The need for a global language - SNOMED CT

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Agenda

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

- General practice
- Ambulance/Emergency services
- Hospitals
- Allied health professions
- Pharmacists
- Specialists
- Diagnostic imaging
- Pathology

Patient record

- "I have breathing problems sometimes"
- "I am an asthmatic"
- "I have asthma attacks"
- "I am diagnosed with respiratory disease"
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**

Clinical Models

- PARTICIPATION
- NURSING ASSESSMENT
- PROCEDURE
- ADVERSE REACTION
- PROBLEM DIAGNOSIS
- ASSESSMENT SCORE

**LOGICAL**

Document specifications

- DISCHARGE SUMMARY
- CLINICAL NOTE
- CARE PLAN

**IMPLEMENTABLE**

Document encodings

- CARE SUMMARY CDA (XML)
- PRESCRIPTION (HL7 V2)
- NURSING HANDOVER FHIR

Use case driven + business requirements

System/platform driven
Types of Information Models

Information system core models
- Models of use
  - User interface models
  - Information storage models
- Models of meaning
  - Regional clinical models
  - National clinical models
  - International clinical models
  - Reference information models

Communication models
- Message models
- Service models

Interoperability based on shared definitions
Data entry, storage and retrieval
Discover knowledge from clinical data
Computerized support of evidence based care

Analytics models
- Data warehouse models

Knowledge models
- Guideline definition models
- Rule models

Shared content definitions
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 be 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
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)

**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

- She had **cold** feet
  - She had 271585001

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

- Disorder of soft tissue of upper limb
- Disorder of skin of upper limb
- Disorder of skin
- Chronic ulcer of skin
- Pressure ulcer
- Soft tissue lesion
- Soft tissue lesion of elbow region
- Disorder of elbow
- Pressure ulcer of elbow
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.

International Editions

Go browsing... International edition January 2016
Ir al Navegador... Edición en español

Local Extensions

Go browsing... Australian edition
Go browsing... Canadian edition
Gå til browser-siden Danish edition
Go browsing... Netherlands edition

Go browsing... Swedish edition
Go browsing... United Kingdom edition
Go browsing... United States edition
Go browsing... Uruguay edition

or take the Tour...

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/
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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