SNOMED International

Leading healthcare terminology, worldwide

Developer Training Terminology Services

Germany - Online

Wednesday, 10th May 2023

https://confluence.ihtsdotools.org/display/DEV/Germany

Welcome & Introductions

The SNOMED International Team

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SNOMED
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Workshop Introduction

To better understand SNOMED CT,

how to deploy it easily in your local environments,

how to keep the terminology updated and

how to integrate it with your applications

Agenda - Part 1

Setting up a production-ready SNOMED CT enabled terminology server

- SNOMED CT in Germany
- Introduction to SNOMED CT
- Introduction to Snowstorm

  Exercise: Snowstorm Setup and SNOMED Import
- Releases and Extensions
- Examples of use (browser, UI demo)
- Learn more

Agenda - Part 2

Using a SNOMED-enabled terminology server

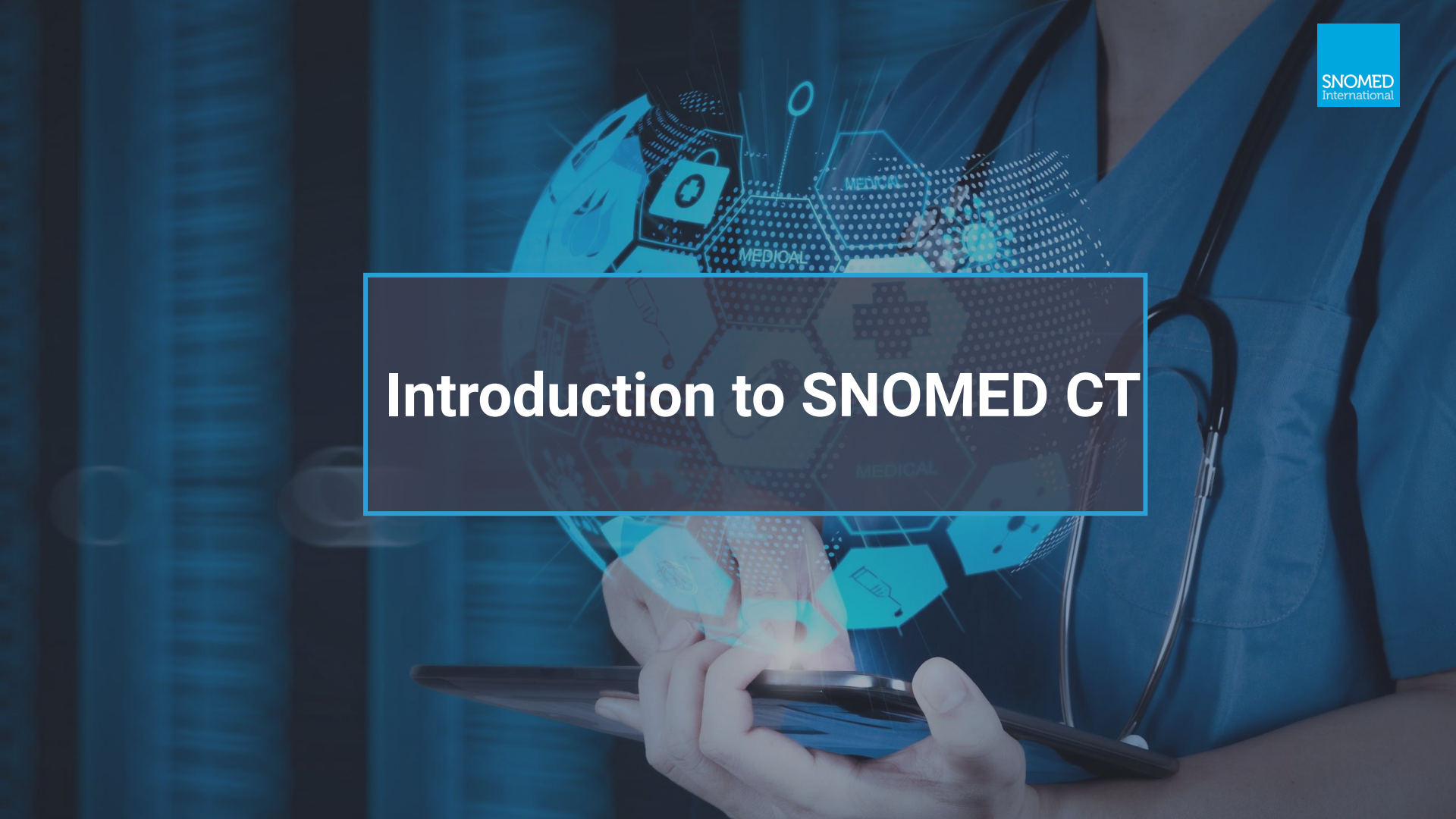
- Components and derivatives
- Practical session (working with the FHIR API)
  - Search and display
  - Lookup Content in SNOMED subsets
  - Use Maps
- Analytics demo
- Practical session (working with the FHIR API)
  - Querying SNOMED CT using the Expression Constraint Language (ECL)

SNOMED CT in Germany

SNOMED International

SNOMED CT

The global language of healthcare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Introduction to SNOMED CT

SNOMED CT

The global language of healthcare

The world's most comprehensive multilingual clinical terminology

A Brief History

2002

First release of SNOMED CT
(merge of SNOMED and Read Codes)

2007

Acquired by IHTSDO
for the public good in 2007

2017

IHTSDO adopted the trading
name **SNOMED International**

Vision

By 2025, Clinical Terminologies will be used globally, which will result in better health and improved patient outcomes, supported by one language of health

Delivering
SNOMED CT

Who is involved now?

Andorra	Czech Republic	Israel	Portugal	Thailand
Argentina	Denmark	Jamaica	Norway	Sweden
Armenia	El Salvador	Jordan	Poland	Switzerland
Australia	Estonia	Kazakhstan	Saudi Arabia	United Arab Emirates
Austria	Finland	Lithuania	Singapore	United Kingdom
Belgium	Germany	Luxembourg	Slovakia	United States
Brunei	Hong Kong, China	Malaysia	Slovenia	Uruguay
Canada	Iceland	Malta	Republic of Indonesia	SNOMED International 47 Members
Chile	India	Netherlands	Republic of Korea	
Cyprus	Ireland	New Zealand	Spain	

SNOMED CT - Organizational Perspective

SNOMED International

Maintains and distributes:

International Edition and all supplementary content and derivatives maintained by SNOMED International

SNOMED International Member

German National Release Center

Will maintain and distribute:

- German Edition of SNOMED CT
- Value Sets

SNOMED International Affiliate

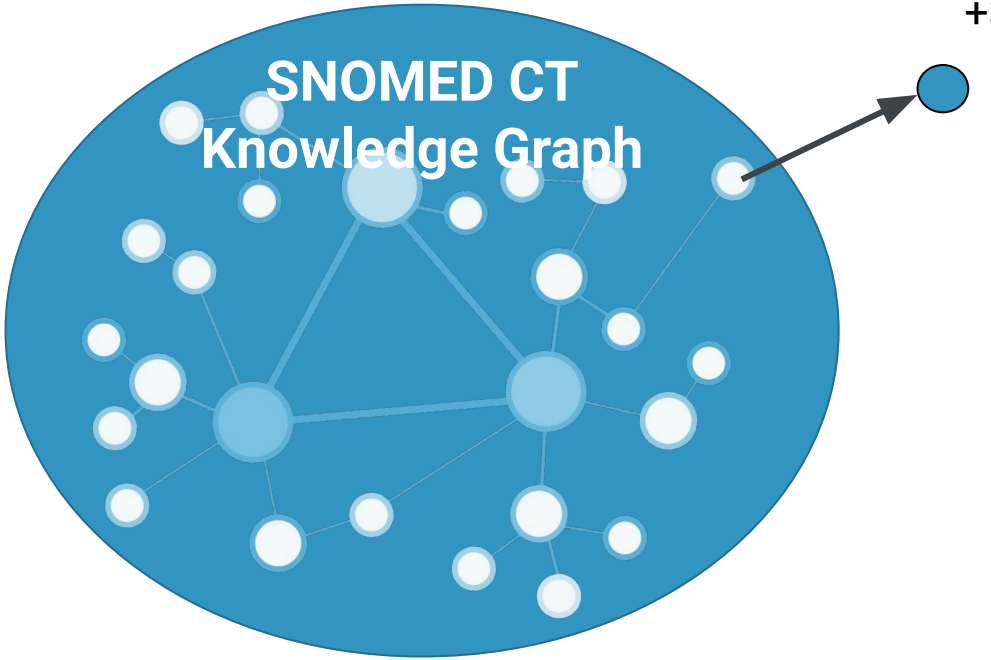
Vendors - System owners

Suppliers of clinical information systems

Implements SNOMED CT in their software systems to meet end user requirements

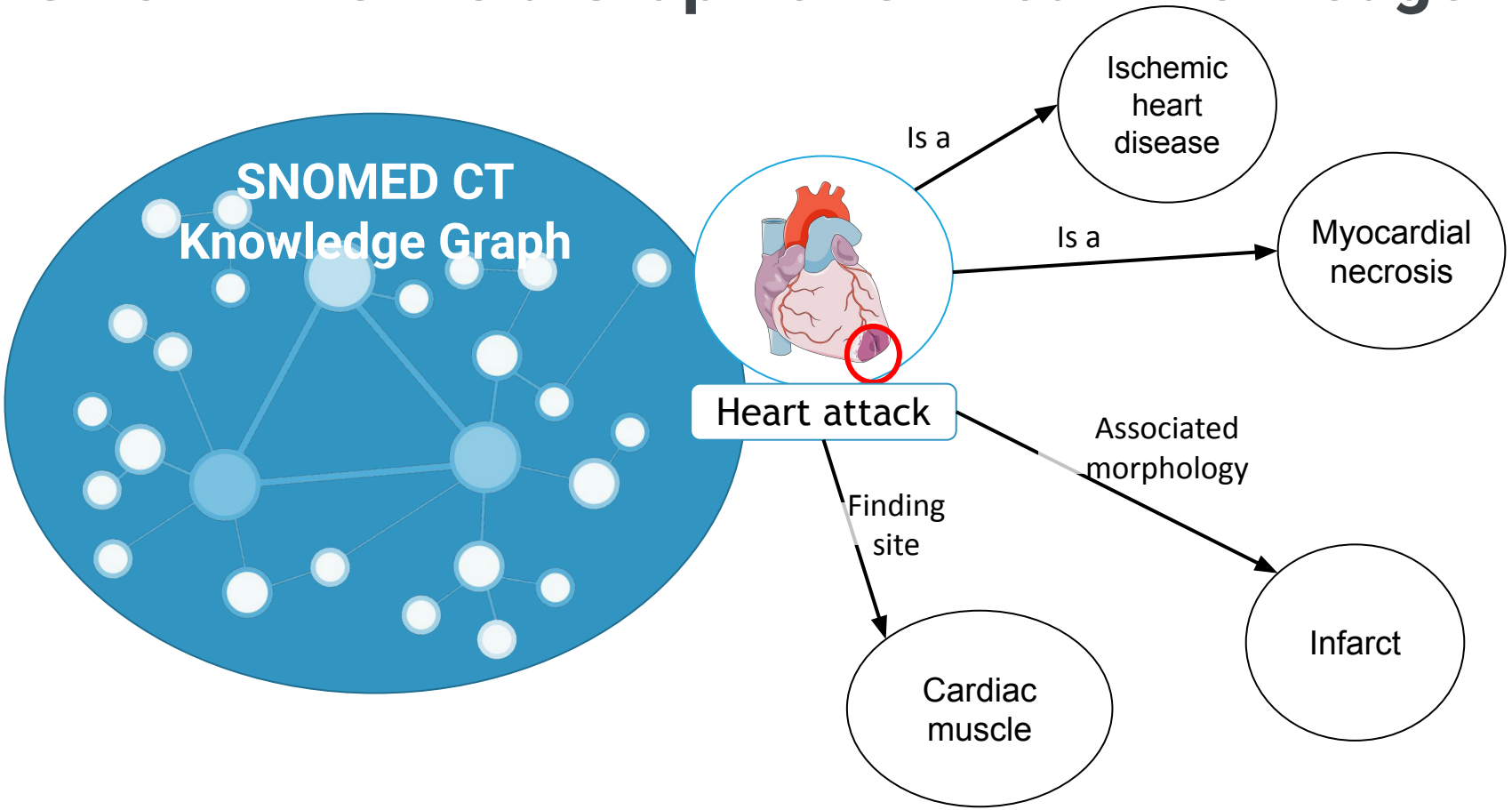
End-users

SNOMED CT is a Graph of Clinical Knowledge



+350 unique clinical concepts linked together via a set of semantic relationships

SNOMED CT is a Graph of Clinical Knowledge



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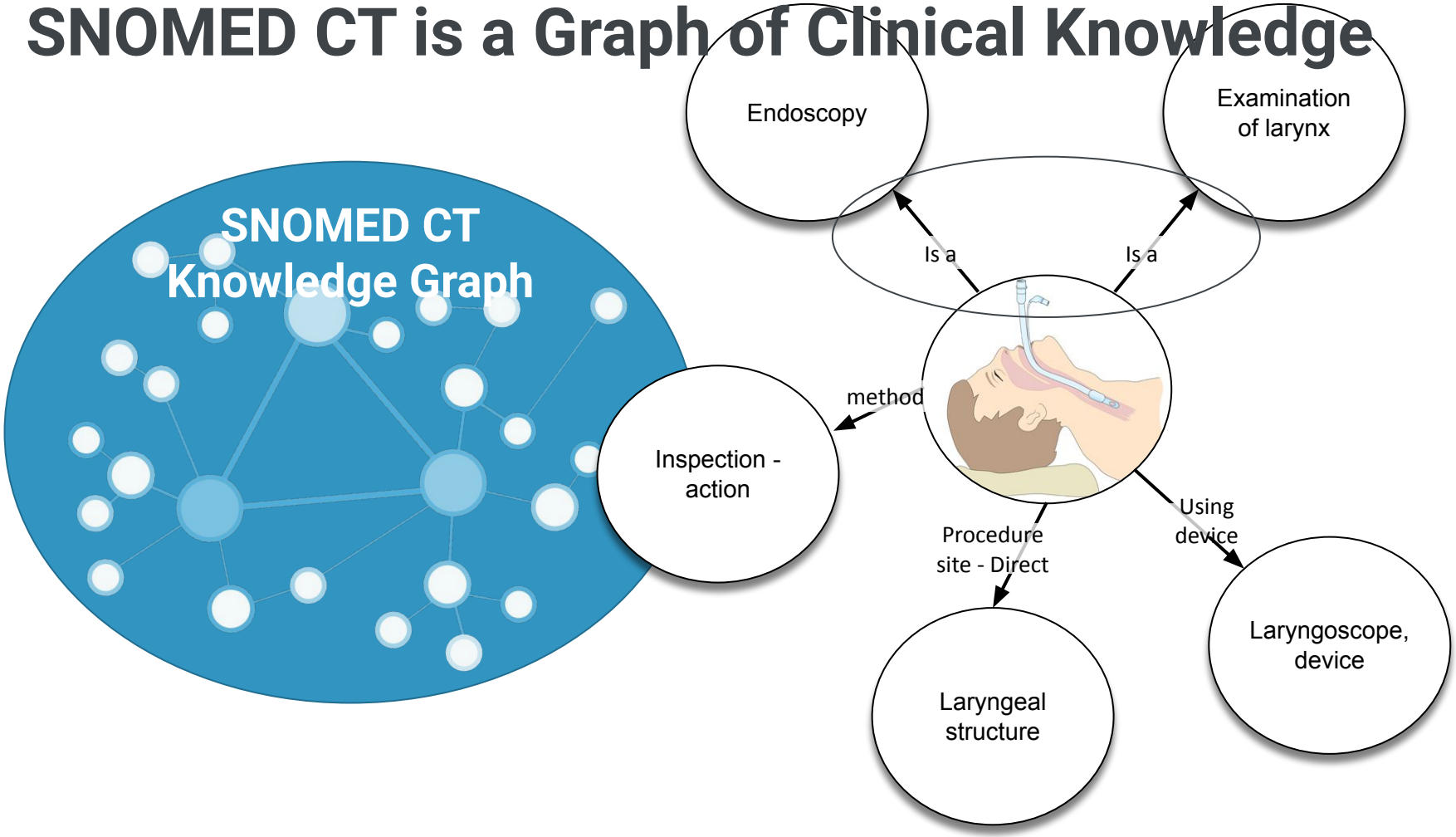
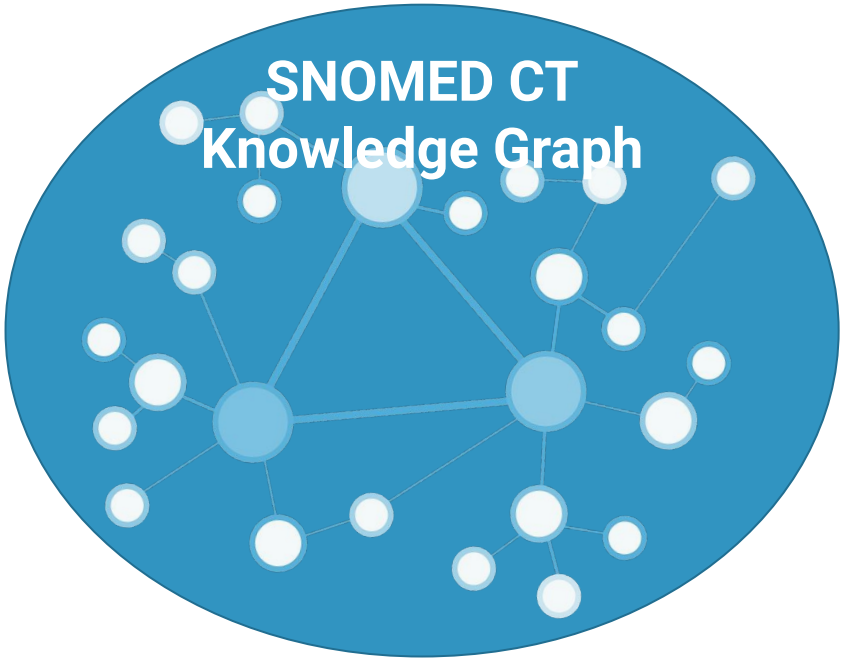
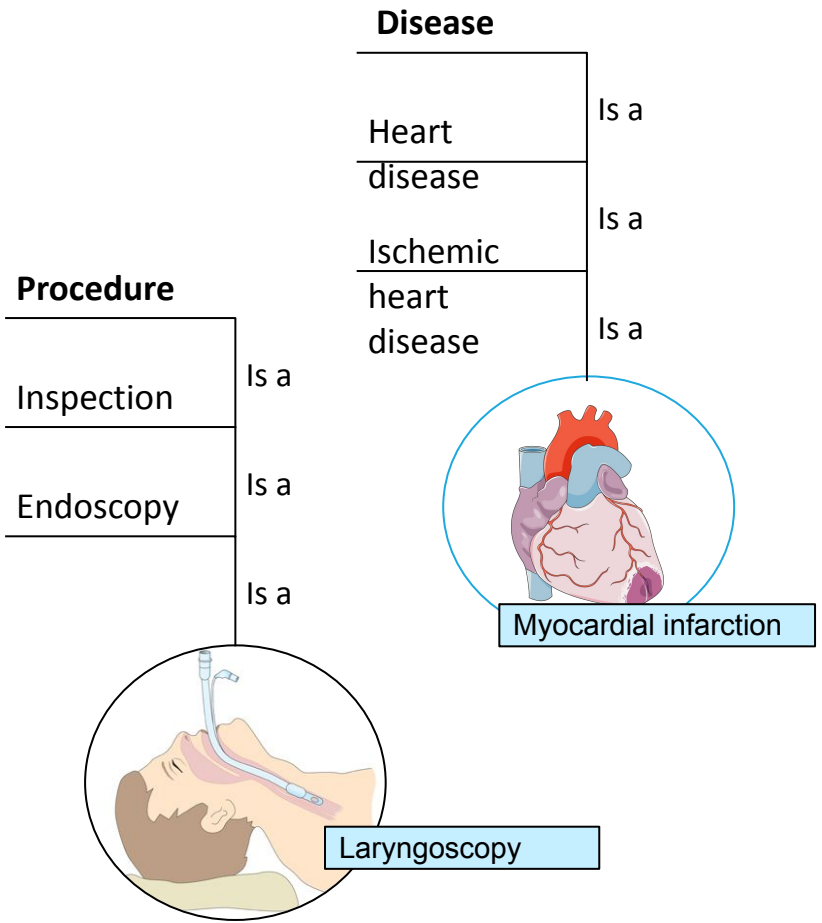


Hierarchies





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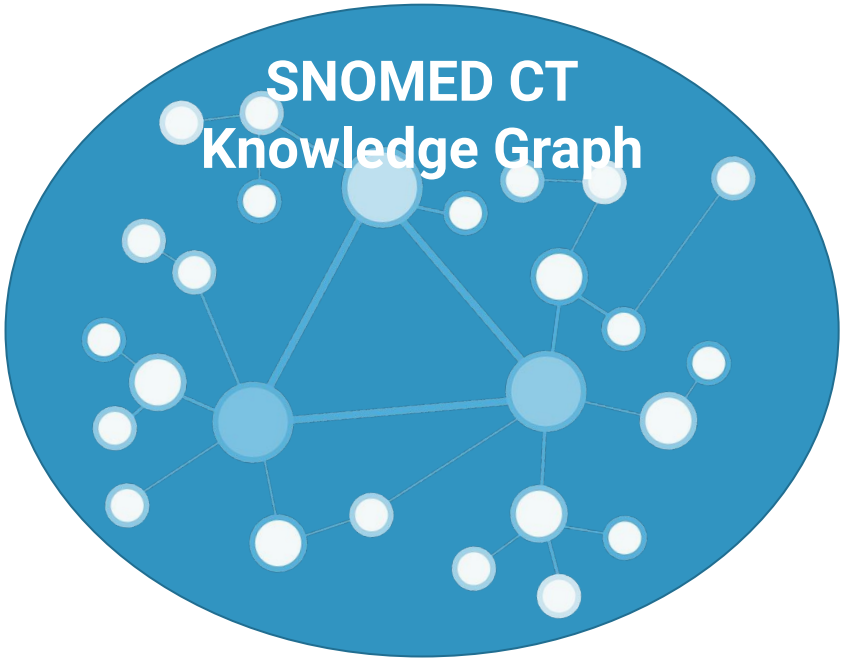


- SNOMED CT Concept (SNOMED RT+CTV3)
  - Body structure (body structure)
  - Clinical finding (finding)
  - Environment or geographical location (environment / location)
  - Event (event)
  - Observable entity (observable entity)
  - Organism (organism)
  - Pharmaceutical / biologic product (product)
  - Physical force (physical force)
  - Physical object (physical object)
  - Procedure (procedure)
  - Qualifier value (qualifier value)
  - Record artifact (record artifact)
  - Situation with explicit context (situation)
  - SNOMED CT Model Component (metadata)
  - Social context (social concept)
  - Special concept (special concept)
  - Specimen (specimen)
  - Staging and scales (staging scale)
  - Substance (substance)

Hierarchies

Signs and symptoms

Diagnosis

Tests and test results

Procedures

General observations

Functions and abilities

Medical history

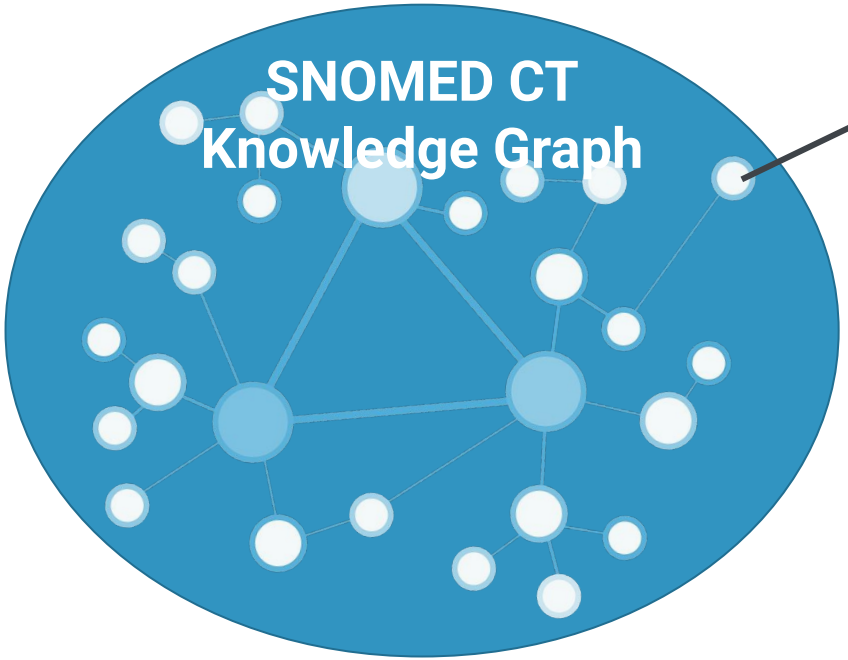
Medication

Social circumstances

Family history

Care and therapy

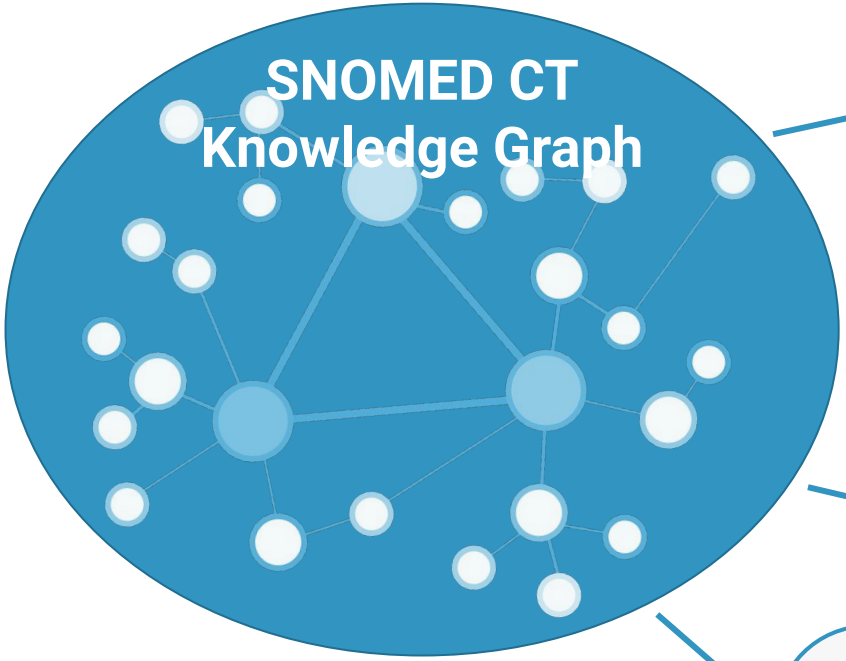
SNOMED CT is a Graph of Clinical Knowledge



+350 unique clinical concepts linked together via a set of semantic relationships

Each concept is associated with a set of descriptions

SNOMED CT is a Graph of Clinical Knowledge



Continuous releases to adapt to emerging requirements

Computable language to query SNOMED CT (ECL)

Specify **subsets** either as a enumerated list or defined as an ECL query

Specify **maps** between SNOMED CT and other code systems

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Introduction to
Snowstorm

Snowstorm

- **Open Source**
  - https://github.com/IHTSDO/snowstorm
  - Apache 2.0 license
- **Features**
  - Provides FHIR terminology services
  - Cross platform, simple to install and run
  - Support for the SNOMED ECL query language
  - Version 8.1 will host multiple code systems (LOINC/ICD etc)
  - Fast and horizontally scalable using Elasticsearch
- **Tools which leverage Snowstorm**
  - SNOMED International Authoring Platform
  - SNOMED International Browser
    https://browser.ihtsdotools.org/

Snowstorm - what it’s not.

SNOWSTORM
by SNOMED International

- SNOMED International is not able to provide a commercial support agreement
- SNOMED International is not able to host an international cloud service for use in production systems
  - There is a public Snowstorm instance for reference and manual testing

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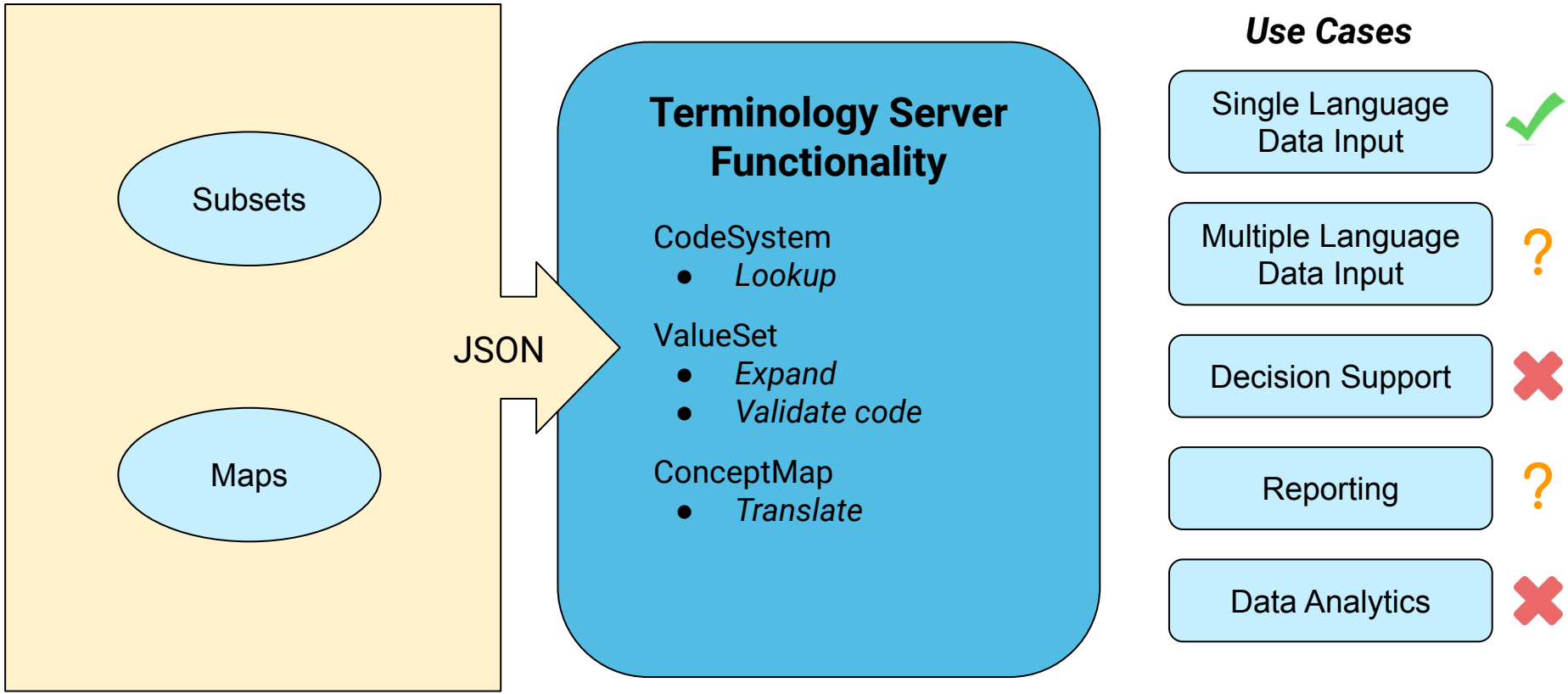
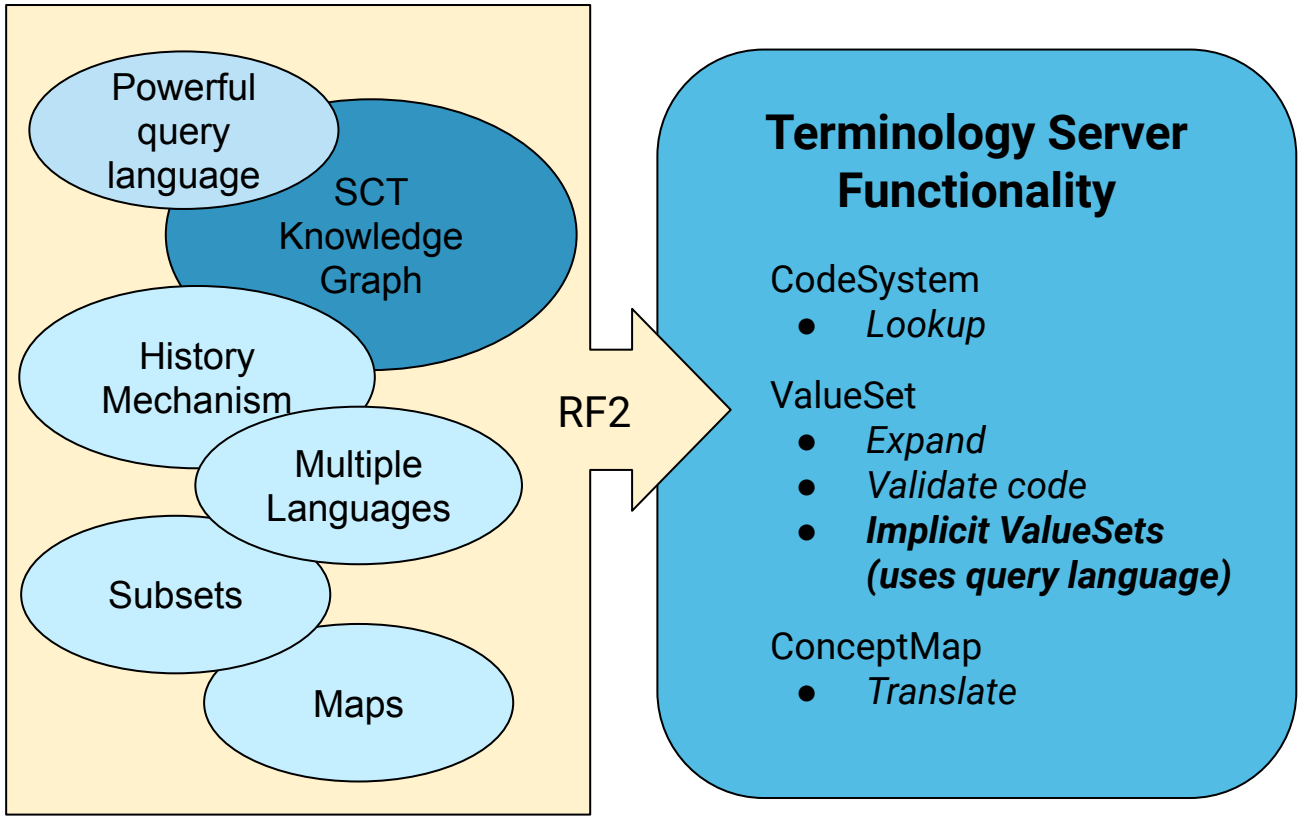
Exercise:
Snowstorm Setup and
SNOMED Import

Terminology Services with flat lists



Terminology Services with SNOMED CT



Use Cases

- Single Language Data Input ✓
- Multiple Language Data Input ✓
- Decision Support ✓
- Reporting ✓
- Data Analytics ✓

SNOMED CT Releases

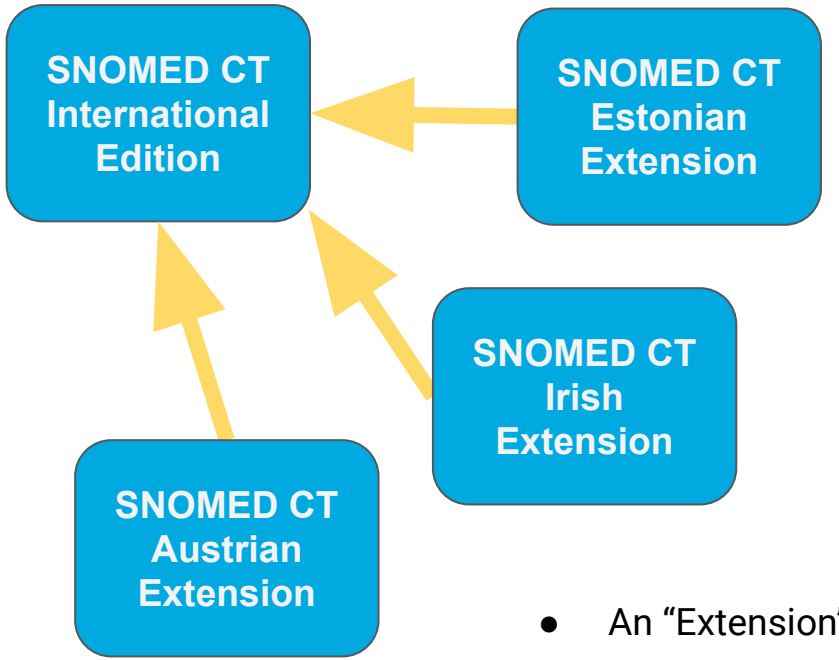
Package Format and Layout

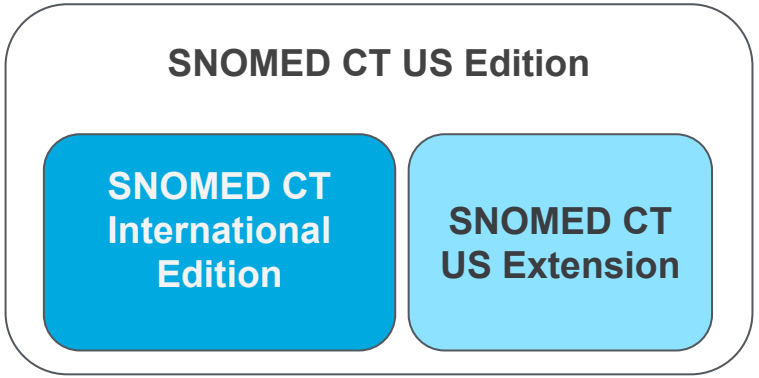
- All SNOMED CT releases are distributed in the **RF2** format (Release Format 2). This is a set of TSV files compressed as a zip archive.

- Within a release package there are two directories:

    - **Snapshot** - the current state of all components in that edition
    - **Full** - the full history of every component in all releases of the edition

SNOMED CT Release Package Types





- An “Extension” package depends on the International Edition package
- A “Edition” package contains everything so has no dependencies. These are usually larger than 500MB.

Snowstorm Setup Exercise

- Using your Ubuntu servers we will:
  - Install Elasticsearch and Snowstorm
  - Load the International Edition
    (pause)
  - Load the Austrian Edition

http://snomed.org/dev-training

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Releases and Extensions
in Snowstorm

SNOMED CT Releases and Extensions

Within a Terminology Server

Snowstorm has a branching mechanism allowing us to:

- Store and access the SNOMED International Edition
- Store and access one or many SNOMED Extensions on top
- Import new releases as they become available
- Retain access to previous SNOMED releases

Snowstorm - Branches

Code Systems and Branches

- Each Code System has a working-branch, containing its SNOMED content, and a version branch, for each release

- The International Edition is stored on a working-branch called **MAIN**, this is the root of the repository

- Extension's working-branches exist under **MAIN** and use a short name matching their Code System

- Examples of Edition/Extension branches:
  - **MAIN** *(The root branch containing the International Edition)*
  - **MAIN/SNOMEDCT-AT** *(The Austrian Extension)*
  - **MAIN/SNOMEDCT-ES** *(The Spanish Translation Extension)*

Snowstorm - Extension Setup

When Snowstorm is started the **SNOMEDCT** Code System and its working-branch **MAIN** is created automatically ready for the terminology content to be imported.

Setting up an extension is a three step process:

1. Import the ***Snapshot*** of the International Edition onto **MAIN**
2. Create the extension Code System “SNOMEDCT-AT”
3. Import the ***Snapshot*** of the additional extension content onto the extension branch **MAIN/SNOMEDCT-AT**

Snowstorm - Extension *Upgrade*

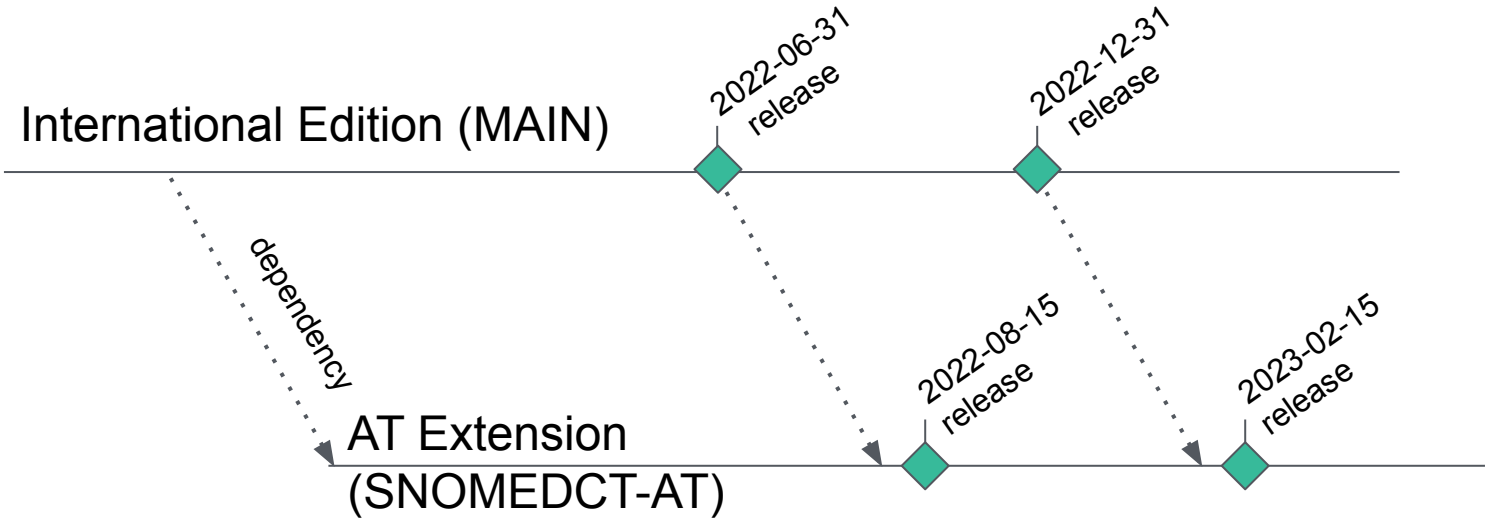
When a new SNOMED CT release becomes available you can import that too. You will still have access to previously imported content.

Upgrading an extension is a three step process:

1. Import the ***Snapshot*** of the new International Edition release into **MAIN**
2. Upgrade the Austrian Code System to depend on the new Int. release
3. Import the ***Snapshot*** of the new extension release onto the Austrian extension branch

Snowstorm - **Version Control**

- The content of SNOMED releases and extensions are managed like source code repository.
- The content of each International Edition release is imported to MAIN, then the Extension branch is rebased/upgraded and new Extension content imported.



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Snowstorm
in Production

Snowstorm in Production

Points to consider:

- What security measures are appropriate?
  - SSL, Firewall
  - Read-Only Mode
- Is redundancy needed?
  - Consider a cluster of two or more instances
  - Disaster recovery options (script + backup/restore?)
- Monitoring
  - Snowstorm + Elasticsearch
- How much traffic do you need to support?
  - Consider horizontal scaling

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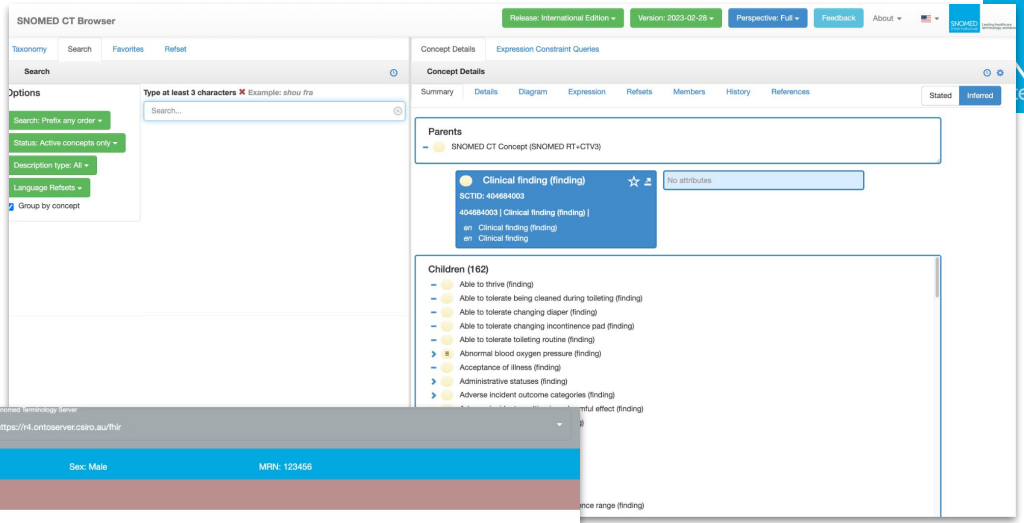
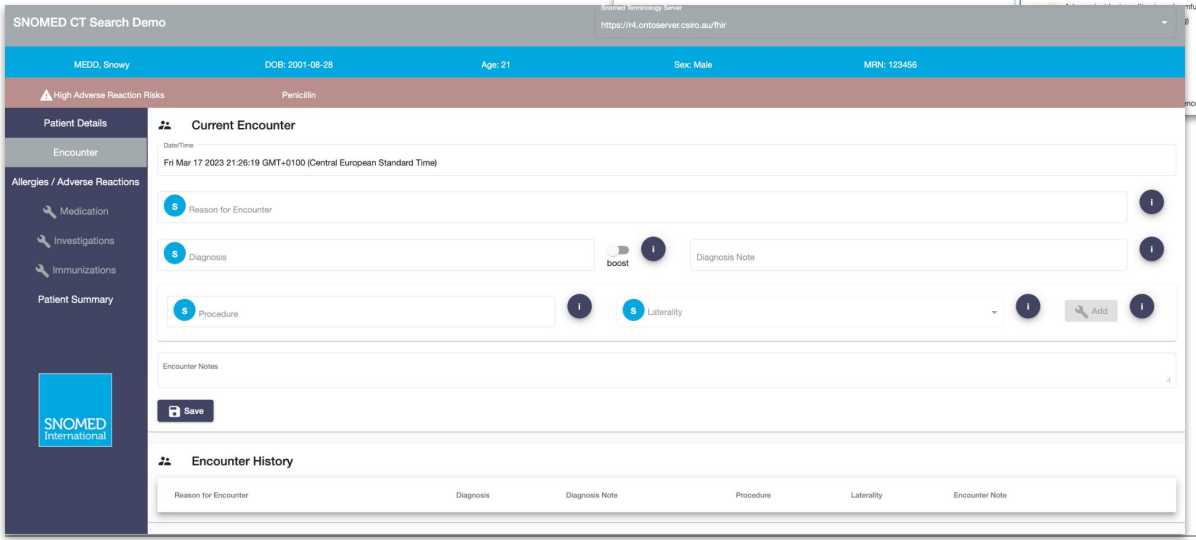
Demonstrations

Demonstrations

SNOMED CT Browser

UI Demo





Best-practice Search *(If you are an end-user)*

- Text-based (minimize scrolling)
  - Group by concept
  - Multiple prefix any order
  - Sort results rationally
    - Frequency of use
    - Shortest matching term first
- Display pt in selected dialect (part of configuration)
- Potentially allow the display of other accepted terms
- Preconfigured constraints
  - Subtype hierarchy
  - Expression constraint (Set determined by rule)
  - Value set (subset)

Application Demo

http://snomed.org/ui

Driven by implicit ValueSets + text filter

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Thank you for your attention
BREAK