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SNOMED CT Introduction


Expo 2016 Tutorial



Delivering
SNOMED CT
The global language of healthcare

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SNOMED CT Introduction Tutorial Overview


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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



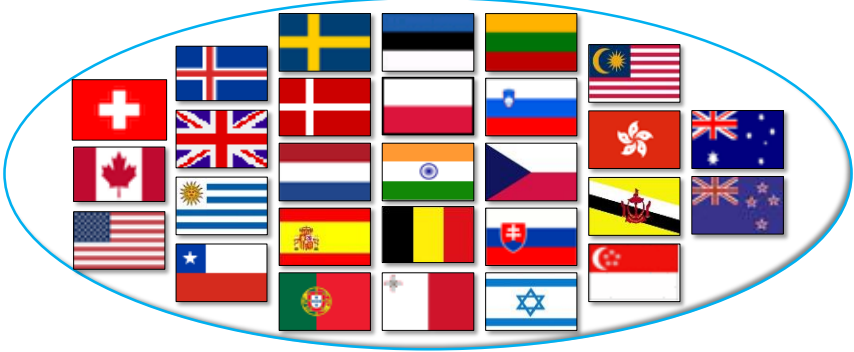


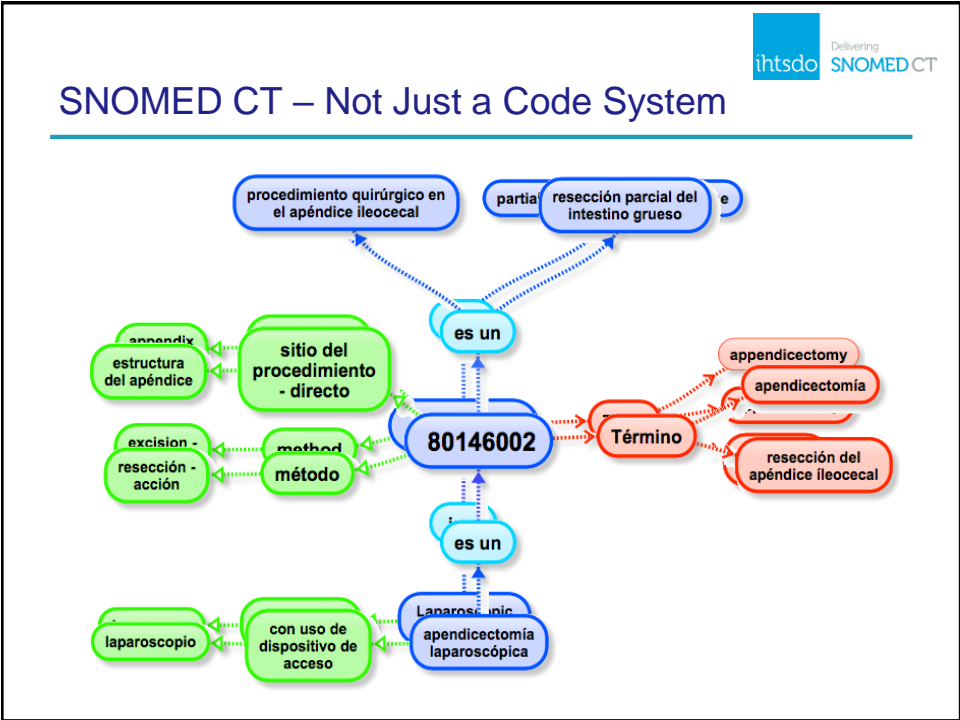
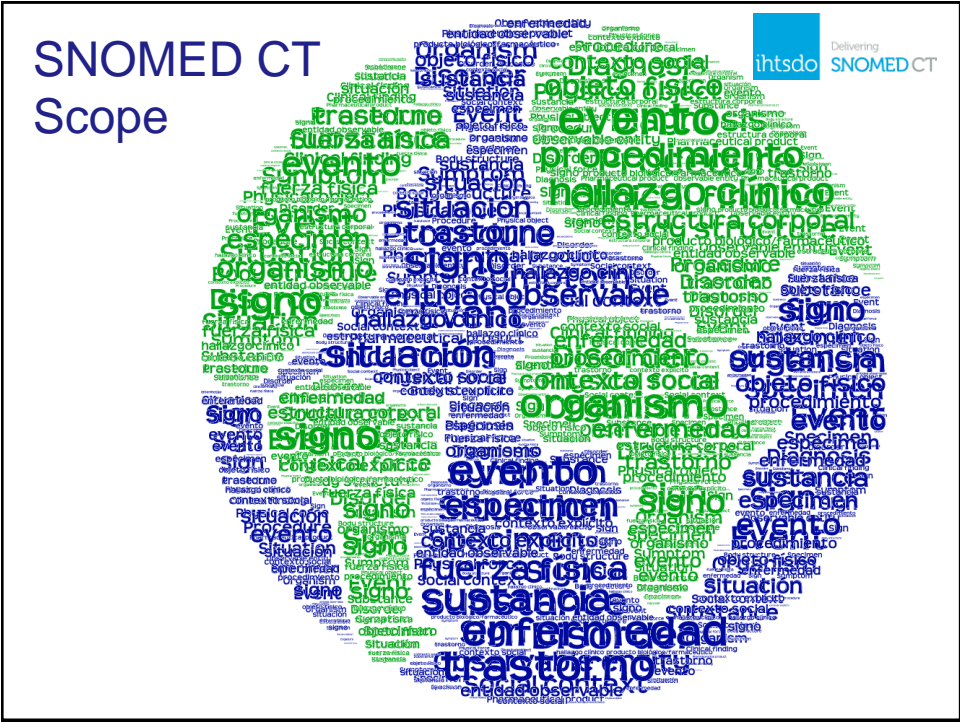
Background





SNOMED Clinical Terms

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






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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



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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”














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IHTSDO Current Members

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


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Collaborations with Other Standards

- **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 resources
 - HL7 CIMI is developing common approaches to modeling clinical information bound to SNOMED CT




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The Business Case for SNOMED CT




Building the Business Case for SNOMED CT - <http://snomed.org/businesscase>




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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





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Benefits Based on SNOMED CT Features

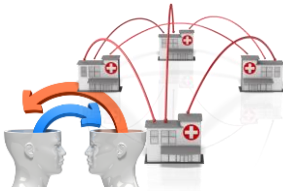
A solid foundation




Improved decision support




Interoperable information and knowledge resources






Improved Clinical and Business Intelligence





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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

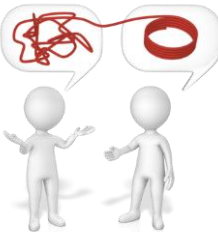
Electronic Health Records

- Making health records electronic


A significant step forward



Improves communication



Increases availability of relevant information



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

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

- 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

Meaningful Views of a Game of Chess

Meaningful view of current situation

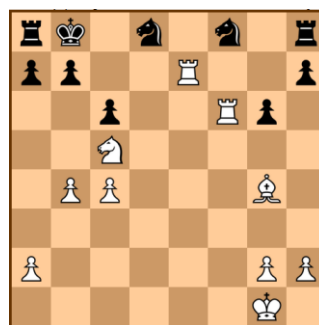
To start with white moved the queen's pawn to forward two spaces. Black responded by moving a knight in front of the king's bishop's pawn. White advanced the queen's bishop's pawn two spaces. Black then moved the king's-knight's pawn two spaces.

...
[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



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?

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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



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

“Lorem ipsum dolor sit amet, consectetur adipiscing elit. Integer elementum elementum eros, quis pharetra quam malesuada vitae.”

Surgical Procedure Summary

Type of surgery:

Action performed:

Approach:

Access:

Body location:

Reason for surgery:

Priority:

Surgical device:

Anaesthesia:



- A
- AA
- AA1
- AA2
- AB1
- B
- BA
- BA1
- BB
- BB1
- BB2
- C

- Local_001
- Local_002
- Local_003
- Local_004
- Local_005
- Local_006
- ...

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

Structured Data in 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

Surgical Procedure Summary

Type of surgery:

Action performed:

Approach:

Access:

Body location:

Reason for surgery:

Priority:

Surgical device:

Anaesthesia:

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

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”

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:	Dr	Code	Note
Smith First: John			
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 atticoantral suppurative otitis media
 F525. Recurrent acute otitis media
F526. Acute left otitis media
 F527. Acute right otitis media
 F528. Acute bilateral otitis media

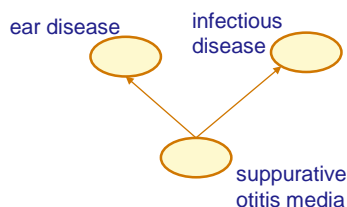
* Read Codes version 2

Limits of Simple Hierarchies of Ideas

- A simple hierarchy is 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



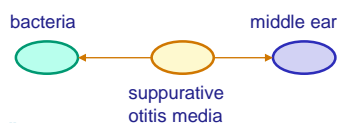
A **polyhierarchy** is needed represent clinical ideas.
 - In a polyhierarchy a node can have multiple parent nodes

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”



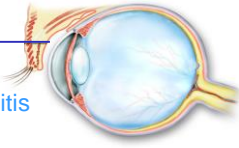
Non-hierarchical relationships are needed to represent these aspects of meaning



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Statistical Classifications

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

- Classifications address the need for consistent statistical reporting by grouping similar conditions (e.g. ICD-10)
- 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 dacryocystitis




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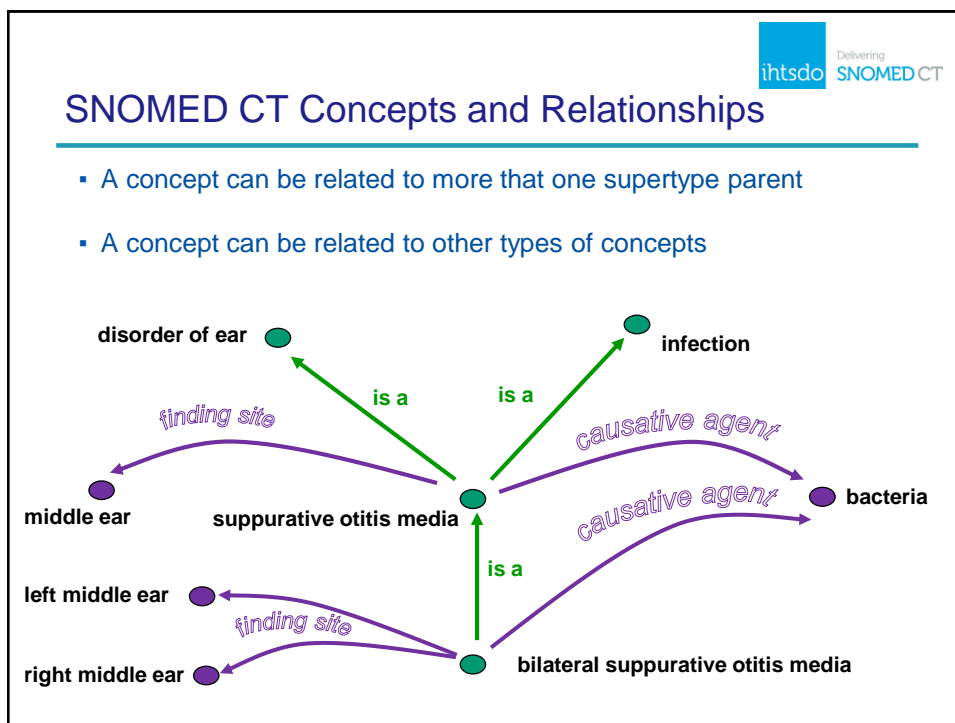
A Purpose Built Terminology

- 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

<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3415631/>

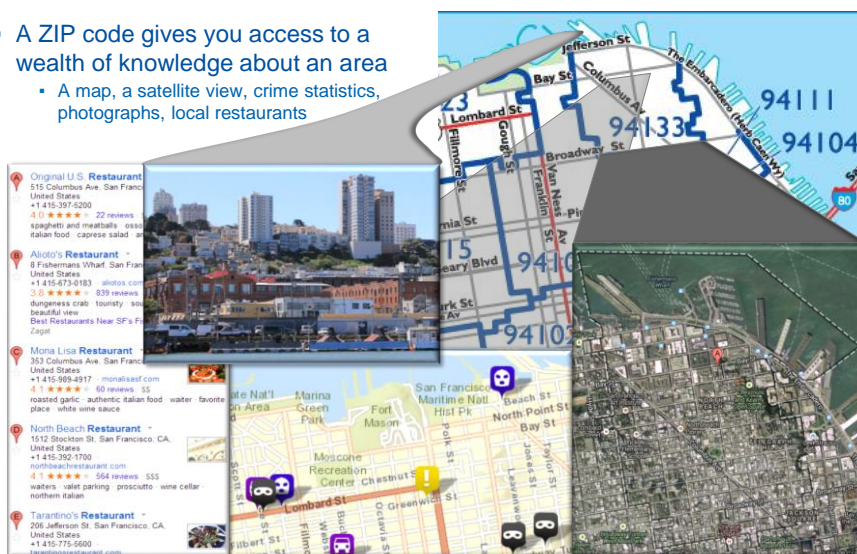


Knowledge Linkage Progress

- 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



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

- 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

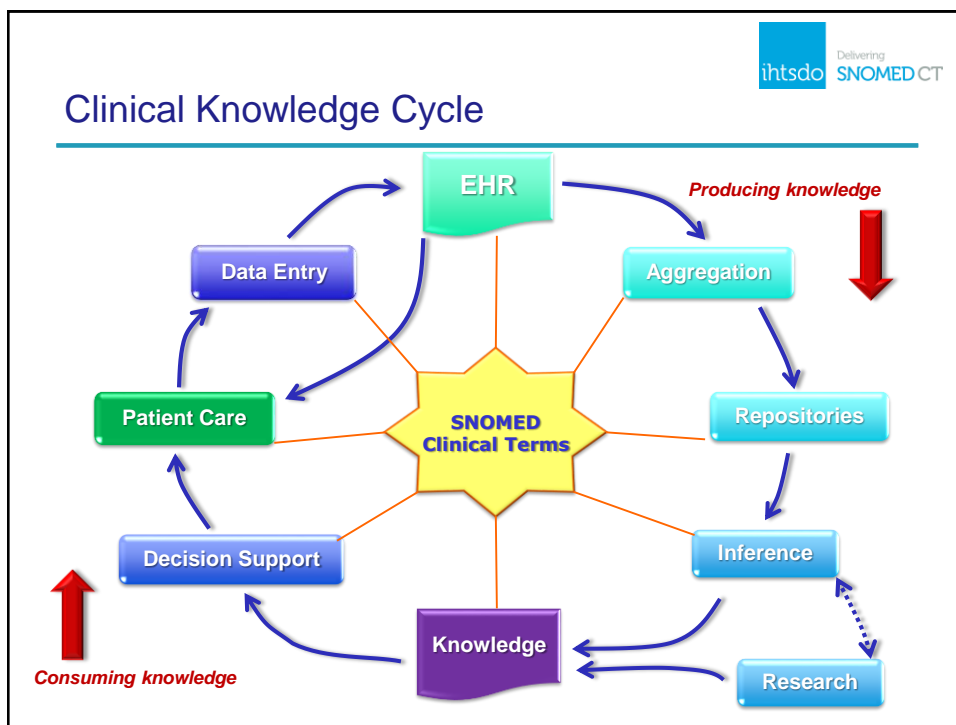
Clinical Knowledge Linkage

- SNOMED CT meets the requirements for an interoperable coordinate systems for EHR knowledge linkage
- SNOMED CT is designed to represent clinical meanings
 - **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)

Geographic Knowledge Cycle

- 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





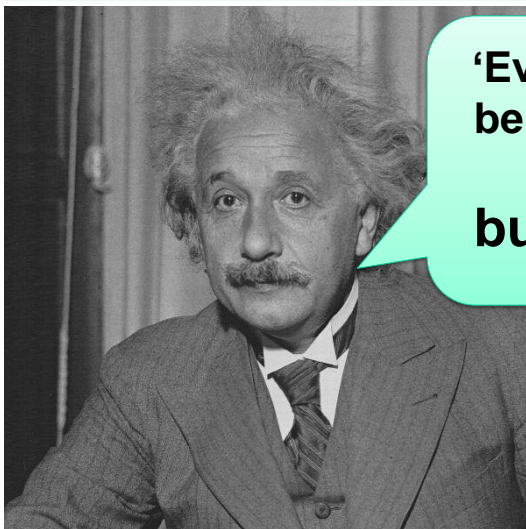
Simple Ideas in a Complex Reality

- 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





SNOMED CT
Features



Concept

A clinical idea with a unique identifier



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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

22298006

Human-readable term linked to a concept

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Relationship

74281007
myocardium structure (body structure)

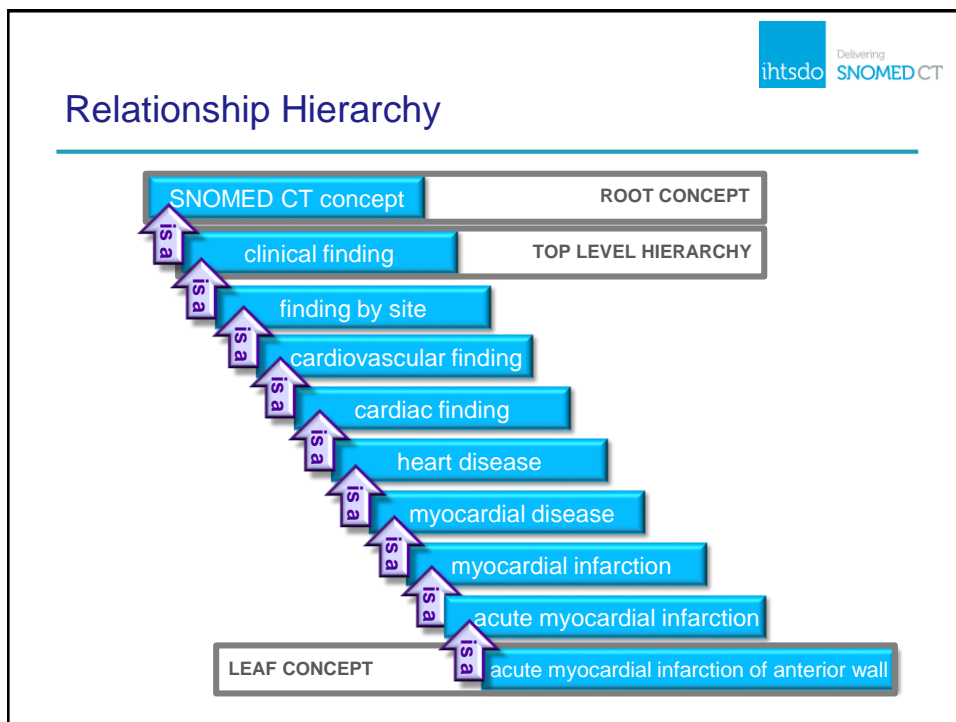
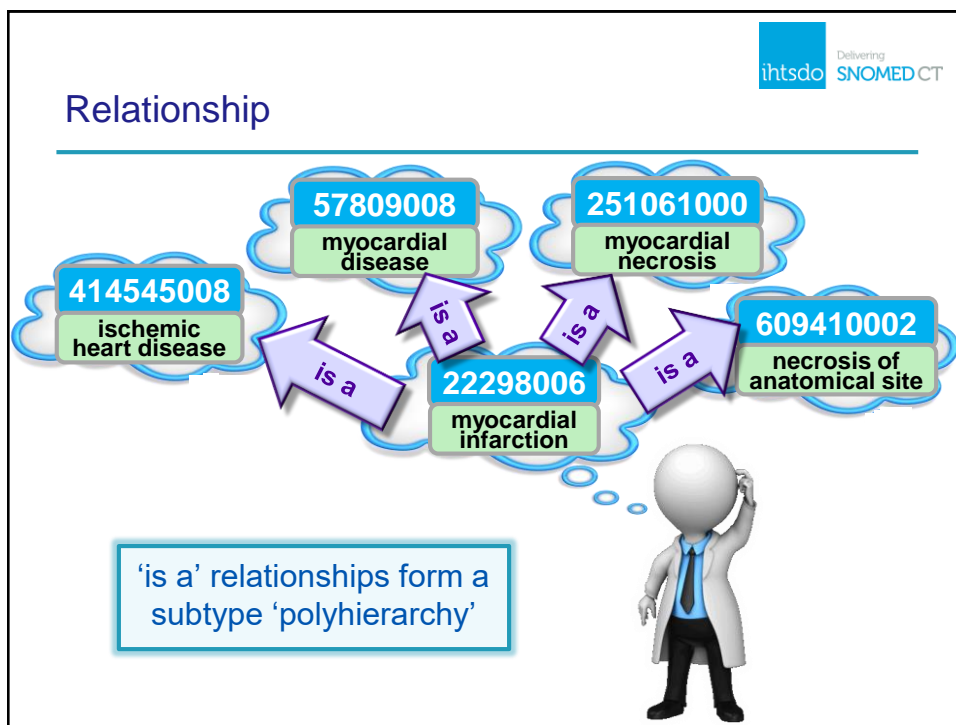
22298006
myocardial infarction (disorder)

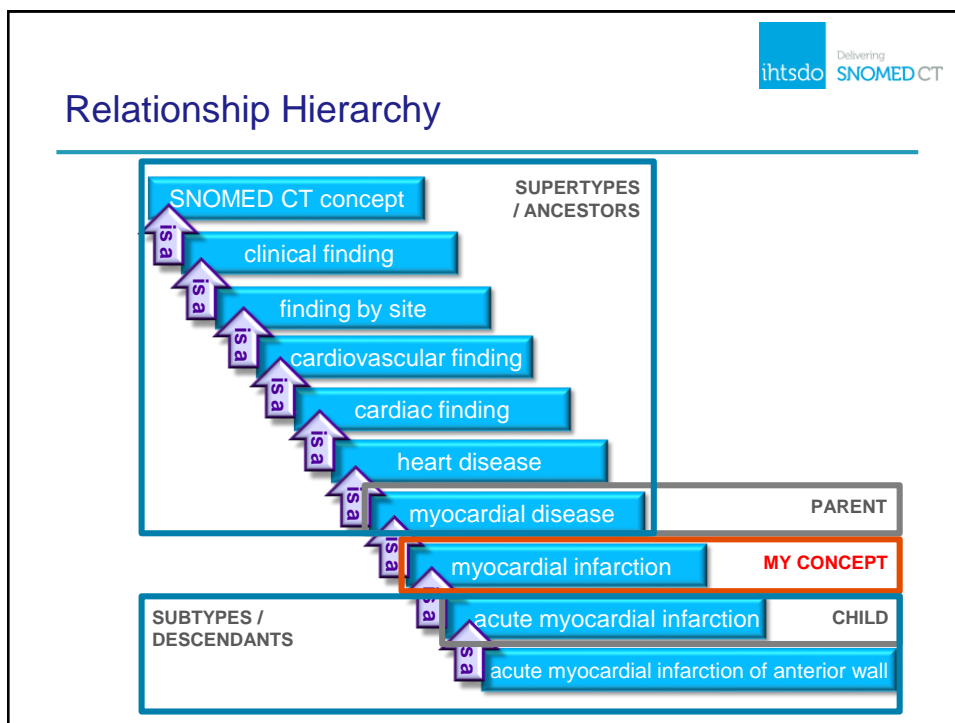
55641003
Infarct (morphological abnormality)

finding site

associated morphology

Can express the defining characteristics of a concept






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 – Maps to or from another code system

The figure shows a 3D white humanoid figure standing and holding a large red arrow that points to the right. The arrow has the text 'SNOMED CT Component' written on it in white. The figure is positioned in the bottom right corner of the slide.



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Subset

A collection of components for a particular purpose

- otic route
- nasal route
- gastrostomy route
- oral route
- subcutaneous route

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


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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	vipoma	8155/1	vipoma, NOS
127573000	neuroendocrine carcinoma, grade 2	8249/3	Neuroendocrine tumor, grade 2
447644002	benign stromal tumour	8935/0	stromal tumor, benign

EN-AU language reference set

- FSN** myocardial infarction (disorder) [Gold Medal]
- SYN** myocardial infarction [Gold Medal]
- SYN** cardiac infarction
- SYN** heart attack
- SYN** MI - Myocardial infarction
- SYN** myocardial infarct

22298006

EN-AU language reference set

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



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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

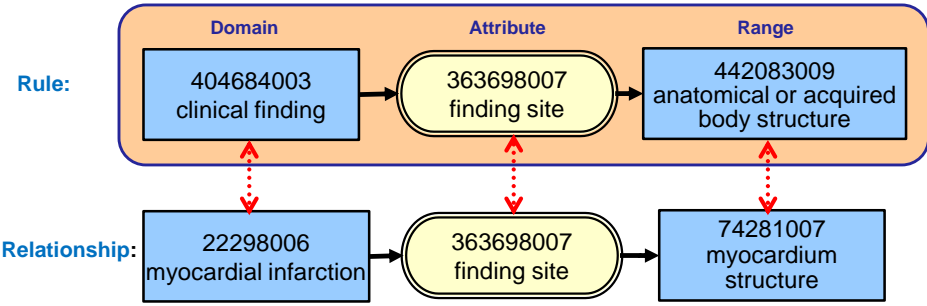


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Concept Model

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




The diagram illustrates the concept model structure. It shows two rows: 'Rule:' and 'Relationship:'. Each row contains three components: 'Domain', 'Attribute', and 'Range', connected by solid arrows from left to right. Red dashed double-headed arrows connect the corresponding components between the Rule and Relationship rows.

	Domain	Attribute	Range
Rule:	404684003 clinical finding	363698007 finding site	442083009 anatomical or acquired body structure
Relationship:	22298006 myocardial infarction	363698007 finding site	74281007 myocardium structure


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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: *Edema 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




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SNOMED CT RF2 Files

Concept


id	effectiveTime	active	moduleId	definitionStatusId
100000000	20090731	0	900000000000207000	90000000000074000
100000006	20020131	1	900000000000207000	90000000000074000
100000004	20030131	0	900000000000207000	90000000000074000
100001001	20090731	0	900000000000207000	90000000000074000
100002008	20090731	0	900000000000207000	90000000000074000
100003003	20090731	0	900000000000207000	90000000000074000

Description

id	effectiveTime	active	moduleId	conceptId	languageCode	typId	term	caseSignificanceId
100000016	20020131	0	900000000000207000	60203004	en	90000000000013000	Abrasion or friction burn of gum with infection	90000000000020000
100000010	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

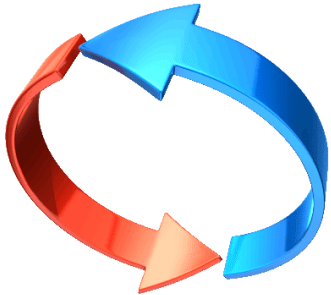
Relationship

id	effectiveTime	active	moduleId	sourceId	destinationId	relationshipGroup	typId	characteristicTypId	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
100000023	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


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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





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



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IHTSDO Tooling Development

TITLE	STATUS	VERSION
SNOMED CT Content Request Service		1.0
SNOMED CT Browser		2.0
SNOMED CT Component Identifier		1.0
SNOMED CT Mapping Tool		1.0
Identity Management Service	LIVE	1.0
SNOMED CT Authoring Platform	LIVE	1.0 Candidate
Refset Management & Translation Tooling	LIVE	Public Beta
IHTSDO Member Distribution & Licensing Service	LIVE	2.0.1


Includes International, Spanish, Australian, Danish, Swedish, UK, Dutch, Canadian, Uruguay and US Editions of SNOMED CT (<http://browser.ihtsdotools.org>)


<http://snomed.org/tools>




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SNOMED CT Summary




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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



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IHTSDO
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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 maintaining and growing 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

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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.

<p>What is SNOMED CT?</p> <p>Learn About SNOMED CT ▶</p>	<p>Why SNOMED CT?</p> <p>The Benefits of SNOMED CT ▶</p>	<p>Learn More</p> <p>E-Learning Service, Starter Guide, Library, Consultant Terminologist Program ▶</p>	<p>SNOMED CT Worldwide</p> <p>Comprehensive, Scalable, Flexible and Translatable ▶</p>
<p>SNOMED CT & Other Terminologies, Classifications & Code Systems</p>	<p>Change or Add to SNOMED CT</p> <p>Request Submission and Namespace Identifiers ▶</p>	<p>SNOMED CT and Licensing</p> <p>Find out how to get SCT ▶</p>	<p>SNOMED CT Tools</p> <p>Products and Services ▶</p>

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What is SNOMED CT?

Why SNOMED CT?

Learn More

- E-Learning Overview** ←
- E-Learning Server
- SNOMED CT Foundation Course Applications
- SNOMED CT Challenge
- Document Library
- Consultant Terminologist Program
- SCT Implementation Advisor Scheme

SNOMED CT Worldwide

SNOMED CT & Other Terminologies, Classifications & Code Systems

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. For more information about these education services please visit the [E-Learning Overview](#). For 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.

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.

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SNOMED CT Worldwide

SNOMED CT & Other Terminologies, Classifications & Code Systems

Change or Add to SNOMED CT

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.

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.

Please visit the [SNOMED CT Foundation Course Applications page](#) for information about how to apply.

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 four months. The course duration is six-months with an estimated time commitment of 15-18 hours per month.

SNOMED CT Content Development Theory Course

This course will build on knowledge gained during the SNOMED CT Foundation course. The objective is to provide a theoretical understanding of SNOMED CT content and its development and maintenance from a content authoring perspective. This course is intended to provide a foundational base upon which further knowledge and skills such as practical content authoring, subset creation, translation, extension management and mapping would be built.

Successful completion of the Foundation Course is a prerequisite for applying for this course. The course duration is three-months with an estimated time commitment of 10-15 hours per month.

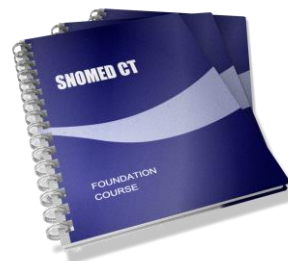
SNOMED CT E-Learning Server


- Online Courses
 - SNOMED CT Foundation Course
 - SNOMED CT Implementation Course
 - SNOMED CT Content Development Theory Course
- 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




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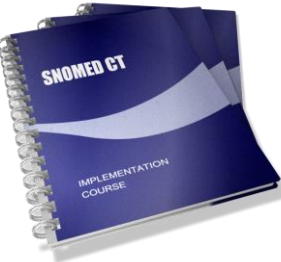
SNOMED CT Foundation Course – Topics


<p style="text-align: center;">Module A</p> <ul style="list-style-type: none"> ▪ Learning about SNOMED CT ▪ Introduction to SNOMED CT ▪ SNOMED CT Benefits for Organizations ▪ Why Clinical Terminology Matters ▪ Introduction to IHTSDO ▪ Exploring SNOMED CT Content 	<p style="text-align: center;">Module B</p> <ul style="list-style-type: none"> ▪ SNOMED CT Components ▪ SNOMED CT Licensing ▪ Release Files and Formats ▪ SNOMED CT Concept Model ▪ Content Development ▪ Introduction to Extensions
<p style="text-align: center;">Module C</p> <ul style="list-style-type: none"> ▪ Reference Sets ▪ SNOMED CT Configurable Features ▪ Translation and Language Preferences ▪ Introduction to Mapping ▪ SNOMED CT Expressions ▪ SNOMED CT Implementation 	


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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
- 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)






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Implementation Course – Topics (A, B, C)

<p>Module A – Adoption & Planning</p> <ul style="list-style-type: none"> ▪ SNOMED CT in EHRs ▪ Building the Business Case ▪ Implementation Examples ▪ Licensing and Distribution ▪ Implementation Overview ▪ Implementation Approaches ▪ Implementation Services & Tools 	<p>Module B – Design (Terminology Content)</p> <ul style="list-style-type: none"> ▪ SNOMED CT Content Hierarchy ▪ Concept Model Overview ▪ Clinical Findings, Procedures ▪ Pharmaceutical / Biologic Products ▪ Substances, Physical Objects ▪ Anatomy, Events, Specimen ▪ Situation with Explicit Context
 <p>Module C – Design (Terminology Services)</p> <ul style="list-style-type: none"> ▪ SNOMED CT Logical Design ▪ Relationship Views and Transforms ▪ Release Format 2 ▪ Reference Sets ▪ Expressions ▪ Expression Constraints ▪ Subtype Testing 	


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Implementation Course – Topics (D, E, F)

<p>Module D – Design (EHR Services)</p> <ul style="list-style-type: none"> ▪ Information Models ▪ Interface Terminology ▪ Searching ▪ Data Entry ▪ Analytics ▪ Communication ▪ Storage 	<p>Module E – Development</p> <ul style="list-style-type: none"> ▪ SNOMED CT Extensions ▪ Handling Missing Content ▪ Importing Release Files ▪ Accessing Components ▪ Mapping Basics ▪ Mapping to ICD-10 ▪ LOINC and SNOMED CT
 <p>Module F – Deployment & Use</p> <ul style="list-style-type: none"> ▪ 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 	


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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


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Content Development Course

Module A – ...

- Controlled Vocabularies and Representing Meaning
- SNOMED CT Content Hierarchy
- SNOMED CT Concept Model
- Introduction to Content
- Managing Requests for Content


Module B – ...

- Procedure Concept Model
- Clinical Finding Concept Model
- Anatomy Concept Model
- Situation with Explicit Context Concept Model
- Creation of Content Part 1
- Creation of Content Part 2




Module C – ...

- Products, Substance and Physical Object Hierarchies Concept Models
- Other Hierarchies
- Changes to Content
- Some Considerations and Issues
- Reviewing Content
- Other Content Development Considerations

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Links to Further Information

- 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://snomed.org/businesscase>)



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Questions and Discussion

