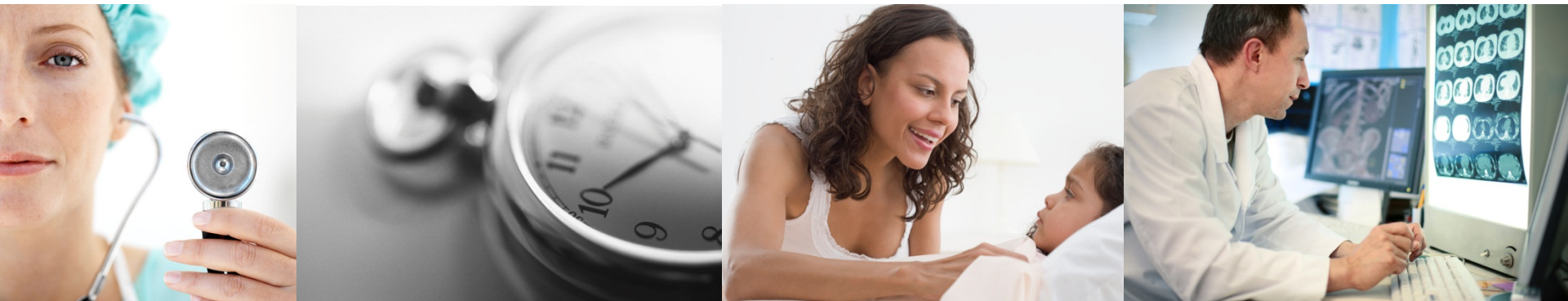


SNOMED CT Introduction



Delivering

SNOMED CT

The global
language of
healthcare

David Markwell and Linda Bird
IHTSDO

SNOMED CT Introduction Tutorial Overview

Part 1

- Background
- Business case
- Meaningful clinical information
- Simple ideas in a complex reality

Part 2

- Features
- Development and releases
- Implementation and tools
- Learning more
- Questions



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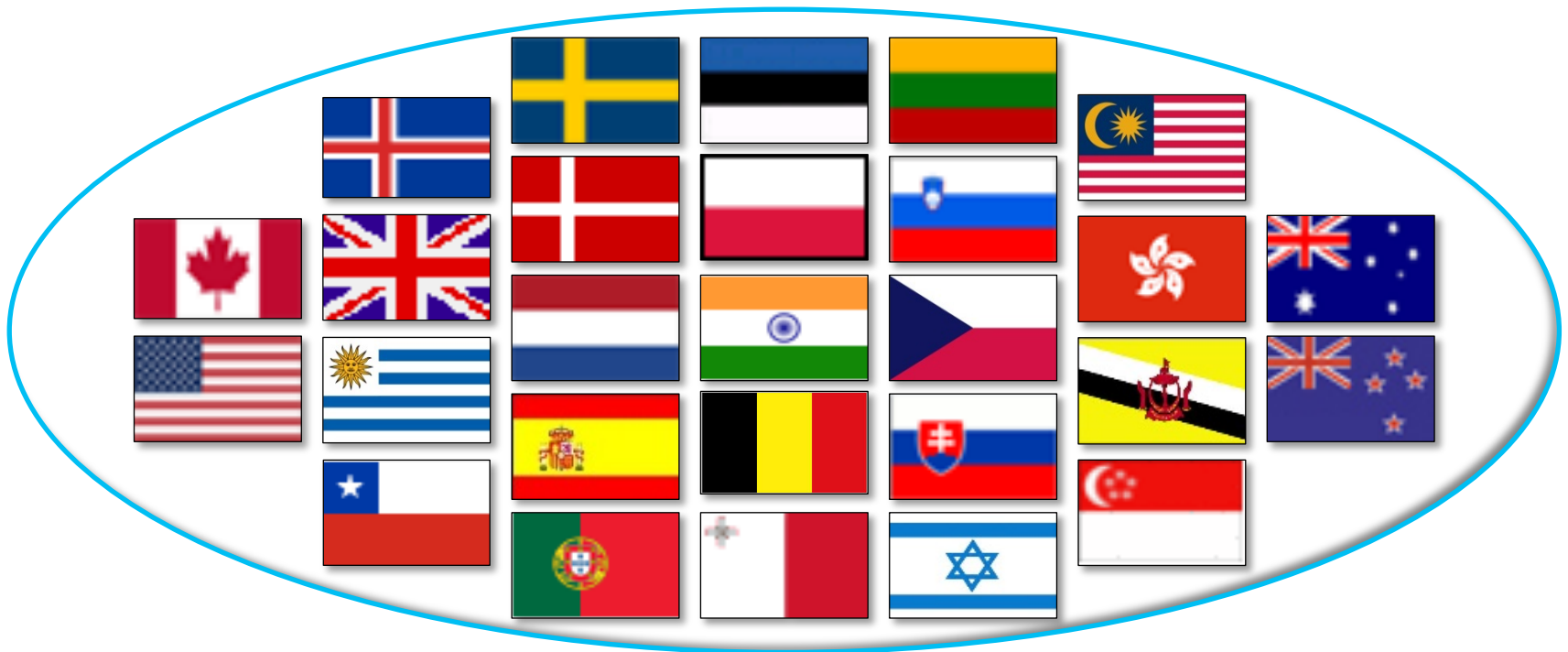
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BACKGROUND

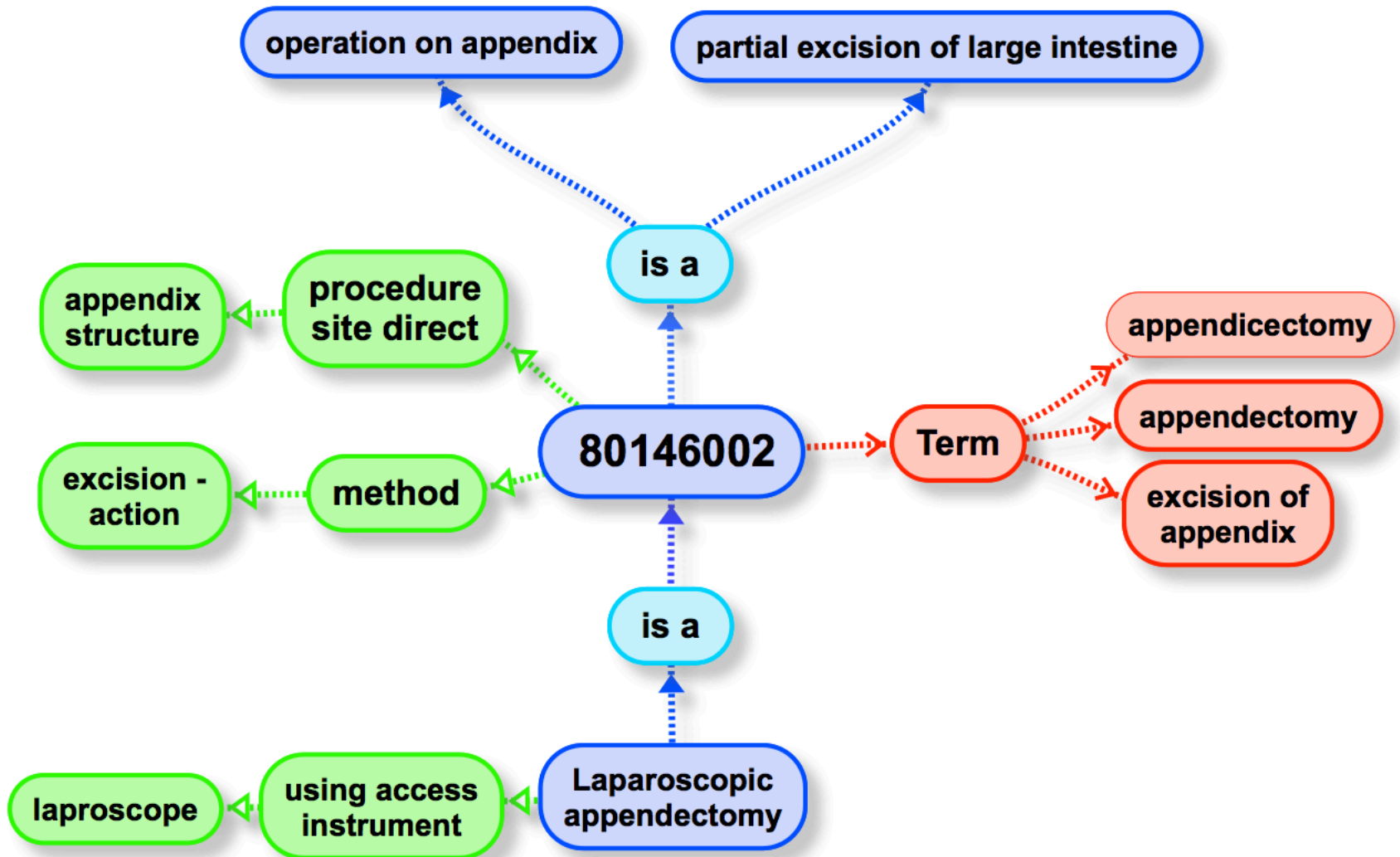


SNOMED Clinical Terms

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



SNOMED CT – not just a code system



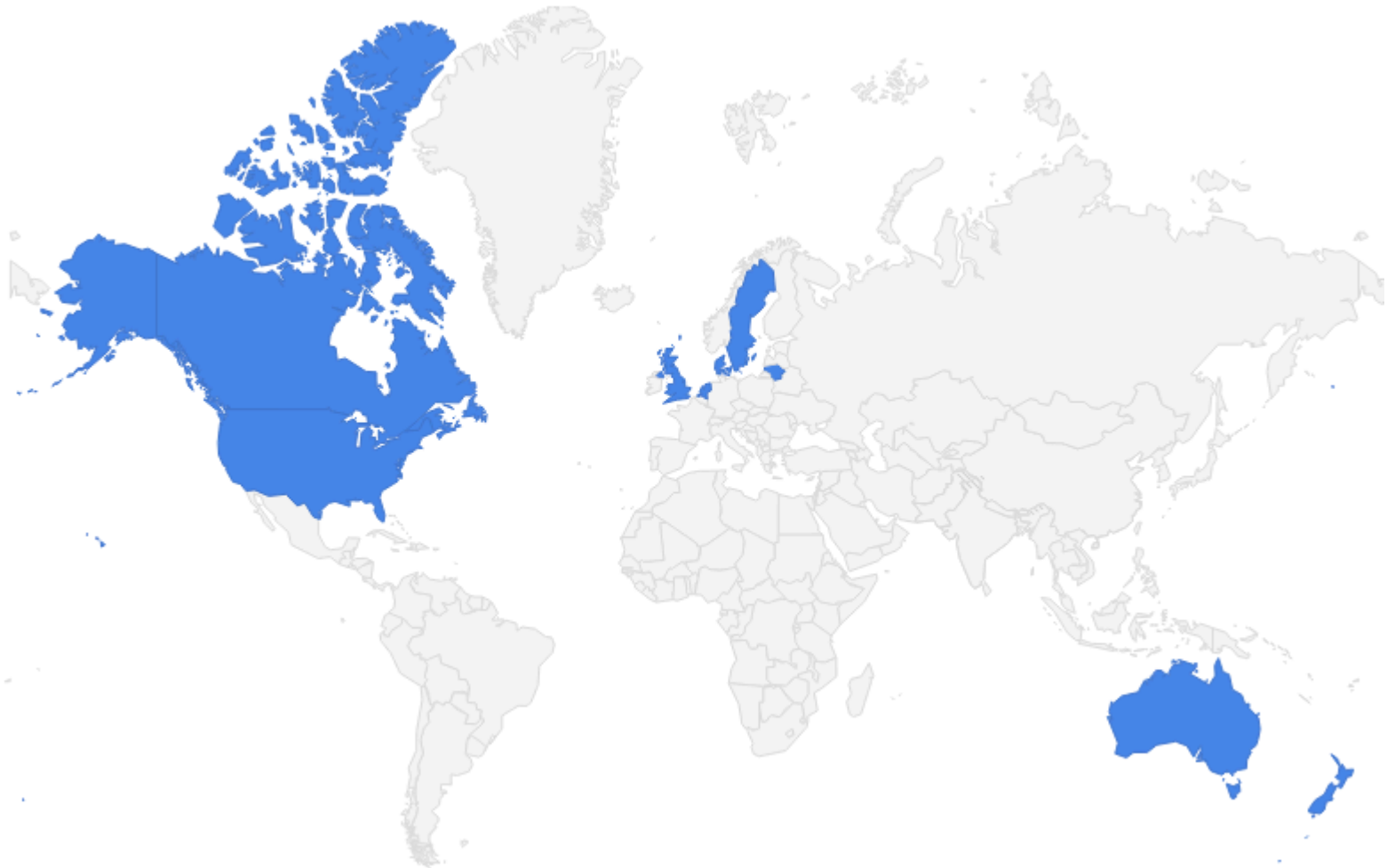
SNOMED CT - History

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

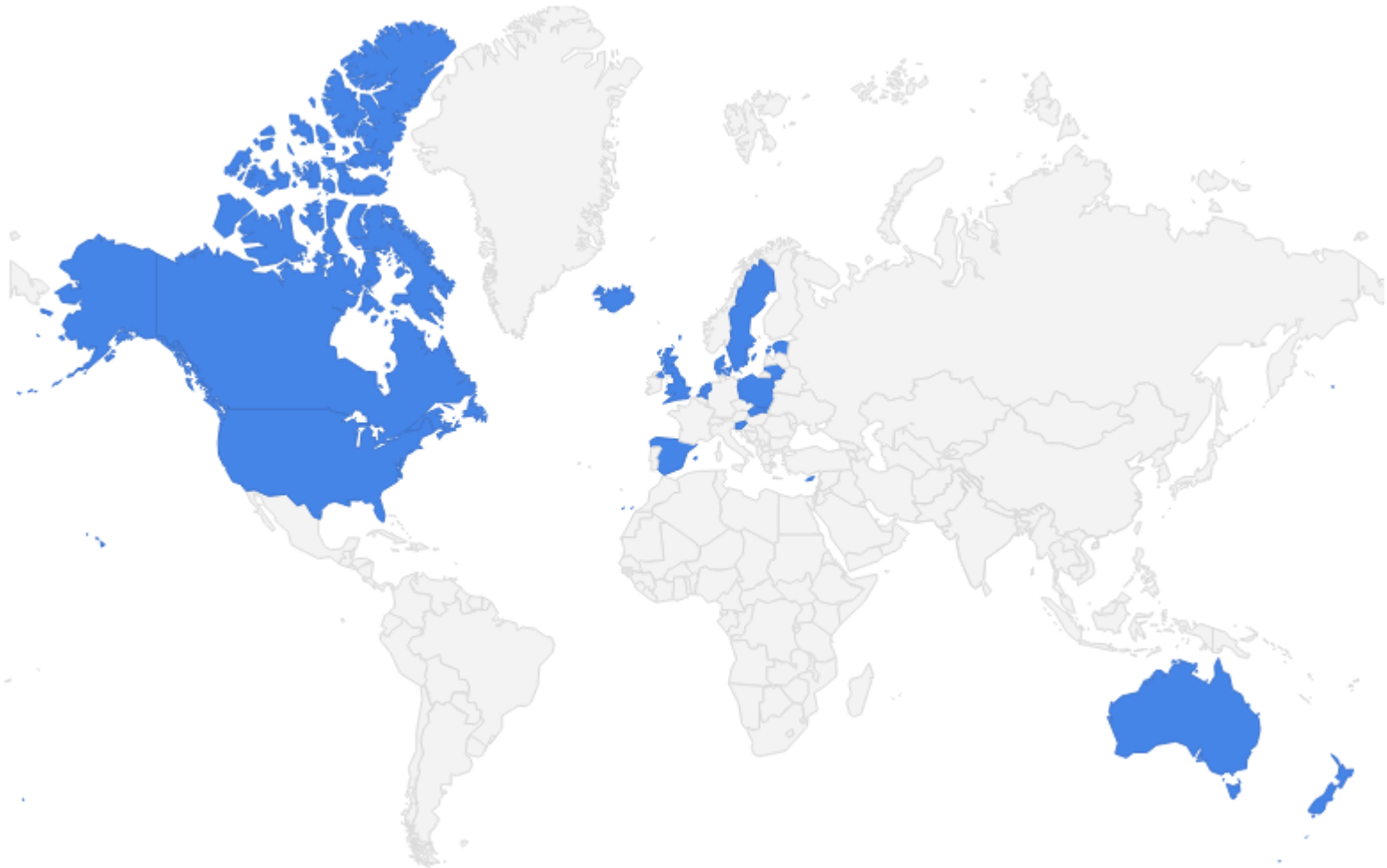
International Health Terminology Standards Development Organisation

- An international not-for-profit association
 - Owned by National Members
 - Governed by General Assembly of its Members
 - Funded by countries based on national wealth
- 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”

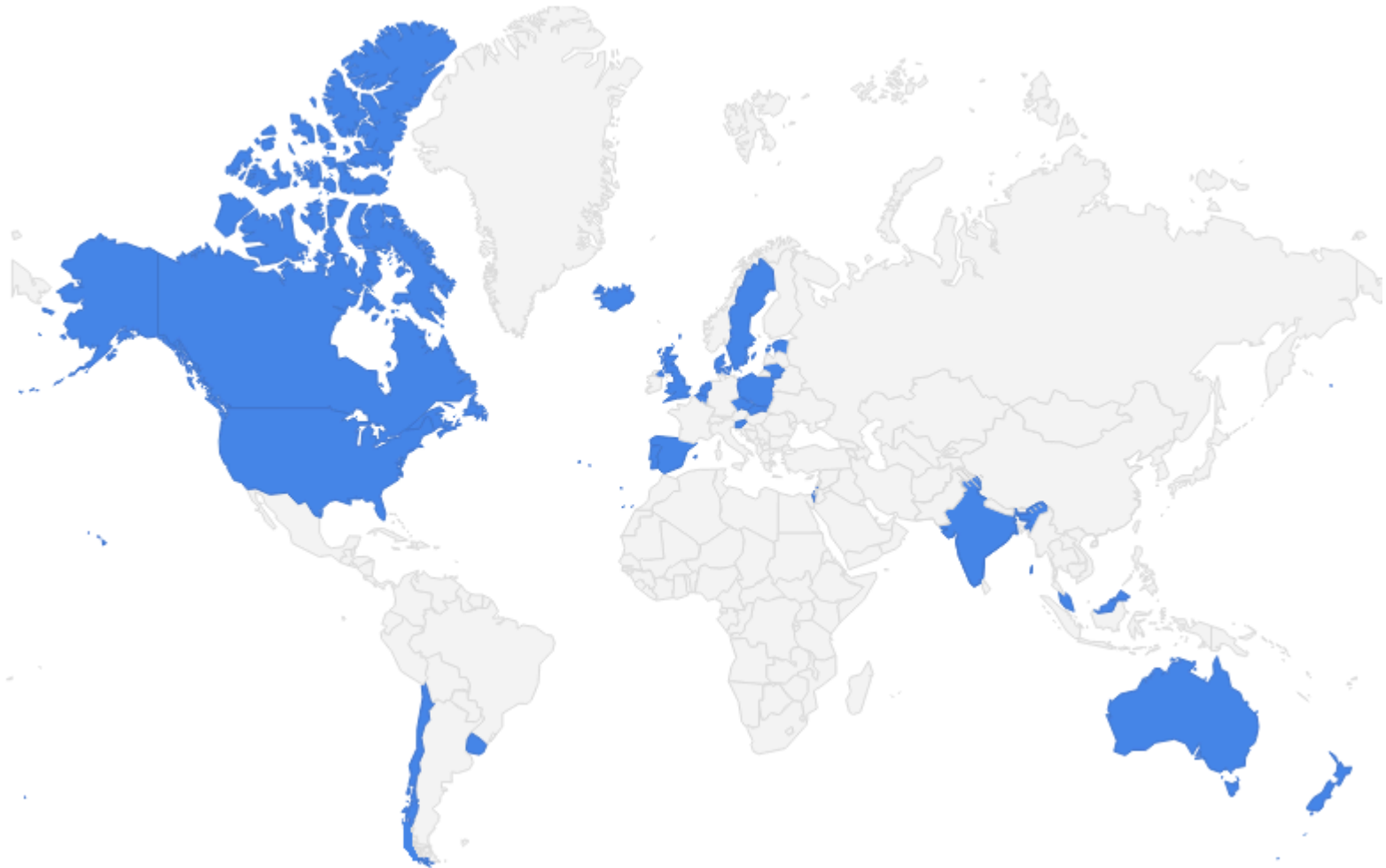
IHTSDO Members 2007



IHTSDO Members 2011



IHTSDO Members 2015



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

Collaborating with others to facilitate integrated approaches to EHR standardization

- 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 users of both code systems
- GMDN
 - Devices terminology linked to SNOMED CT
- HL7
 - Collaboration agreement to encourage effective use of SNOMED CT in HL7 artifacts including FHIR
- CIMI
 - Developing common approaches to modeling clinical information bound to SNOMED CT

THE BUSINESS CASE FOR SNOMED CT



You can download **Building the Business Case for SNOMED CT** from the IHTSDO website <http://www.ihtsdo.org/resource/resource/98> (this link is also at end of the presentation)

Why SNOMED CT?

- Comprehensive foundation
- Controlled vocabulary with extensive content coverage
- Formal structured representation of meaning
- International and multilingual
- Well connected standard supports well connected solutions
- Extendable model

Benefits based on SNOMED CT features

- **Clinically validated vocabulary**
 - No need to duplicate effort on local or specialty code systems
- **Improved decision support**
 - Meaning-based retrieval makes relevant information available
- **Improved clinical and business intelligence**
 - Meaning based retrieval assists research and monitoring of care delivery enabling improved treatment and care management
- **Interoperable information and knowledge resources**
 - Enhanced communication between healthcare providers enhances patient care and clinical safety
- **Network benefits**
 - Wider adoption scales up benefits as interconnections increase

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



MAKING CLINICAL INFORMATION MEANINGFUL



Electronic Health Records

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

... but this 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 meaning and contributes to meaningful health records**

Process-based views of health records

- Many of today's electronic health records focus on process views of health care
- They record what happened using mixtures of
 - Free-text
 - Local codes or specialty specific codes
 - A variety of data sets each designed to meet a specific limited set of requirements
- They report what happened using
 - Statistical classifications (such as ICD-10)
 - They allow audit of the process of care
- They are not so good at presenting or analyzing the current situation

Meaningful views of the current situation

- Decisions require understanding of the current situation rather than detailed data about every event
 - The significance of past events varies, some are irrelevant others are critically important
- The current situation is a result of what has happened but ...
- ... computing the current situation depends on consistent processable representation of potentially relevant clinical information
- A meaningful record system should be able to make inferences and present a useful view of the current situation as a basis for decision making

Process records and meaningful views of a game of chess

Descriptive record of what happened?

To start with white moved the queen's pawn to forward two spaces. Black responded by moving a knight in front of the kings bishop's pawn. White advanced the queen's bishops pawn two spaces. Black then moved the king's-knight's pawn two spaces.

...

[47 more moves in same style]

...

Then black moved his king next to his rook.

What should white do next?



To decide I need to understand the current situation

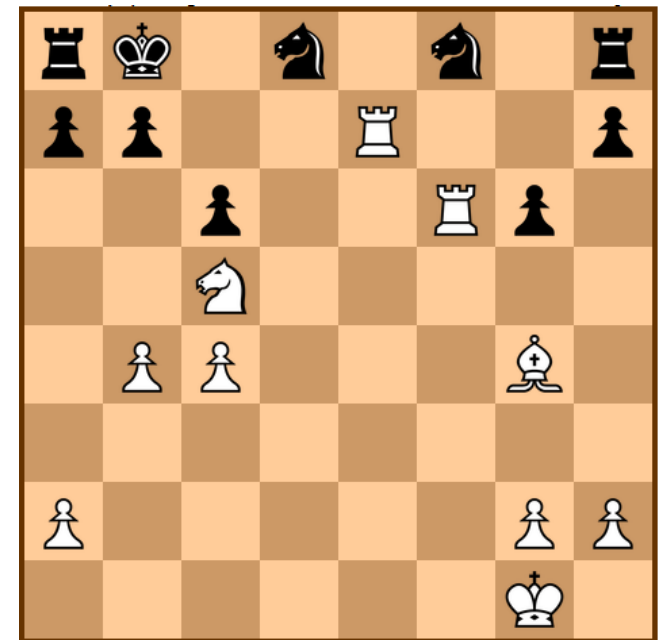
Process records and meaningful views of a game of chess

Meaningful view of current situation

1. d4 Nf6
2. c4 g6
3. Nc3 Bg7
4. e4 d6
5. Be2 e5
6. dxe5 dxe5
7. Qxd8 Kxd8
8. f4 Nfd7
9. Nf3 c6
10. O-O exf4
11. Bxf4 f6
12. Rad1 Ke8
13. e5 fxe5
14. Bg3 Nc5
15. Bxe5 Bxe5
16. Nxe5 Be6
17. b4 Ncd7
18. Nf3 Ke7
19. Ng5 Nf8
20. Nxe6 Nxe6
21. Bg4 Nd7
22. Rde1 Ndf8
23. Ne4 Nd8
24. Nc5 Kd6
25. Rf6 Kc7
26. Re7 Kb8



I understand the current situation so I can decide



Practical requirements for meaningful records

- An EHR should allow relevant questions to be answered:
 - **Accurately:** without false positives
 - **Completely:** without false negative
 - **Efficiently:** easily and quickly enough for each use case
- Examples:
 - To meet individual patient care requirements
 - What is the patient allergic to?
 - What medication is the patient taking?
 - Does the patient have any known problems with their liver?
 - To meet population care requirements
 - How many people did I see with asthma in the last month?
 - Which patients have I treated with digoxin in the last year?

Representing clinical ideas

- Clinical ideas comprise everything we think we know about health, illness, prevention, investigation, and treatment
- Clinical ideas are the building blocks of personal health records

otitis media

hearing aid

ear infection

antibiotic

inflammation

streptococcus pyogenes

otitis externa

deafness

adenoids

cerum

catarrh

middle ear

earache

adenoidectomy

myringotomy

Working with clinical ideas

- Recognition, manipulation and interconnection of clinical ideas is essential for practice of any clinical discipline
- Growth of knowledge requires new clinical ideas to be developed, expressed and tested
- Effective delivery of high-quality health care requires clinical ideas to be shared in ways that ...
 - Enhance the quality of patient care
 - Facilitate the growth of clinical knowledge
 - Demonstrably deliver value for money

Different ways of representing clinical ideas

- Free text
- Structured data based on forms
- Simple code systems
- Simple code based hierarchies
- Statistical classifications
- A purpose built clinical terminology

Representing clinical ideas using: Free text

Let clinicians type (or dictate) what they want to record

- Intuitive data entry
- Does not support meaning-based retrieval
 - For example
 - In 1980 an attempt was made to count patients with middle ear infections using a text-based record in a UK general practice
 - This turned in a research project into the many different ways doctors in a single practice represented this condition ...
 - Otitis media, Acute otitis media, Ot med., Ear infection, Mid ear inf., OM, AOM, LOM, ROM, BOM ... *etc.*
 - NLP (natural language processing) may help but still has limitations

Representing clinical ideas using: Structured data based on forms

Capture data using customized data entry forms and store the data entered in a data structure that matches the form

- A well-designed form can make data capture easy
- Form-based data structures allow effective retrieval of data entered using a single form
- More general clinical information retrieval is difficult due to many different forms
- There is a requirement for
 - a common structure for representation
 - a common way to express clinical ideas

Representing clinical ideas using: Simple code systems

Codes that represent clinical ideas stored in a data structure or used to tag part of a textual record

- Using simple codes reduces variability of recording
- Retrieval of records containing a single specific clinical idea is possible
- If clinical ideas are expressed at different levels of detail, retrieval may be incomplete

For example

- In a simple code system the code for “ear disease” and “left otitis media” would be separate and unrelated
- To retrieve all patients with “ear disease” it would first be necessary to identify all the codes that were types of “ear disease”

Representing clinical ideas using: Simple code based hierarchies

Codes may be organized in a hierarchical so it is easier to analyze data at different levels of specificity

- The image shows shows an example from a simple hierarchical code system* originated in the late 1980's
- Retrieving all ear diseases is easy (codes starting F5)
- However, simple hierarchies of ideas have limitations

Name: Smith	First: John			
Date	Dr	Code	Note	
20/1/83	AB	H33..	Asthma	
		137R.	Smoker	
		12C5.	Family	
7/5/84	CD	TE60.	Dog	
		6561.	F	
18/6/84	PN	6562.	second tele	
1/9/84	AB	F527.	Acute right otitis media	
1/12/84	CD	F526.	Acute left otitis media	

F.... Nervous system (& sense organ) diseases
 F5... Ear diseases
 F52.. Suppurative and unspecified otitis media
 F520. Acute suppurative otitis media
 F521. Chronic tubotympanic suppurative otitis media
 F522. Chronic atticofacial suppurative otitis media
 F525. Recurrent acute otitis media
F526. Acute left otitis media
 F527. Acute right otitis media
 F528. Acute bilateral otitis media

* Read Codes version 2

Limits of simple hierarchies of ideas

- A simple hierarchy is a like a tree
 - Each node has only one parent node
- Relationships between clinical ideas are more complicated

For example:

- “Suppurative otitis media” is
 - an ear disease
 - ... and it is also*
 - an infectious disease
- A **polyhierarchy** is needed represent clinical ideas
 - In a polyhierarchy a node can have multiple parent nodes

Limits of hierarchies of ideas

- Some interconnections between clinical ideas are not hierarchical
- For example
- “Suppurative otitis media”
 - is caused by “bacteria”
but ... it is not a type of “bacteria”
 - occurs in the “middle ear”
but ... it is not a type of “middle ear”
 - Non-hierarchical relationships are needed to represent these aspects of meaning

Representing clinical ideas using: Statistical classifications

Group clinical ideas into categories that ensure each recorded idea is only counted once in statistical reports

- Classifications such as ICD-10 address the need for consistent statistical reporting by grouping similar conditions
- Statistical classifications limit meaning-based retrieval
 - Same limitation as simple hierarchies
 - Coding rules designed to avoid double counting lead to similar conditions being in different categories
 - For example in ICD-10
 - H10-H13 Disorders of conjunctiva
 - H16.2 Keratoconjunctivitis
 - P39.1 Neonatal conjunctivitis and dacrocystitis

Representing clinical ideas using: A purpose built clinical terminology

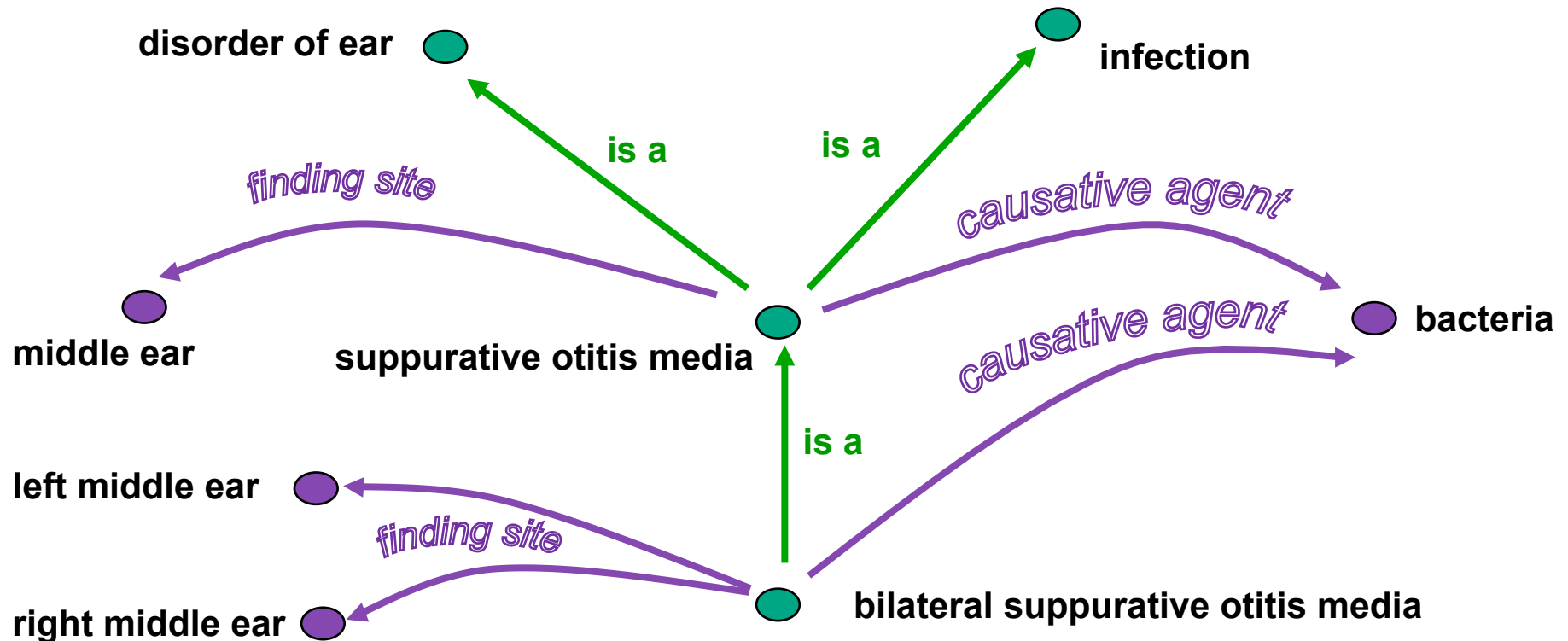
- The requirements for effective representation of clinical ideas are described in Dr James Cimino's widely referenced, peer acclaimed 1998 paper
- "Desiderata for controlled clinical vocabularies in the twenty-first century"

**SNOMED CT
was designed to
address these
requirements**

- 1 Content, Content, and Content
- 2 Concept Orientation
- 3 Concept Permanence
- 4 Non-semantic Concept Identifier
- 5 Polyhierarchy
- 6 Formal Definitions
- 7 Reject "Not Elsewhere Classified"
- 8 Multiple Granularities
- 9 Multiple Consistent Views
- 10 Representing Context
- 11 Evolve Gracefully
- 12 Recognize Redundancy

SNOMED CT concepts and relationships

- A concept can be related to more than one supertype parent
- A concept can be related to other types of concepts



CLINICAL KNOWLEDGE LINKAGE



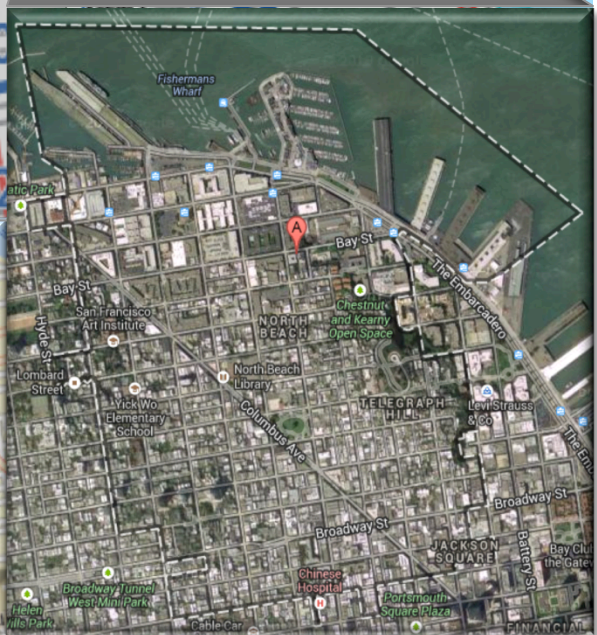
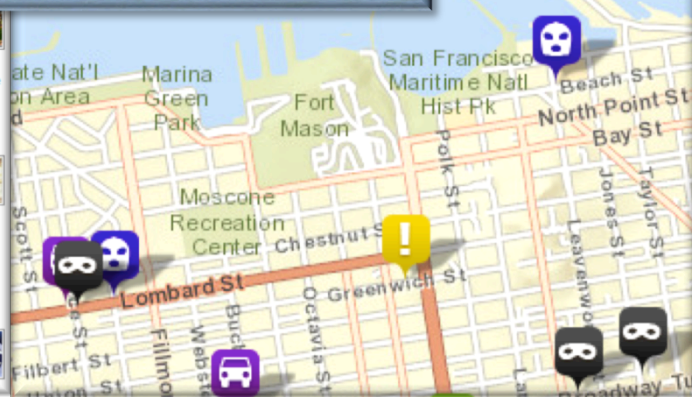
Knowledge linkage progress

- In recent years there has been rapid growth of knowledge linkage in many domains
- For example, geographic knowledge linkage now allows us to access information about any point on earth
- Healthcare knowledge linkage remains patchy, system specific and typically localized
- A standard open way to link health records to relevant clinical knowledge should be possible
 - What is needed to make this happen?

Geographic knowledge linkage

- A ZIP code gives you access to a wealth of knowledge about an area
 - A map, a satellite view, crime statistics, photographs, local restaurants

- A Original U.S. Restaurant**
515 Columbus Ave., San Francisco, United States
+1 415-397-5200
4.0 ★★★★★ 22 reviews - \$
spaghetti and meatballs - ossobuco - italian food - caprese salad - and more
- B Alioto's Restaurant**
8 Fishermans Wharf, San Francisco, United States
+1 415-673-0183 - aliotos.com
3.8 ★★★★★ 839 reviews - \$
dungeness crab - touristy - southern - beautiful view
Best Restaurants Near SF's Fisherman's Wharf
Zagat
- C Mona Lisa Restaurant**
353 Columbus Ave., San Francisco, United States
+1 415-989-4917 - monalisasf.com
4.1 ★★★★★ 60 reviews - \$\$
roasted garlic - authentic italian food - waiter - favorite place - white wine sauce
- D North Beach Restaurant**
1512 Stockton St., San Francisco, CA, United States
+1 415-392-1700 - northbeachrestaurant.com
4.1 ★★★★★ 564 reviews - \$\$\$
waiters - valet parking - prosciutto - wine cellar - northern italian
- E Tarantino's Restaurant**
206 Jefferson St., San Francisco, CA, United States
+1 415-775-5600 - tarantinosrestaurant.com



Interoperable geographic knowledge linkage

- ZIP codes
 - Groups of locations for one initial use case - postal services
 - Used for other purposes for which no specific areas are defined
- Limitations of ZIP codes
 - Areas vary in size and shape
 - Not precise enough for detailed journey planning
 - Not international
- Latitude and Longitude
 - The common denominator for interoperable geographic knowledge linkage
 - A global, logically defined, consistent set of coordinates for all surface locations on earth
 - Capable of being used to any level of precision
 - Used to define ZIP code areas to allow knowledge to be linked

Clinical knowledge linkage needs a common coordinate system

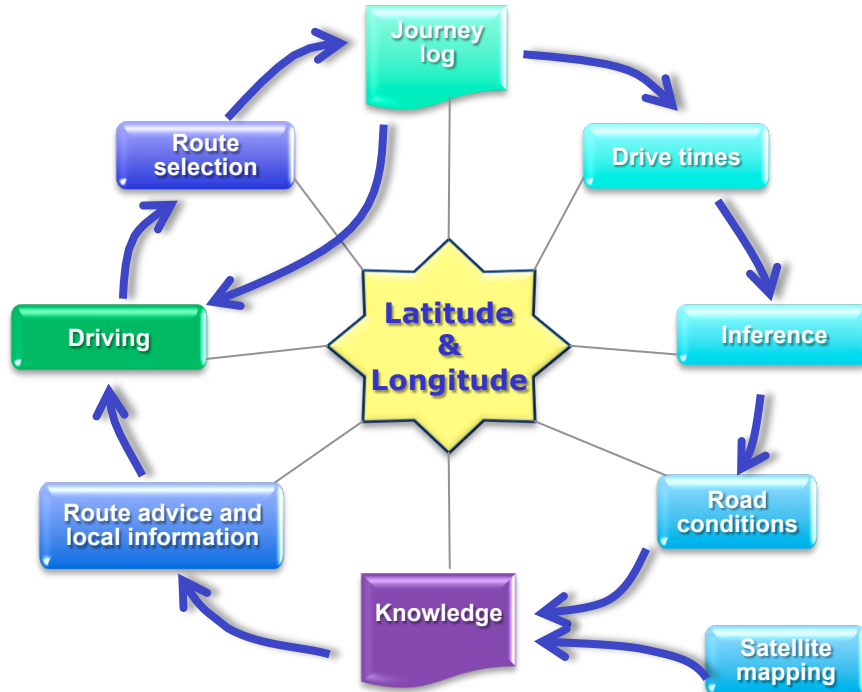
- A way to pinpoint and interrelate health care concepts
 - International, non-commercial with potential for global adoption
 - Broad scope - not focused on a single discipline or specialty
 - Accurate and detailed representation of clinical information
 - Designed to represent meaning rather than terms or categories
- Clinical information is complex and requires a coordinate system that captures this complexity

Clinical knowledge linkage needs a common coordinate system

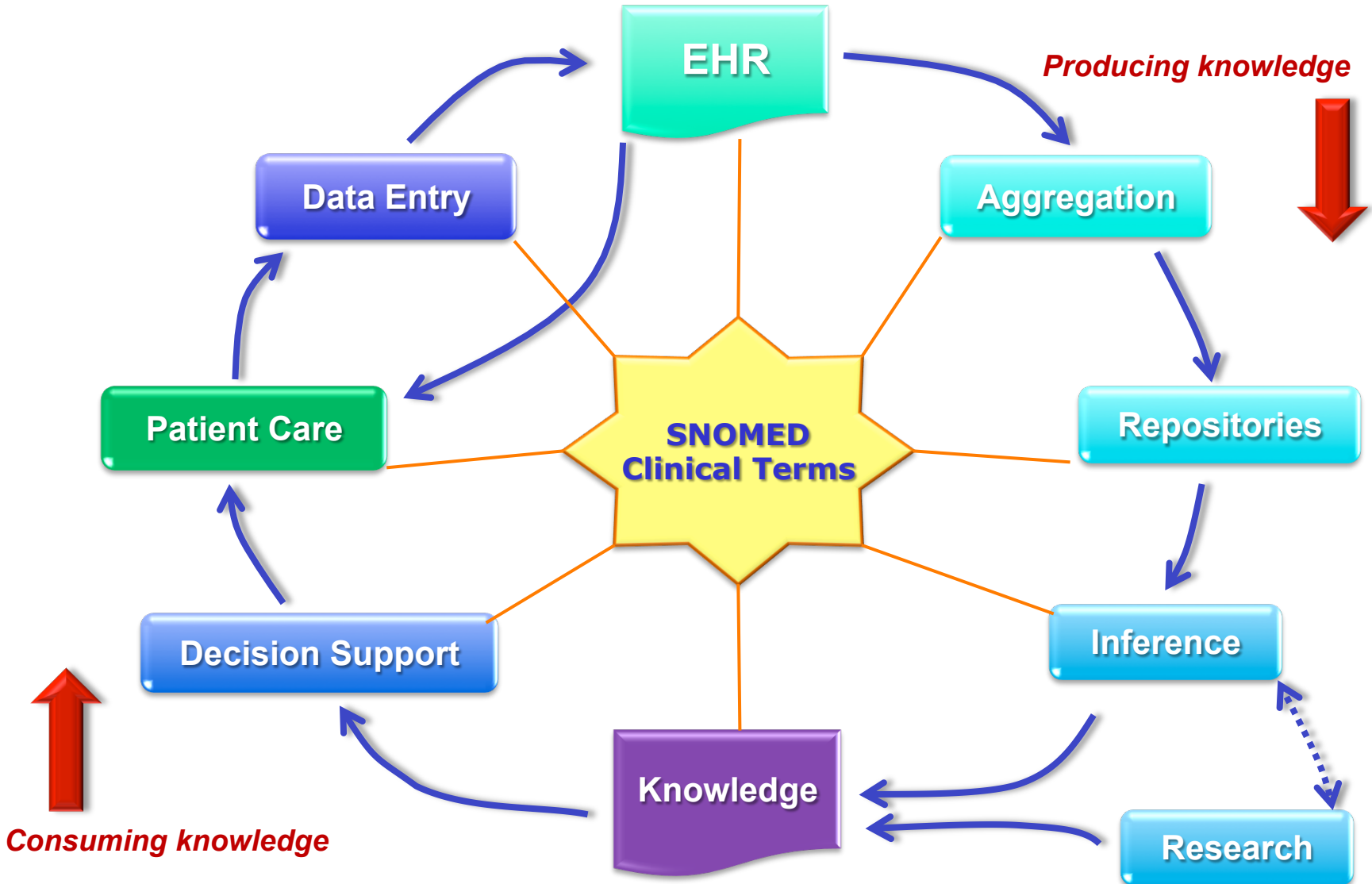
- SNOMED CT is designed to represent clinical meanings
 - It meets the requirements for an interoperable coordinate systems for EHR knowledge linkage
 - International and owned by a not-for-profit association
 - Covers the broad scope of healthcare
 - Represents clinical information at different levels of detail
 - A network of semantic links between concepts
 - Enables description logic inferences
- Note
 - Classifications like ICD-10 are similar to Zip codes in that they specify arbitrary categories for a specific purpose (e.g. for statistical analysis)

Knowledge linkage is not a one way street – there is a cycle of knowledge

- Linked knowledge identifies roads, traffic conditions and toll charges to support routing decisions
- The journey itself contributes to linked knowledge about traffic conditions and drive times



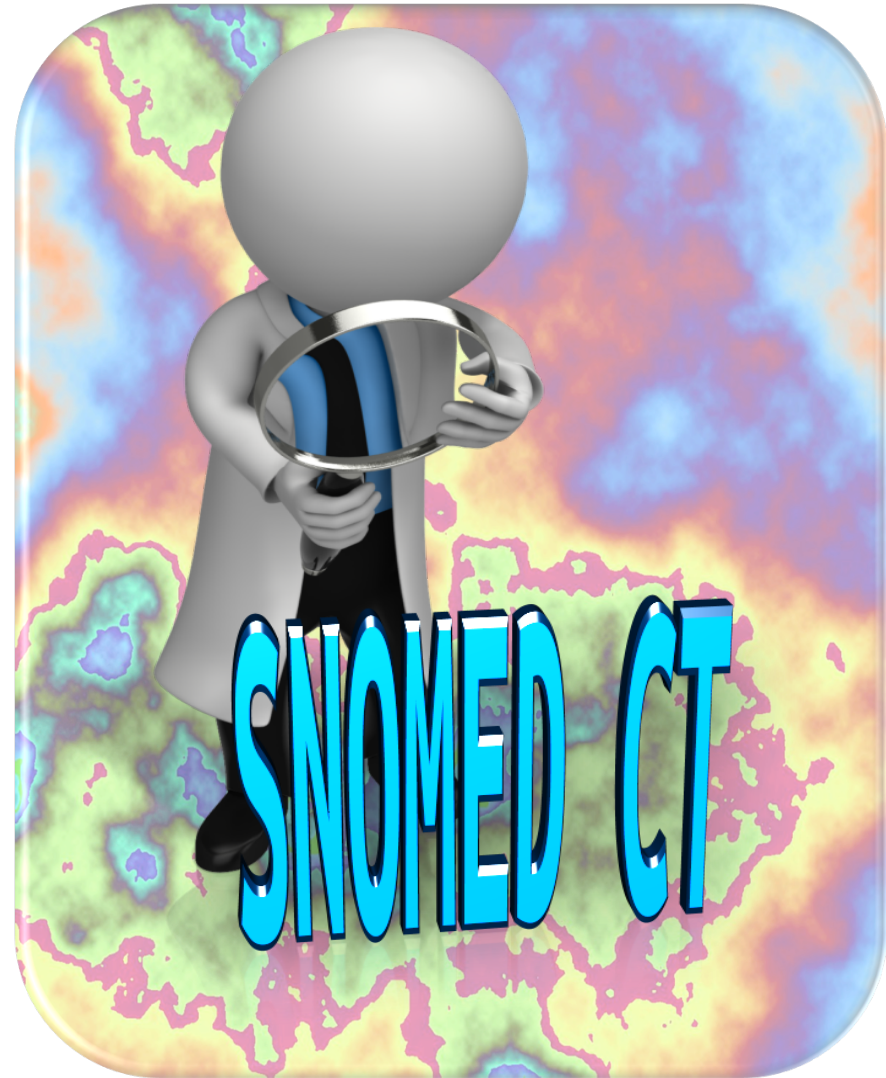
SNOMED CT is the coordinate system for linking the clinical knowledge cycle



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SIMPLE IDEAS
IN A COMPLEX
REALITY



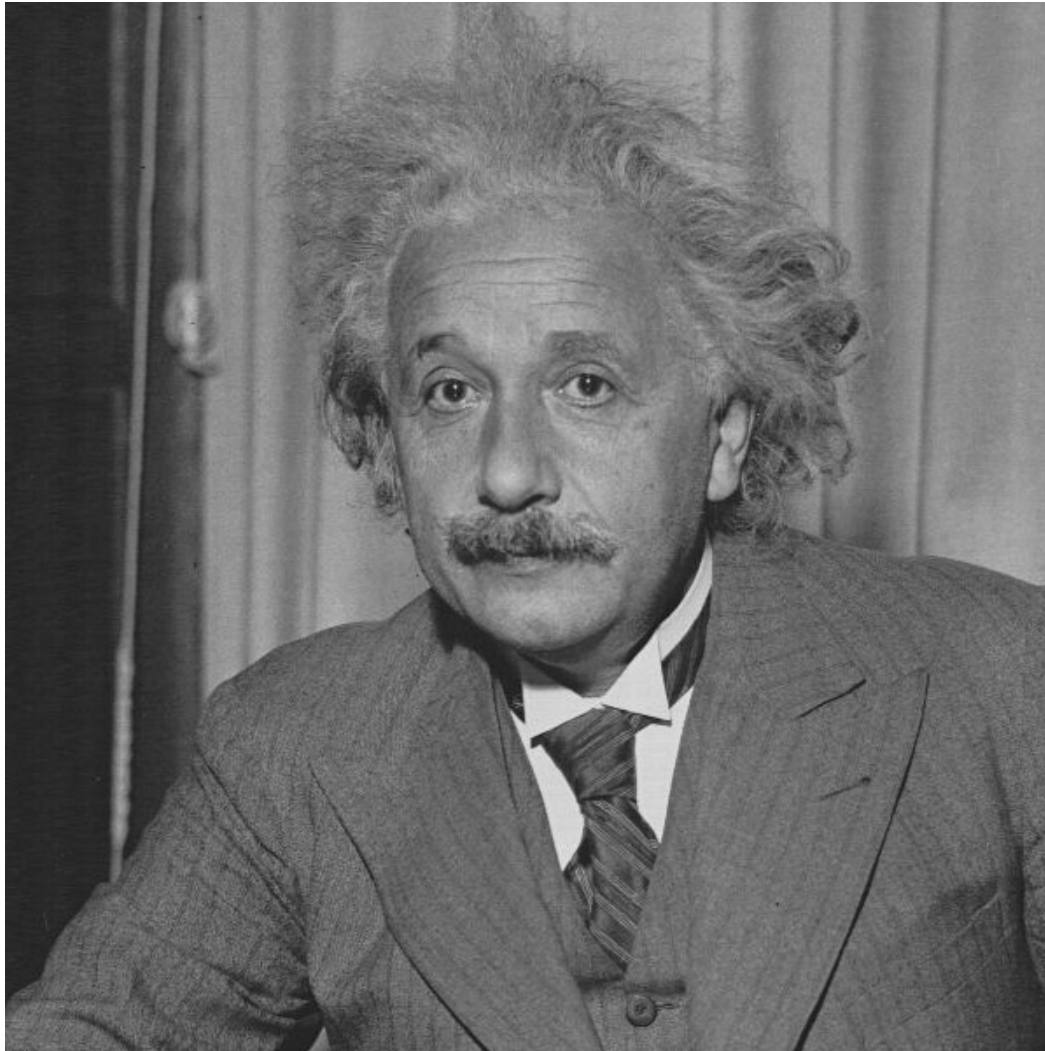
Simple ideas in a complex reality

- SNOMED CT is a bit more complicated than a simple list of codes and terms
 - Why not keep it simple?

Because ...

- Clinical information is inherently complex
 - It consists of thousands of clinical ideas woven into a multitude of shapes determined by ...
 - Life events of people, families and populations
 - Perceptions of clinicians, patients and politicians
 - Anatomical, physiological, psychological and cultural interconnections

Dealing with inherent complexity



**‘Everything
should be made
as simple as
possible,
but no
simpler.’**

Albert Einstein

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FEATURES



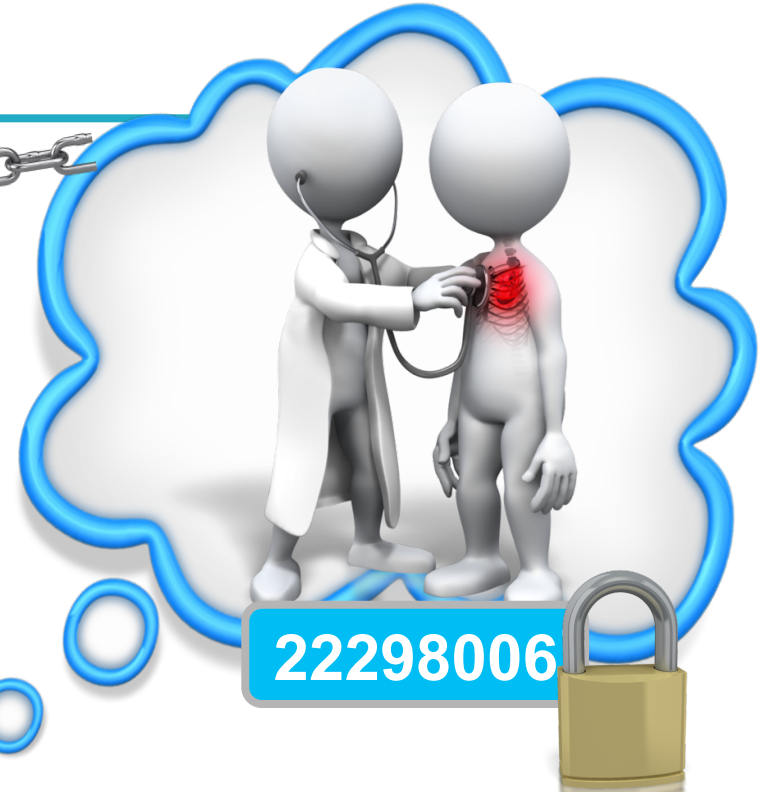
Concept

A clinical idea with a unique identifier



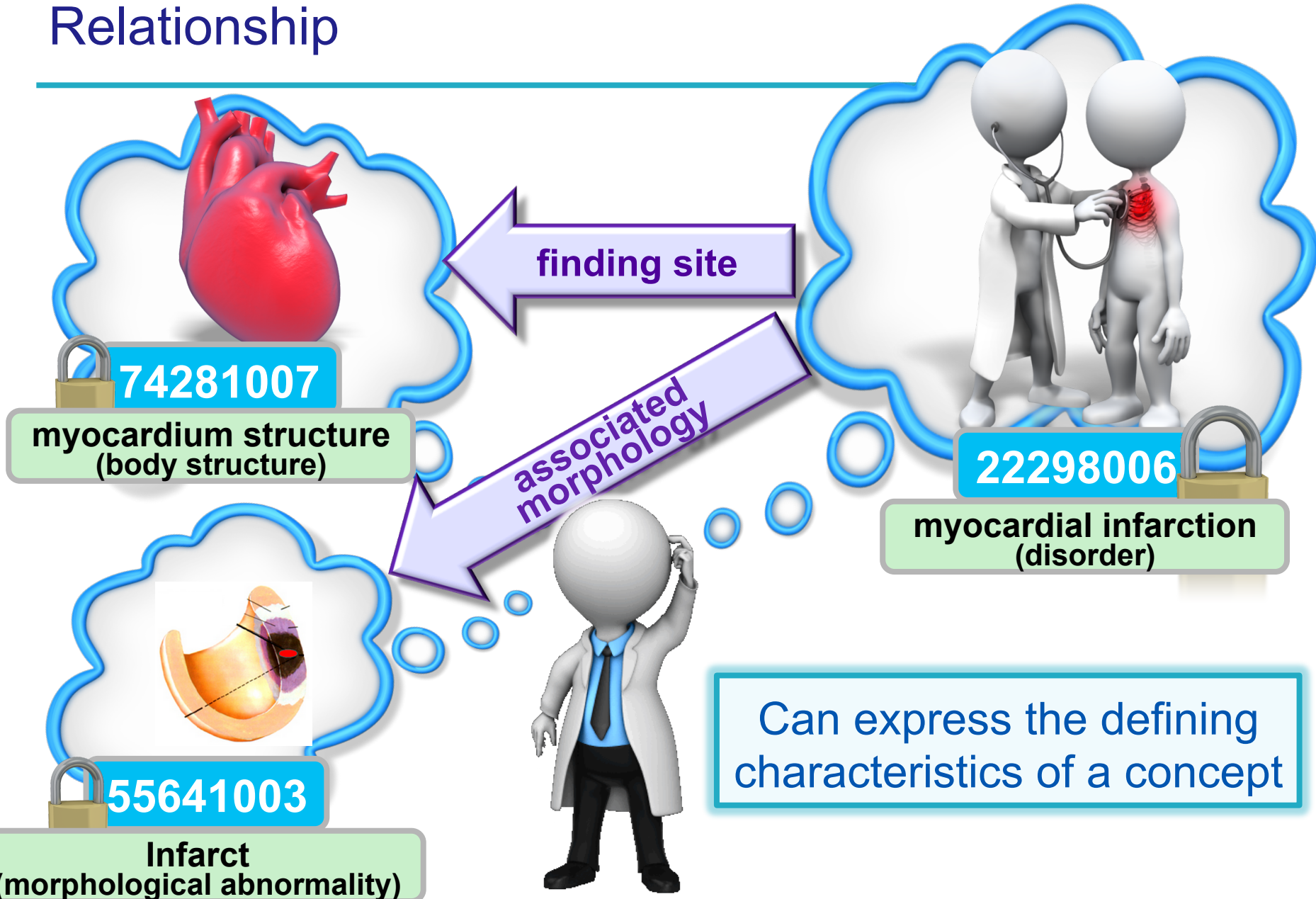
Description

FSN	myocardial infarction (disorder)	751689013
SYN	myocardial infarction	37436014
SYN	cardiac infarction	37442013
SYN	heart attack	37333015
SYN	MI – Myocardial infarction	17848
SYN	myocardial infarct	17848

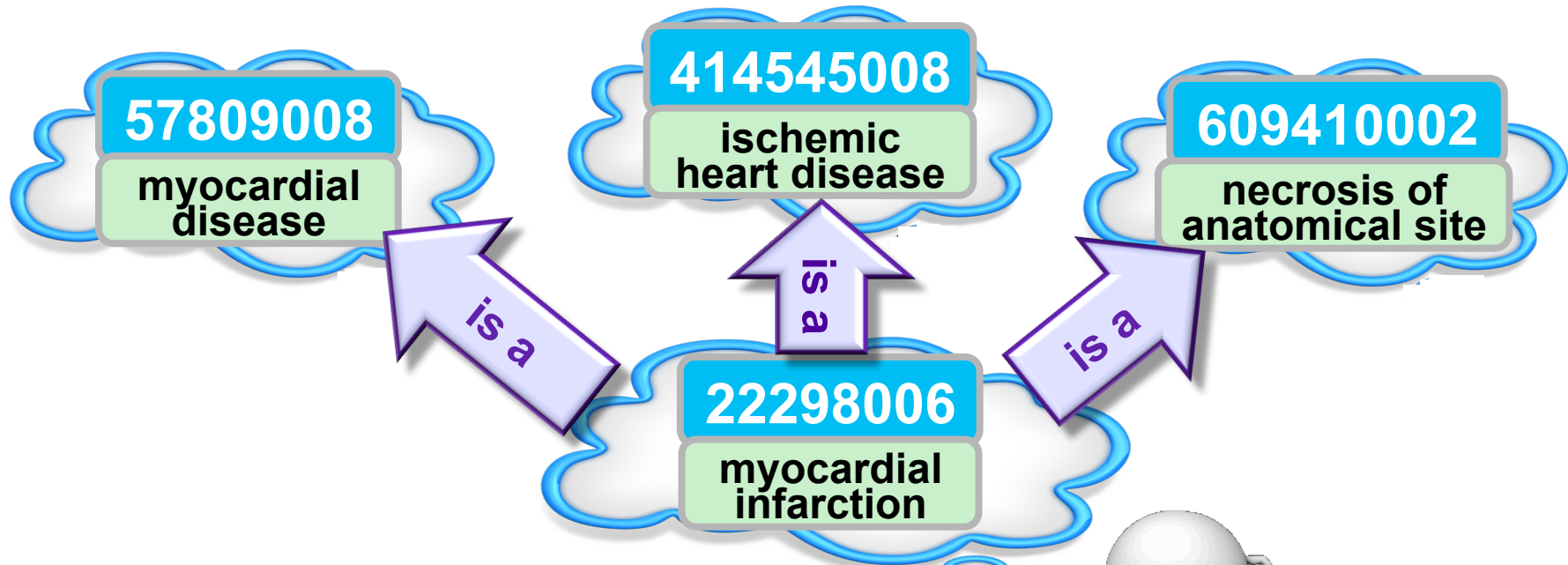


Human-readable term linked to a concept

Relationship



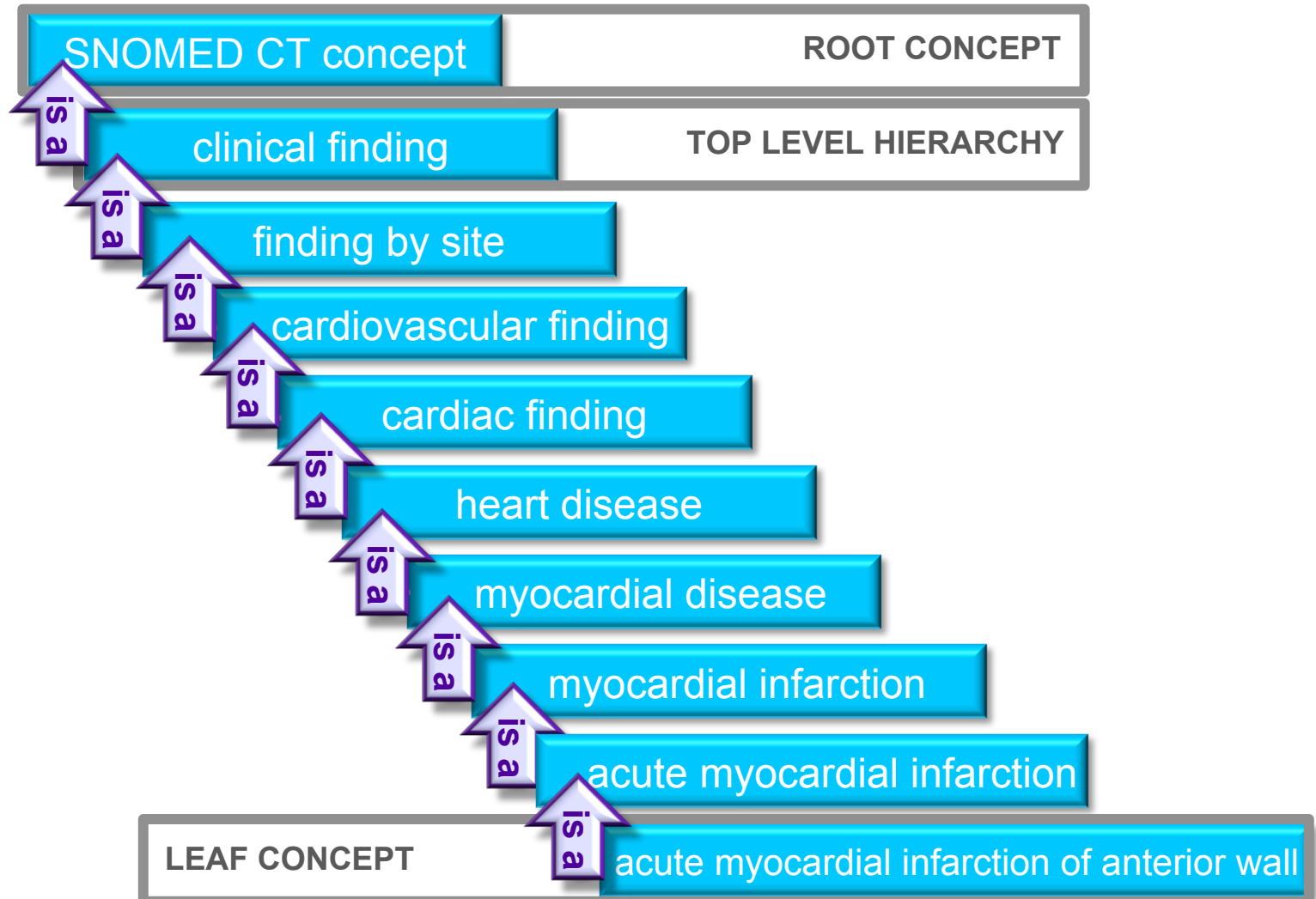
Relationship



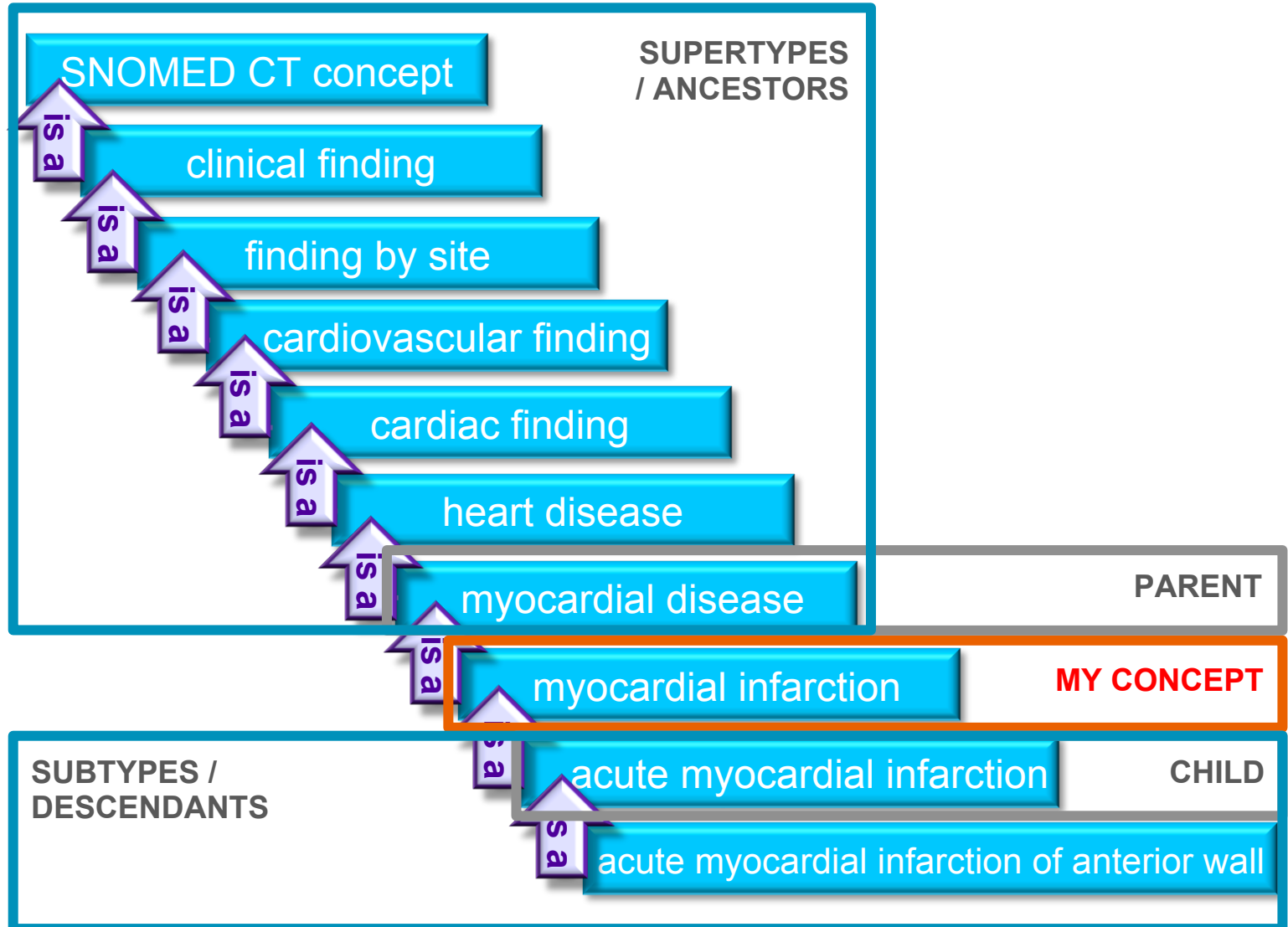
'is a' relationships form a subtype 'polyhierarchy'



Relationship Hierarchy



Relationship Hierarchy



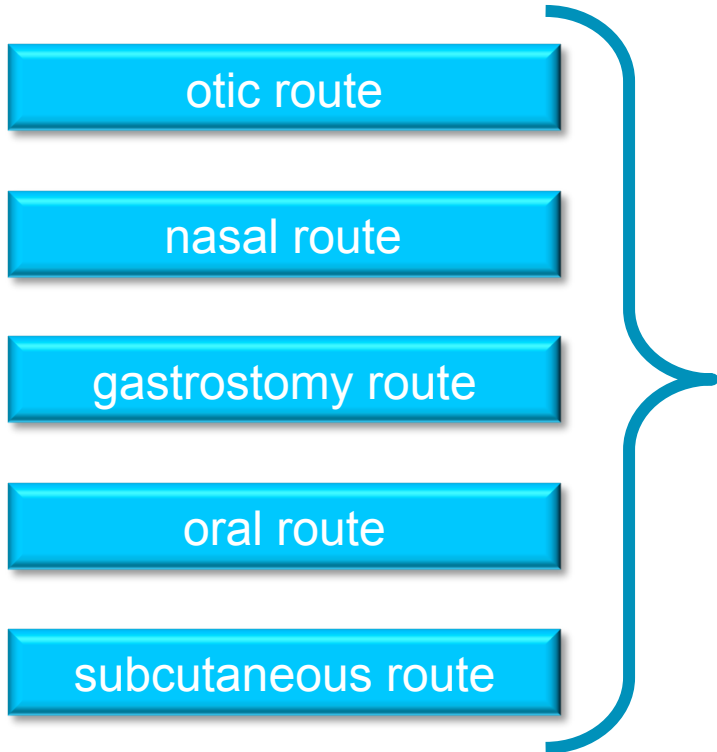
Reference Set

- A mechanism for representing references to SNOMED CT components to support many requirements including:
 - Subset – Limited search list or message data validation
 - Language – Preferred and acceptable descriptions in a dialect
 - Order – Prioritised display order in a search list
 - Alternative hierarchy – Navigational or aggregation
 - Annotation – Additional information about referenced component
 - Map – To or from another code system



Subset

A collection of components for a particular purpose



Route of administration subset	
Id	Term
10547007	Otic route
46713006	Nasal route
127490009	Gastrostomy route
26643006	Oral route
34206005	Subcutaneous route

Map

Between SNOMED CT and an external code system

ICD-O simple map reference set

SNOMED CT concept		ICD-O code	
243930007	entire spine	C41.2	Vertebral column
372177002	entire nail plate	C44.9	Skin, NOS
61685007	lower limb structure	C76.5	lower limb, NOS
447643008	lipoma	8155/1	lipoma, NOS
127573000	neuroendocrine carcinoma, grade 2	8249/3	Neuroendocrine tumor, grade 2
447644002	benign stromal tumour	8935/0	stromal tumor, benign

Language Preferences

EN-AU language reference set

FSN myocardial infarction (disorder) 

SYN myocardial infarction 

SYN cardiac infarction

SYN heart attack

SYN MI – Myocardial infarction

SYN myocardial infarct



22298006 



Language Preferences



EN-AU language reference set

SNOMED CT description		Acceptability	
751689013	myocardial infarction (disorder)	9000000000000548007	preferred
37436014	myocardial infarction	9000000000000548007	preferred
37442013	cardiac infarction	9000000000000549004	acceptable
37443015	heart attack	9000000000000549004	acceptable

Extension

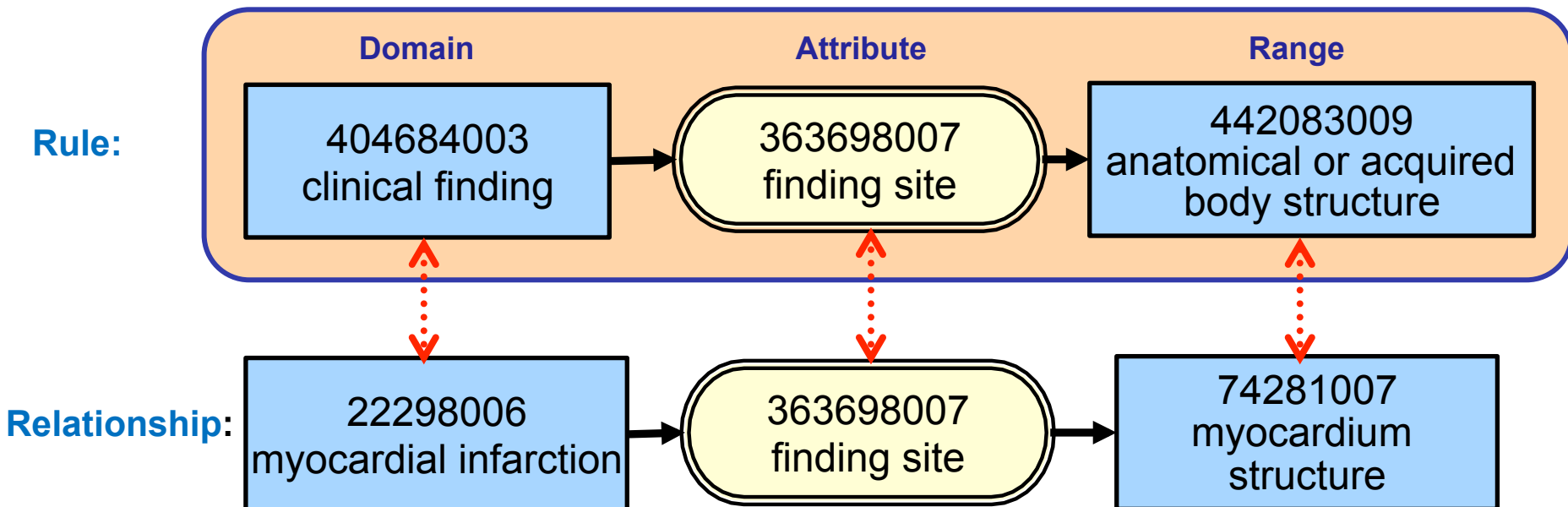
- Additional content for local use
 - To meet the needs of countries, specialties and realms
 - To meet vendor needs
 - To meet local business needs
- May include local
 - Components
 - Concepts, relationships, descriptions
 - Reference Sets
 - Subsets, Language, Maps
- Must have one or more authorized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



21782 1000132 10 5

Concept Model

- Rules for how SNOMED CT concepts are defined
 - Constrains the domain and range of each attribute
 - Defines some additional constraints (e.g. cardinality)



SNOMED CT Languages

1. Compositional Grammar

To define a SNOMED CT expression

Example: Right hip

182201002 | **hip joint** | : 272741003 | **laterality** | = 24028007 | **right** |

2. Expression Constraint Language

To constrain the set of possible concepts or expressions

Example: Edemas of lung

< 19829001 | **disorder of lung** | :
116676008 | **associated morphology** |
= << 79654002 | **edema** |



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CONTENT DEVELOPMENT AND RELEASES



Content Development

- Does it belong in SNOMED CT?
 - Must create and sustain semantic interoperability
 - Concepts must be Understandable, Reproducible and Useful
 - Must coordinate with information architecture components
 - Concepts represent classes or categories of real things
 - Comprehensiveness of coverage in included domains

- International content
 - Necessary for international conformance and interoperability
 - Useful for more than one country
 - Meets editorial guidelines

- National extension content
 - Outside the scope of the international release
 - 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 the current release format (since 2011)
- RF2 has additional features for versioning and extensibility



SNOMED CT RF2 Files

Concept

id	effectiveTime	active	moduleId	definitionStatusId
100000000	20090731	0	900000000000207000	900000000000074000
10000006	20020131	1	900000000000207000	900000000000074000
1000004	20030131	0	900000000000207000	900000000000074000
100001001	20090731	0	900000000000207000	900000000000074000
100002008	20090731	0	900000000000207000	900000000000074000
100003003	20090731	0	900000000000207000	900000000000074000

Description

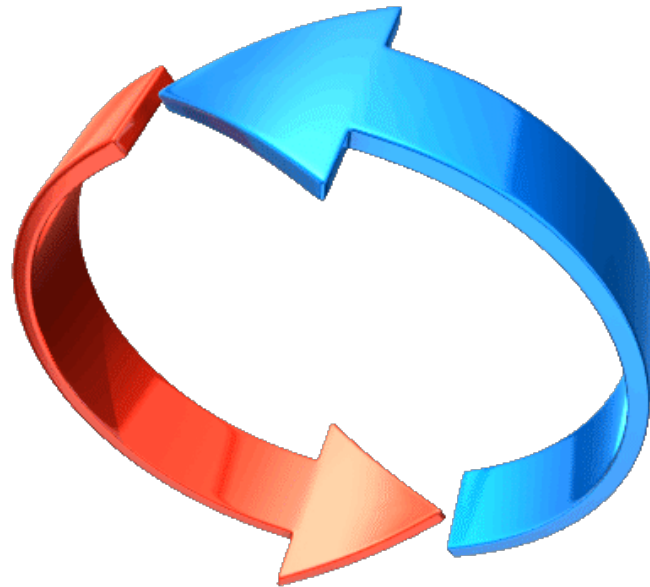
id	effectiveTime	active	moduleId	conceptId	languageCode	typeld	term	caseSignificanceId
100000016	20020131	0	900000000000207000	60203004	en	90000000000013000	Abrasion or friction burn of gum with infection	90000000000020000
10000010	20020131	1	900000000000207000	5379004	en	90000000000013000	Small intestine muscularis propria	90000000000020000
100001017	20020131	1	900000000000207000	60203004	en	90000000000013000	Gingival abrasion with infection	90000000000020000
100002012	20020131	1	900000000000207000	60204005	en	90000000000013000	Cauterization of conjunctival lesion	90000000000020000
100004013	20020131	1	900000000000207000	60206007	en	90000000000013000	Cutaneous actinobacillosis of sheep AND/OR cattle	90000000000020000
100005014	20020131	0	900000000000207000	60206007	en	90000000000013000	Cutaneous actinobacillosis of sheep and cattle	90000000000020000
100006010	20020131	1	900000000000207000	60207003	en	90000000000013000	Fibre lapper	90000000000020000
100007018	20020131	1	900000000000207000	60208008	en	90000000000013000	Coagulation factor V	90000000000020000
100008011	20130731	1	900000000000207000	60208008	en	90000000000013000	Proaccelerin	90000000000020000

Relationship

id	effectiveTime	active	moduleId	sourceId	destinationId	relationshipGroup	typeld	characteristicTypeld	modifierId
100000021	20020731	0	900000000000207000	255116009	367639000	0	308489006	90000000000011000	900000000000451000
100000028	20020131	1	900000000000207000	280844000	71737002	0	116680003	90000000000011000	900000000000451000
1000001020	20020731	0	900000000000207000	255135009	49596003	0	363698007	90000000000011000	900000000000451000
1000002029	20080731	0	900000000000207000	10002003	129304002	1	260686004	90000000000011000	900000000000451000
10000023	20100131	0	900000000000207000	10392004	47040006	0	116680003	90000000000011000	900000000000451000
1000003023	20030131	0	900000000000207000	10002003	119212007	3	363704007	90000000000011000	900000000000451000
1000004028	20050131	0	900000000000207000	10041001	91241007	2	116676008	90000000000011000	900000000000451000
1000005027	20020731	0	900000000000207000	10041001	44567001	1	363698007	90000000000011000	900000000000451000

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



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IMPLEMENTATION AND TOOLS



SNOMED CT in Use Around the World

- SNOMED CT is used in more than 50 countries
- National policy endorses use of SNOMED CT in several countries, including
 - Australia
 - Canada
 - England
 - India
 - Netherlands
 - Singapore
 - Sweden
 - United States
- Examples of SNOMED CT deployments
 - <http://snomedinaction.org/>



SNOMED in Action - Domains

- Clinical research
 - Public health
- Computerized Physician Order Entry
- Electronic prescriptions
- Immunization history
- Infection prevention
- Electronic health records
 - Hospital, Emergency care, Outpatient, Primary Care, Personal
- Specialties
 - Rheumatology, Pathology, Oncology, Ophthalmology, Optometry, Surgery
- And many more ...



Implementation Approaches

SNOMED CT can be used as:

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

IHTSDO Tooling Development

<http://www.ihtsdotools.org>

- Online SNOMED CT Browser (<https://browser.ihtsdotools.org>)
 - Includes International, Spanish, Australian, Danish, Swedish, UK and US Editions of SNOMED CT
- SNOMED CT Authoring
 - IHTSDO Workbench: <http://tiny.cc/78vgbx>
 - New IHTSDO online authoring environment under development
- Other IHTSDO tools available or under development
 - SNOMED CT Mapping Tool
 - MLDS (Licensing)
 - SIRS (Request Submission)
 - Reference Set management tool
 - Release service
 - Terminology server



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SUMMARY



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



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LEARNING
MORE





Welcome to IHTSDO

The International Health Terminology Standards Development Organisation determines global standards for health terms, an essential part of improving the health of humankind.

We are committed to maintain and grow our leadership as the global experts in healthcare terminology, ensuring that SNOMED CT, our world-leading product, is accepted as the global common language for health terms.

Latest news

SNOMED CT Expo 2015: Call for Papers Deadline Extension

July 13, 2015

IHTSDO is pleased to announce that due to popular demand the deadline for submissions for the SNOMED CT Expo 2015 Call for Papers has been extended.

IHTSDO Events

Information & Sign Up

SNOMED CT Events

SNOMED CT

The Global Language of Healthcare

SNOMED CT is the most comprehensive and precise clinical health terminology product in the world, owned and distributed around the world by The International Health Terminology Standards Development Organisation (IHTSDO).

SNOMED CT has been developed collaboratively to ensure it meets the diverse needs and expectations of the worldwide medical profession and is now accepted as a common global language for health terms.

Patients and healthcare professionals benefit from improved health records, clinical decisions and analysis, leading to higher quality, consistency and safety in healthcare delivery.

What is SNOMED CT?

[Learn About SNOMED CT ▶](#)

Why SNOMED CT?

[The Benefits of SNOMED CT ▶](#)

Learn More

[Learning Service, Starter Guide, Library ▶](#)

SNOMED CT Worldwide

[Comprehensive, Scalable, Flexible and Translatable ▶](#)

SNOMED CT & Other Terminologies



Change or Add to SNOMED CT

[Request Submission and Namespace Identifiers ▶](#)

Get SNOMED CT

[Find out how to get SCT ▶](#)

SNOMED CT Tools

[Products and Services ▶](#)



[What is SNOMED CT?](#)

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Learn More

SNOMED CT E-Learning Service

IHTSDO provides online courses, tutorials and other materials that are designed to enable you to learn more about SNOMED CT. Additionally, we offer completion certificates to those who pass course assessments. To find out more about these education services please visit the [E-Learning Overview](#). For courses, tutorials and other educational materials go to the [SNOMED CT E-Learning Server](#).

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](#) ►

[What is SNOMED CT?](#)

[Why SNOMED CT?](#)

[Learn More](#)

[E-Learning Overview](#)

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E-Learning Overview

IHTSDO provides online courses, tutorials and other materials that are designed to enable you to learn more about SNOMED CT. These services are delivered through the [SNOMED CT E-Learning Server](#).

Online Courses

[SNOMED CT Foundation Course](#)

The objective of this course is to extend the depth and breadth of knowledge of SNOMED CT in the global community. The course aims to provide authoritative coverage of a broad range of topics related to SNOMED CT at a relatively basic level. It also enables the growth of more detailed understanding of SNOMED CT by enabling those who complete this course to join more advanced SNOMED CT E-Learning courses in future. This course is targeted at anyone seeking to acquire or demonstrate a broad foundational knowledge of SNOMED CT.

Two intakes have now completed the course, a new intake of over 500 people recently started the course and 700 more are booked to start in September. Applications reopen on 24th August 2015 and from that point onwards our target is to offer all applicants a start date within 8 weeks of receipt of their application. Study is self-paced and is expected to require a total of 30-35 hours. The course must be completed within a maximum of four months but it is possible to complete it within as little as a week.

[SNOMED CT Implementation Course](#)

This course builds on knowledge gained during the SNOMED CT Foundation course. It provides an understanding of SNOMED CT that is sufficient for those engaged in various parts of the implementation process – from the decision to adopt SNOMED CT, through to specification and procurement and/or design and development of SNOMED CT enabled solutions, to deployment and practical use.

Successful completion of the Foundation Course is a prerequisite for applying for this course. The first intake began in mid 2015 with new intakes scheduled every three months. The course duration is six-months with an estimated time commitment of 12-15 hours per month.

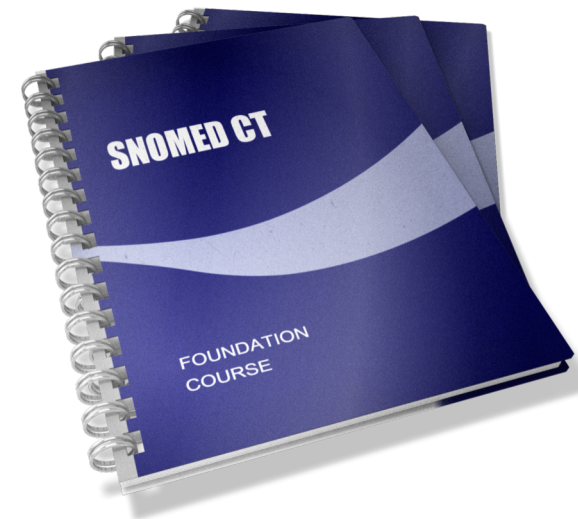
SNOMED CT E-Learning Server

- Online Courses
 - SNOMED CT Foundation Course
 - SNOMED CT Implementation Course
 - SNOMED CT Content Development Theory Course (*starts 2016*)
- Open Access Services
 - Starter Tutorials
 - SNOMED CT Challenge
 - Other Educational Materials
 - Member Education Resources
 - Showcase / Expo Presentations
 - Other Presentations



SNOMED CT Foundation Course

- Provides authoritative coverage of a broad range of topics related to SNOMED CT at a relatively basic level
- Those who complete the course may join more advanced SNOMED CT courses
- Self paced requiring a total of 30 – 35 hours
- May be completed in between 1 week and 4 months
- E-Learning presentations
 - 3 modules with 6 presentations per module
- Online assessments
 - 4 assessments (1 per module and 1 final practical assessment)
- Completion certificate



SNOMED CT Foundation Course – Topics

Module A

- Learning about SNOMED CT
- Introduction to SNOMED CT
- SNOMED CT Benefits for Organizations
- Why Clinical Terminology Matters
- Introduction to IHTSDO
- Exploring SNOMED CT Content

Module B

- SNOMED CT Components
- SNOMED CT Licensing
- Release Files and Formats
- SNOMED CT Concept Model
- Content Development
- Introduction to Extensions

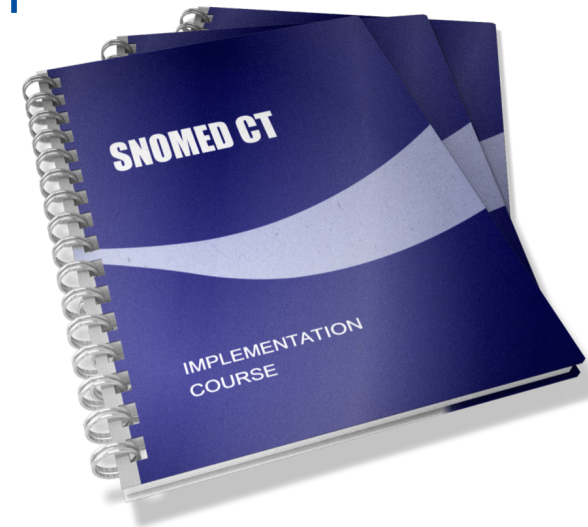
Module C

- Reference Sets
- SNOMED CT Configurable Features
- Translation and Language Preferences
- Introduction to Mapping
- SNOMED CT Expressions
- SNOMED CT Implementation



SNOMED CT Implementation Course

- Builds on knowledge gained during the SNOMED CT Foundation Course
- Provides an understanding of SNOMED CT that is sufficient for those engaged in various parts of the implementation process
- Six month course with new intakes every 3 months
- Requires around 12-15 hours per month
- Six modules (1 per month)
 - E-Learning presentations (*6 - 12 per module*)
 - Webinar tutorials (*1 per module*)
 - Assignments (*1 per module*)
 - Online assessments (*1 per module and 1 final assessment*)



Implementation Course – Topics (A, B, C)

Module A – Adoption & Planning

- Building the Business Case
- Implementation Examples
- Licensing and Distribution
- SNOMED CT in EHRs
- Implementation Overview
- Implementation Approaches
- Implementation Services & Tools

Module B – Design (Terminology Content)

- SNOMED CT Content Hierarchy
- Concept Model Overview
- Clinical Findings, Procedures
- Pharmaceutical / Biologic Products
- Substances, Physical Objects
- Anatomy, Events, Specimen
- Situation with Explicit Context

Module C – Design (Terminology Services)

- SNOMED CT Logical Design
- Relationship Views and Transforms
- Release Format 2
- Reference Sets
- Expressions
- Expression Constraints
- Subtype Testing



Implementation Course – Topics (D, E, F)

Module D – Design (EHR Services)

- Information Models
- Interface Terminology
- Searching
- Data Entry
- Analytics
- Communication
- Storage

Module E – Development

- SNOMED CT Extensions
- Handling Missing Content
- Importing Release Files
- Accessing Components
- Mapping Basics
- Mapping to ICD-10
- LOINC and SNOMED CT

Module F – Deployment & Use

- Creating, Distributing and Using Subsets
- Maintenance and Change Management
- Using Description Logic
- Advanced Description Logic
- Migration from Legacy Systems
- EHR Tooling Case Studies
- SNOMED CT Deployment Examples



SNOMED CT Content Development Theory Course

- Explores
 - SNOMED CT content and concept models
 - Principles of development and changes to content
- Audience
 - Those interested in learning more about SNOMED CT content and how changes to content are made
- Duration
 - 3 months
- Prerequisite
 - Successful completion of the SNOMED CT Foundation Course

Other SNOMED CT Resources

- IHTSDO Website (<http://www.ihtsdo.org>)
- SNOMED CT Document Library (<http://snomed.org/doc>)
 - SNOMED CT Starter Guide
 - National Release Center Guide
 - Vendor Introduction to SNOMED CT
 - Technical Implementation Guide
- SNOMED CT E-Learning <http://elearning.ihtsdotools.org/>
- SNOMED CT Browser (<http://browser.ihtsdotools.org/>)
- SNOMED CT Business Case (<http://www.ihtsdo.org/resource/resource/98>)

