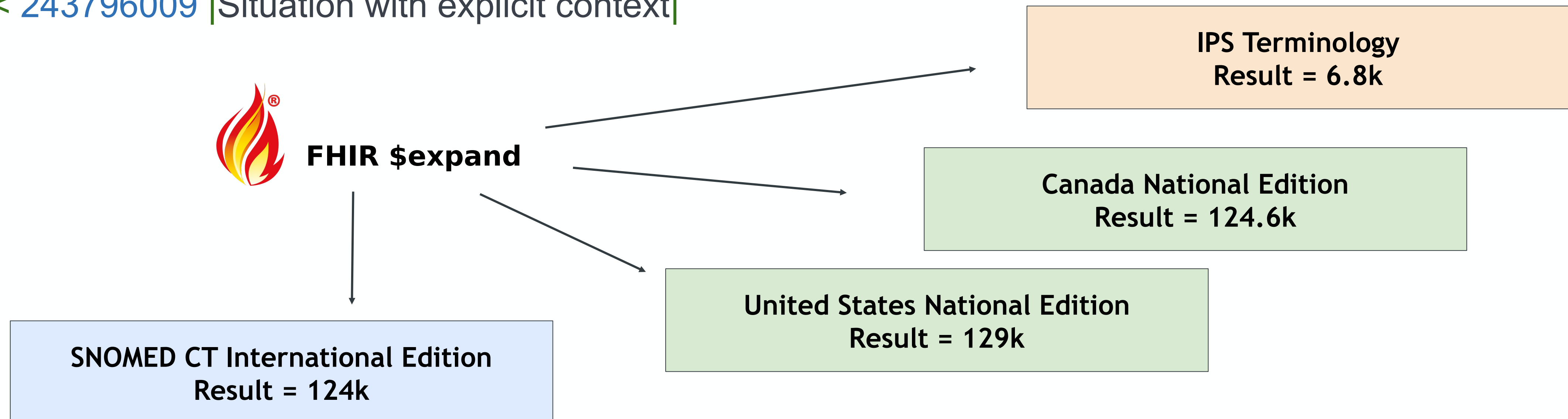
**Children (16)**



# ECLs in Terminology Bindings

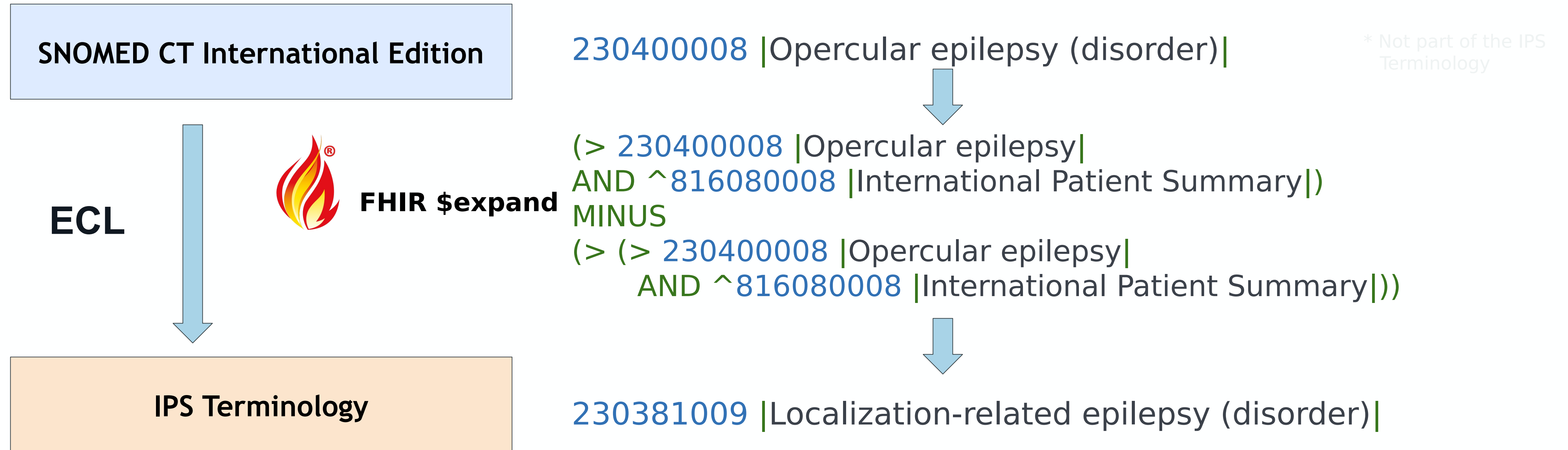
Example terminology binding from the official HL7 IPS Implementation Guide:

< 404684003 |Clinical finding|  
OR < 272379006 |Event|  
OR < 243796009 |Situation with explicit context|



# ECLs Enabling International Interoperability

Transform from an international edition concept to one that is part of the IPS Terminology using the **proximal ancestor** strategy:





# IPS Terminology Bindings Demo

The screenshot displays the 'IPS - International Patient Summary' application. At the top, there is a navigation bar with the SNOMED International logo, the title 'IPS - International Patient Summary', and several utility buttons: 'Full Editions of SNOMED CT', 'International Edition SNOMED CT release 2022-12-31', 'en', 'Export Bindings', and an information icon. Below the navigation bar is a horizontal menu with tabs for 'Allergies and Intolerances', 'Problem List', 'Immunizations', 'Procedures', 'Medications', and 'Result Organisms'. The 'Problem List' tab is selected and underlined. The main content area is titled 'Problem List' and contains a descriptive paragraph: 'The IPS problem section lists and describes clinical problems or conditions currently being monitored for the patient.' Below this, there are two search options, each with a description and a 'Demo UI: Autocomplete' button followed by a 'BINDING' button. The first option is 'Problem List Finding/Situation/Event (all SNOMED CT)' with the description 'Searching problem list codes using a complete edition of SNOMED CT.' The second option is 'Problem List Finding/Situation/Event (IPS Refset)' with the description 'Searching problem list codes using members of the IPS Refset only.'



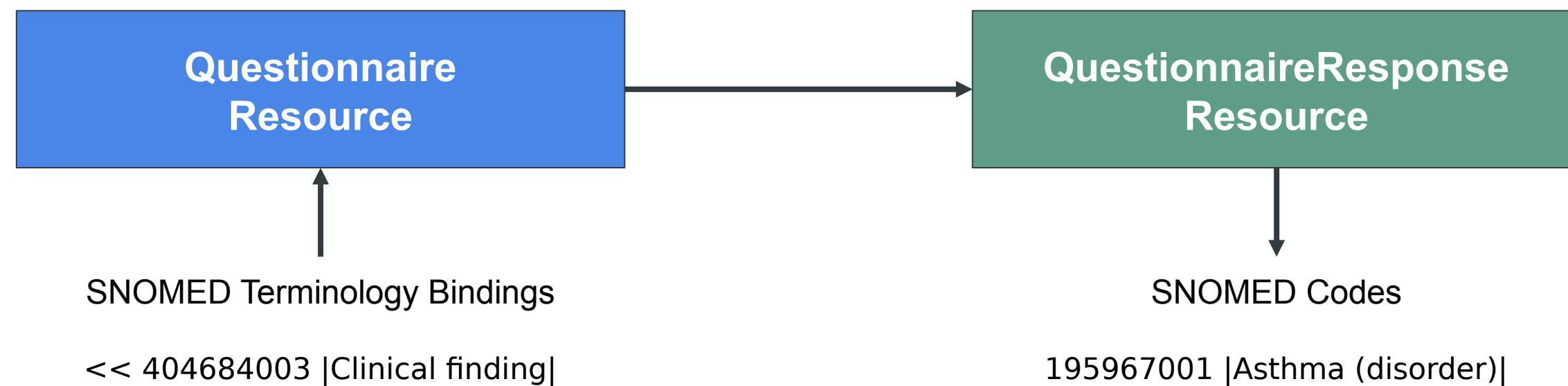
# SNOMED in FHIR Questionnaires

Guidance and tooling for using  
SNOMED in FHIR  
Questionnaires

SNOMED &  
other standards



# SNOMED CT in FHIR Questionnaires



## NLM Form Builder

A tool for building HL7<sup>®</sup> FHIR<sup>®</sup> Questionnaires

Export Import Edit form attributes

### Carcinoma of the Exocrine Pancreas Histopathology Reporting Form

#### Questions Tree

- ▶ 1 Administrative info
- ▶ 2 Neoadjuvant therapy
- ▶ 3 Neoadjuvant therapy description
- ▶ 4 Operative procedure
- ▶ 5 Tumor focality
- ▶ 6 What is the site of the tumor?
- ▶ 7 Tumor dimensions
- ▶ 8 Histological tumor type
- ▶ 9 Histological tumor grade
- ▶ 10 Extent of invasion
- ▶ 11 Lymphatic and venous invasion
- ▶ 12 Perineural invasion
- ▶ 13 Response to neoadjuvant therapy
- ▶ 14 Margin status
- ▶ 15 Lymph node status
- ▶ 16 Histologically confirmed distant met...
- ▶ 17 Pathological staging

#### Current Item (Administrative info:)

Edit item (question or header)

- The questions are organized in hierarchical tree on the left side. Select th

Question text Administrative info:

Prefix [Add css styles](#)

Question code

Help text

Data type header (group/display)

Allow repeating question?

Answer required

Read only

#### Advanced fields

[Delete this item](#)

Connect with NLM



National Library of Medicine  
8600 Rockville Pike  
Bethesda, MD 20894

Web Policies  
FOIA  
HHS Vulnerability Disclosure

NLM | NIH | HHS | USA.gov

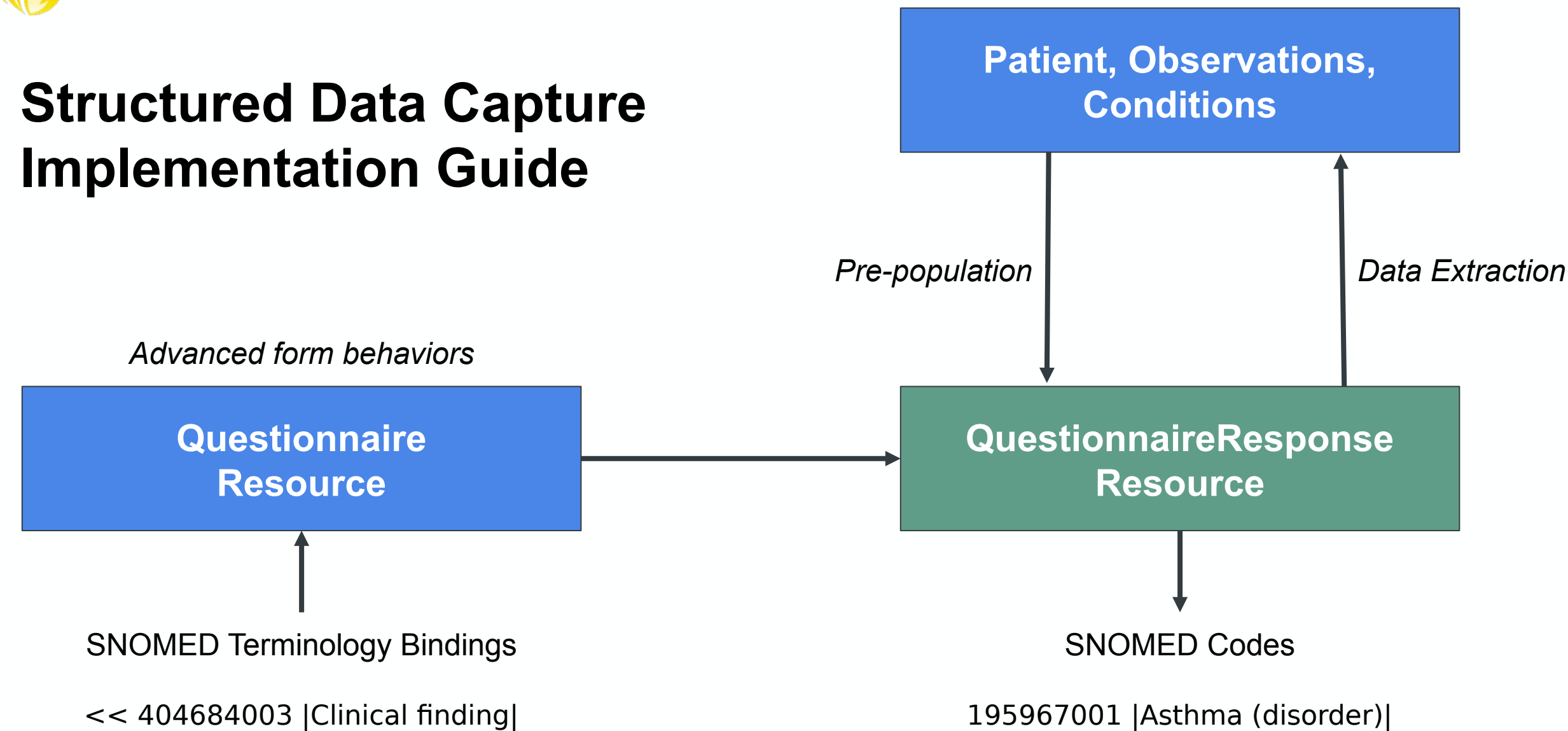
<https://formbuilder.nlm.nih.gov/>



# SNOMED CT in FHIR Questionnaires



## Structured Data Capture Implementation Guide



- ▶ 1 Administrative info: ...
- ▶ 2 Neoadjuvant therapy ...
- ▶ 3 Neoadjuvant therapy description ...
- ▶ 4 Operative procedure ...
- ▶ 5 Tumor focality ...
- ▶ 6 What is the site of the tumor? ...
- ▶ 7 Tumor dimensions ...
- ▶ 8 Histological tumor type ...
- ▶ 9 Histological tumor grade ...
- ▶ 10 Extent of invasion ...
- ▶ 11 Lymphatic and venous invasion ...
- ▶ 12 Perineural invasion ...
- ▶ 13 Response to neoadjuvant therapy ...
- ▶ 14 Margin status ...
- ▶ 15 Lymph node status ...
- ▶ 16 Histologically confirmed distant met... ...
- ▶ 17 Pathological staging ...

Edit item (question or header)

- The questions are organized in hierarchical tree

Question text ⓘ Administrative info:

Prefix ⓘ  [Add css styles](#)

Question code ⓘ

Help text ⓘ

Data type ⓘ header (group/display)

Allow repeating question? ⓘ

Answer required ⓘ

Read only ⓘ

**Advanced fields** ^

Conditional display ⓘ **Question** ⓘ

Show this item when ⓘ  All conditions are true  An...

Terminology server ⓘ You may wish to set this if you are providing an answer value...

Add link to pre-populate FHIR Observation? ⓘ

Use FHIR Observation extraction? ⓘ



<https://formbuilder.nlm.nih.gov/>



# SNOMED CT in FHIR Questionnaires

Question text ⓘ Histological tumor type Add css styles ▾

Prefix ⓘ Add css styles ▾

Question code ⓘ No code Include code

Code ⓘ	System ⓘ	Display ⓘ
911753511000004104	http://snomed.info/sct/	Histologic type of primary malignant nec

+ Add new code

Help text ⓘ

Data type ⓘ choice ▾

Answer list source ⓘ Answer options SNOMED answer value set Answer value set URI

Display ⓘ	Code ⓘ	System ⓘ	Score ⓘ	Default ⓘ
Infiltrating duct carcinoma (m	82711006	http://snomed.info/:		<input type="radio"/>
Acinar cell carcinoma (morph	45410002	http://snomed.info/:		<input type="radio"/>
Intraductal papillary-mucinou:	128692006	http://snomed.info/:		<input type="radio"/>
Mucinous cystic neoplasm wit	734074006	http://snomed.info/:		<input type="radio"/>

+ Add another answer

Answer list layout ⓘ Drop down Radio Button

<https://formbuilder.nlm.nih.gov/>

# SNOMED CT in FHIR Questionnaires

Answer list source ⓘ **Answer options** SNOMED answer value set Answer value set URI

Answer value set ⓘ *Note that this option also sets the terminology server option below (under "Advanced fields").*

Enter SNOMED ECL ⓘ:

Select SNOMED edition:  ▼

Select SNOMED version:  ▼

*Formatted answerValueSet URI:*  
`http://snomed.info/sct/900000000000207008?  
fhir_vs=ecl%2F102299009+%7CStructure+of+vein+of+trunk+%28body+structure%29%7C+OR+90771006+%7CStructu  
re+of+superior+mesenteric+vein+%28body+structure%29%7C+OR+32764006+%7CPortal+vein+structure+%28body+str  
ucture%29%7C+OR+308734009+%7CStructure+of+artery+of+trunk+%28body+structure%29%7C+OR+42258001+%7C  
Superior+mesenteric+artery+structure+%28body+structure%29%7C+OR+66559000+%7CStructure+of+common+hepati  
c+artery+%28body+structure%29%7C+OR+57850000+%7CStructure+of+celiac+artery+%28body+structure%29%7C`

Answer list layout ⓘ **Drop down** Auto-complete Radio Button

<https://formbuilder.nlm.nih.gov/>



# SNOMED CT in FHIR Questionnaires

- Challenges with real world scale projects
  - Store and manage large collections of questionnaires
  - Maintain references to SNOMED Concepts up to date
  - Repeating sections between questionnaires
- Free tool:
  - SNOMED FHIR Questionnaire Manager
  - Integrated with NLM Forms Editor



# SNOMED CT in FHIR Questionnaires

SNOMED CT Implementation Demos

Select Demonstrator FHIR Server: SNOMED Public International Edition en

SNOMED CT Terminology Bindings Validator - FHIR Questionnaire Manager

Home / Questionnaires repository

Connected to <https://hapi.fhir.org/baseR4> as "alopez" Upload Download Create Questionnaire Create Modular Questionnaire

My Questionnaires Preview Validate SNOMED Bindings History

Title	Status	Version	Type	Actions
Carcinoma of the Exocrine Pancreas Histopathology Reporting Form	DRAFT	11	QUESTIONNAIRE	✓ 👁 📄 ⬆️ ✎ ⌛ 🗑
Breast Cancer	DRAFT	3	QUESTIONNAIRE	✓ 👁 📄 ⬆️ ✎ ⌛ 🗑
Appendicitis data entry form (example)	DRAFT	1	QUESTIONNAIRE	✓ 👁 📄 ⬆️ ✎ ⌛ 🗑
Multiple Sclerosis form	DRAFT	1	QUESTIONNAIRE	✓ 👁 📄 ⬆️ ✎ ⌛ 🗑
Danish Pregnancy folder	DRAFT	2	QUESTIONNAIRE	✓ 👁 📄 ⬆️ ✎ ⌛ 🗑
HD0070_ Multiple Sclerosis	DRAFT	1	QUESTIONNAIRE	✓ 👁 📄 ⬆️ ✎ ⌛ 🗑
BE Project: Identification	DRAFT	1	QUESTIONNAIRE	✓ 👁 📄 ⬆️ ✎ ⌛ 🗑
BE Project Clinical: Multiple Sclerosis	DRAFT	2	QUESTIONNAIRE	✓ 👁 📄 ⬆️ ✎ ⌛ 🗑
Multiple Sclerosis root questionnaire	DRAFT	1	MODULAR ROOT	✓ 🔑 📄 ⬆️ ✎ ⌛ 🗑
Modular test 3	DRAFT	2	MODULAR ROOT	✓ 🔑 📄 ⬆️ ✎ ⌛ 🗑

<https://ihtsdo.github.io/sct-implementation-demonstrator/#/questionnaires>



# Cancer Synoptic Reporting

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Implementation Guide from the  
Clinical Reference Group

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SNOMED &  
other standards



# Cancer Synoptic Reporting

- Cancer Synoptic Reporting Project Group: supports on the creation of SNOMED CT content necessary to unambiguously represent the data elements required for cancer reporting for all solid tumors, adult and pediatric, as published by the College of American Pathologists (**CAP**) and the International Collaboration on Cancer Reporting (**ICCR**)
- Resulted on the creation of Observable entities, Body structures and Clinical findings required for the project
- Delivers example report templates as FHIR Questionnaires



Deliverable:


## Refset vs Questionnaires





# Cancer Synoptic Reporting



### Carcinoma of the Exocrine Pancreas Histopathology Reporting Guide



Family/Last name  Date of birth

Given name(s)

Patient identifiers  Date of request  Accession/Laboratory number

Elements in **black text** are CORE. Elements in **grey text** are NON-CORE.  [SCOPE OF THIS DATASET](#) 

indicates multi-select values  indicates single select values

#### NEOADJUVANT THERAPY

Information not provided

Not administered

Administered (select all that apply)

- Chemotherapy
- Radiotherapy
- Other, *specify*

#### TUMOUR SITE (select all that apply)

No macroscopically visible tumour

- Pancreatic head
- Pancreatic body
- Pancreatic tail
- Other, *specify*

#### OPERATIVE PROCEDURE (select all that apply)

- Whipple pancreatoduodenectomy
- Pylorus-preserving pancreatoduodenectomy
- Distal pancreatectomy
- Total pancreatectomy
- Subtotal pancreatectomy
- Pancreatic resection (tick one of the options above) extended with one or more of the following additionally resected organs/structures:
  - Vein
    - Superior mesenteric vein
    - Portal vein
  - Artery(s)

#### TUMOUR DIMENSIONS

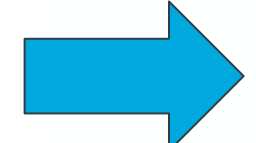
Maximum tumour dimension (largest tumour)  mm

Additional dimensions (largest tumour)  mm x  mm

Dimensions of additional smaller tumour foci

mm x  mm x  mm

mm x  mm x  mm



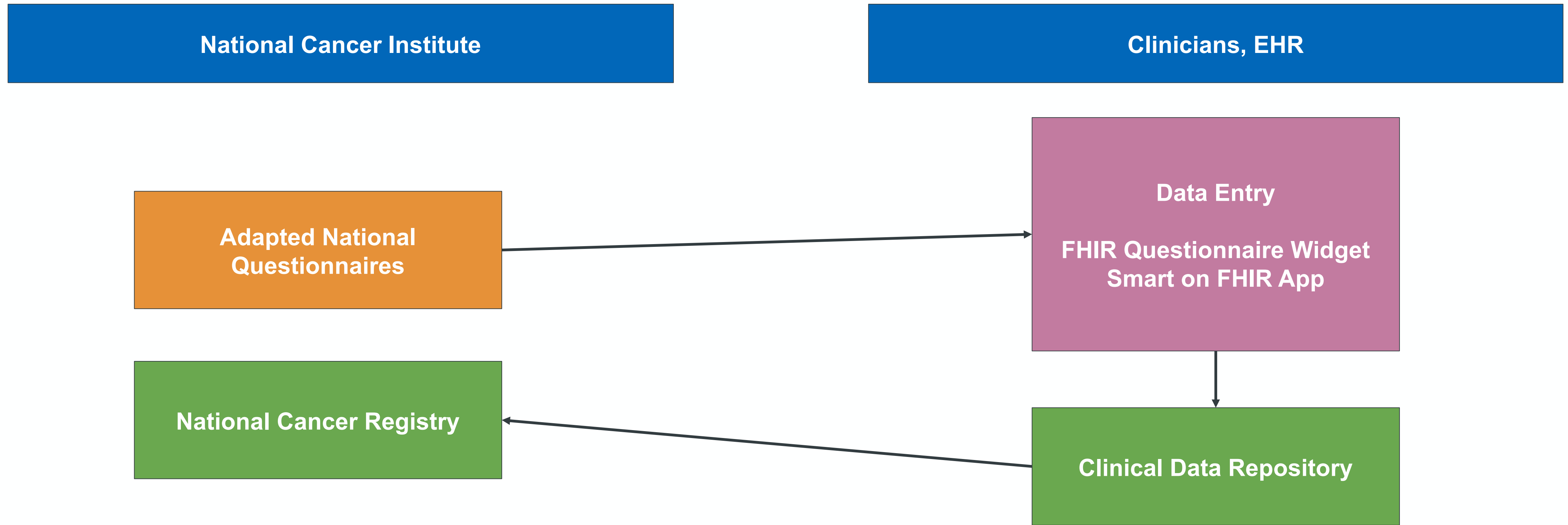
### Carcinoma of the Exocrine Pancreas Histopathology Reporting Form

- Administrative info:
  - Family / Last Name
  - Given name(s)
  - Date of birth
  - Patient identifiers
  - Date of request
  - Accession/Laboratory number
- Neoadjuvant therapy
- Operative procedure
  - Subtotal pancreatectomy  Pancreaticoduodenectomy
  - Total pancreatectomy  Distal subtotal pancreatectomy
- Additionally resected organs/structure
- Tumor focality
- What is the site of the tumor?
- Tumor dimensions
- Histological tumor type
- Histological tumor grade
- Extent of invasion
- Lymphatic and venous invasion
- Perineural invasion
- Response to neoadjuvant therapy
- Margin status
  - Pancreatic transection margin
  - Bile duct transection margin
  - Gastric/proximal duodenal transection margin



# Cancer Synoptic Reporting

## Possible implementation scenario





# Allergy / Hypersensitivity recording

Implementation Guide from the  
Clinical Reference Group

SNOMED &  
other standards



# Allergy / Hypersensitivity Implementation Guide

- SNOMED Allergy Hypersensitivity Clinical Reference Group
- Promote interoperability within and between realms in a consistent way by providing clear guidance for structuring adverse sensitivity data as part of a patient's Electronic Health Record.
- Based on the HL7 FHIR Allergy / Hypersensitivity resource
- Terminology bindings
- Business logic
- User Interface Demonstrator

The screenshot shows a web page for the SNOMED CT Implementation Guide for Allergy, Hypersensitivity and Intolerance. The page title is "SNOMED CT Implementation Guide for Allergy, Hypersensitivity and Intolerance" with a yellow "OUT OF SYNC" badge. It was created by David Markwell and last modified by Anne Randorff Højén on 2023-Oct-20. The page features the SNOMED International logo and tagline "Leading healthcare terminology, worldwide". The main text describes the guide's purpose: to offer comprehensive guidance for healthcare providers, information managers, and software developers to standardize documenting adverse sensitivity data, including allergies, non-allergic hypersensitivity, and intolerance. It includes five chapters: Introduction, Clinical Use Case, Allergy Content in SNOMED CT, Information Model and Terminology Binding, and Implementation Considerations. A table of contents on the right lists these chapters and their sub-sections. The page also includes links for a web browsable version, the SNOMED CT Document Library, and an implementation demonstration. A copyright notice at the bottom states: "© Copyright 2024 International Health Terminology Standards Development Organisation, all rights reserved. This document is a publication of International Health Terminology Standards Development Organisation, trading as SNOMED International. SNOMED International owns and maintains SNOMED CT®. Any modification of this document (including without limitation the removal or modification of this notice) is prohibited without the express written permission of SNOMED International. This document may be subject to updates. Always use the latest version of this document published by SNOMED International. This can be viewed online and..."



# Allergy / Hypersensitivity Implementation Guide

The screenshot displays the 'Allergy, Hypersensitivity and Intolerance' section of the SNOMED CT Implementation Demos. It features two tabs: 'Allergy List Approach (AllergyIntolerance FHIR resource)' and 'Problem List Approach (Condition FHIR resource)'. The 'Allergy Intolerance Form' is active, showing fields for 'Allergy/Intolerance by propensity' (with a 'Propensity based model' toggle), 'Allergy Intolerance Type', 'Clinical Status' (Active), 'Verification Status' (Unconfirmed), 'Allergy/Intolerance substance or product', 'Substance Category', 'Allergy Criticality', 'Reaction Manifestation', 'Reaction Severity', and 'Exposure Route'. A 'Clear' button is present. To the right, the 'AllergyIntolerance HL7 FHIR Resource (link)' is shown as a JSON object:

```
{
  "resourceType": "AllergyIntolerance",
  "id": "medication",
  "text": {},
  "clinicalStatus": {
    "coding": [
      {
        "system": "http://terminology.hl7.org/CodeSystem/allergyintolerance-clinical",
        "code": "active",
        "display": "Active"
      }
    ]
  },
  "verificationStatus": {
    "coding": [
      {
        "system": "http://terminology.hl7.org/CodeSystem/allergyintolerance-verification",
        "code": "unconfirmed",
        "display": "Unconfirmed"
      }
    ]
  },
  "type": "",
  "category": [],
  "criticality": {},
  "code": {
    "coding": []
  },
  "reaction": [
```

<https://ihtsdo.github.io/sct-implementation-demonstrator/#/allergies>



# OpenMRS and Bhamni

Demonstrating best practice  
integrations in open source software

SNOMED  
Collaborations



# The Bahmni Project

- Open source suite of clinical systems
- 500+ sites. 50+ countries. 4K+ users. 2M+ patient records
- Clinical tool based on



# The Bahmni Project

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## SNOMED International Collaboration with Bahmni Coalition

- Adding best practice SNOMED support in Bahmni / OpenMRS
  - Provide implementation support
    - Help designing overall terminology extension strategy
    - Provide open source tools: Snowstorm Lite, CDS Server
  - Funding open source development teams
- Demonstrating the benefits of SNOMED in settings with constrained resources
  - Typically there are no national dictionaries, drug extensions, access to vendors support or knowledge bases, low technical capabilities, etc.



# Bahmni Demo



# Prescription in the Bahmni Project

Order Drug

Recent 13 Dec

Drug Name

Amoxicillin 250 mg chewable tablet (Tablet)

Amoxicillin 500 mg oral capsule (Capsule)

Amoxicillin 50 mg/mL oral suspension

Dose

Units

Frequency

Route

Aspirin 100 mg c

Enalapril maleat

tablet (Tablet)

The local list of generic drugs was mapped to  
SNOMED CT Clinical Drugs  
(Based on the WHO Essential Medications List)

Order Drug

Drug Name

Accept

Dose

Units

Frequency

Route

Start Date

Duration

Units

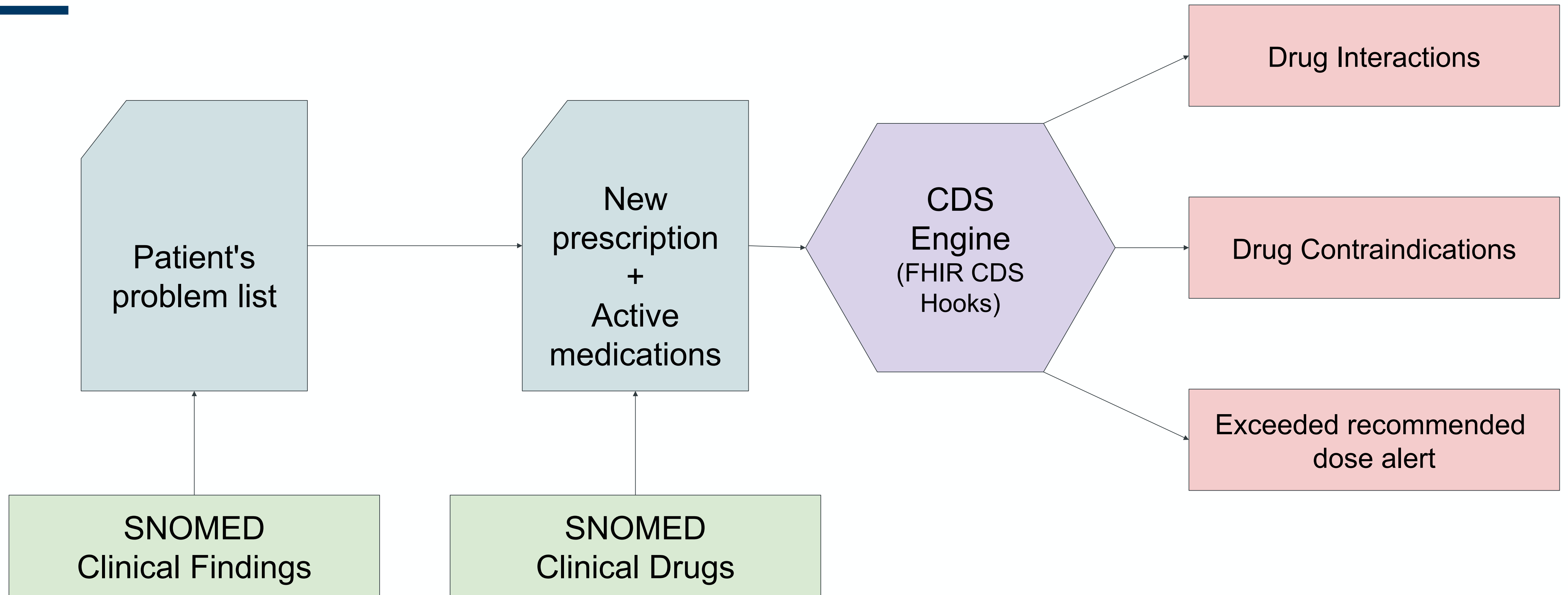
Total Quantity

Units

Prescription instructions are captured in the  
Bahmni Information Model



# Use case for prescription CDS



# Knowledge bases

A particular challenge for an open source project aimed for LMICs. Difficult to depend on knowledge bases vendors.

Possible solutions:

- Find public domain databases
- Provide the format so that implementers develop their own knowledge bases relevant to local use cases

In this demo:

- Drug - Condition (contraindications): local list
- Drug - Drug (interactions): local list
- Maximum recommended dose: computed from ATCs DDDs





# Dose alerts knowledge base

- This a safety rule, intended to detect atypical dosages that may be the result of data entry errors, focus on extreme cases
- A license for ATC was obtained for the demo project
- ATC drugs were mapped to SNOMED Substances
- DDDs were extracted
- Rules have been set up as:
  - Dosage > DDD \* 2 = Warning

○ Dos

ATC code	Name	DDD	U	Adm.R	Note
C07AB03	<u>atenolol</u>	75	mg	O	
		75	mg	P	



# Dose alerts knowledge base

385268001 |Oral dose form (dose form)|

ATC code	Name	DDD	U	Adm.R	Note
C07AB03	<u>atenolol</u>	75	mg	O	
		75	mg	P	

387506000 |Atenolol (substance)|

258684004 |milligram (qualifier value)|

**4** ✕ 318420003 |Product containing precisely atenolol 50 milligram/1 each conventional release oral tablet (clinical drug)|

200 mg a day > 75 mg \* 2 DDD →

**Warning**





# Snowstorm Lite

A new lightweight terminology server  
simplifying implementation environments

SNOMED Tools



# Snowstorm Terminology Server

- Open source under Apache 2.0
- Stand up your own SNOMED CT FHIR Terminology Server in less than an hour
- Support other CodeSystems
- Used as the backend of the browser and authoring tool
- X Version with Post-coordination support



[github.com/ihtsdo/](https://github.com/ihtsdo/)

[snowstorm](https://github.com/ihtsdo/snowstorm)



[github.com/ihtsdo/snowstorm-x](https://github.com/ihtsdo/snowstorm-x)



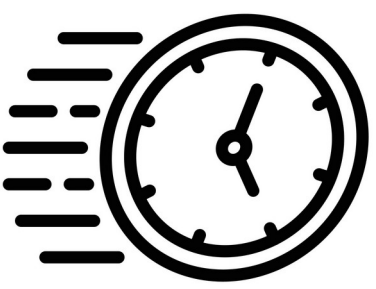
# SNOWSTORM

by SNOMED International



# Snowstorm Lite

- Single edition server
- CodeSystem lookup
- ValueSet expand with ECL Lite
- ConceptMap Translate
- Fast and simple:
  - Index ready in 40 seconds
  - 1 gb ram



 [github.com/ihtsdo/snowstorm-lite](https://github.com/ihtsdo/snowstorm-lite)



 **snowstorm-lite** Public



# Refset & Translation Tool

An open access tool for  
maintaining reference sets

SNOMED Tools



# SNOMED CT Reference Set Tool

The SNOMED International SNOMED CT Reference Set Tool supports the creation of reference sets and translations

The screenshot shows the 'Reference Set and Translation Service' web application. The user is logged in as 'Linda Bird' and is viewing the 'Refset' section for the 'Armenian Project' with the role of 'AUTHOR'. The interface displays a table of available reference sets and a detailed view for a specific reference set.

**Available (4, AUTHOR)**

Refset Id	Name / Last Modified	Mod / Term / Domain	Actions
TMP-h0l621	EXAMPLE (adapt) - NLM Core Problem List 2021-04-14 03:18:22	no module id SNOMEDCT MAIN/2021-01-31 no domain specified	[List] [Edit]
TMP-2iuazs	EXAMPLE (query) - Diagnosis (diabetes) reference set 2021-04-14 03:17:17	900000000000207008 SNOMEDCT MAIN/2021-01-31 no domain specified	[Settings] [Edit]
TMP-7hcla7	Example (adapt) International Patient Summary Subset 2021-04-14 03:18:50	no module id SNOMEDCT MAIN/2021-01-31 no domain specified	[List] [Edit]

**EXAMPLE (query) - Diagnosis (diabetes) reference set**

**Actions:** [List] [Edit] [Share] [Refresh]

**Description:** A reference set used for recording the diagnoses of patients during diabetic care.

**Notes:** [Add Note]

**Refset Id:** TMP-2iuazs

**Module Id:** 900000000000207008

**Namespace:** 1000003

**Organization:** IHTSDO

**Terminology:** SNOMEDCT MAIN/2021-01-31

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Available at:

<https://refset.ihtsdotools.org>

# Refset Tool

- Creates Simple Type Reference Sets
  - Extensional definitions
  - Intensional definitions
- Supports Refsets and Localsets
- Assignments and revisions
- Translation
- Helps in updating to new versions of the substrate
  
- New Refset tool in development!
  - In internal testing today

Reference Set and Translation Service

Directory Refset Translation Admin

Project: Armenian Project Role: AUTHOR

Available (4, AUTHOR)

Search Add Refset Add Local Set

Refset Id	Name / Last Modified	Mod / Term / Domain	All	
TMP-h0i621	EXAMPLE (adapt) - NLM Core Problem List 2021-04-14 03:18:22	no module id SNOMEDCT MAIN/2021-01-31 no domain specified		
TMP-2iuazs	EXAMPLE (query) - Diagnosis (diabetes) reference set 2021-04-14 03:17:17	900000000000207008 SNOMEDCT MAIN/2021-01-31 no domain specified		
TMP-7hcla7	Example (adapt) International Patient Summary Subset 2021-04-14 03:18:50	no module id SNOMEDCT MAIN/2021-01-31 no domain specified		

EXAMPLE (query) - Diagnosis (diabetes) reference set

Actions

Description: A reference set used for recording

Notes

Refset Id: TMP-2iuazs

Module Id: 900000000000207008

Namespace: 1000003

Organization: IHTSDO

Terminology: SNOMEDCT MAIN/2021-01-31

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<https://refset.ihtsdotools.org>



# Weblate

---

An open access tool for  
maintaining translations

---

SNOMED Tools



# Weblate

- A Web based SNOMED Translation Tool
- Open to all member countries
- Automatic translation support

A screenshot of the SNOMED Weblate web application interface. The top navigation bar includes the 'SNOMED Weblate' logo, a search bar, and links for 'Dashboard' and 'Projects'. The main content area shows a breadcrumb trail: 'Implementation Support / SNOMED CT Procedures / Vietnamese / Translate'. Below this, there are navigation controls for a list of 631 items, with the first item selected. A filter is set to 'state:>=translated'. The main section is titled 'Translation' and shows the English source text: 'CT guided percutaneous fine needle aspiration biopsy of pseudocyst of pancreas'. The Vietnamese target text is 'sinh thiết chọc hút bằng kim nhỏ nang giả tụy có hướng dẫn CT'. There is a checkbox for 'Needs editing' which is currently unchecked. At the bottom of the translation section are four buttons: 'Save and continue', 'Save and stay', 'Suggest', and 'Skip'. Below the translation section, there are tabs for 'Nearby strings' (29), 'Similar keys' (30), 'Comments', 'Automatic suggestions', and 'Other languages'. A table below these tabs shows a list of keys with their corresponding English and Vietnamese translations.

Key	English	Vietnamese
899020431000132100	Post-exposure herpesvirus infection prophylaxis	
450229981000132104	Toilet and suture of wound	
345713791000132107	Urinary tract infection prophylaxis	



# Weblate

The screenshot shows the SNOMED Weblate interface. At the top, there is a search bar and navigation links for Dashboard, Projects, Languages, and Checks. The main header indicates the current project: Implementation Support / SNOMED CT Procedures / Vietnamese / Translate, with a 'translated 6%' indicator. Below the header, there are navigation controls showing '1 / 631' items and a filter set to 'state:>=translated'. The main workspace is divided into two sections: a translation editor and a sidebar. The translation editor shows the English source string: 'CT guided percutaneous fine needle aspiration biopsy of pseudocyst of pancreas' and the Vietnamese target string: 'sinh thiết chọc hút bằng kim nhỏ nang giả tụy có hướng dẫn CT'. Below the strings are buttons for 'Save and continue', 'Save and stay', 'Suggest', and 'Skip'. The sidebar contains a 'Glossary' section with a search bar and a message 'No related strings found in the glossary.', and a 'String information' section with fields for 'Screenshot context', 'Explanation', 'Key', and 'Source string description'. The 'Key' field contains '16559261000119101' and the 'Source string description' contains the full English source string.

<https://translate.snomedtools.org/>



# Weblate

---

An open access tool for  
maintaining maps

---

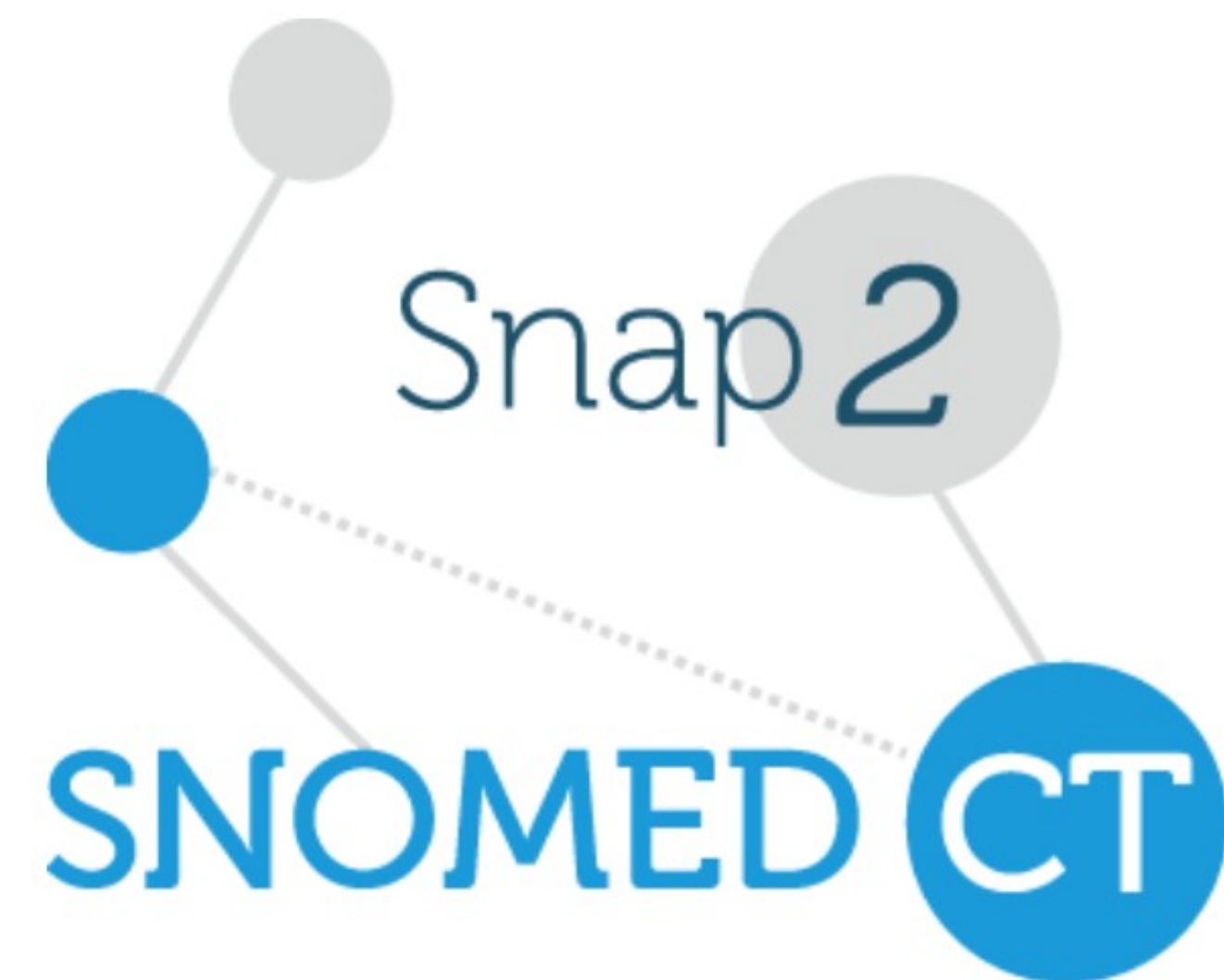
SNOMED Tools



# Snap2Snomed

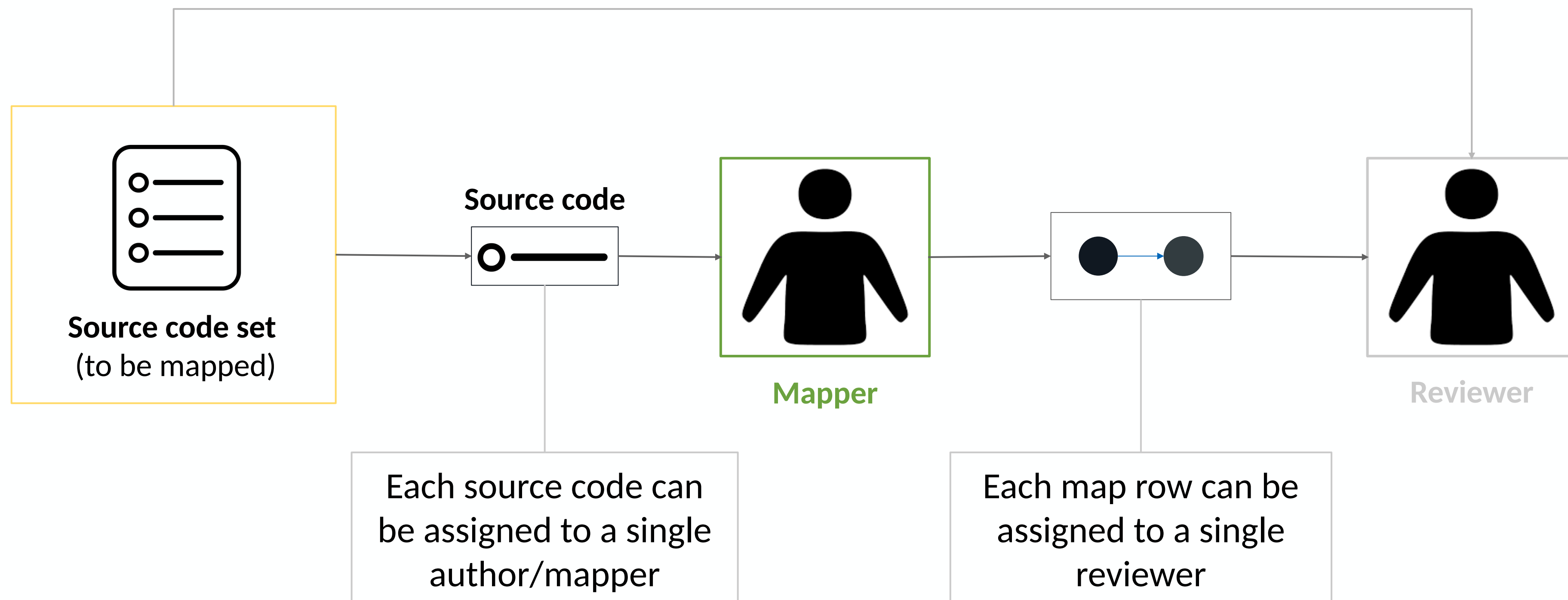
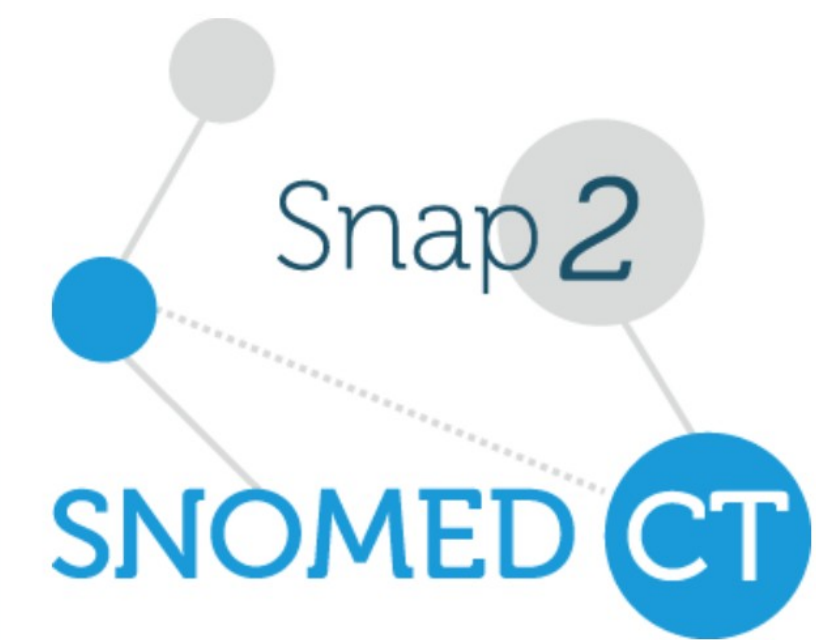
- **New features**

- Streamlines login process
- Dual author mode with reconciliation
- Support for replacement of inactive concepts
- Display concept definitions
- Enhanced export format (multiple columns, notes and more)
- Export to FHIR ConceptMap



# Snap2Snomed

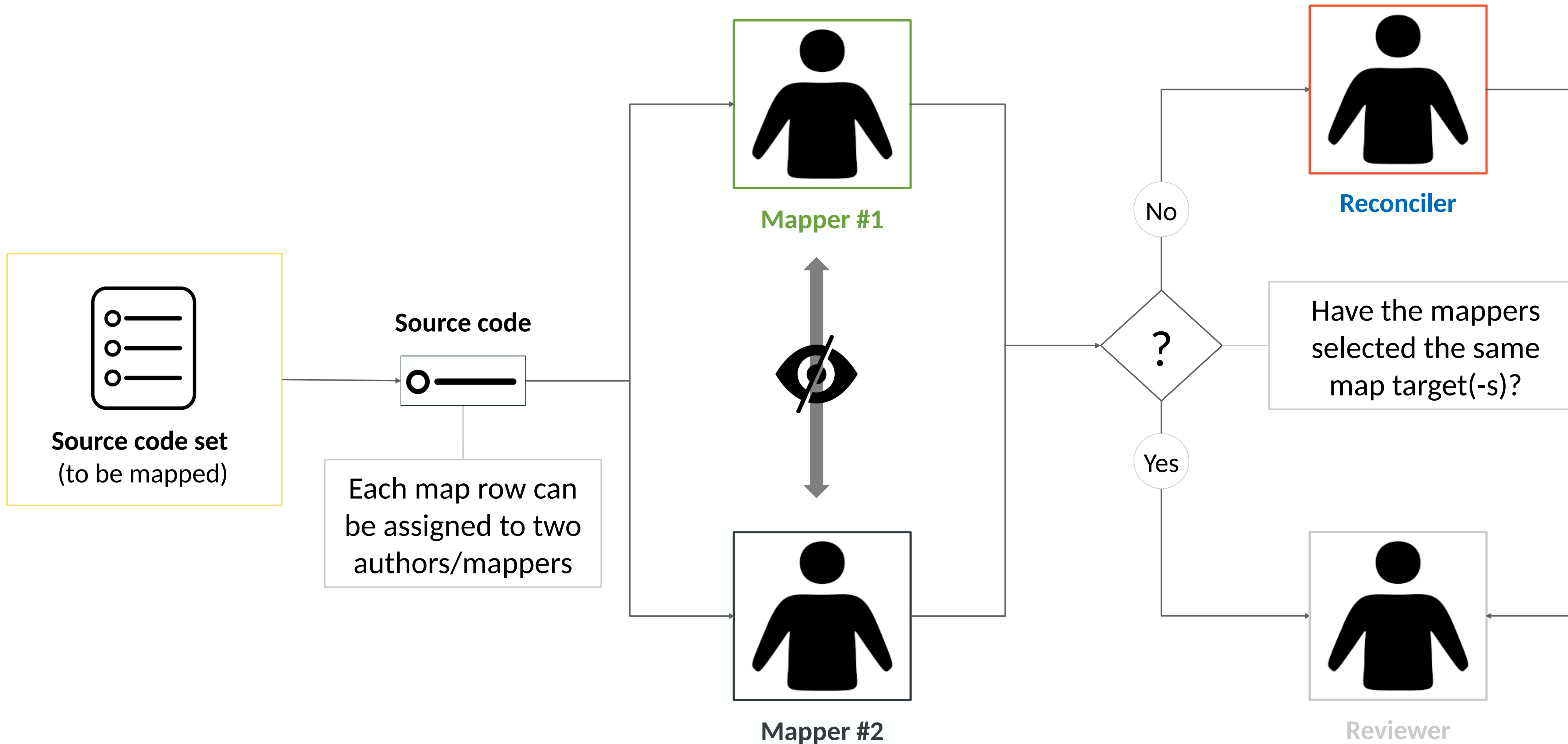
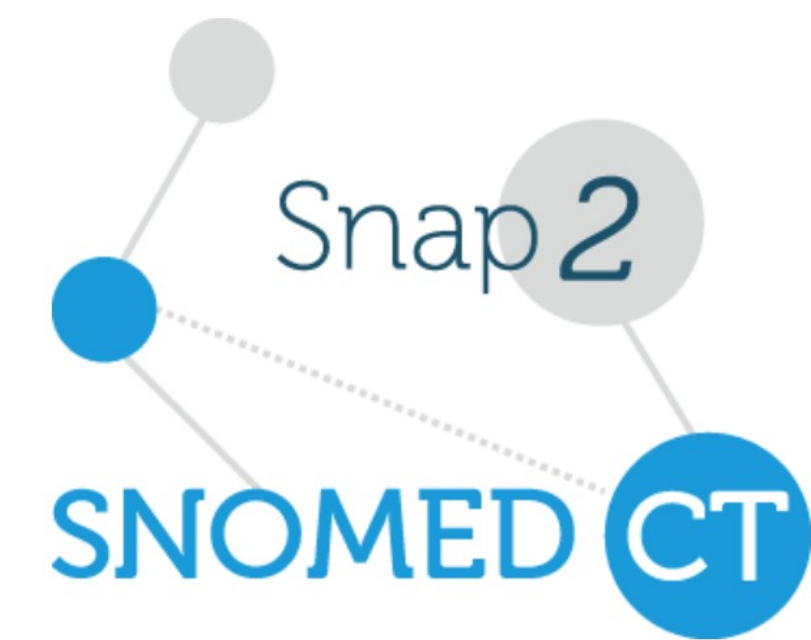
- Single author mode





# Snap2Snomed

- Dual author mode with reconciliation

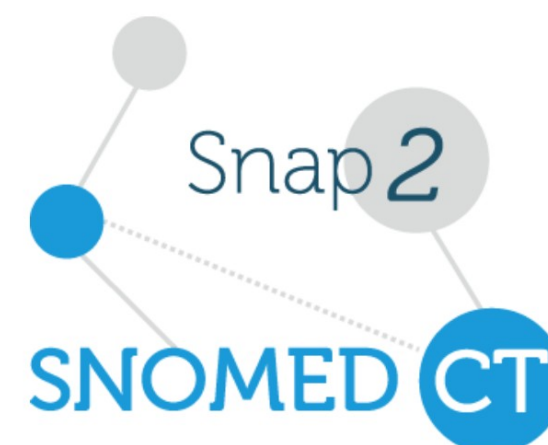


# Snap2Snomed

- Support for replacement of inactive concepts




Each version of a map is based on a specific substrate/  
SNOMED CT version



Uses historical associations to propose replacements for map targets that are inactive (out of scope) in the new version



# Snap2Snomed



Snap2SNOMED SNOMED-4-dual-authoring-process

Welcome, Anne

Home

### Create Map

Single Author Mode **Dual Author Mode**

Title \*

Maximum characters 100

Version \*

Maximum characters 30 0/30

Description

Maximum characters 200 0/200

Source code-set \*  
Select a code-set or import new code-set with plus button

Target SNOMED CT edition \* Target SNOMED CT version \*

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Filter	Roles
	All
Title	Description
test dual review	www
test	
INACTIVATION TEST	

# Snap2Snomed

- Enhanced export format
- Export to FHIR ConceptMap

Select my task

**EXPORT** **IMPORT** **VALIDATE** **BULK EDIT**

Comma separated

Tab separated

Excel (xlsx)

FHIR (json)

Excel (xlsx) extended

FILTER **RESET FILTERS** **SHOW**

relati	Status	Tags	Flag	Notes	Last author/ reviewer	Assigned author
NAR	MAPPED				FZ	FZ
EQU	MAPPED				FZ	FZ
NAR	MAPPED				FZ	FZ
EQUIVALENT	MAPPED				FZ	FZ



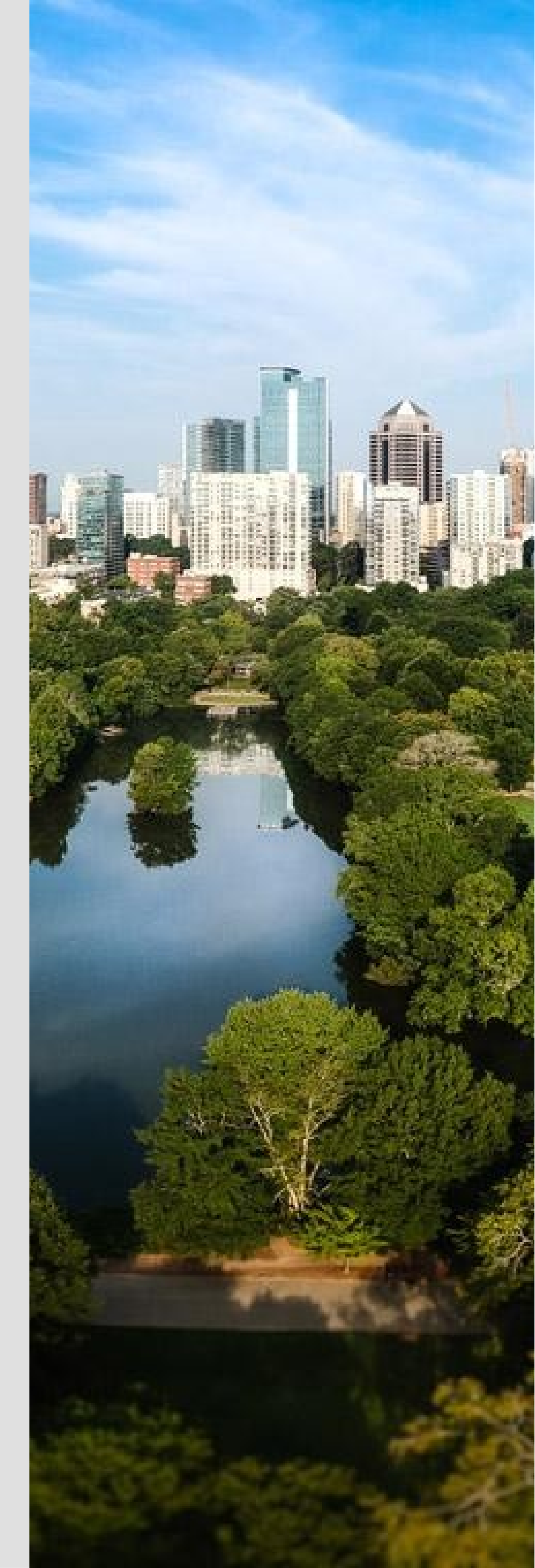
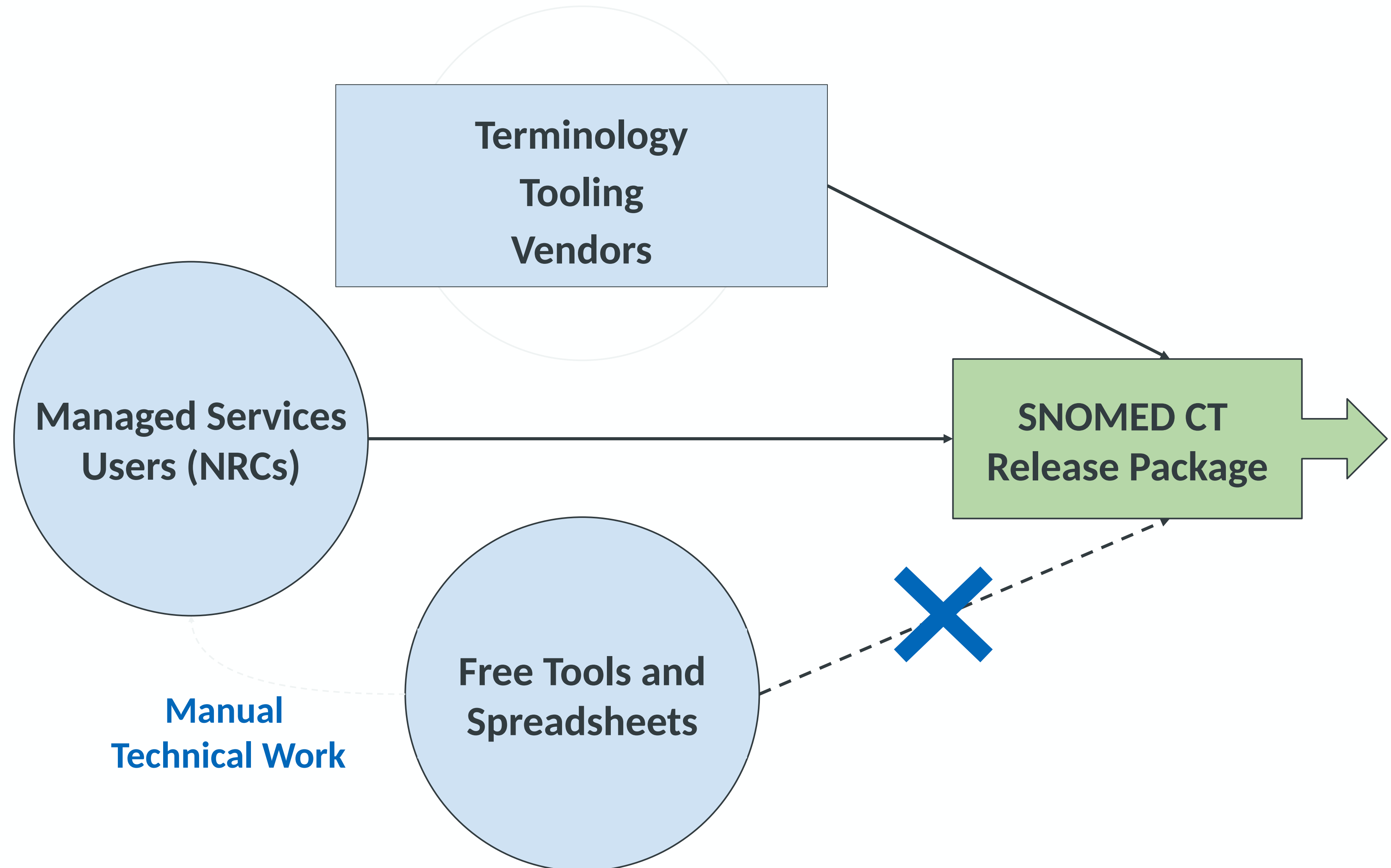
# Simplex Toolkit

A new tool for publishing simple  
SNOMED CT Extensions

SNOMED Tools



# The Challenge with Free SNOMED Tools





# Simplex: Philosophy

- Open to everyone
- Scalable service
  - Generic service, not customised for any user
  - Simple features, easy to use
  - Guide and enable users to do everything themselves
    - Including setup and release process
    - Aim: no individual support needed
- Leverage existing SI tools
- Produce a high quality standard release



# Simplex: Features

- Create and maintain:
  - Subsets
  - Maps
  - Translations
  - Synonyms
  - Local concepts
    - Basic primitive concepts with a stated parent but no stated attributes
- Assemble this content into an Edition
- Browse the Edition during maintenance
- Validate and Release the Edition



# Simplex: Solution Outline

## Implementation Tools

Weblate

Refset & Translation Tool

Snap2Snomed

Spreadsheets

**Simplex**

## Release Tools

RF2 Release

## Production Systems

Clinical  
information  
systems

Terminology  
Server

SNOMED CT  
Browser





# Simplex Service: Demo After the Break

SNOMED CT Simple Extension Tool

Test

Edit Content Manage Edition Edition info

Edition artifacts

- Second Subset (foundation metadata concept) **Subset**
- Test Subset (foundation metadata concept) **Subset****
- First map (foundation metadata concept) **Map**
- My Translation (foundation metadata concept) **Translation**

New artifact

Test Subset (foundation metadata concept) **Subset**

ConceptId	839500981000003107
Fully Specified Name	Test Subset (foundation metadata concept)
Preferred term	Test Subset
ModuleId	663510841000003108
Active artifact	true
Active member count	0
Type	Subset

Imports

File type  
Spreadsheet Subset

Choose File sct2\_Description\_Snapshot-vil000269\_20230929.txt

Upload data

Created	Name	Status	Records
No data imports were requested in this component yet			



# SnoGuess

---

An educational word guessing  
game based on the FHIR API

---

SNOMED Tools



# Snoguess

## A SNOMED Game

- Guess the terms and learn about the content of SNOMED CT
- Use the attributes as hints
- Content from the IPS Terminology
- Retrieves random concepts using the FHIR API
- Multi-lingual
- Get in the High Scores Board!

# HIGH SCORES



# SNOGUESS

Welcome to SnoGuess!

A fun way to learn about SNOMED CT concepts and their definitions.

New game

Instructions

High Scores









<http://snomed.org/snoguess>



# Snoguess

## A SNOMED Game

### INSTRUCTIONS

- ✓ Click the keys on the screen to guess the letters of the term 
- ✓ You have three to five lives, depending on your difficulty level 
- ✓ You will lose one life with each wrong guess 
- ✓ You earn points for each correct guess **+1**
- ✓ In Easy mode you get 2 hints for free, and in Medium mode you get one 
- ✓ You can reveal more hints, but each hint it will cost one life 
- ✓ If you guess the whole term you can recover one life 
- ✓ Keep guessing terms to increase your score and earn trophies 
- ✓ Endless mode will not finish when you reach the Diamond Trophy 

<http://snomed.org/snoguess>



# Snoguess

## A SNOMED Game

**SNOGUESS**  
Medium - English

Round: 2   Score: 72   Life: ♥♥♥♥   Time: 1m 08s

C\_lculu\_ o\_ bile duct \_it\_ ob\_t\_uctio\_ (disorder)

Click the keys to guess the letters of the term!

1 2 3 4 5 6 7 8 9 0

Q W **E** R **T** Y **U** **I** **O** P

A S **D** F G H J K **L**

Z X **C** V **B** N M

Reveal Hint   Abandon game

**Hints:**

This concept has a *Finding site (attribute)* of *Bile duct structure (body structure)*

\* Hints are generated from the definition of the SNOMED CT concept, retrieved from the FHIR API as an SCG grammar expression

Score Progression

snomed.org

<http://snomed.org/snoguess>



snomed.org



x.com/SnomedCT



linkedin.com/company/ihtsdo



youtube.com/@snomedct

SNOMED  
International

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# Thank You

---

[alo@snomed.org](mailto:alo@snomed.org) - [support@snomed.org](mailto:support@snomed.org)