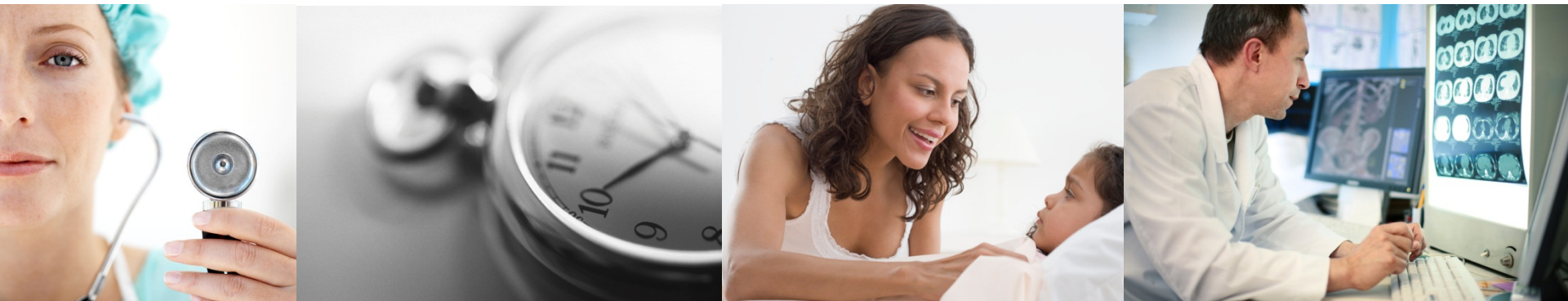


SNOMED CT Introduction



Delivering

SNOMED CT

The global
language of
healthcare

Dr Linda Bird, IHTSDO
Implementation Specialist

Audience and Objectives

Audience

- Attendees of the SNOMED CT Implementation Showcase who are either new to SNOMED CT or who would like a quick refresher session prior to attending the rest of the meeting.

Objectives

- To gain a basic level of understanding of SNOMED CT to allow attendees to get the most benefit from the rest of the showcase.

Agenda

- Overview
- Benefits
- Features
- Content Development and Releases
- Implementation and Tools
- IHTSDO
- Questions

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SNOMED Clinical Terms

Without SNOMED CT

Yes No Have you had surgery on your eyes or ears?
 Yes No Have you had surgery on your brain? Pituitary removal
 Yes No Have you had surgery on your spine?
 Yes No Have you had any cardiac surgery?
 Yes No Have you had any vascular surgery?
 Yes No Have you had any joint replacement surgery?
 Yes No Have you had any abdominal surgery?
 Yes No Have you had any pelvic surgery?
 Yes No Have you had any other surgery? gall bladder

With SNOMED CT

Yes No Have you had surgery on your eyes or ears?
 Yes No Have you had surgery on your brain? Hypophysectomy (52699005)
 Yes No Have you had surgery on your spine?
 Yes No Have you had any cardiac surgery?
 Yes No Have you had any vascular surgery?
 Yes No Have you had any joint replacement surgery?
 Yes No Have you had any abdominal surgery?
 Yes No Have you had any pelvic surgery?
 Yes No Have you had any other surgery? Gallbladder operation (19744006)

Free text (handwritten or typed)

- Legibility
- Typing/writing errors
 - e.g. “pitutary”
- Interpretation of meaning needed
 - e.g. “gallbladder” means “gallbladder surgery”

Encoded

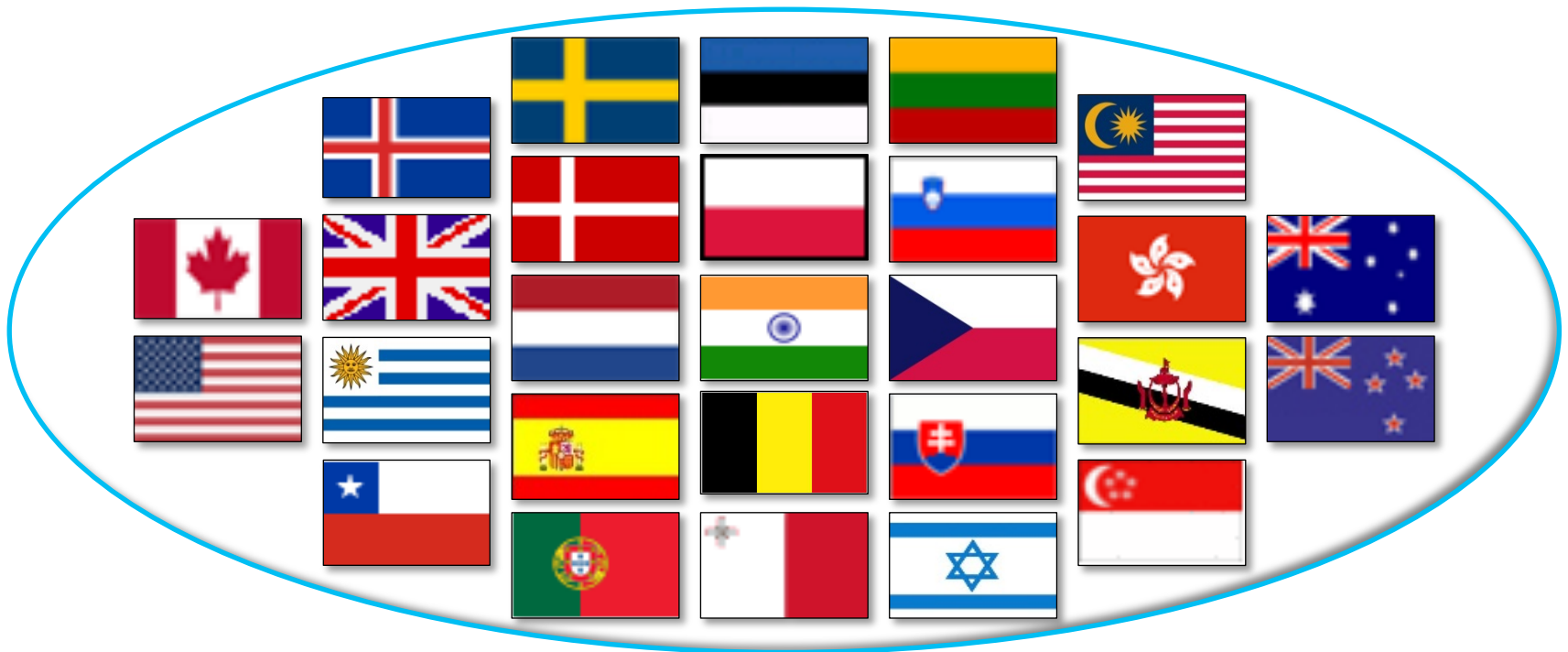
- Unambiguous
- Clear meaning and context
- Enables aggregation
 - e.g. patients with “Endocrine operations”
- Enables queries over meaning

SNOMED CT - Hierarchies

- Clinical finding
 - Diagnosis
 - Signs / Symptoms
- Procedure
- Observable
- Body structure
- Organism
- Substance
- Pharmaceutical products
- Physical object
- Physical force
- Specimen

SNOMED Clinical Terms

- Most comprehensive multilingual clinical terminology
- Supports high quality clinical content in health records
- Owned and maintained by IHTSDO



SNOMED CT - History

- First released by College of American Pathologists (CAP) in 2002
- Original Content from
 - SNOMED 3.5 and SNOMED RT (developed and owned by CAP)
 - Read Codes (owned by and widely used in the UK NHS)
- Acquired by IHTSDO for the public good in 2007
 - Nine founding members
- Design based on
 - Identified user requirements
 - Practical experience
 - Scientific principles established in peer reviewed publications

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Meaningful Health Records

- Making health records electronic
 - A significant step forward
 - Improves communication
 - Increases availability of relevant information

... but it is only a partial solution; the real challenge is ...

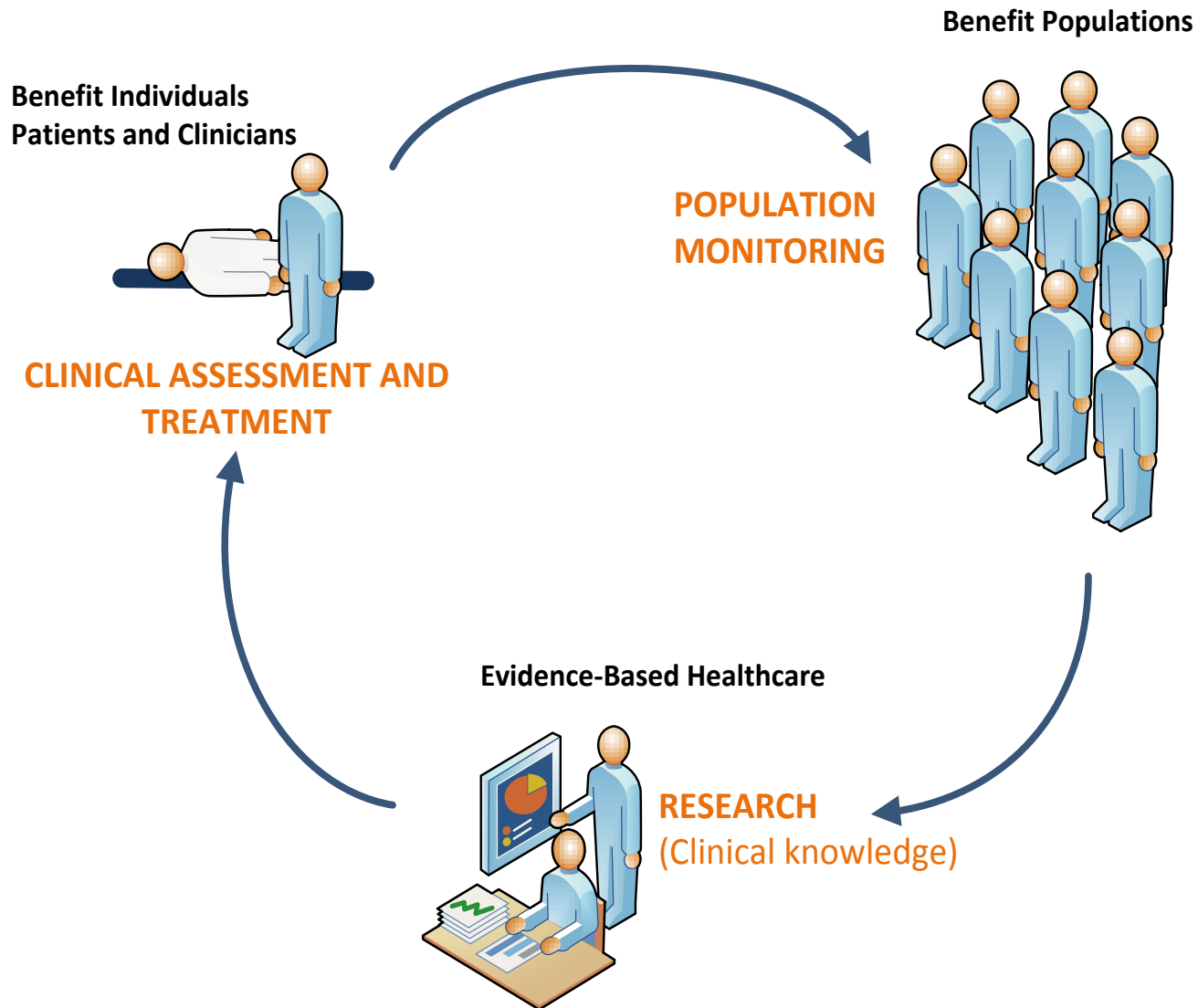
- Making health records meaningful
 - Identifying significant facts in oceans of data
 - Enabling effective meaning-based retrieval
 - Linking the EHR to authoritative clinical knowledge
- SNOMED CT represents clinical information meaningfully as part of a well-designed EHR

Design Benefits of SNOMED CT

- Comprehensive content
- Clinical meaning oriented
- Subtype hierarchy
- Defining relationships
- Robust versioning
- International
- Implementable



Benefits of SNOMED CT in EHRs



Benefits of SNOMED CT in EHRs

- Enhancing the care of individuals
 - Display appropriate information
 - Guideline & decision support integration
 - Communicating & sharing relevant information
 - Retrospective searches for patterns requiring follow-up
- Enhancing the care of populations
 - Epidemiology monitoring & reporting
 - Research into the causes & management of diseases
- Supporting cost-effective delivery of care
 - Guidelines to minimize risk of costly errors
 - Reducing duplication of investigations & interventions
 - Auditing the delivery of clinical services
 - Planning service delivery based on emerging health trends

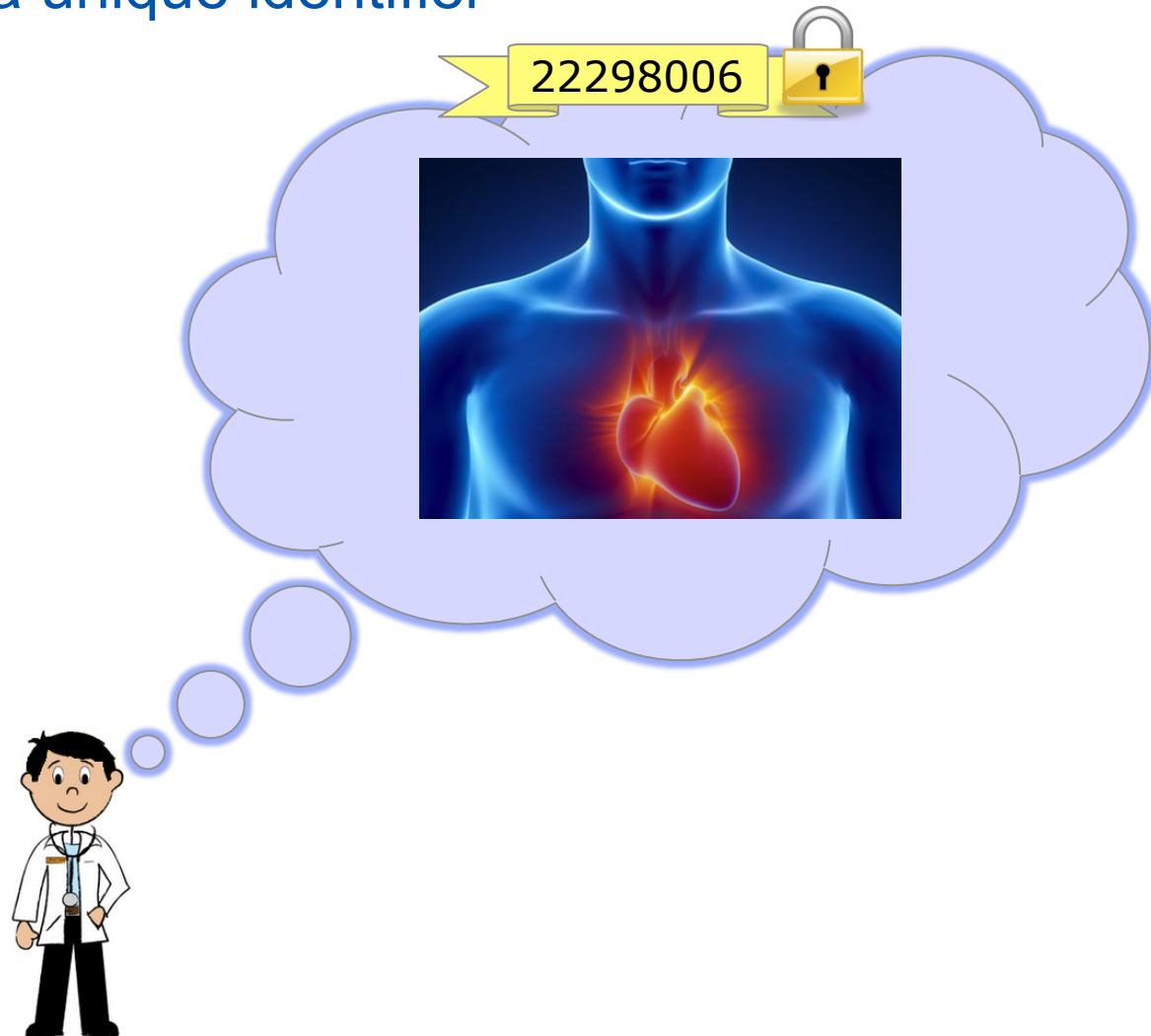


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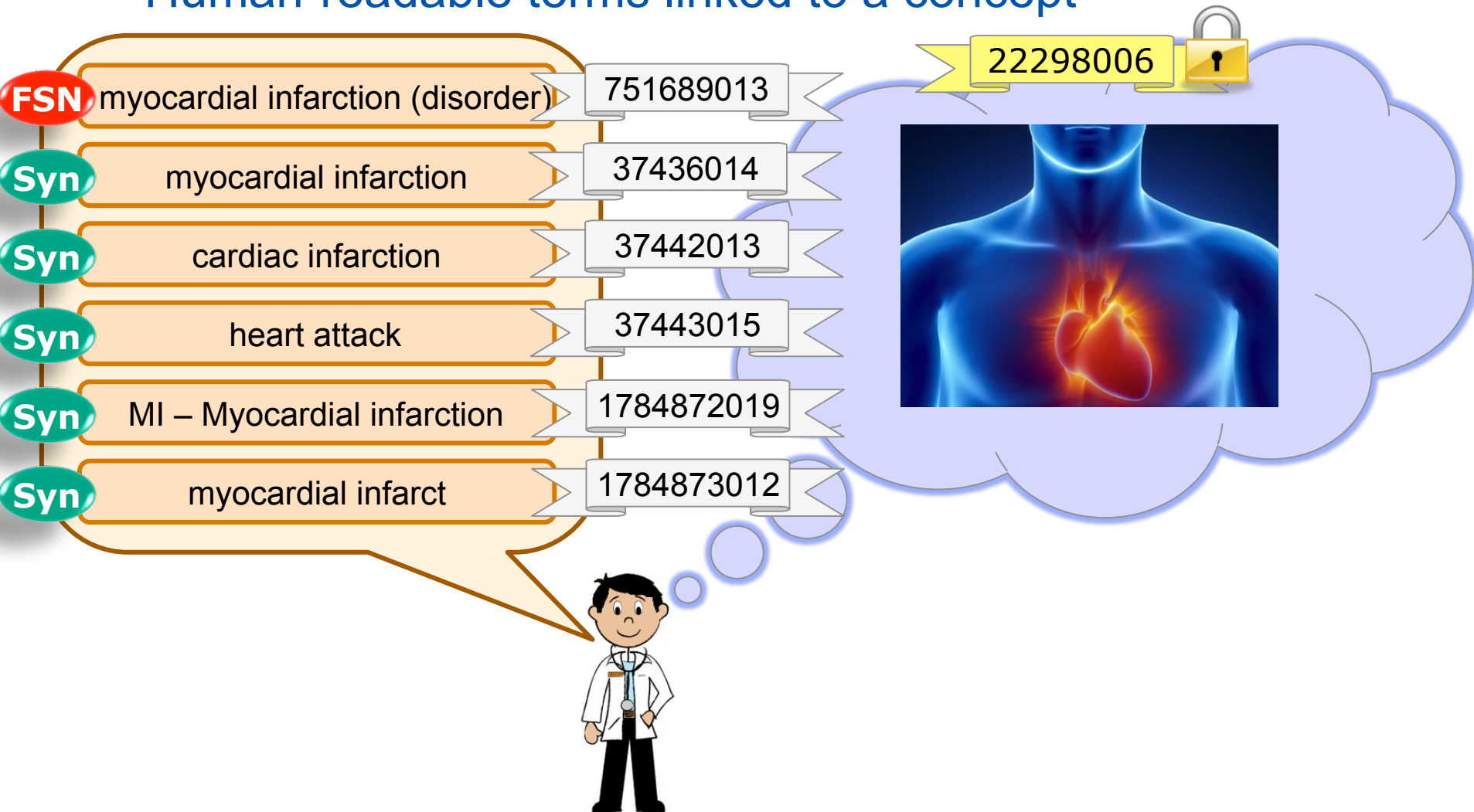
Concepts

- A clinical idea with a unique identifier



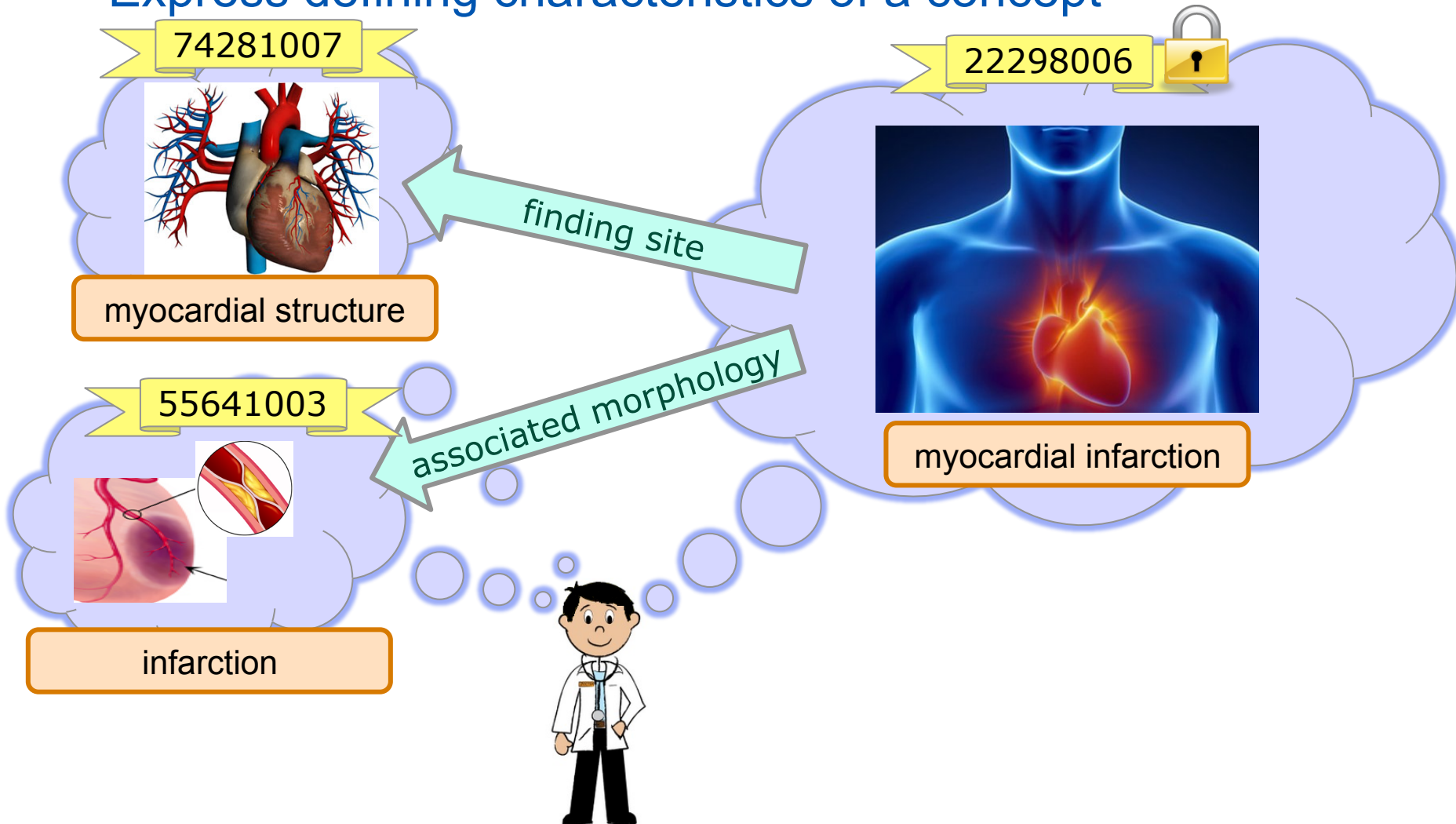
Descriptions

- Human-readable terms linked to a concept



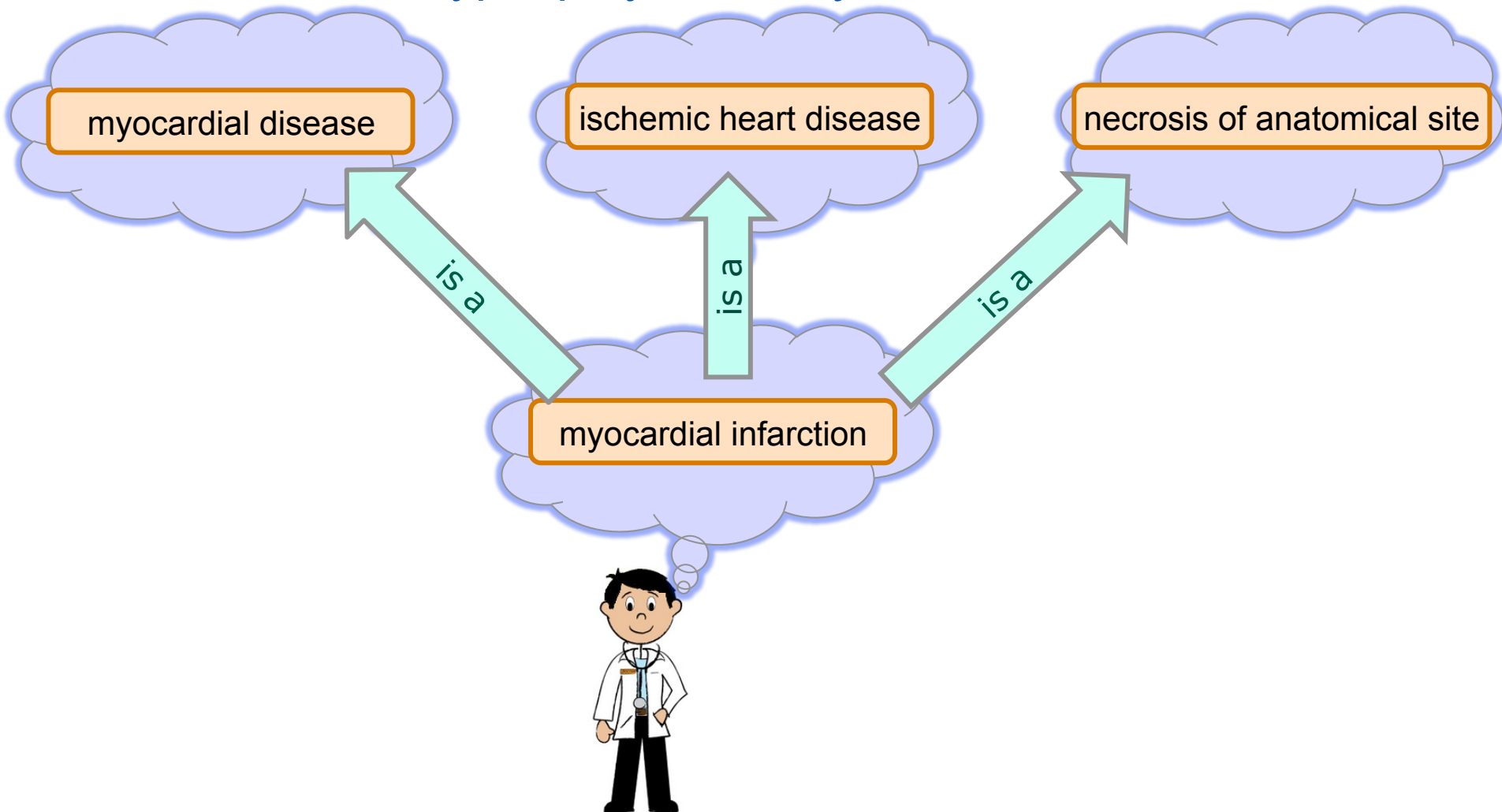
Relationships

- Express defining characteristics of a concept

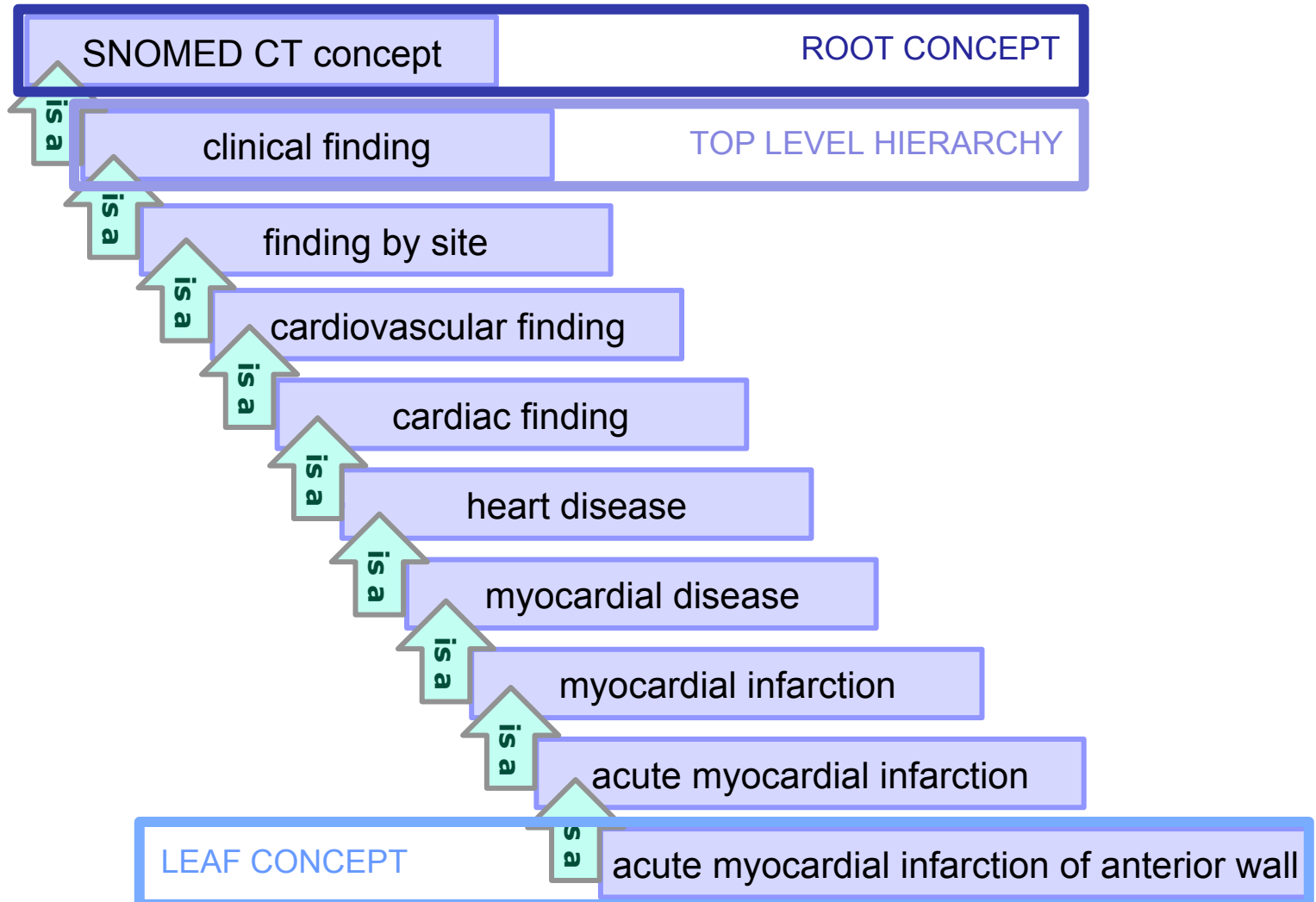


Relationships

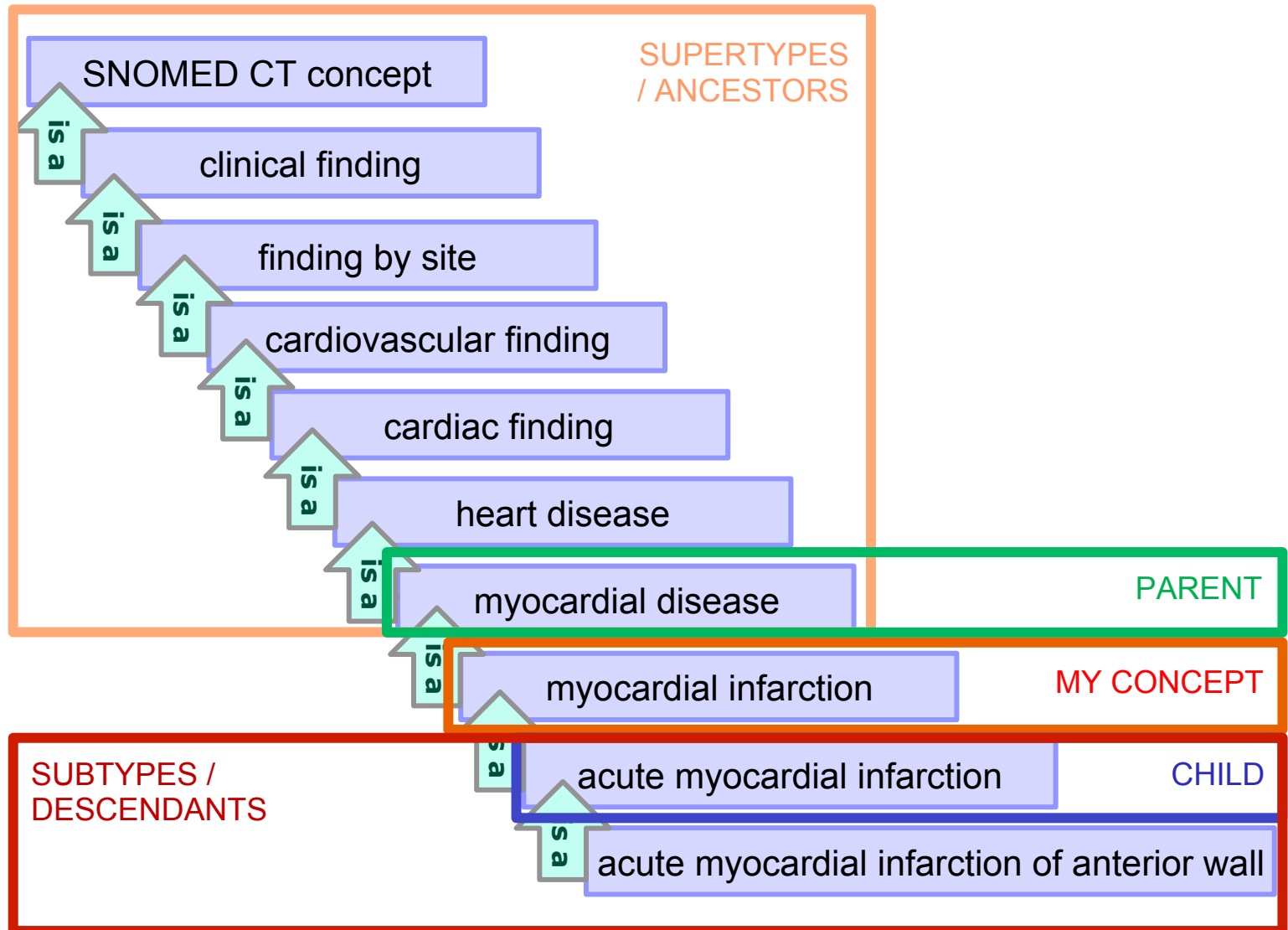
- Create a subtype 'polyhierarchy'



Relationships



Relationships



Reference Set

A mechanism for representing references to SNOMED CT components to support many requirements including:

- Language
 - Indicates preferred and acceptable descriptions in a specific dialect
- Subset
 - Limited search list
 - Message constraint validation
- Prioritised display order in a search list
- An alternative hierarchy
 - Navigational – alternative tree views to allow ease of entry
 - Aggregation – groupings to support alternative analyses
- Annotation
- Map

Reference Sets - Subsets

- A collection of components for a particular purpose

Id	term
10547007	Otic route
12130007	Intra-articular route
127490009	Gastrostomy route
127491008	Jejunostomy route
127492001	Nasogastric route
16857009	Vaginal route
26643006	Oral route
34206005	Subcutaneous route
37161004	Rectal route
372449004	Dental route
372450004	Endocervical route
372451000	Endosinusial route

Reference Set - Mappings

- Between SNOMED CT and an external code system

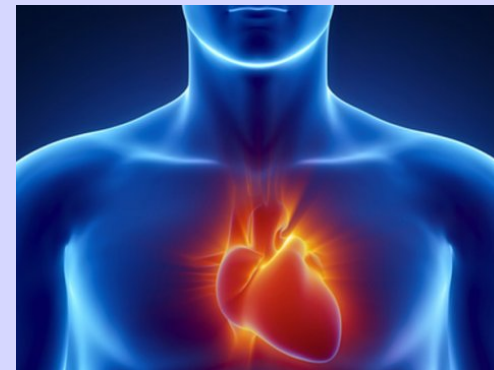
SNOMED CT concept		ICD-O code	
243930007	entire spine	C41.9	malignant neoplasm of bone and articular cartilage, unspecified
372177002	entire nail plate	C44.9	other and unspecified malignant neoplasm of skin, unspecified
31047003	lymphomatoid papulosis	9718/1	lymphomatoid papulosis
397356009	indolent systemic mastocytosis	9741/1	mastocitosi sistemica
399648005	intravascular large B-cell lymphoma	9712/3	intravascular large B-cell lymphoma
447643008	vipoma	8155/1	vipoma
447644002	benign stromal tumour	8935/0	stromal tumor, benign
128809007	langerhans cell histiocytosis	9751/3	langerhans cell histiocytosis

Reference Set - Language Preferences



Relationship	Term	SNOMED ID
FSN	myocardial infarction (disorder)	751689013
Syn	myocardial infarction	37436014
Syn	cardiac infarction	37442013
Syn	heart attack	37443015
Syn	MI – Myocardial infarction	1784872019
Syn	myocardial infarct	1784873012

22298006



Reference Set - Language Preferences



SNOMED CT description		Acceptability	
751689013	myocardial infarction (disorder)	900000000000548007	preferred
37436014	myocardial infarction	900000000000548007	preferred
37442013	cardiac infarction	900000000000549004	acceptable
37443015	heart attack	900000000000549004	acceptable

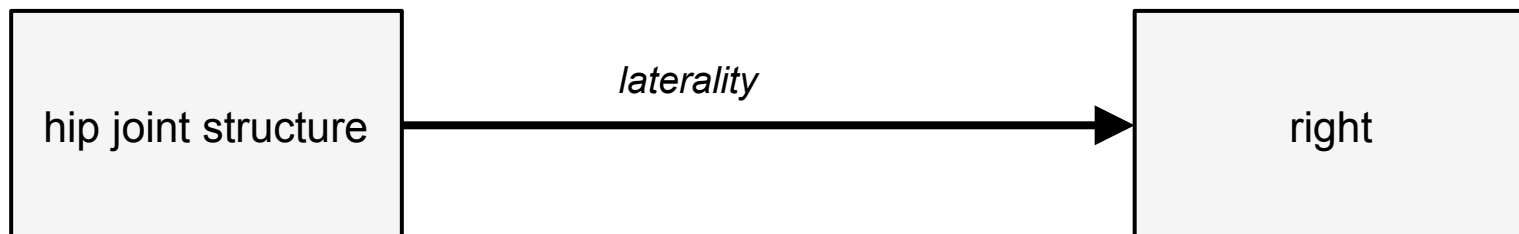
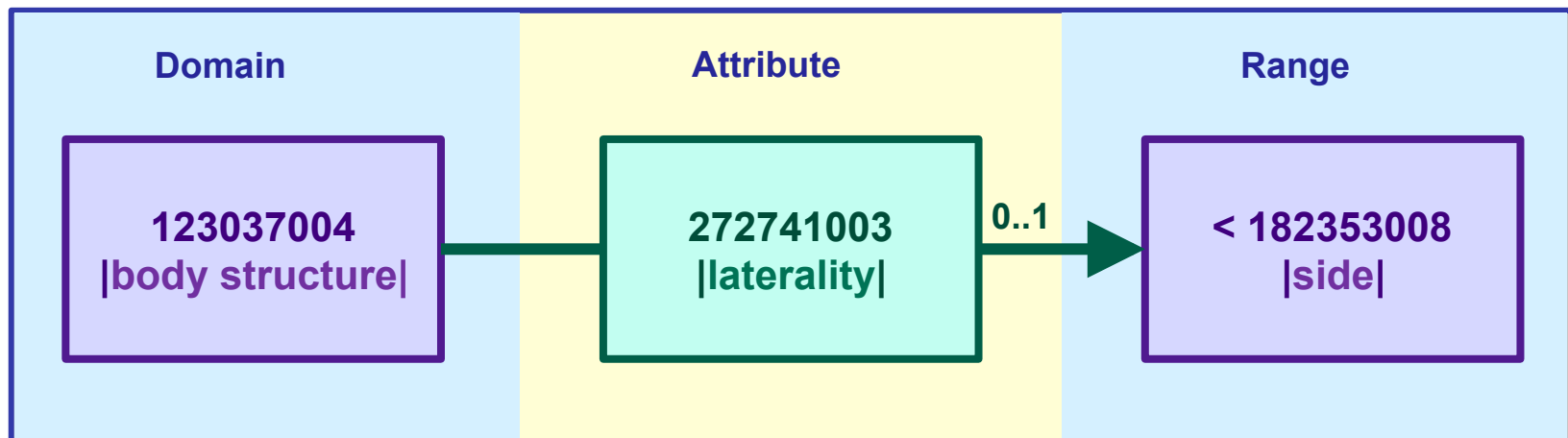
Extensions

- Additional content for local use
 - To meet the needs of specialties and realms
 - To meet vendor needs
 - To meet local business needs
- May include local
 - Components
 - Concepts, relationships, descriptions
 - Reference Sets
 - Subsets, Language preferences, Annotations
- Must have one or more authorized namespaces
 - Ensures global uniqueness of identifiers

21782 1000132 10 5

Concept Model

- Rules for how relationships can be defined
 - Defines the domain and range of each attribute
 - Defines some additional constraints (e.g. cardinality)



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Content Development

- Does it belong in SNOMED CT?
 - Creation and maintenance of semantic interoperability
 - Understandable, Reproducible and Useful (URU)
 - Coordination with information architecture components
 - Comprehensiveness of coverage in included domains
- International content
 - Content necessary for international conformance and interoperability
- National extension content
 - Content outside the scope of the international release, but necessary for national conformance and interoperability

Release Format (RF2)

- SNOMED CT is released as text files that can be imported into relational databases or other software
- RF2 is current release format for SNOMED CT (since 2011)
- RF2 has additional features for versioning and extensibility

SNOMED CT RF2 Files

Concepts

id	effectiveTime	active	moduleId	definitionStatusId
100000000	20020131	1	900000000000380005	900000000000130009
100000000	20090731	0	900000000000380005	900000000000130009
100000006	20020131	1	900000000000380005	900000000000130009
10000004	20020131	1	900000000000380005	900000000000130009
10000004	20030131	0	900000000000380005	900000000000130009

Descriptions

id	effectiveTime	active	moduleId	conceptId	languageCode	typeId	term	caseSignificanceId
100000016	20020131	0	900000000000380005	60203004	en	900000000000187000	Abrasion or friction burn of gum with infection	900000000000448009
100000010	20020131	1	900000000000380005	5379004	en	900000000000187000	Small intestine muscularis propria	900000000000448009
100001017	20020131	1	900000000000380005	60203004	en	900000000000187000	Gingival abrasion with infection	900000000000448009
100002012	20020131	1	900000000000380005	60204005	en	900000000000187000	Cauterization of conjunctival lesion	900000000000448009
100003019	20020131	0	900000000000380005	60205006	en	900000000000187000	Retired procedure	900000000000448009
100004013	20020131	1	900000000000380005	60206007	en	900000000000187000	Cutaneous actinobacillosis of sheep AND/OR cattle	900000000000448009
100005014	20020131	0	900000000000380005	60206007	en	900000000000187000	Cutaneous actinobacillosis of sheep and cattle	900000000000448009
100006010	20020131	1	900000000000380005	60207003	en	900000000000187000	Fibre lapper	900000000000448009
100007018	20020131	1	900000000000380005	60208008	en	900000000000187000	Coagulation factor V	900000000000448009
100008011	20020131	1	900000000000380005	60208008	en	900000000000187000	Proaccelerin	900000000000022005
100009015	20020131	1	900000000000380005	60208008	en	900000000000187000	Labile factor	900000000000448009

Relationships

id	effectiveTime	active	moduleId	sourceId	destinationId	relationshipGroup	typeId	characteristicTypeId	modifierId
1000000021	20020131	1	900000000000380005	255116009	367639000		0 308489006	90000000000006009	900000000000451002
1000000021	20020731	0	900000000000380005	255116009	367639000		0 308489006	90000000000006009	900000000000451002
1000000028	20020131	1	900000000000380005	280844000	71737002		0 116680003	90000000000006009	900000000000451002
1000001020	20020131	1	900000000000380005	255135009	49596003		0 363698007	90000000000006009	900000000000451002
1000001020	20020731	0	900000000000380005	255135009	49596003		0 363698007	90000000000006009	900000000000451002
1000002029	20020131	1	900000000000380005	10002003	129304002		2 260686004	90000000000006009	900000000000451002
1000002029	20020731	1	900000000000380005	10002003	129304002		3 260686004	90000000000006009	900000000000451002
1000002029	20030131	0	900000000000380005	10002003	129304002		3 260686004	90000000000006009	900000000000451002
1000002029	20030131	1	900000000000380005	10002003	129304002		1 260686004	90000000000006009	900000000000451002
1000002029	20050131	1	900000000000380005	10002003	129304002		1 260686004	90000000000006009	900000000000451002

SNOMED CT release cycle

- International Edition of SNOMED CT
 - Released twice a year – January and July
- National Extensions of SNOMED CT
 - Released twice a year – e.g. April and September
 - Some are released more frequently in fast changing areas (eg drugs)

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SNOMED CT in National use (1 of 2)

- Summary
 - Countries in which SNOMED CT is used: >50
 - National policies endorse use of SNOMED CT in several countries
- US
 - The Office of the National Coordinator for Health Information Technology require use of SNOMED CT for problem lists and entry of structured data in certified EHR systems for phase 2 of “Meaningful Use”
 - SNOMED CT is already widely used in EHR systems in the US (e.g. Kaiser Permanente, Intermountain)
- Australia
 - SNOMED CT is the preferred national clinical terminology

SNOMED CT in National use (2 of 2)

- England
 - SNOMED CT was selected and approved as the terminology to be adopted by the NHS in England
- Netherlands
 - 50+ affiliate licenses
 - SNOMED CT is key terminology in national programs on “generic data for patient transfer” and “single recording of patient information”
- Singapore
 - SNOMED CT is part of the National Electronic Health Record
- Sweden
 - SNOMED CT is now translated into Swedish and will, together with other classifications, be the national resource in the field of terminology and classifications

Implementation Approaches

SNOMED CT can be used as:

What	Why
An interface terminology	To capture clinical information
A code system	To store clinical information
An indexing system	To retrieve clinical information
A common terminology	To communicate in a meaningful way
A dictionary	To query, analyze and report
	To link to knowledge resources
Extensible foundation	To represent new types of clinical data

IHTSDO Tooling Development

- Online SNOMED CT Browser
 - Currently includes International, Spanish, Australian, Danish, Swedish, UK and US Editions of SNOMED CT
 - <https://browser.ihtsdotools.org>
- Other IHTSDO tools available or under development

<http://www.ihtsdotools.org/>

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International Health Terminology Standards Development Organisation

- Maintains and delivers SNOMED CT
 - Licensed to registered Affiliates
 - Free use in Member countries
 - Low-cost licenses for institutions in other countries
 - Free in poorest countries
 - Fee waivers for approved limited uses for “Public Good”
- Is an international not-for-profit association
 - Based in Denmark
 - Owned by National Members
 - Governed by General Assembly of its Members
 - Funded by countries based on national wealth

IHTSDO Current Members

	Australia		Iceland		Portugal
	Belgium		India		Singapore
	Brunei		Israel		Slovak Republic
	Canada		Lithuania		Slovenia
	Chile		Malaysia		Spain
	Czech Republic		Malta		Sweden
	Denmark		The Netherlands		United Kingdom
	Estonia		New Zealand		USA
	Hong Kong		Poland		Uruguay

IHTSDO Collaboration

- WHO
 - Maps to ICD-9-CM, ICD-10 and ICD-10-CM
 - IHTSDO and WHO cooperating on development of ICD-11
- LOINC
 - SNOMED CT and LOINC are being linked together to minimize duplication and benefit uses of both systems
- GMDN
 - Devices terminology linked to SNOMED CT
- HL7
 - Collaboration agreement to encourage use of SNOMED CT in HL7 messages and documents
- CIMI (Clinical Information Modeling Initiative)
 - Developing common approaches to modelling clinical information bound to SNOMED CT

Summary

- **International**
 - Multilingual and in use in more than 50 countries
- **Clinical**
 - Designed by clinicians to support patient care
- **Meaningful**
 - Enables meaning-based capture, retrieval and sharing of information
- **Comprehensive**
 - Supports clinical needs across healthcare disciplines and settings
- **Flexible**
 - Tailor to your specific needs using reference sets and extensions
- **Collaborative**
 - Harmonized with many standards, code systems and classifications
- **Implementation and Tooling**
 - Increasing number of tools and implementations around the world

What is SNOMED CT?

Why SNOMED CT?

Learn More

[E-learning Center](#)

[SNOMED CT Challenge](#)

[Document Library](#)

SNOMED CT Worldwide

SNOMED CT & Other Terminologies

Change or Add to SNOMED CT

Get SNOMED CT

SNOMED CT Tools

Learn More

SNOMED CT E-Learning Center

The [E-Learning Center](#) is a web resource that includes a growing set of recorded tutorials about SNOMED CT provided by IHTSDO. In addition the site provides links to training presentations developed by IHTSDO Members.

SNOMED CT Starter Guide

The Starter Guide is a practical and useful starting point from which anyone with a general interest in healthcare information can begin learning about SNOMED CT.

In just over fifty pages it provides a general introduction to key topics. It provides sufficient knowledge for those interested in an overview of what SNOMED CT is and how it works. For those seeking a more detailed understanding, the Starter Guide is still a good place to gain the foundational knowledge on which to build.

Download the latest version of the Starter Guide below in Information Sheets.

SNOMED CT Document Library

The [SNOMED CT Document Library](#) provides links to online and downloadable specifications, guides and discussion papers. This document include materials likely to be of interest to a variety of people engaged in adoption, implementation, deployment and use of SNOMED CT.

Information sheets

- [SNOMED CT - Starter Guide 2014--7-31](#) ▶

Questions and Discussion

Delivering

SNOMED CT

The global
language of
healthcare