SNOMED International

Leading healthcare terminology, worldwide

Developer Training Terminology Services

Germany - Online

Tuesday, 19th March 2024

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

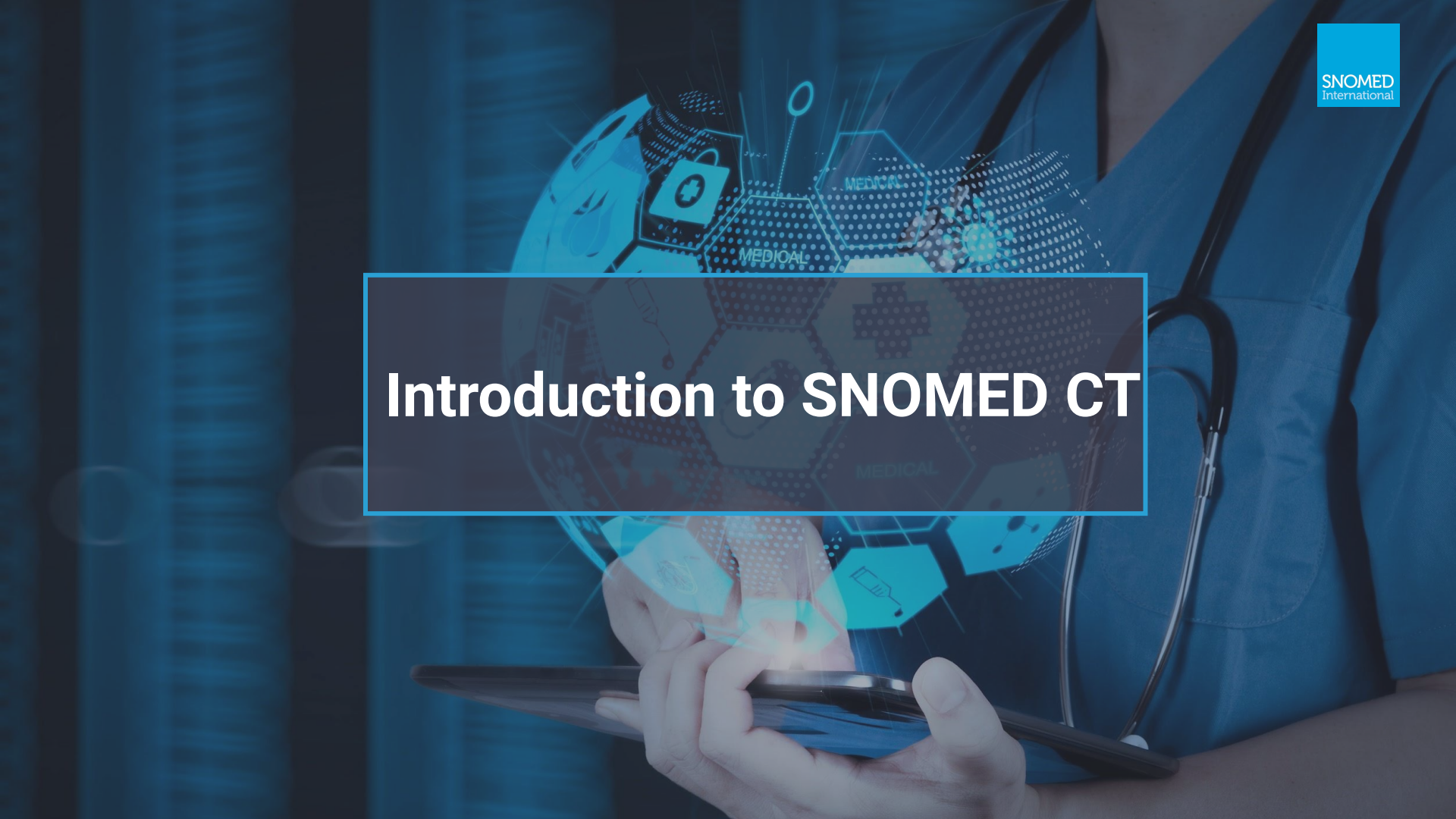
- Components and derivatives
- Practical session (working with the FHIR API)
  - Search and display
  - Lookup Content in SNOMED subsets
  - Use Maps
- Analytics demo
- Practical session (working with the FHIR API)
  - Querying SNOMED CT using the Expression Constraint Language (ECL)

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

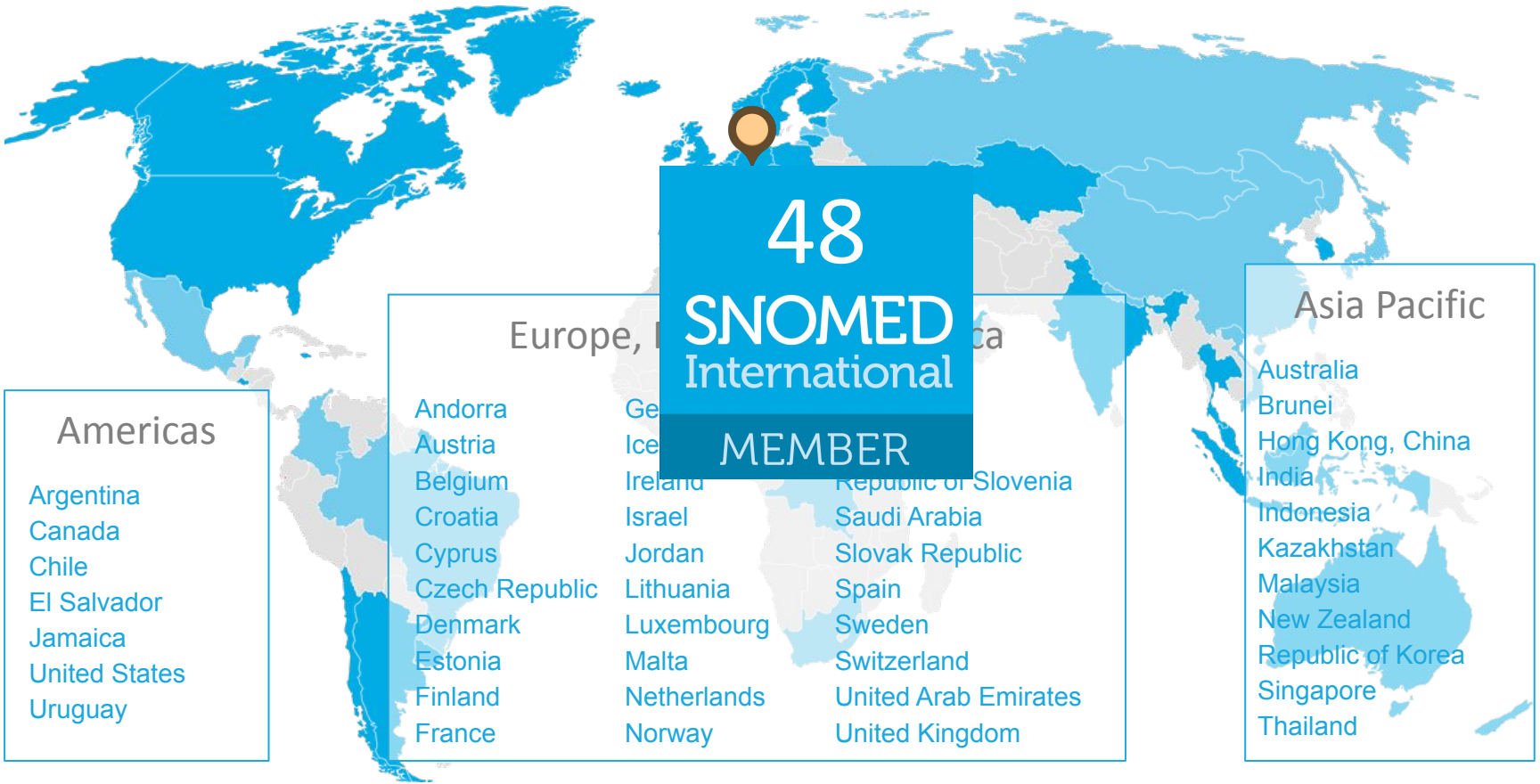
IHTSDO adopted the trading
name **SNOMED International**

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?



Americas

- Argentina
- Canada
- Chile
- El Salvador
- Jamaica
- United States
- Uruguay

Europe, I ca

- Andorra
- Austria
- Belgium
- Croatia
- Cyprus
- Czech Republic
- Denmark
- Estonia
- Finland
- France
- Ge
- Ice
- Ireland
- Israel
- Jordan
- Lithuania
- Luxembourg
- Malta
- Netherlands
- Norway
- Republic of Slovenia
- Saudi Arabia
- Slovak Republic
- Spain
- Sweden
- Switzerland
- United Arab Emirates
- United Kingdom

Asia Pacific

- Australia
- Brunei
- Hong Kong, China
- India
- Indonesia
- Kazakhstan
- Malaysia
- New Zealand
- Republic of Korea
- Singapore
- Thailand

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

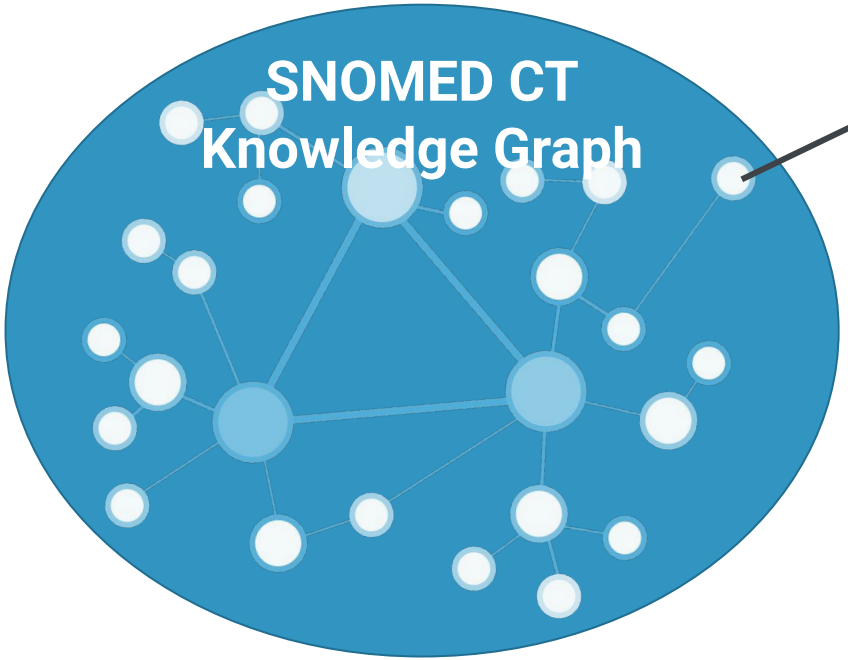
Vendors - System owners

Suppliers of clinical information systems

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

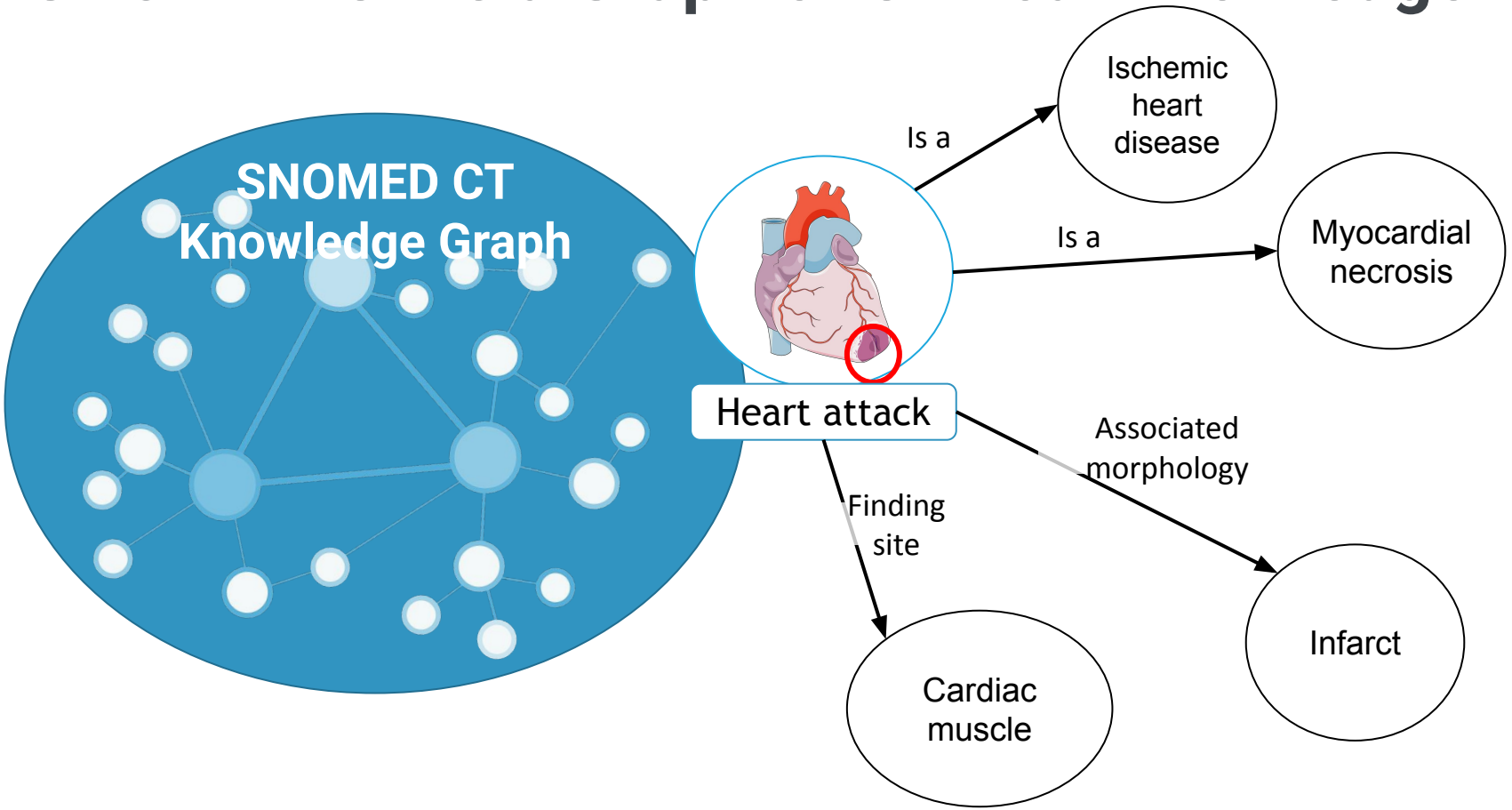
End-users

SNOMED CT is a Graph of Clinical Knowledge

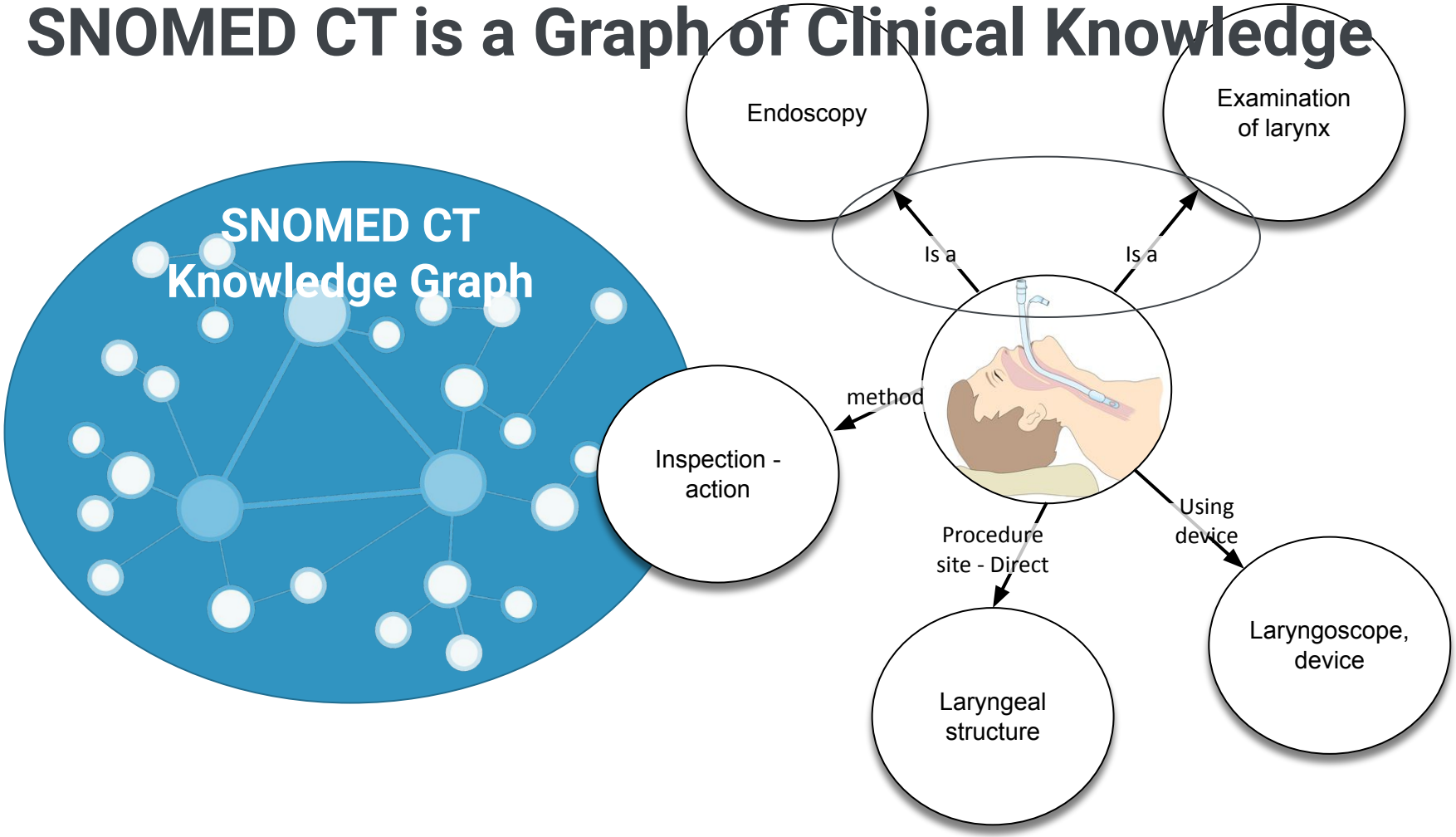


+360.000 unique clinical concepts linked together via a set of semantic relationships

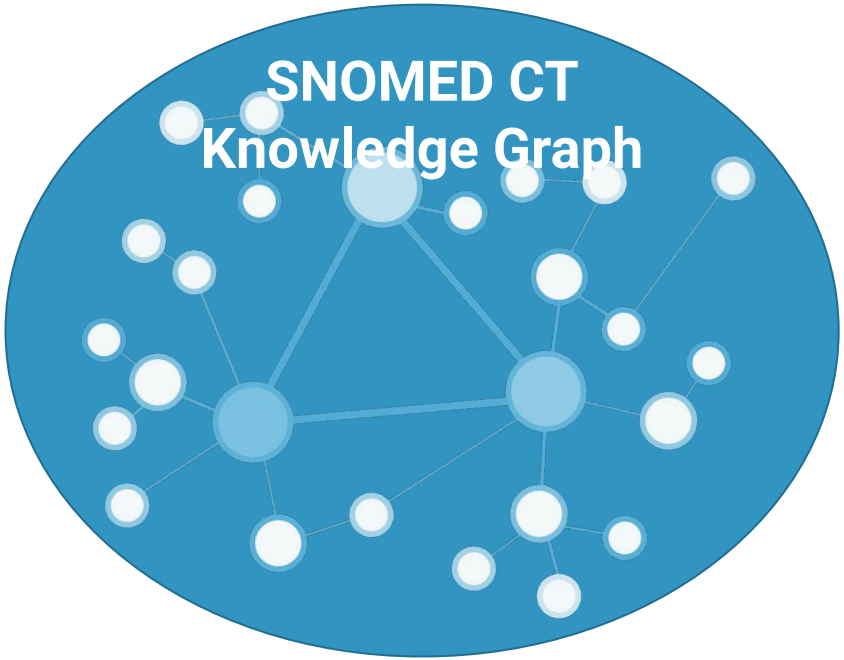
SNOMED CT is a Graph of Clinical Knowledge

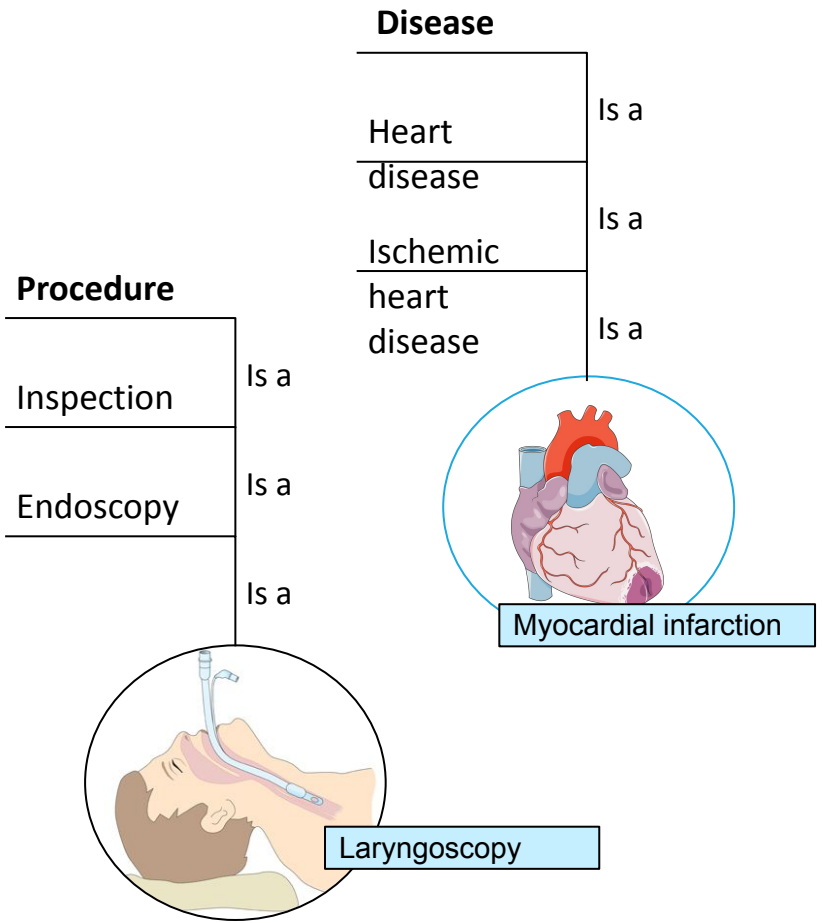


SNOMED CT is a Graph of Clinical Knowledge

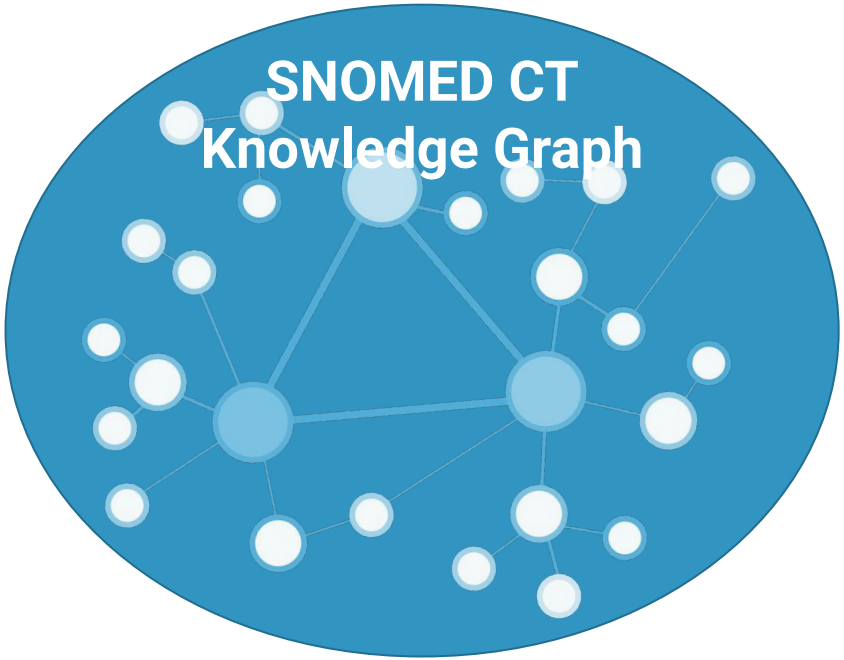


Hierarchies





Hierarchies



- 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

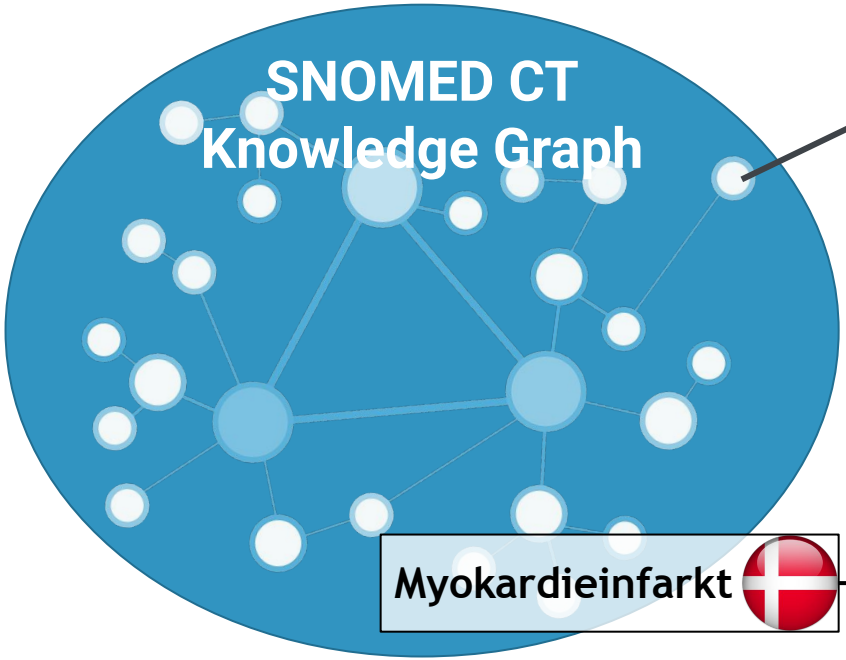
Medication

Social circumstances

Family history

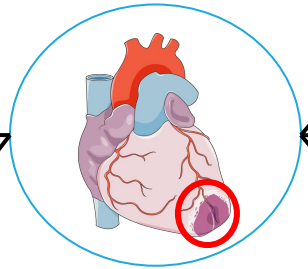
Care and therapy

SNOMED CT is a Graph of Clinical Knowledge



+360K unique clinical concepts linked together via a set of semantic relationships

Each concept is associated with a set of descriptions



Code:22298006

Myocardial infarction

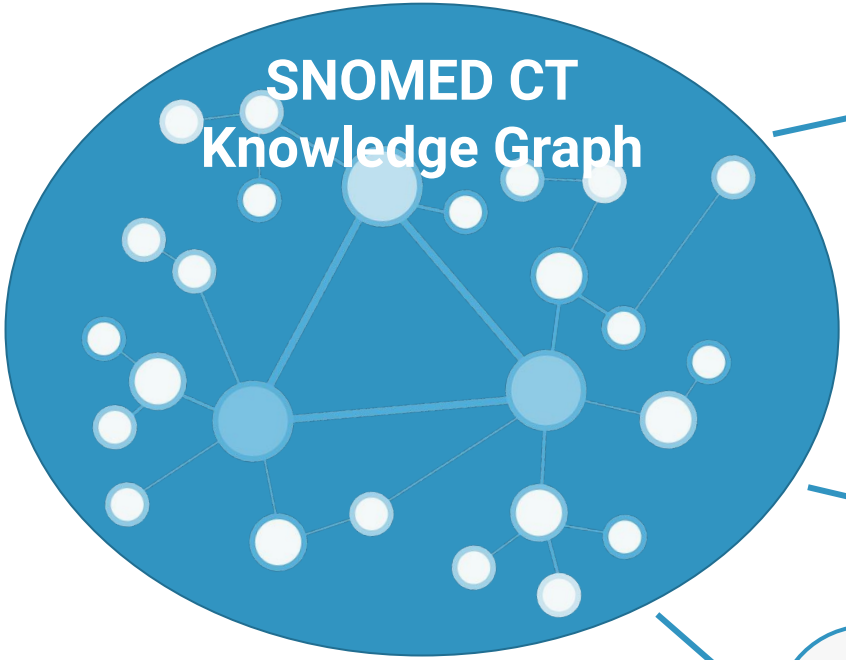
Cardiac infarction

Heart attack

Myokardieinfarkt

Myocardinfarct

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
  - Host multiple code systems (LOINC/ICD etc)
  - Fast and horizontally scalable using Elasticsearch
- **Tools that leverage Snowstorm**
  - SNOMED International Authoring Platform
  - SNOMED International Browser https://browser.ihtsdotools.org/
  - Analytics Demonstrator, UI Demo

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
  - The public Snowstorm instance is made available for reference and manual testing


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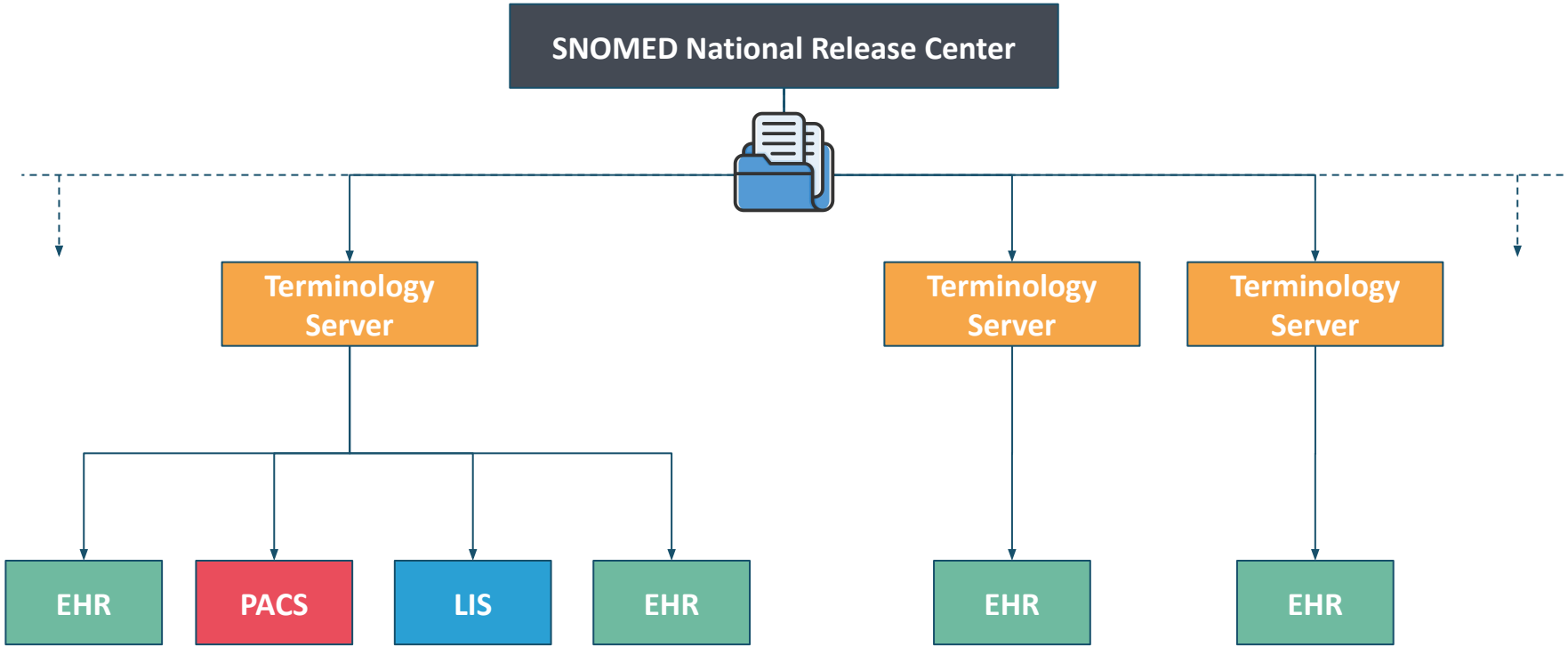
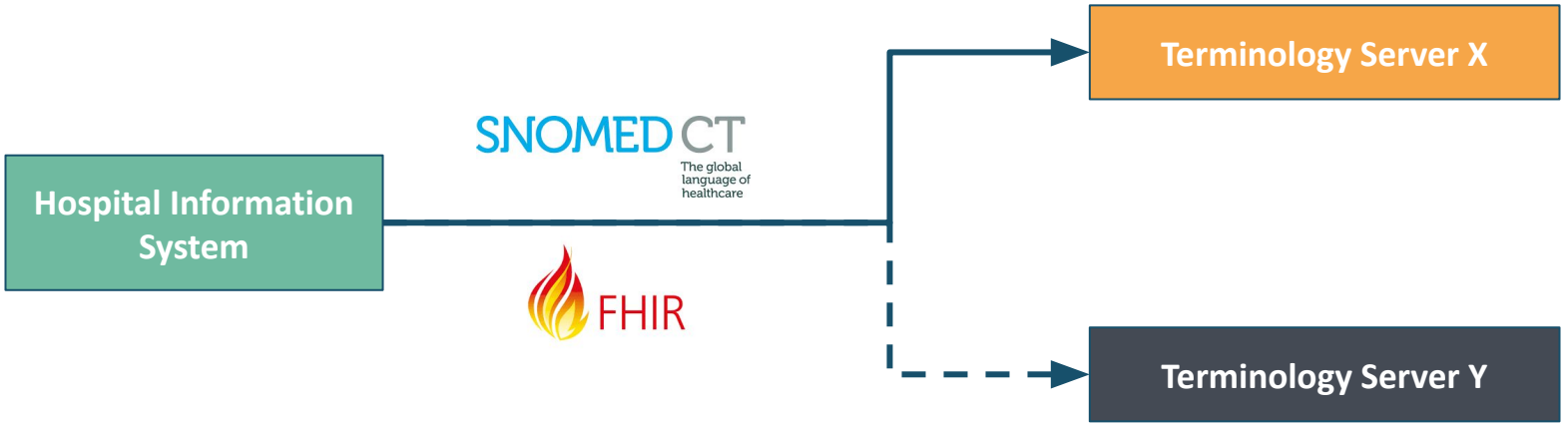
Exercise:
Snowstorm Setup and
SNOMED Import

Terminology services architecture

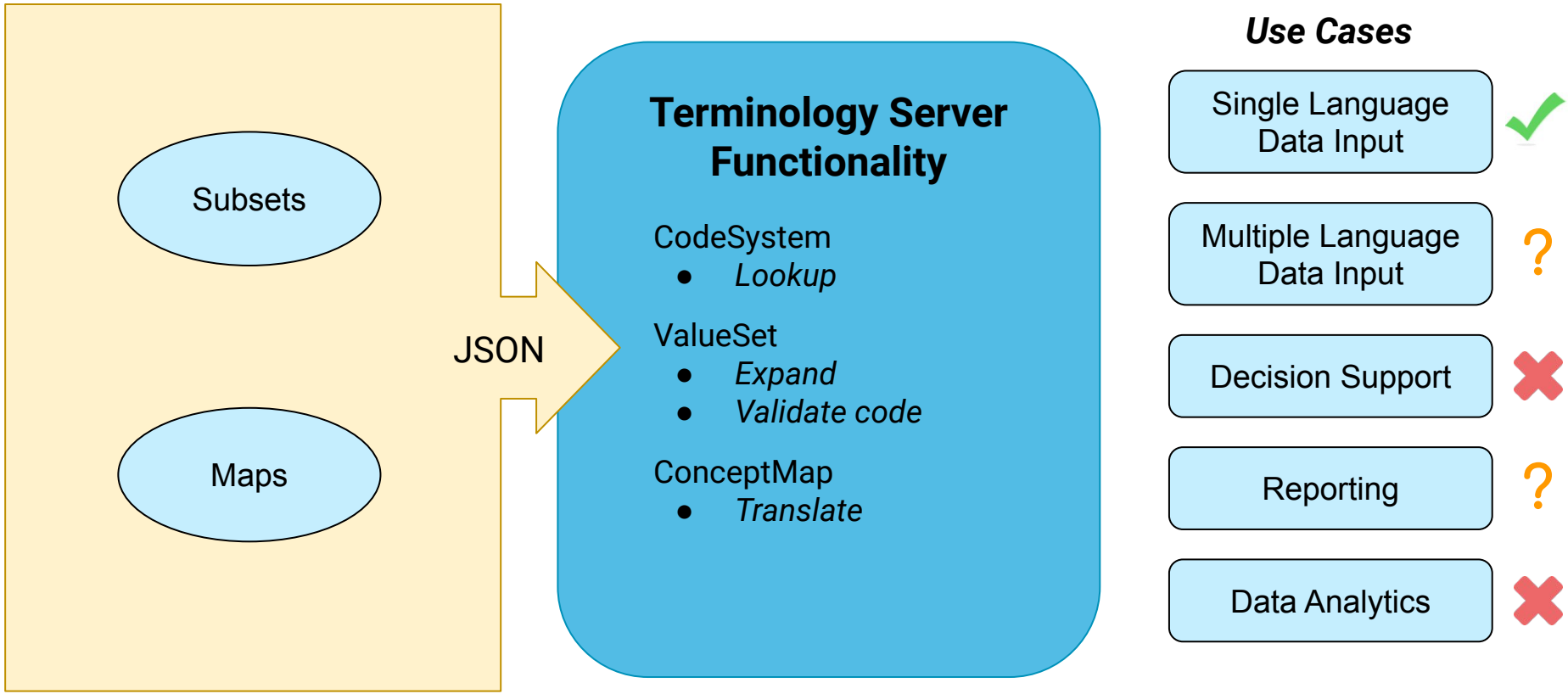


Standards in terminology services

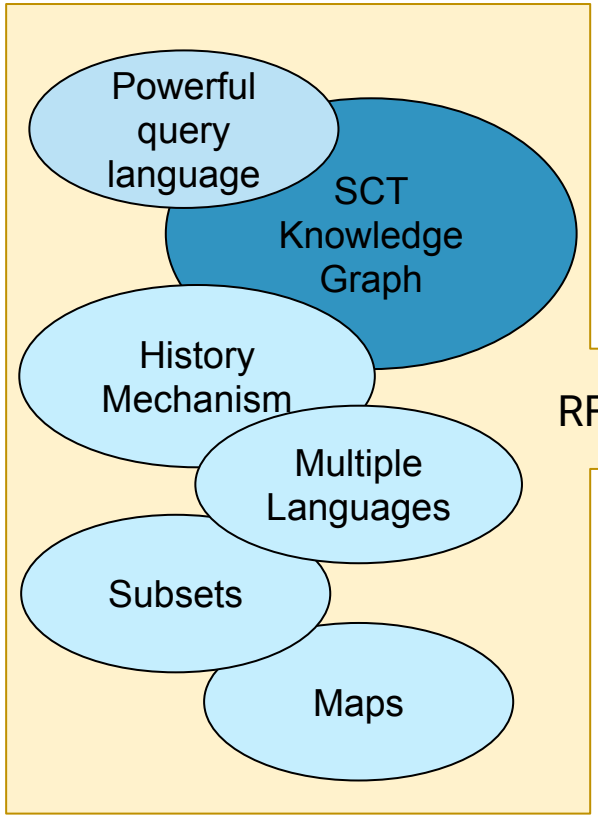


Standards provide flexibility, simplify software integration, and prevent lock-in

Terminology Services Approach: Using Flat Lists



Terminology Services Approach: Using SNOMED CT Structures



RF2

Terminology Server Functionality

CodeSystem
- *Lookup*

ValueSet
- *Expand*
- *Validate code*
- ***Implicit ValueSets (uses query language)***

ConceptMap
- *Translate*

Use Cases

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

Why use Terminology Services?

- Search algorithms are the key for effective data entry
- Terminology navigation and retrieval requires optimization
- Queries can be constructed using standard languages
- Terminologies can be updated frequently

SNOMED CT Distribution Format

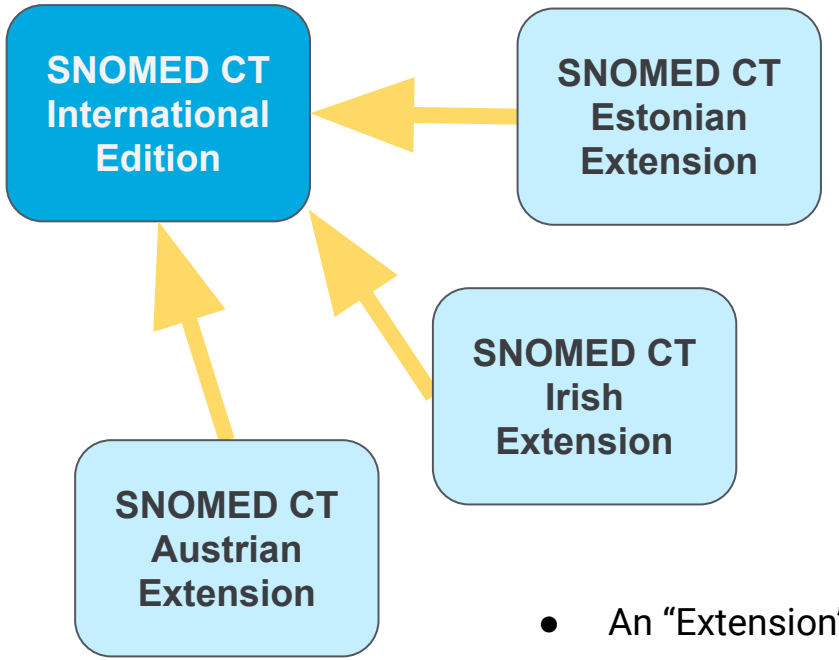
Package Format and Layout

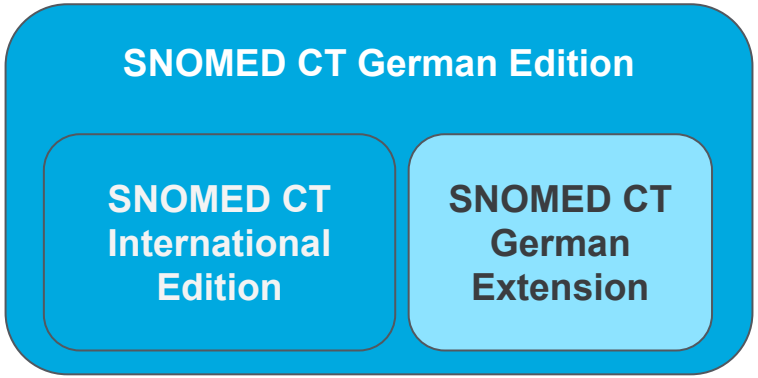
- All SNOMED CT releases are distributed in the **RF2** format (Release Format 2). This is a set of TSV files compressed as a zip archive.

- 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 German Edition

http://snomed.org/dev-training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SNOMED CT Releases
in Snowstorm

SNOMED CT Releases and Extensions

Within a Terminology Server

Snowstorm has a branching mechanism for SNOMED CT allowing us to:

- Store and access multiple SNOMED Editions and Extensions
- 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 main Edition is stored on a working-branch called **MAIN**, this is the root of the repository

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

- Examples of Edition/Extension branches:
  - **MAIN** *(The root branch usually contains the International Edition)*
  - **MAIN/SNOMEDCT-BE** *(The Belgian Extension)*
  - **MAIN/SNOMEDCT-ES** *(The Spanish Translation Extension)*

Snowstorm - Edition 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 using an edition package is a two step process:

1. Configure the **SNOMEDCT** Code System
   setting the Edition URI for use by the FHIR API

2. Import the German Edition package ***Snapshot*** onto **MAIN**

Snowstorm - Edition *Upgrade*

When a new SNOMED CT release becomes available that can be imported too.

The previously imported release will still be accessible.

Upgrading using an edition package is a simple one step process:

1. Import the new German Edition package ***Snapshot*** onto **MAIN**

Snowstorm - **Version Control**

- The content of SNOMED releases are managed like a source code repository.
- The content of Edition release is imported to MAIN.
- Release branches are created automatically that point to the content of that commit.


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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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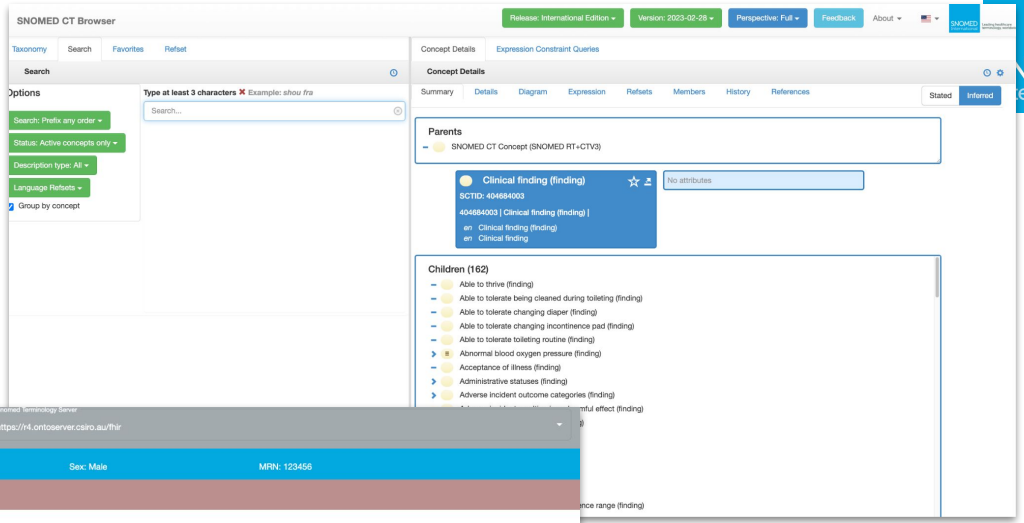
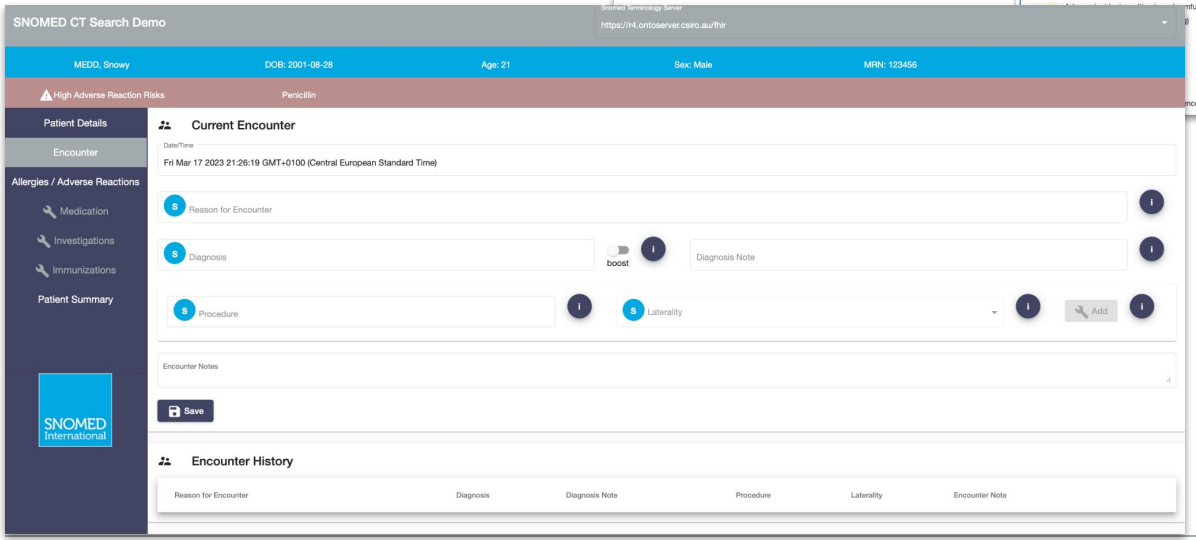
Demonstrations

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


Thank you
for your attention
BREAK