

The need for a global language - SNOMED CT

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Delivering

SNOMED CT

The global
language of
healthcare

Agenda

- SNOMED CT and the EHR
- SNOMED CT – history and features
- Browsing
- Translation
- Collaboration

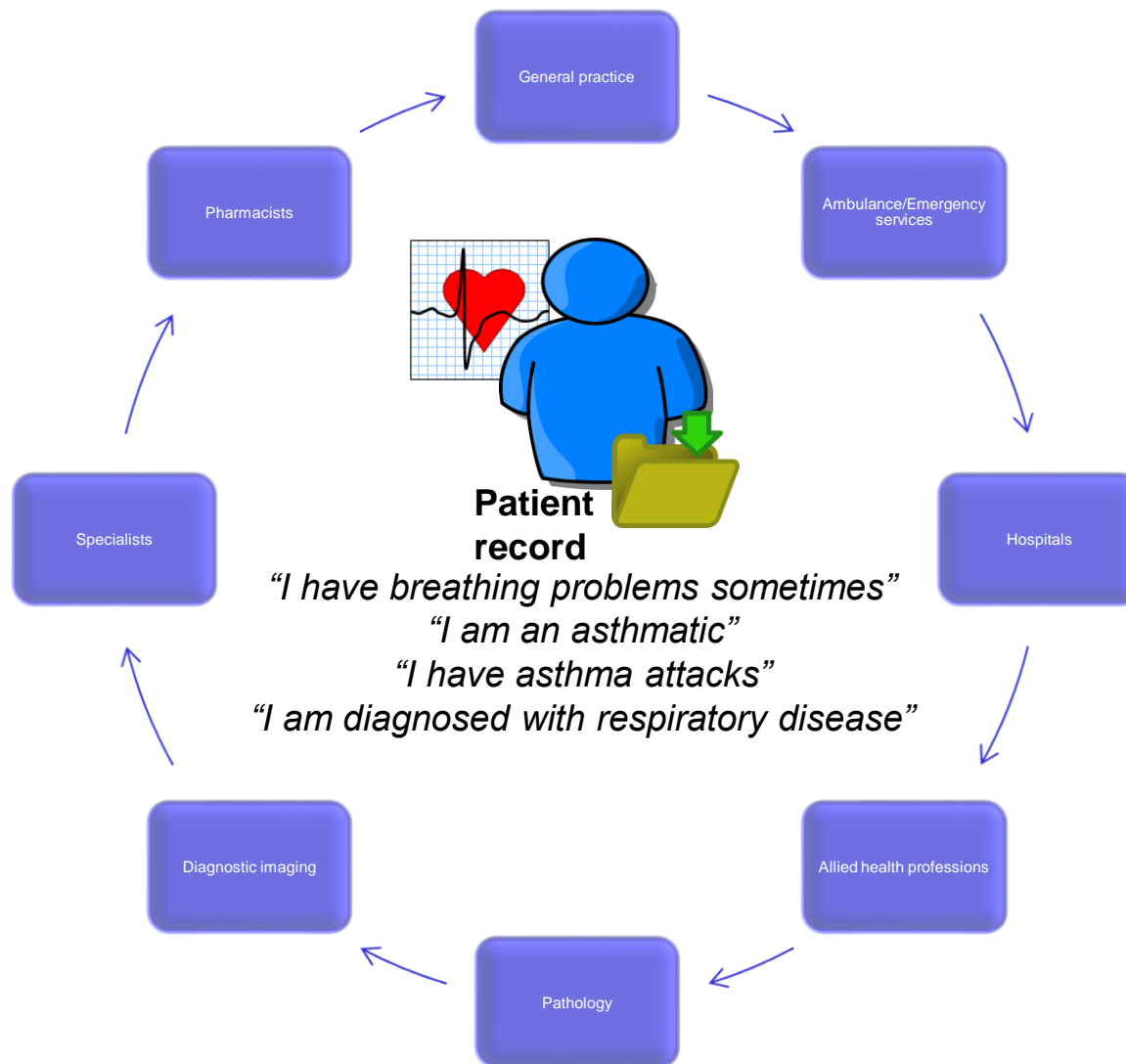
SNOMED CT and the EHR



The interoperability challenge

DIFFERENT DOCUMENTS

DIFFERENT TERMINOLOGY



DIFFERENT FORMATS

DIFFERENT SYSTEMS

Same information represented in different ways

- Retrieval and reuse may miss similar information represented in different structure/terminology combinations
- For example, representing Family history of asthma
 - A 'family history' check list with 'asthma' marked 'yes'
 - A 'family history' section referring to the SNOMED CT concept 'asthma'
 - A record entry referring to the 'family history of asthma' using a single SNOMED CT concept
 - A record entry containing a SNOMED CT expression such as 'family history : associated finding = asthma'
 - A record entry containing the SNOMED CT concept 'asthma' associated to a 'family member' by an information model
 - A patient record recording the information using ICD-10

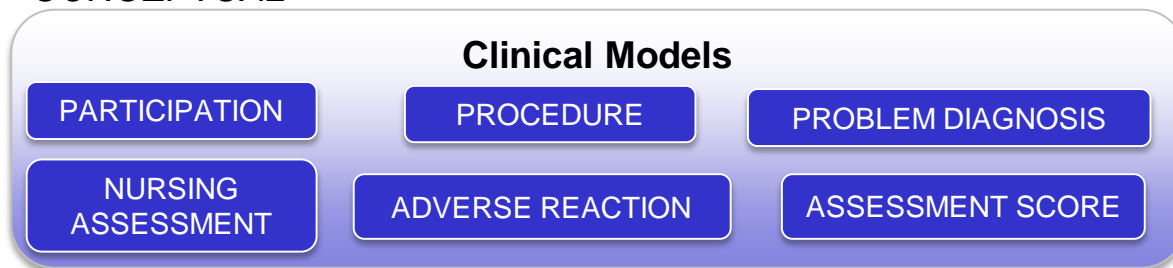
Where does SNOMED CT go in the EHR?

- Statements in EHR"s
 - Electronic health record is made up of a series of clinical assertions
- Codes are the values for fields/slots in the information model
 - Codes from the terminology fill in some or all of the statement body
 - Information model determines the fields/slots that are available
- Coordination required to avoid gaps and overlaps between:
 - Terminology model
 - Information model

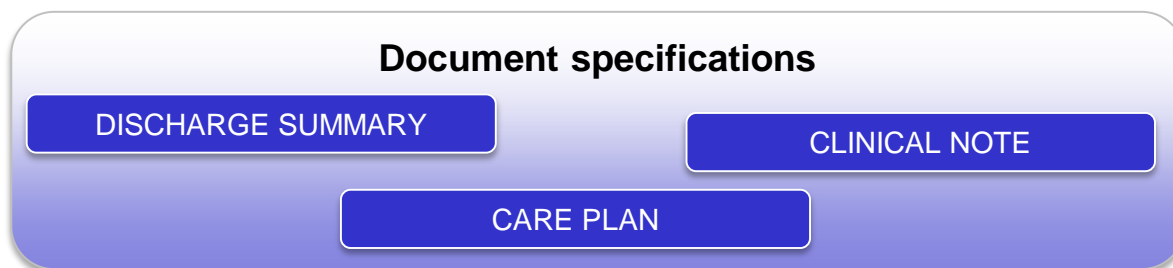


Information models

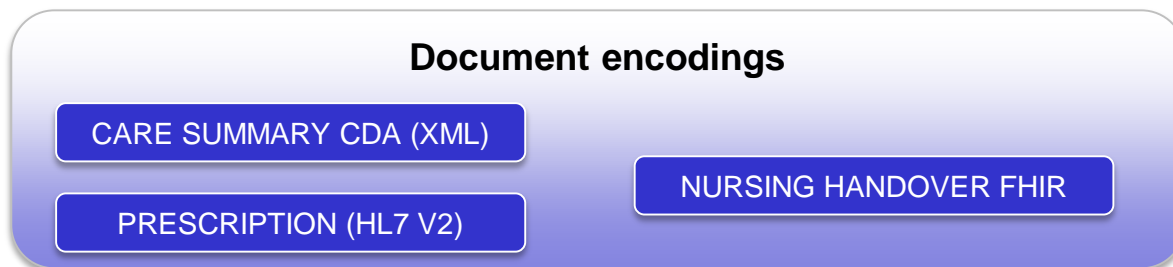
CONCEPTUAL



LOGICAL



IMPLEMENTABLE

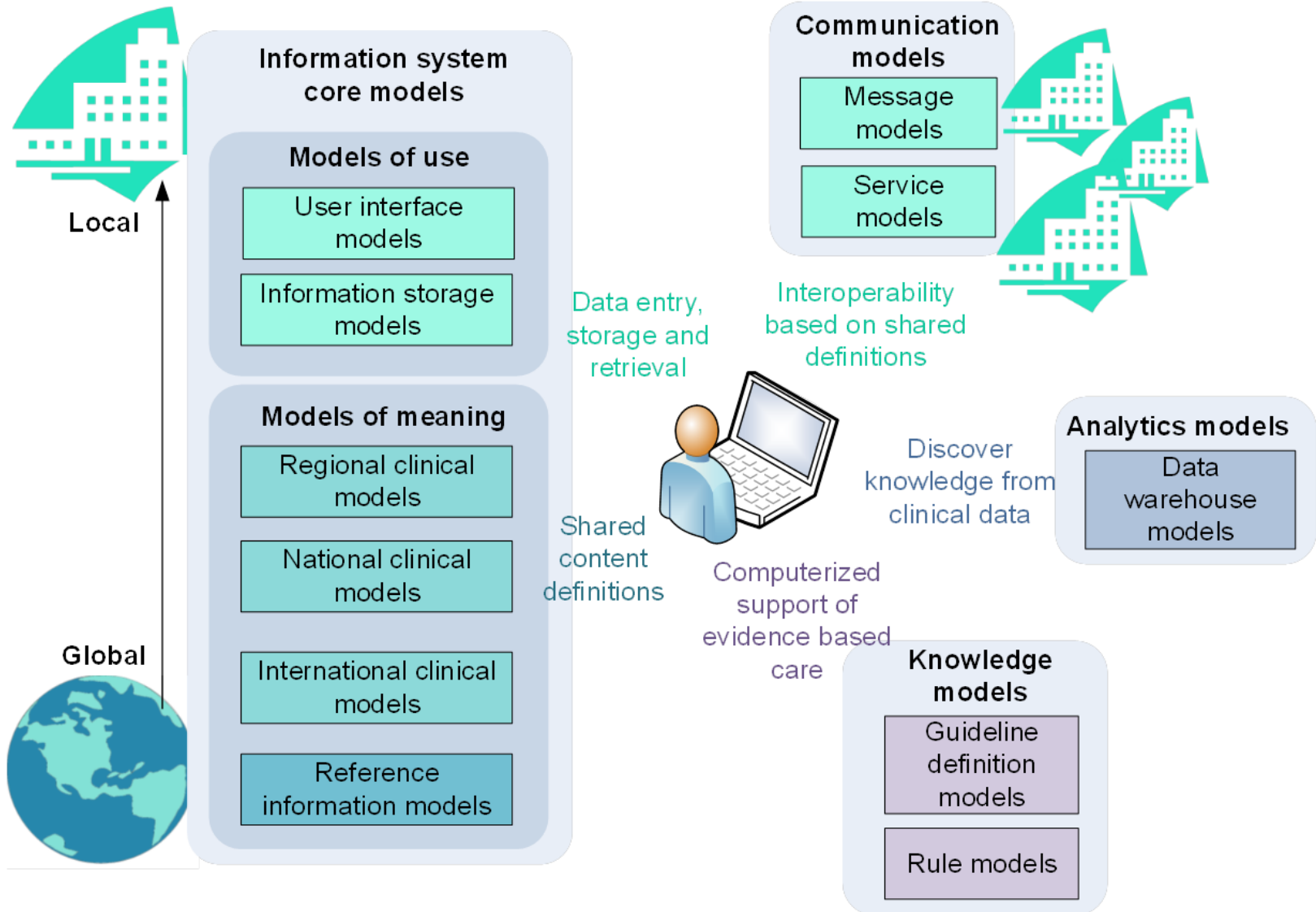


Use case driven +
business requirements

System/platfo
rm driven



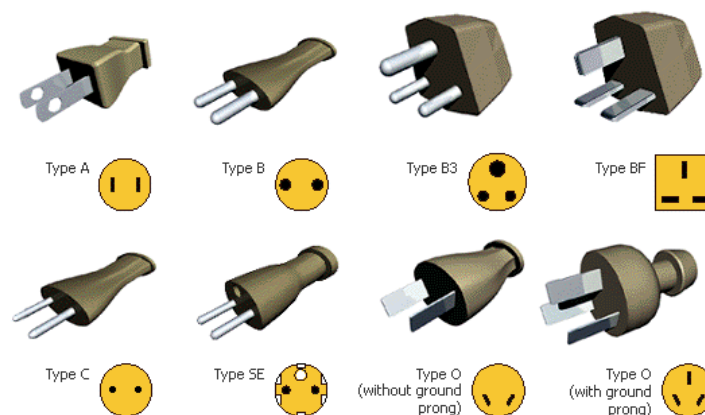
Types of Information Models



Information standards (examples)

- **Terminologies**
 - SNOMED CT
 - LOINC
 - RxNORM
 - AMT
- **Classifications**
 - ICD-9CM
 - ICD-10
 - ICD-10CM, AM etc
 - ICPC-2
 - ICNP
 - NIC, NOC, NANDA

- **Messaging**
 - HL7 (V2, CDA, FHIR)
- **Content Modelling**
 - Clinical Archetypes (CEN 13606)
 - openEHR
 - CIMI



SNOMED CT – history and key features



What is SNOMED CT ?

- SNOMED CT is a coded clinical terminology
- SNOMED CT supports
 - Detailed recording of relevant clinical data, that can patient focused
 - Effective retrieval of clinical information
 - Communication of clinical data interoperably
- SNOMED CT is the result of a collaboration between:
 - College of American Pathologists
 - United Kingdom's National Health Service
- SNOMED CT forms the foundation for a global clinical reference terminology

What can SNOMED CT be used for?

- Representation of patient based health information
 - Recording health & care of individuals with fidelity to the clinical situation
 - Indexing & retrieval of health information generally
 - Record retrieval & analysis based on meaning
 - Important for decision support applications
- More specific examples
 - Outcome measurement by monitoring progress over time
 - Public health reporting – infectious diseases, cancer, bio-surveillance
 - Reminders and alerts for preventative care

SNOMED CT - purpose

- To represent health information
- Recorded by clinicians
- At the level of detail they prefer
- At point of care
- To retrieve and analyze health information
- Retrieving health statements according to their meaning
- At various levels of abstraction
- For clinicians, patient, researchers, organizations and public health

SNOMED CT – purpose outcomes

- Providing a consistent way of recording, indexing, storing, retrieving and aggregating clinical data from structured, computerized clinical records, in order to support clinical care
- Recording statements about health and health care of an individual patient
- Retrieving those statements according to their meaning
- Retrieving at various levels of abstraction
- Meeting different use cases

Who uses SNOMED CT?

- Clinicians
 - The end users of EHRs
- System developers & vendors / suppliers
- System implementers
 - Hospitals, clinics, laboratories, etc.
- Information specialists
- Public health specialists
- Policy makers (government, professions, etc.)
- Researchers

History

College of American Pathologists

- SNOMED 2 (1979)
- SNOMED 3 - International (1993)
- SNOMED RT - Reference Terminology (2000)

United Kingdom – National Health Service

- Read Codes - 4-byte (1984)
- Read Codes 2 - 5-byte (1988)
- Clinical Terms Version 3 (CTV3) - Read Codes - 1999

A true confluence

- All concepts in SNOMED RT and CTV3 are included in SNOMED CT

From CAP to IHTSDO and Denmark to London

- 2007 – ownership of SNOMED CT moved to IHTSDO
- International Health Terminology Standards Development Organization (IHTSDO)
 - A not-for-profit organization incorporated in Denmark
 - Currently 30 member countries
 - Member nations provide the resources for coordinated development and release of terminology products
 - Owns and governs SNOMED CT and antecedent works
- 2016 – IHTSDO formally moved to be incorporated and based in the UK

Key features

- **Concepts**
 - The anchors for meaning
- **Descriptions**
 - Terms (strings of readable characters) used to express the meanings of the concepts in human language
- **Relationships**
 - Concept-to-concept links used to express information in computer processable language
 - First purpose: formal logical meanings
 - Other purposes: tracking retired concepts, representing facts that may vary, and supporting post-coordination

Standardising language

Why?

▪ Cold

- February is a cold month
- February is a 45893009 month

Cold weather
(physical
force)

- She had cold feet
- She had 271585001

Cold feet
(finding)

- Julia is in bed with a cold
- Julia is in bed with a 82272006

Common cold
(disorder)

Example

Fundus

- fundus of gallbladder – 14347000
- fundus uteri – 27485007
- fundus of eye – 65784005
- gastric fundus – 414003

All have a synonym of fundus in clinical practice, and within SNOMED CT

- It is essential that when information is transmitted, there is no room for ambiguity

Concepts and codes

- **One code per meaning, one meaning per code**
 - Strings of digits, length 6 to 18 (most commonly 8 or 9 digits)
 - 22298006 means “myocardial infarction (MI)”
 - 399211009 means “past history of MI”
 - Meaningful, but without embedded meaning within the code
- **Concepts vs Codes vs Real things**
 - Concepts are in people's heads
 - Codes are in the terminology
 - The codes *refer to* real things in the real world

Terms and descriptions

- A term string is a sequence of readable characters
 - E.g. “immunosuppression”
- A “description” is a term attached to a concept
- These are two different “descriptions” that have the same term string:
 - immunosuppression → immunosuppressive therapy (procedure)
 - Description ID = 507152014
 - Immunosuppression → immunosuppression (finding)
 - Description ID = 63394015

Relationships

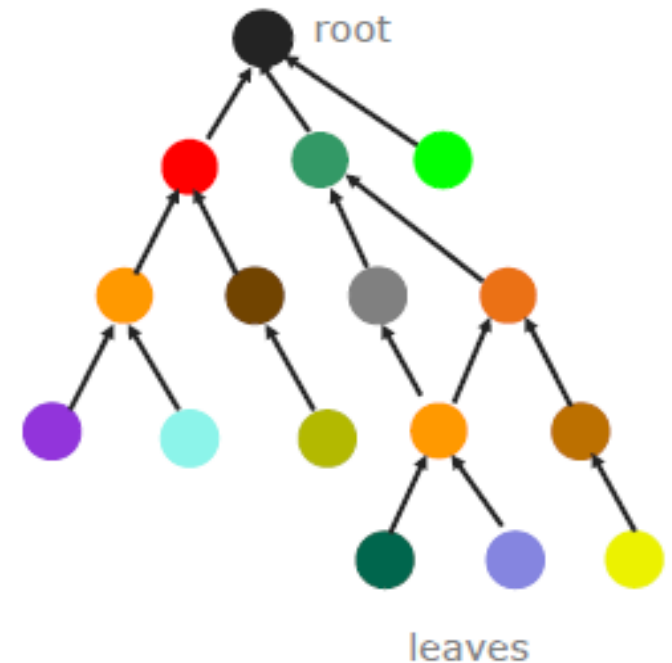
- **Can be of several types:**
 - Definitional: necessarily true about the concept
 - Qualifiers: may be added to specialize the concept
 - Historical: provides a pointer to current concepts from retired concepts
 - Additional: allows non-definitional information to be distributed

How are codes organized?

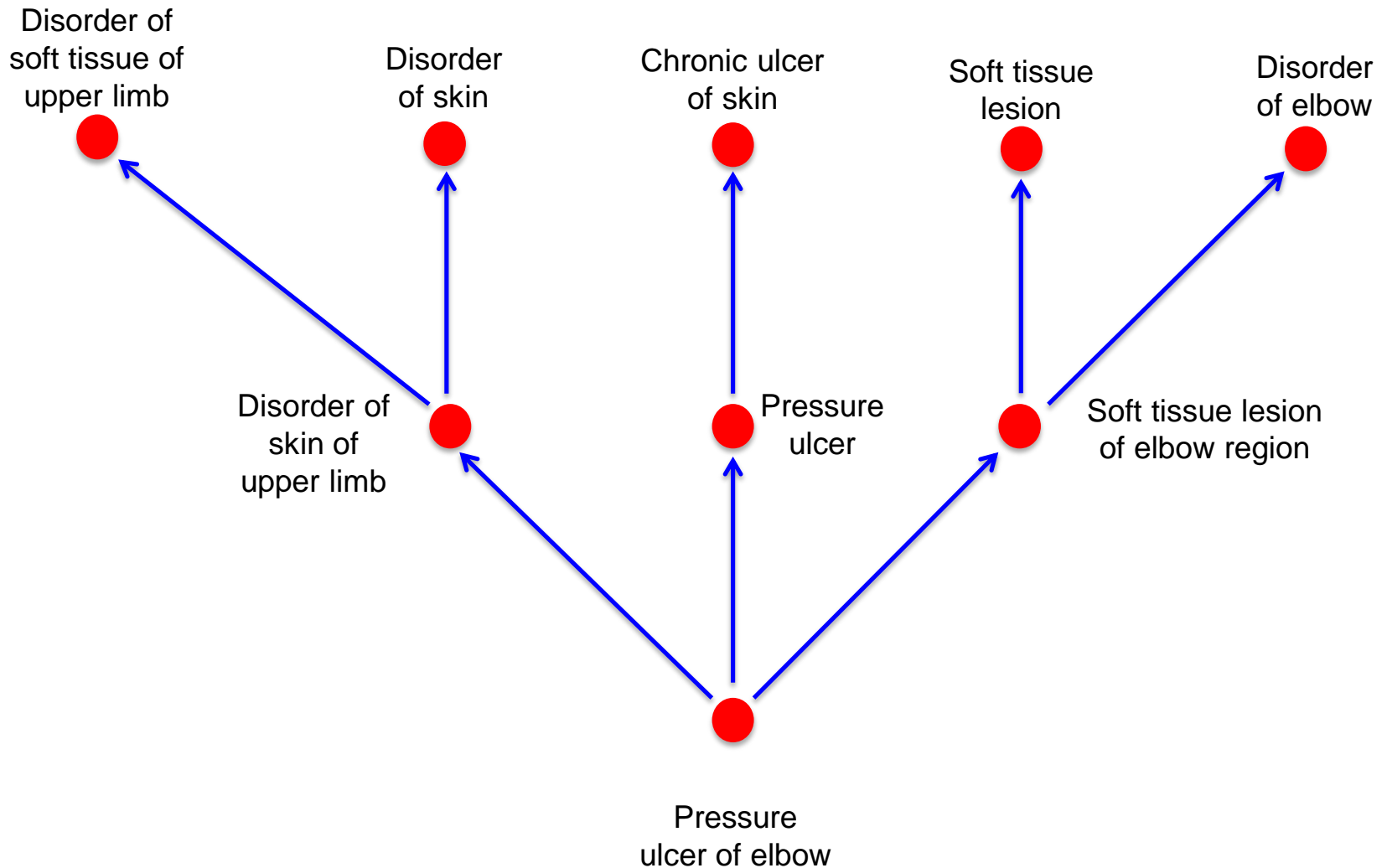
- **1) Directed acyclic graph**
 - logical subsumption relationships, with a single root
- **2) Attributes with values**
 - Necessarily true “existential restrictions”
- **3) Description logic definitions of each concept code**
 - Structured combinations of Is-a’s and attribute-value relationships

DAG (Directed acyclic graph)

- **Structure is based on a “Is_a” hierarchy**
 - Represents logical subsumption
 - A Is_a B means all instances of A are also instances of B



Example – Is_a hierarchy



SNOMED CT browser

The IHTSDO SNOMED CT Browser

The IHTSDO SNOMED CT Browser has just got better! This is version 2.0. Please go to the [release notes](#) to see what's changed!

The IHTSDO SNOMED CT Browser provides ways to browse and search SNOMED CT. The browser has been implemented as part of development within the IHTSDO Open Tooling Framework, by the IHTSDO and its development partners

The Browser is provided by the IHTSDO to anyone for reference purposes. The interface and REST APIs are **not** to be used as part of production systems in health care settings.


Please provide any feedback on the browser by clicking on the feedback button at the top of the page. Your feedback is essential to the evolution and improvement of this service. Please visit [SIRS](#) to provide content feedback.


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January 2016


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Many thanks to the IHTSDO Member countries who have provided their extensions in this browser. If you would like to enquire further about any of the Member country extensions in this browser, please contact the relevant National Release Center via the URLs below:

Web address - <http://browser.ihtsdotools.org/>

Browser – first page

Taxonomy

Inferred view

- SNOMED CT Concept
 - 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)

Concept Details

Concept Details

Summary Details Diagram Expression Refsets Members References

Stated Inferred

Parents

- SNOMED CT Concept (SNOMED RT+CTV3)

Clinical finding (finding) ☆

SCTID: 404684003

404684003 | Clinical finding (finding) |

Clinical finding (finding)

Clinical finding

No attributes

Children (30)

- Administrative statuses (finding)
- Adverse incident outcome categories (finding)
- Bleeding (finding)
- Calculus finding (finding)
- Clinical history and observation findings (finding)
- Clinical stage finding (finding)
- Cyanosis (finding)
- Deformity (finding)
- Disease (disorder)
- Drug action (finding)
- Drug interaction (finding)
- Edema (finding)

Translation

- SNOMED CT International release
 - US English
 - South American Spanish
- Translation is the responsibility of individual Member countries.
- Translations are released as part of Member Releases
- Current translations
 - Swedish
 - Danish
 - Dutch
 - Canadian French
 - European Spanish
- Language variations
 - UK English
 - Australian English



IHTSDO's key collaborations

- WHO – ensuring linkage between SNOMED CT and WHO classifications – ICD-10, ICD-11, ICD-O, (ICF)
 - HL7 – ensuring appropriate use of SNOMED CT in HL7 v2, v3, CDA and FHIR
 - ICN – Linking SNOMED CT to ICNP
 - DICOM – SNOMED CT set used globally in DICOM Digital Imaging standard
 - ISO TC 216 Health Informatics – contributing to development based on SNOMED CT requirements to interoperate
 - ADA - alignment between SNOMED CT and SNODENT
 - GS1- Linking SNOMED CT and GTINs (bar coded information on medicinal products)
 - WONCA - general/family practice subset and maps to ICPC2
- ... and many more

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