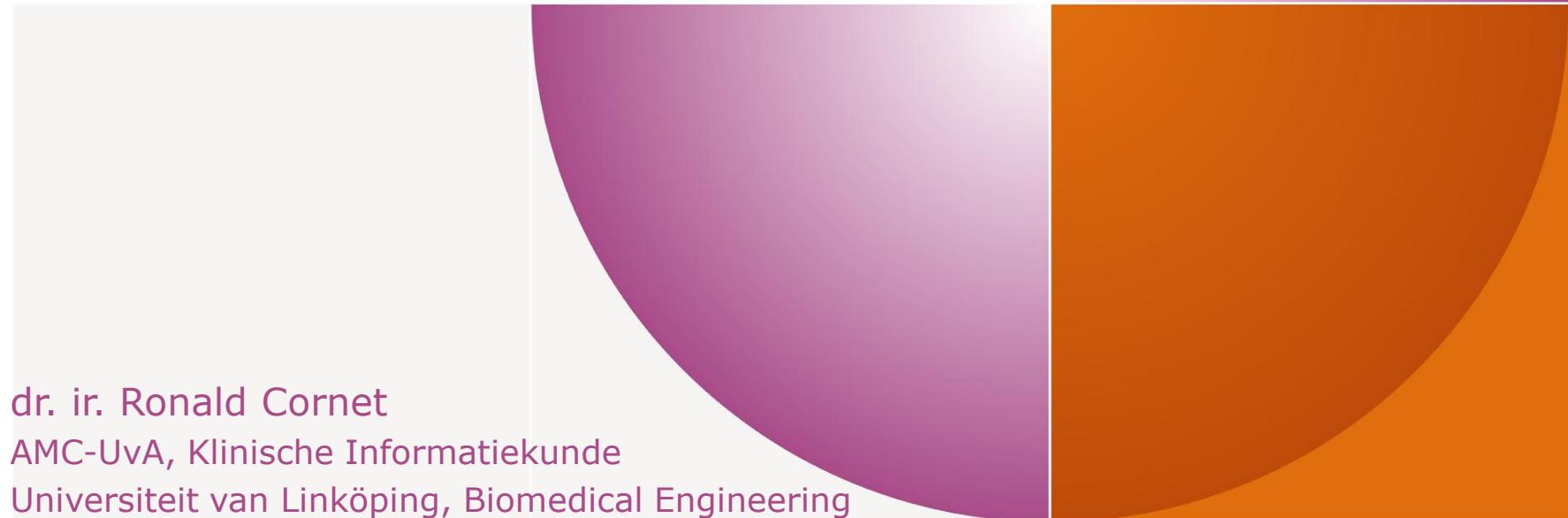


SNOMED CT

Structuur en inhoud



Semantiek



Over SNOMED

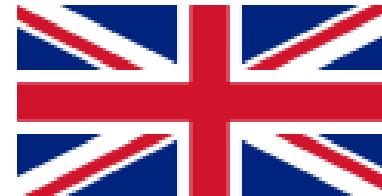


In ontwikkeling bij
College of American Pathologists (CAP)

1965 **SNOP** (Systematized
Nomenclature of Pathology)

1974 **SNOMED** (Systematized
Nomenclature of Medicine)

2000 **SNOMED RT** (Reference
Terminology)



informatie

Nictiz The logo features the word "Nictiz" in a dark grey sans-serif font next to a stylized orange and grey "T" shape with a small circle at the top.



1982 Read codes (Gen. Pract)

1990 NHS codes The logo consists of the letters "NHS" in a large, white, sans-serif font against a solid blue rectangular background.

SNOMED RT

Clinical Terms V3

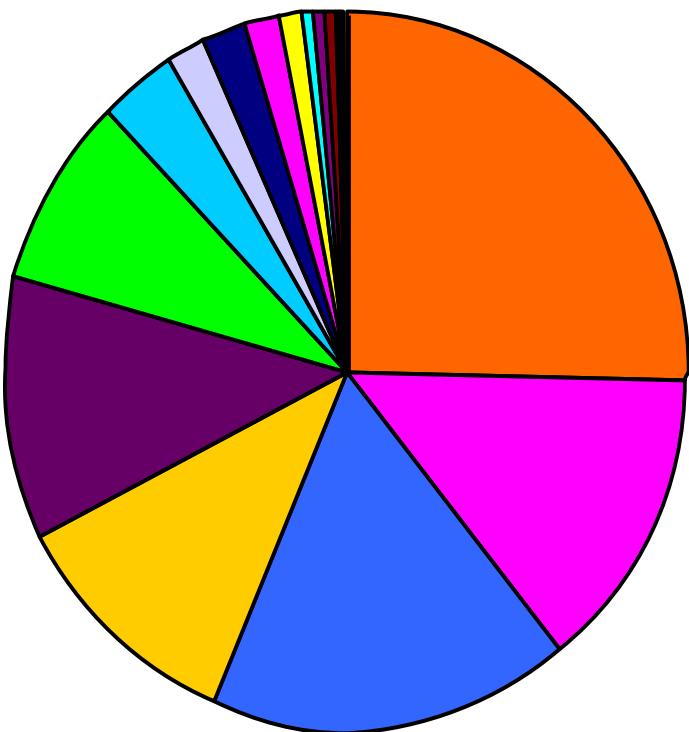
2002: **SNOMED CT** (Clinical Terminology)

Cijfers (januari 2013 release)

- 397,983 concepten
- 297,998 actief
- 99,985 inactief

body structure
clinical finding
environment or geographical location
event
linkage concept
observable entity
organism
pharmaceutical / biologic product
physical force
physical object
procedure
qualifier value
record artifact
situation with explicit context
social context
special concept
specimen
staging and scales
substance

Concept categorieën



- Disorders**
- Findings**
- Procedures**
- Body structures**
- Substances**
- Organisms**
- Qualifier values**
- Context-dependent categories**
- Social contexts**
- Observable entities**
- Physical objects**

Aandoeningen (Disorders)

- Ziekten, functionele beperkingen, alles wat als “diagnosis” kan worden opgevoerd
- Bijvoorbeelden:
 - Croup
 - Swimmer’s ear (otitis externa)
 - Third degree burn of back of hand
 - Schizoaffective disorder, bipolar type
 - Acute necrotizing ulcerative gingivitis

Waarneembare feiten (Observables)

- “Het onderwerp van een observatie”
- Een bevinding (finding) = observable + uitkomst
- Voorbeelden:
 - Head circumference
 - Contents of ear canal
 - Ability to hear whisper
 - PR interval
 - Heart rate
 - Blood pressure
 - Temperature
 - Synovial fluid viscosity

Bevindingen (Findings)

- Ook wel: observaties (observations)
- O.a. voorgeschiedenis, symptomen, lab uitslagen, bevindingen op basis van imaging, EEG of ECG
- Kan normaal, abnormaal, of onbepaald zijn
- Voorbeelden:
 - Pain
 - Dizziness
 - Normal deep tendon reflexes
 - Decreased serum sodium
 - Prolonged PR interval (ECG)
 - Non-smoker
 - Able to walk
 - Unable to perform wheelchair transfers

Verrichtingen (Procedures)

- Alle handelingen in de context van zorg:
 - Behandeling, therapie, planning, voorschrijven
 - Operatieve en niet-operatieve verrichtingen
- Voorbeelden:
 - Patient registration
 - Physical examination
 - Change of dressing
 - Fitting of splint
 - Intravenous steroid injection
 - Epistaxis control with cautery
 - Appendectomy
 - Percutaneous transluminal coronary angioplasty
 - HIV counselling
 - Post-laryngectomy rehabilitation
 - Admission to hospice

SNOMED CT

- Specialisme-overstijgend
- Beroepsgroep-overstijgend
 - Klinici, huisartsen, verpleegkundigen, paramedici
- Landsgrens-overstijgend
 - Uitwisseling op basis van identifiers

Welk specialisme?

- squamous cell carcinoma
of auricle of ear
- (plaveiselcelcarcinoom
van de oorschelp)



Domeinen

- Medisch, paramedisch, verpleegkundig

- giving encouragement to perform functional activity
- procedure with a procedure focus
 - giving encouragement to exercise
 - exercise promotion: strength training
 - exercise promotion: stretching

- + C physical therapy procedure
- + C manual therapy
- + C adverse neural tension technique
- + C bandaging therapy
- + C crano sacral therapy
- + C manipulation of joint - non-surgical
- + C massage physiotherapy
 - + C connective tissue massage
 - + C effleurage
 - + C ghee massage
 - + C ice cube massage
 - + C infant massage
 - + C massage of body region
 - + C myofascial release
 - + C percussion therapy
 - + C Petrissage
 - + C physical medicine massage, initial 30 minutes
 - + C physiotherapeutic frictions
 - + C post-event massage
 - + C pre-event massage
 - + C reduction of edema
 - + C scar tissue massage
 - + C shiatsu massage
 - + C silicone oil massage

Cijfers (januari 2013 release)

- 297,998 concepten
- 58 typen relaties
 - Is a
 - finding site
 - method
 - associated morphology
 - ...
 - ~ 900,000 instantiaties

Cijfers (januari 2013 release)

- 297,998 concepten
- 58 typen relaties; 900,000 instantiaties
- 1 miljoen Engelse omschrijvingen
 - US en UK Engels
 - Ook (Argentijns-)Spaanse, Deense en Zweedse vertaling gemaakt
 - Nederlandse vertaling zal incrementeel gebeuren

Wat is SNOMED?

- Terminologiestelsel
 - **Codes** identificeren **concepten**
 - **Relaties** tussen concepten
 - **Definities** op basis van relaties
 - **Termen** benoemen concepten en relaties
 - **Regels** om concepten samen te stellen

Wat is SNOMED?

P 75570004 viral pneumonia	C viral respiratory infection	ConceptStatus Current
P 276692000 congenital viral pneumonia	C infective pneumonia	↳ Fully defined by ...
P 16810008 AIDS with viral pneumonia	↳ viral pneumonia	↳ 116680003 Is a
P 421508002 viral pneumonia associated with	↳ adenoviral pneumonia	↳ ↳ 312133006 viral respiratory infection
S 16810008 acquired immunodeficiency syr	↳ chickenpox pneumonia	↳ ↳ 312342009 infective pneumonia
L 195882005 viral pneumonia NEC	↳ congenital viral pneumonia	↳ 246075003 Causative agent
L 195883000 viral pneumonia NOS	↳ cytomegaloviral pneumonia	↳ ↳ 49872002 virus
L 196204006 [X]Other viral pneumonia	↳ Hantavirus pulmonary syndrome	↳ Group
L 196209001 [X]Pneumonia in viral diseases	↳ Hantavirus pulmonary syndrome	↳ 116676008 Associated morphology
	↳ herpes simplex pneumonia	↳ ↳ 23583003 inflammation
	↳ infectious mononucleosis pneumonia	↳ ↳ 9656002 consolidation
	↳ measles pneumonia	↳ ↳ 363698007 Finding site
	↳ parainfluenza virus pneumonia	↳ ↳ 39607008 lung structure
	↳ pneumonia and influenza	↳ Qualifiers
	↳ pneumonia due to respiratory syncytial vi	↳ 246112005 Severity
	↳ progressive pneumonia of sheep	↳ ↳ 272141005 severities
	↳ viral pneumonia associated with AIDS	↳ 246456000 Episodicity
	↳ viral pneumonia NEC	↳ ↳ 288526004 episodicities
	↳ viral pneumonia NOS	↳ 263502005 Clinical course
	↳ [X]Other viral pneumonia	↳ ↳ 288524001 courses
	↳ [X]Pneumonia in viral diseases classified	Legacy codes
		↳ SNOMED: DE-30015
		↳ CTV3ID: XE0YG
		Descriptions
		↳ F 816194010 viral pneumonia (disorder)
		↳ P 125510013 viral pneumonia

Wat is SNOMED?

Definities o.b.v.
relaties

Samenstel-regels

Codes

Termen

ConceptStatus Current

- + Fully defined by ...
 - 116680003 Is a
 - + D 312133006 viral respiratory infection
 - + D 312342009 infective pneumonia
 - 246075003 Causative agent
 - + D 49872002 virus
- + Group
 - 116676008 Associated morphology
 - + D 23583003 inflammation
 - + D 9656002 consolidation
 - 363698007 Finding site
 - + D 39607008 lung structure
- + Qualifiers
 - 246112005 Severity
 - + S 272141005 severities
 - 246456000 Episodicity
 - + S 288526004 episodicities
 - 263502005 Clinical course
 - + S 288524001 courses
- + Legacy codes
 - SNOMED: DE-30015
 - CTV3ID: XE0YG
- + Descriptions
 - F 816194010 viral pneumonia (disorder)
 - P 125510013 viral pneumonia

Structuur van SNOMED CT

- **Synonieme**

FOKKE & SUKKE
MAKEN ZICH ZORGEN OVER HET KLIMAAT

EERST EEN CYCLOON
IN BIRMA...

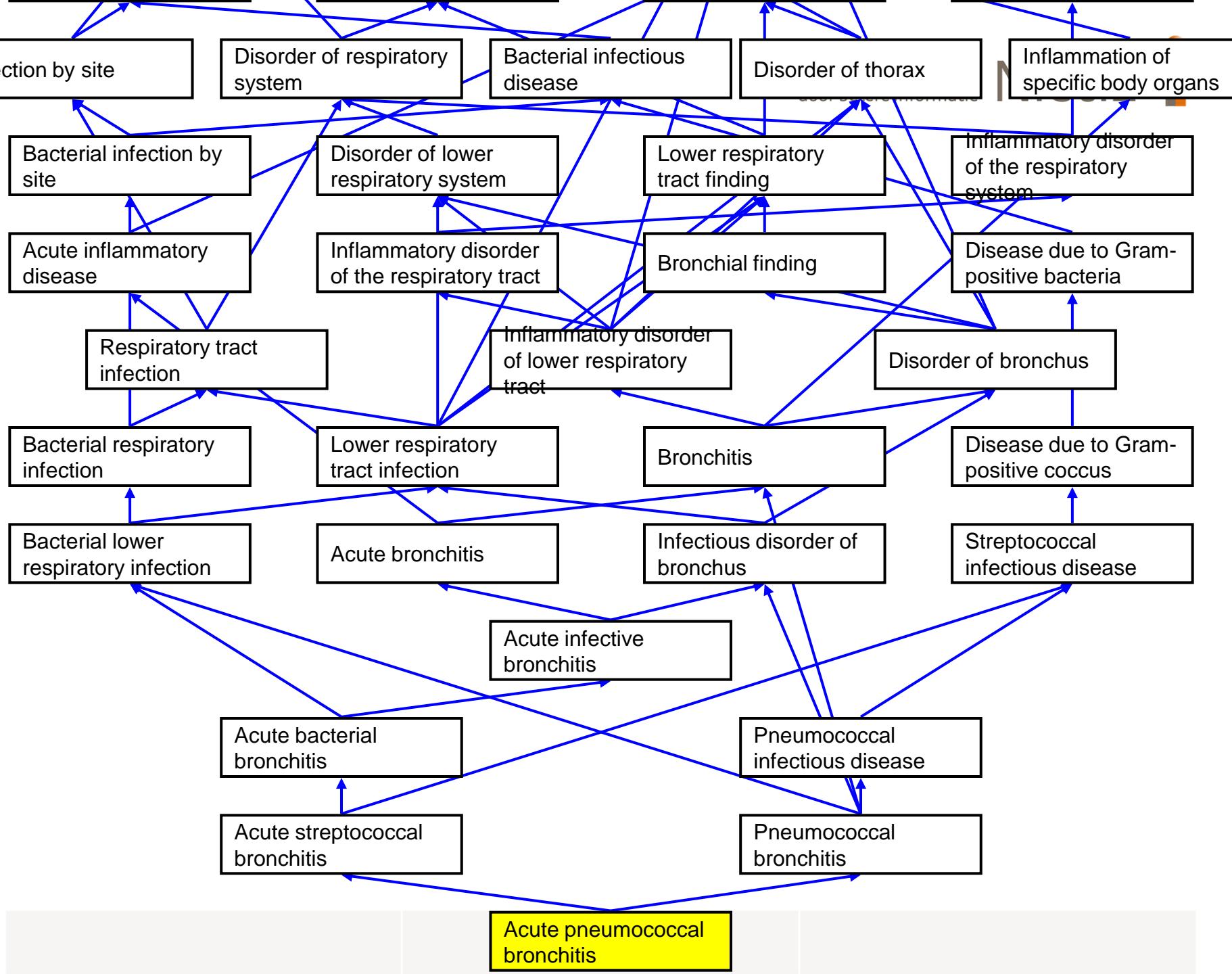


...EN NU WEER
EEN TYFOON IN
MYANMAR!

- 1 “fully specified name” per concept
(Engels)
- Onbeperkt aantal synoniemen

Structuur van SNOMED CT

- Synonieme termen
- **Meerdere ouders
(polyhierarchie)**
 - Meer dan 1 ordeningsmogelijkheid; bijv. ziekten per anatomie, ziekten per morfologie



Structuur van SNOMED CT

- Synonieme termen
- Meerdere ouders (polyhierarchie)
- **Expliciete relaties**
 - Essentiële relaties
 - Qualifiers
 - Mogelijkheid te zoeken/aggregeren op basis van relaties

Essentiële relaties

- S L C streptococcal infectious disease
- S d C pneumococcal infectious disease
- P D C acute pneumococcal pericarditis
- P D C invasive Streptococcus pneumoniae disease
- P D C pneumococcal arthritis
- P D C pneumococcal bronchitis
- P D C pneumococcal laryngitis
- P D C pneumococcal meningitis
- P D C pneumococcal peritonitis
- P D C pneumococcal pharyngitis
- P D C pneumococcal pleurisy
- P D C pneumococcal pneumonia
- P D C pneumococcal septicemia
- P D C septic myocarditis - pneumococcal

Qualifiers

- Toevoegen van detail
 - Severity, course
- Verder specificeren
 - viral pneumonia: causative agent=influenza C virus

Hoe gebruik je SNOMED?

- Onzichtbaar
 - “data items” en “data values” coderen m.b.v. SNOMED CT

Geslacht Man

263495000 248153007



↳ C 138875005 SNOMED CT Concept
↳ C 363787002 observable entity
↳ C 278844005 general clinical state
↳ C 263495000 gender



↳ C 138875005 SNOMED CT Concept
↳ C 404684003 clinical finding
↳ C 365860008 general clinical state finding
↳ C 365873007 gender finding
+ C 248152002 female
+ C 302081005 finding of sex of baby
C 394743007 gender unknown
C 394744001 gender unspecified
+ C 248153007 male
C 405242009 castrated male
+ C 407375002 surgically transgendered transsexual

Hoe gebruik je SNOMED?

- Onzichtbaar
 - “data items” en “data values” coderen m.b.v. SNOMED
 - Vrije tekst (semi-)automatisch naar SNOMED concepten omzetten

New consultation

Tick to confirm that this is what you mean:

Referred by another GP

Pain in finger

- Index finger
- Left

Unable to grip ▾

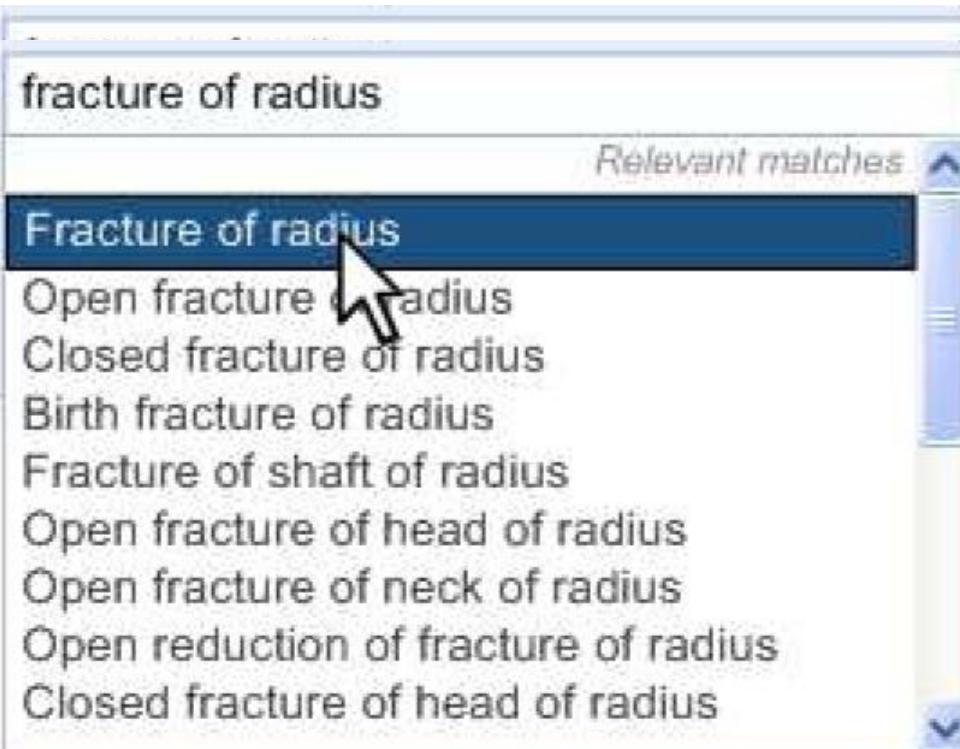
Type your notes here:

referred by gp

Pain in left index finger. [Unable to grip properly]

Hoe gebruik je SNOMED?

- Zichtbaar
 - Picklists met SNOMED termen/concepten
 - Samenstel-mogelijkheden ondersteunen



A screenshot of a computer interface for selecting medical terms from a SNOMED picklist. On the left, a list of terms is shown under the heading 'Relevant matches':

- Fracture of radius
- Open fracture of radius
- Closed fracture of radius
- Birth fracture of radius
- Fracture of shaft of radius
- Open fracture of head of radius
- Open fracture of neck of radius
- Open reduction of fracture of radius
- Closed fracture of head of radius

The term 'Fracture of radius' is highlighted with a blue background and has a cursor arrow pointing at it.

On the right, a detailed view of the selected term 'Fracture of radius (disorder)' is displayed:

Fracture of radius (disorder)
is a Fracture of forearm

Side: Please specify *

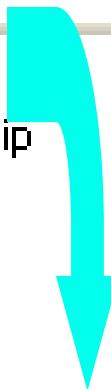
* you must choose an option here

Wat is SNOMED...?

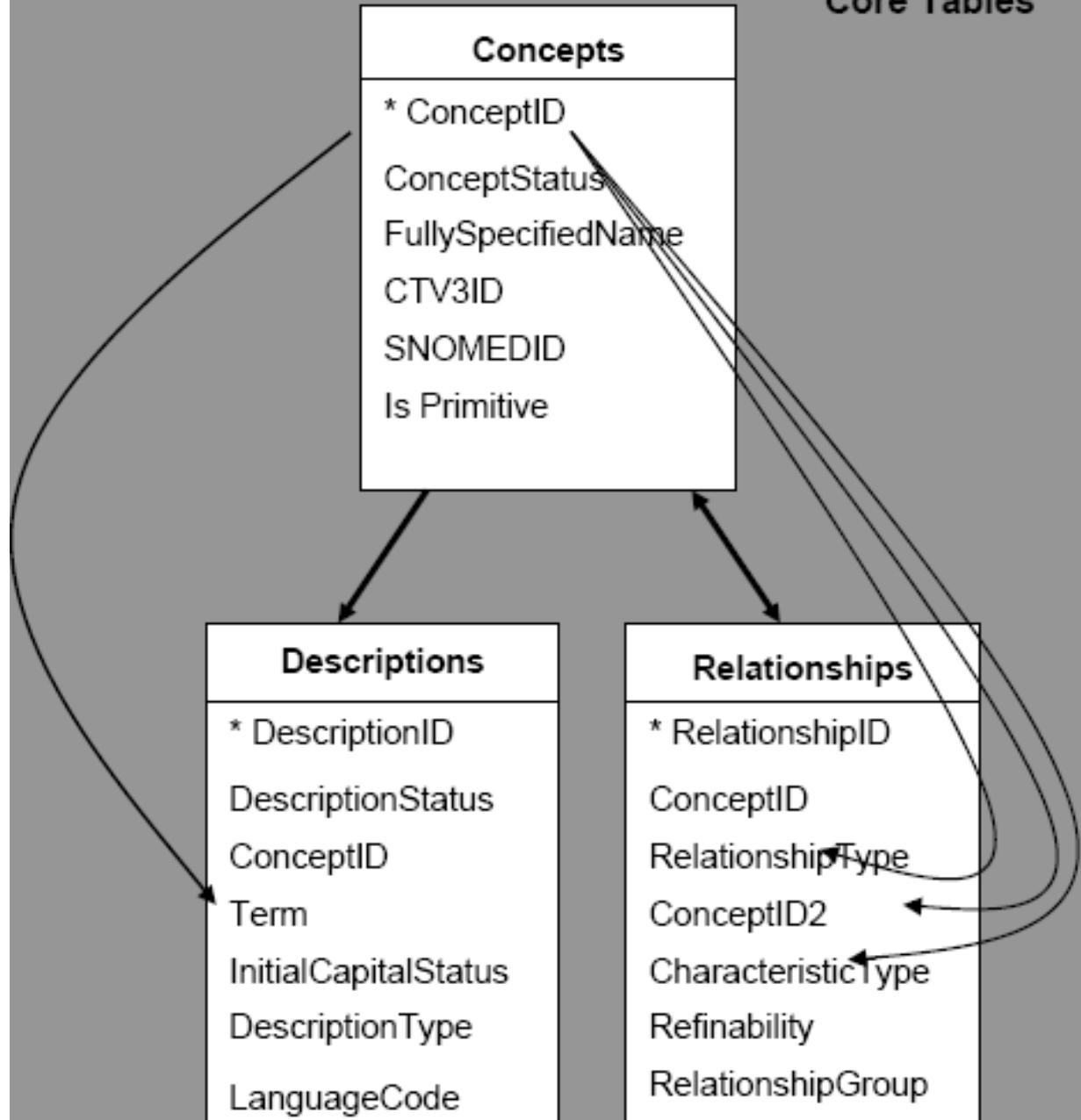
- GEEN Software

GEEN Software

 SNOMED_CT_Essential_20080131.zip	137,598 KB	Compressed (zipped) Folder
 SNOMED_CT_member_resources_20080131.zip	5,945 KB	Compressed (zipped) Folder
 SNOMED_CT_Optional_20080131.zip	2,969 KB	Compressed (zipped) Folder
 sct_relationships_20080131.txt	62,342 KB	Text Document
 sct_descriptions_20080131.txt	69,355 KB	Text Document
 sct_concepts_20080131.txt	26,753 KB	Text Document



Core Tables



* Denotes key field

Wat is SNOMED...?

- GEEN Software
- NIET Perfect

SNOMED is niet perfect

- “Overbodige” inhoud
- Inconsistente inhoud
- Post-coördinatie
 - Soms te beperkt
 - Soms te veel mogelijk
 - Post-coördinatie equivalentie
- Onderdefinitie

Overbodig?

- C number
 - + C cardinal number
 - C eight
 - C eleven
 - C five
 - C four
 - C lower limit numbers
 - C >5
 - C >90
 - C >97
 - C nine
- + C numerical range
 - C one
- + C ordinal number
- + C ratio
- C seven
- C six
- C ten
- C three
- C twelve
- C two
- + C upper limit numbers

Inconsistent

- Versie Juli 2007:

- female
 - finding of sex of baby
 - baby female

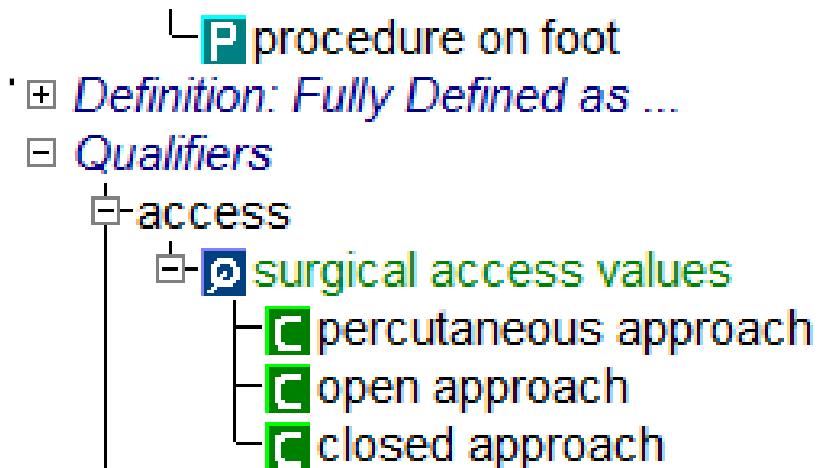
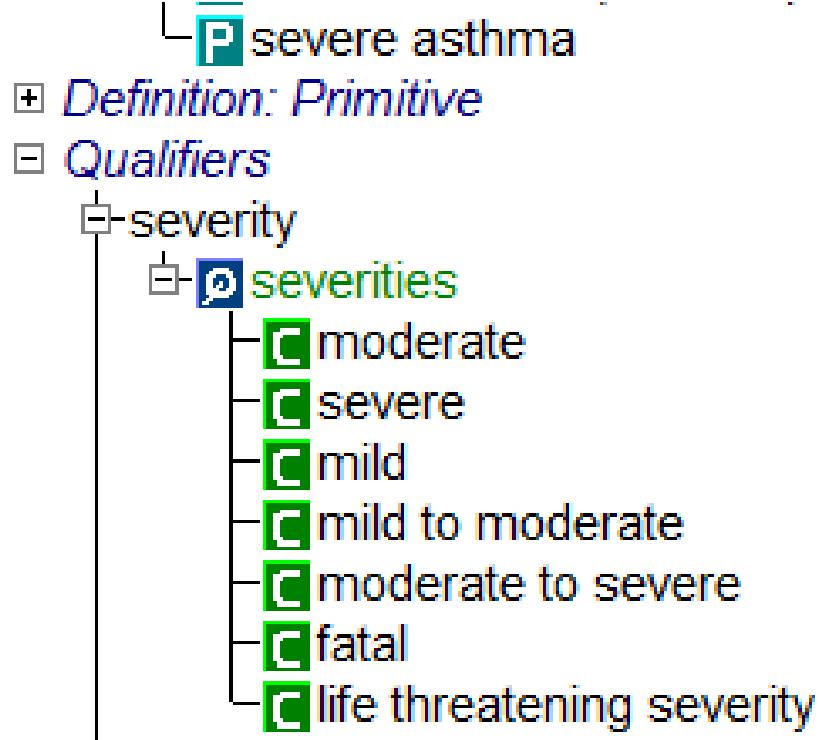
- male
 - finding of sex of baby
 - baby male

Versie Januari 2008!

Post-coordinatie

- severe asthma
- procedure on foot
 - access = minimal frontal sinus

Versie Januari 2008!



Onderdefinitie

- Geen onderscheid tussen hyper- en hypo-magnesemia
- Hypertension
 - *is a Disease*
 - *finding site* = Systemic Arterial Structure

Juli 2008 →

definitional manifestation = Finding of Increased Blood Pressure

Wat is SNOMED...?

- GEEN Software
- NIET Perfect
- GEEN Dossier

(Geen) Dossier

- SNOMED: Hypertension
- History of: Hypertension
- Family history of: Hypertension
- Diagnosis: Hypertension
- Differential Diagnosis: Hypertension
- Finding: No Hypertension
- At risk of: Hypertension

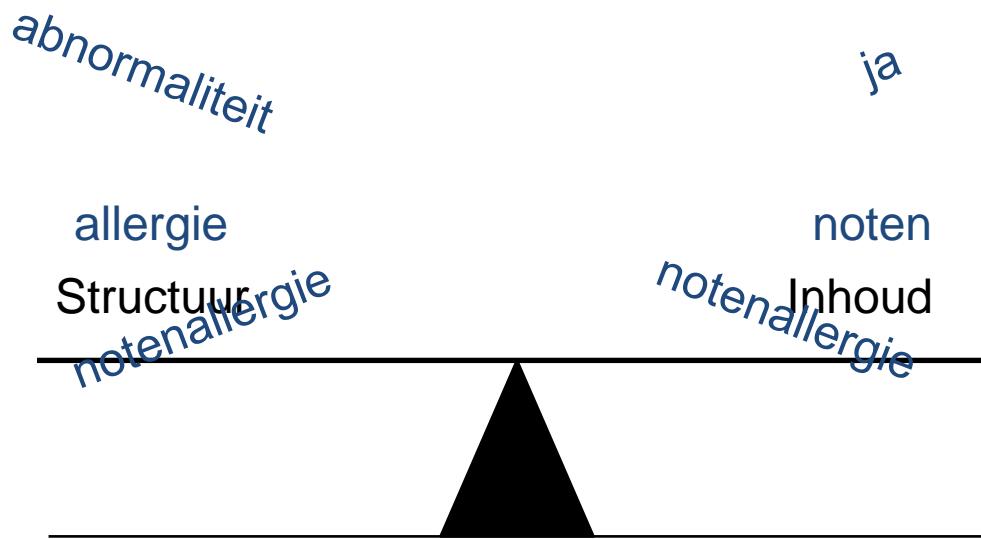
Informatiemodel versus terminologie

- The simplest information model:
Put all clinical data here:

(everything else is in the terminology)

- The simplest terminology model:
YES; NO
(everything else is a fieldname)

Informatiemodel versus terminologie



Balans tussen structuur & inhoud

Risicogroepen H1N1

- Iedereen die een oproep krijgt voor de jaarlijkse gripprik, *zoals patiënten met functiestoornissen van de luchtwegen en longen, patiënten met hartproblemen of patiënten met suikerziekte*
- Vrouwen, 13 weken of langer zwanger
- Kinderen van 6 maanden tot en met 4 jaar
- Gezonde 60-plusser
- En ...

Risicogroepen H1N1

- **Huisgenoten van kinderen** in de leeftijd van 0 tot en met 5 maanden
- Personeel in de gezondheidszorg met mogelijk direct **contact met patiënten uit medische risicogroepen**
- Gezinsleden en mantelzorgers van **mensen met een zeer hoog risico op ernstige ziekte en sterfte door griep**

Wat is SNOMED...?

- GEEN Software
- NIET Perfect
- GEEN Dossier
- GEEN “Handboek”

GEEN “Handboek”



Tot zover de basistheorie. Maar een genetische vrouw, met twee X-chromosomen, kan zich toch als man ontwikkelen, bijvoorbeeld als de bijnier door een enzymafwijking te veel testosteron produceert. Andersom kan een genetische man, met een X en een Y-chromosoom, uitgroeien tot een vrouw als de cellen door een genetische afwijking niet gevoelig zijn voor testosteron.

MANVROUW:

Wat is SNOMED...?

- GEEN Software
- NIET Perfect
- GEEN Dossier
- GEEN “Handboek”
- GEEN Panacee ; GEEN Totaaloplossing
 - Een deel van de oplossing...
 - Met een aantal nieuwe uitdagingen

Uitdagingen

- Implementatie
 - Registratie met behulp van SNOMED CT
 - Beslissingsondersteuning / richtlijnen
 - Vereist formalisatie van richtlijnen
 - Samenstellen (patiënt)groepen

Samengevat

■ Disorders

■ Findings

■ Procedures

■ Body structures

■ Substances

■ Organisms

■ Qualifier values

■ Context-dependent
categories

■ Social contexts

■ Observable entities

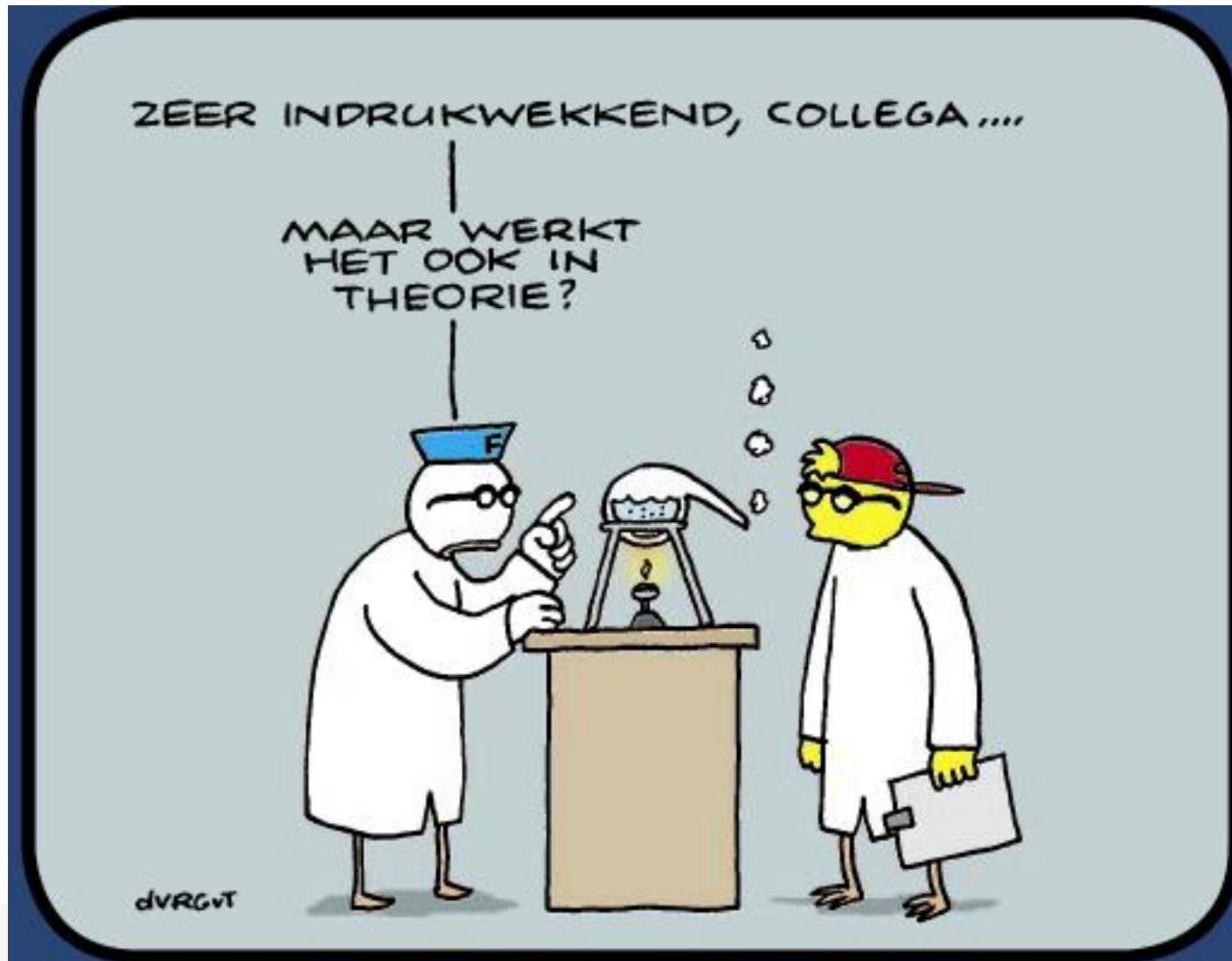
■ Physical objects

Overstijgt:

■ Specialisme

■ Beroeps groep

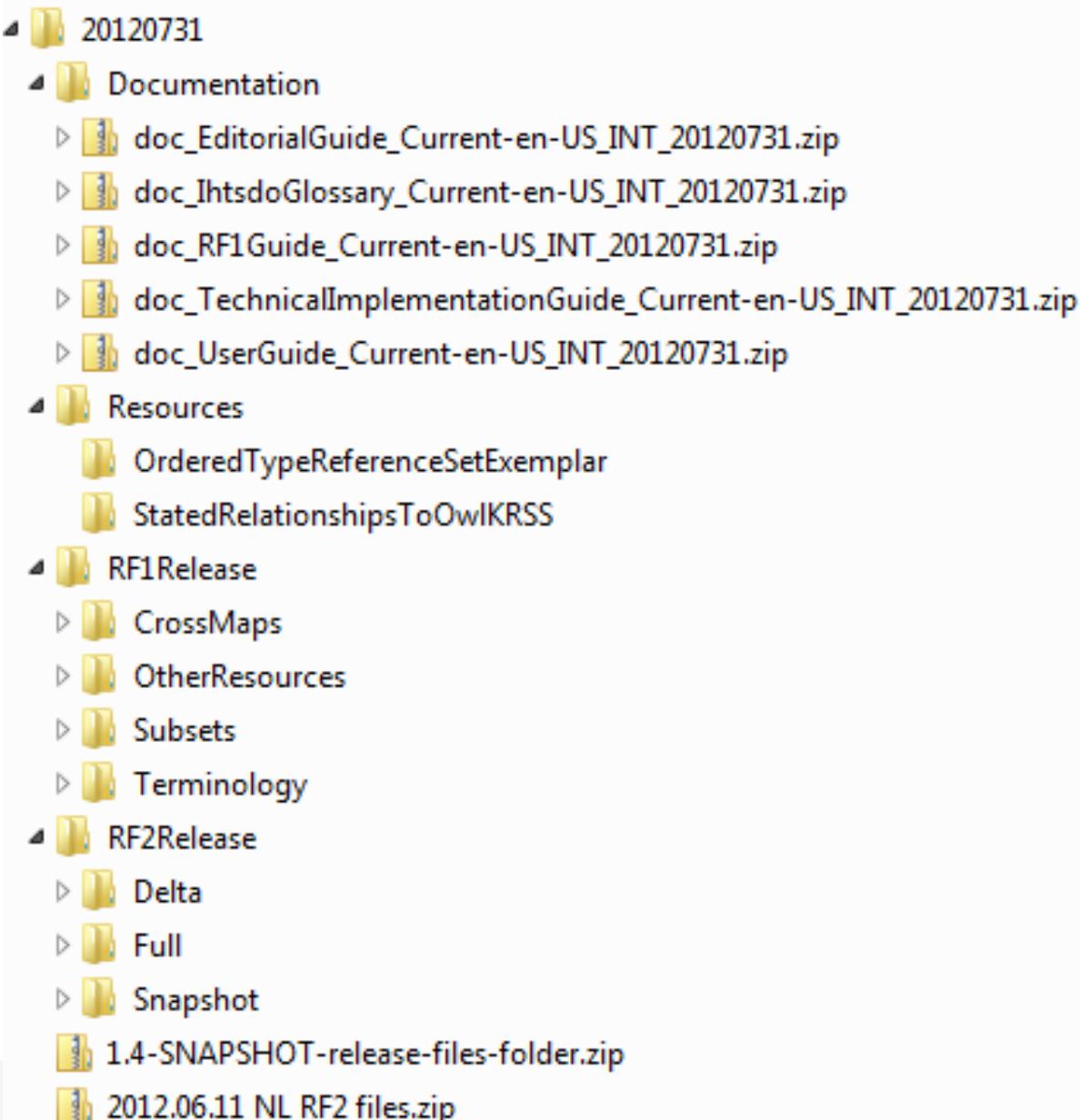
■ Landsgrens



SNOMED CD

Ofwel:
Wat staat er op
de SNOMED CT CD

CD Inhoud



Documentation

- User Guide
- Editorial Guide
- Technical Implementation Guide

Terminology

- Concepts
- Descriptions
- Relationships
- In Nederland gebruiken we “Release Format 2”

Release Format 2 (RF2)

- SNOMED CT volledig geversioneerd
- Geen onderscheid (meer) tussen voorkeurs- en synonieme termen (wordt lokaal bepaald)

Release Format 2 (RF2)

Id	effectiveTime	Active	moduleId	definitionStatusId
101291009	20070731	1	Module 1	Primitive
101291009	20080131	1	Module 2	Primitive
101291009	20080731	1	Module 2	Fully defined
101291009	20090131	0	Module 2	Fully defined

Concepts (RF2)

id	effectiveTime	active	moduleId	definitionStatusId
100000000	20020131	1	90000000000380005	90000000000130009
100000000	20090731	0	90000000000380005	90000000000130009
10000006	20020131	1	90000000000380005	90000000000130009
1000004	20020131	1	90000000000380005	90000000000130009
1000004	20030131	0	90000000000380005	90000000000130009
100001001	20020131	1	90000000000380005	90000000000130009
100001001	20090731	0	90000000000380005	90000000000130009
100002008	20020131	1	90000000000380005	90000000000130009
100002008	20090731	0	90000000000380005	90000000000130009
100003003	20020131	1	90000000000380005	90000000000130009
100003003	20090731	0	90000000000380005	90000000000130009
100004009	20020131	1	90000000000380005	90000000000130009
100004009	20090731	0	90000000000380005	90000000000130009
100005	20020131	0	90000000000380005	90000000000130009
100005005	20020131	1	90000000000380005	90000000000130009
100005005	20090731	0	90000000000380005	90000000000130009
100006006	20020131	1	90000000000380005	90000000000130009

Relationships (RF2)

id	effectiveTime	active	moduleId	sourceId	destinationId	relationshipGroup	typId	characteristicTypeId	modifierId
10000000021	20020131	1	900000000000380005	255116009	367639000		0	308489006	900000000000006009
10000000021	20020731	0	900000000000380005	255116009	367639000		0	308489006	900000000000006009
10000000028	20020131	1	900000000000380005	280844000	71737002		0	116680003	900000000000006009
10000001020	20020131	1	900000000000380005	255135009	49596003		0	363698007	900000000000006009
10000001020	20020731	0	900000000000380005	255135009	49596003		0	363698007	900000000000006009
10000002029	20020131	1	900000000000380005	10002003	129304002		2	260686004	900000000000006009
10000002029	20020731	1	900000000000380005	10002003	129304002		3	260686004	900000000000006009
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10000002029	20070131	1	900000000000380005	10002003	129304002		1	260686004	900000000000006009
100000023	20020131	1	900000000000380005	10392004	47040006		0	116680003	900000000000006009
100000023	20100131	0	900000000000380005	10392004	47040006		0	116680003	900000000000006009
1000003023	20020131	1	900000000000380005	10002003	119212007		2	363704007	900000000000006009
1000003023	20020731	1	900000000000380005	10002003	119212007		3	363704007	900000000000006009
1000003023	20030131	0	900000000000380005	10002003	119212007		3	363704007	900000000000006009
1000004028	20020731	1	900000000000380005	10041001	91241007		1	116676008	900000000000006009
1000004028	20030131	0	900000000000380005	10041001	91241007		1	116676008	900000000000006009
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1000006026	20030731	1	900000000000380005	10058006	26036001		1	116676008	900000000000006009
1000006026	20040731	0	900000000000380005	10058006	26036001		1	116676008	900000000000006009
1000006026	20020131	1	900000000000380005	10058006	26036001		1	116676008	900000000000006009
1000006026	20030131	0	900000000000380005	10058006	26036001		1	116676008	900000000000006009

Voorbeeld

- Concept 3738000:

id	effectiveTime	active	moduleId	definitionStatusId
3738000	20020131	1	90000000000380005	90000000000128007

- Geïntroduceerd: 31 januari 2002
- Actief

Voorbeeld

- Descriptions:

id	effectiveTime	active	moduleId	definitionStatusId
3738000	20020131	1	90000000000380005	90000000000128007

Id	effectiveTime	active	conceptId	languageCode	typeId	term
7302012	20020131	1	3738000	en	90000000000187000	Viral hepatitis
7303019	20020131		id	conceptId	languageCode	term
7304013	20020131		90000000000276019	90000000000128007	en	Sufficiently defined concept definition status
486706012	20020131		90000000000277011	90000000000128007	en	Defined
70			90000000000278018	90000000000128007	en	Necessary and sufficient definition
	90000000000801016		90000000000279014	90000000000128007	en	Sufficiently defined concept definition status (core metadata concept)
	90000000000802011		90000000000380005	en		SNOMED CT core module
	90000000000803018					

Voorbeeld

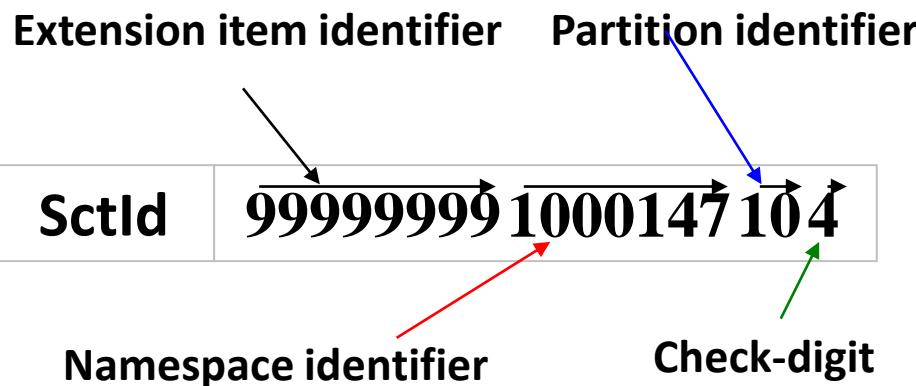
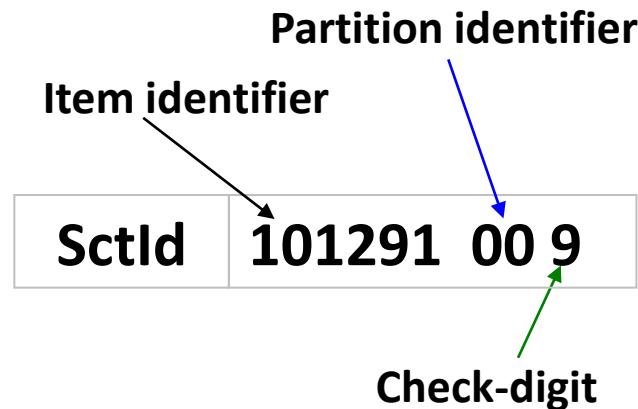
- Relaties

Id	effectiveTime	active	sourceId	destinationId	relationshipGroup	typeId
1142543026	20020131		13738000	367325008		0246100006
1142543026	20020731		03738000	367325008		0246100006
2731963021	20050131		13738000	40733004		042752001
2731963021	20060731		03738000	40733004		042752001
208755024	20020131		13738000	128240006		0116680003
208755024	20020731		03738000	128240006		0116680003
2691409027	20050131		13738000	312158001		0116680003
2691409027	20090731		03738000	312158001		0116680003
1142542020	20020131		13738000	367324007		0246100006
1142542020	20020731		03738000	367324007		0246100006
765268027	20020131		13738000	49872002		0246075003
765268027	20070131		13738000	49872002		0246075003
765267021	20020131		13738000	23583003		1116676008
765267021	20070131		13738000	23583003		1116676008
1142546023	20020131		13738000	272141005		0246112005
208759029	20020131		13738000	363171009		0116680003
208759029	20020731		03738000	363171009		0116680003

Color by numbers

≥ 100.000

dus minstens 6 posities



Max 18 (!) posities,
kan worden
gerekend
als (un-)signed
64-bit integer

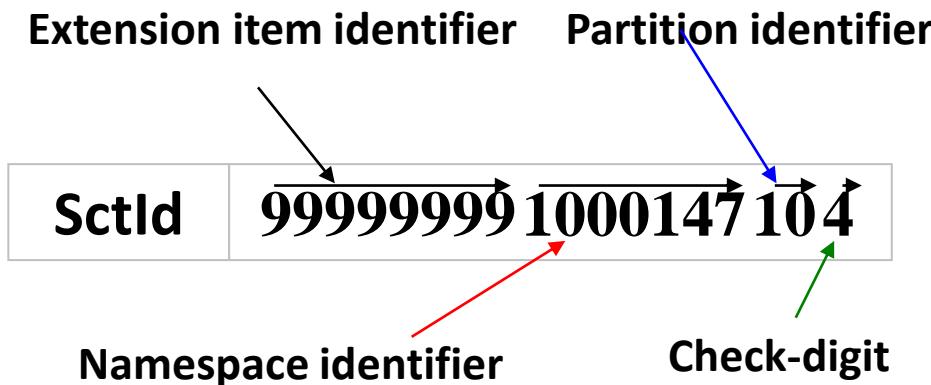
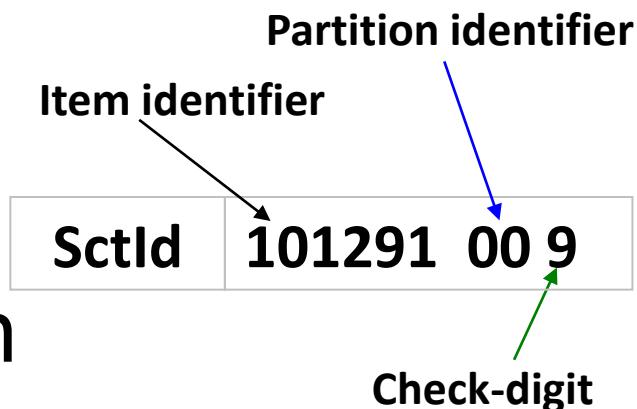
Partition identifier

00 = core concept

10 = extension concept

..1 = core/ext description

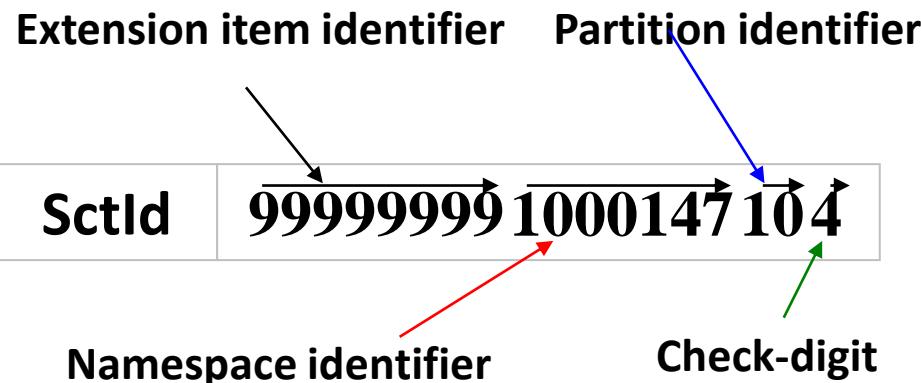
..2 = core/ext relationship



Namespace identifier

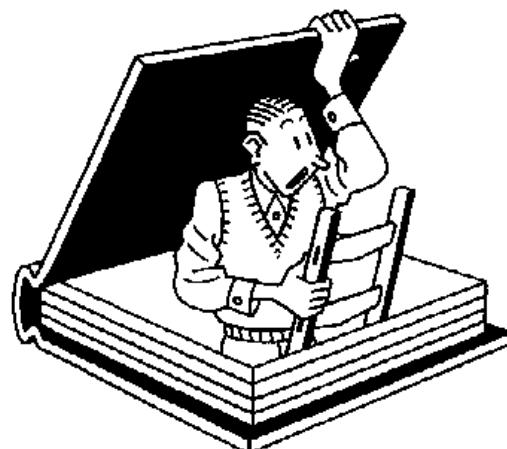
<http://www.ihtsdo.org/develop/namespaces/>

1000147	21-Dec-2011	Nictiz – National IT Institute for Healthcare in The Netherlands (The Netherlands) – IHTSDO Member <i>See entry for Namespace ID #1000146</i>
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Bestanden

- De terminologie-inhoud is vastgelegd in tekst-bestanden (.txt)
- Géén software meegeleverd



Browsers

Browser	URL	Free	Registration required	Web-based	Local installation	Notes
CaTTS (Coding and Taxonomy / Terminology Service)	http://www.jdet.com	x		x		Demo version only, from BT (British Telecommunications plc)
CliniClue	http://www.cliniclue.com	x	x		x	
HealthTerm	http://www.carecom.dk/Joomla/index.php?option=com_content&task=view&id=12&Itemid=27				x	
HLI LExPlorer	http://www.snomed.cfh.nhs.uk/lexplorer			x		Athens account required
Mycroft	http://www.apelon.com/products/mycroft.htm	x	x		x	
NCI Terminology Browser	http://nciterms.nci.nih.gov/NCIBrowser	x		x		

Browsers

- Online:
 - <http://terminologie.nictiz.nl/>
 - ... en vele anderen ...
- Lokale browsers:
 - SNOB (Snomed Browser)
 - CliniClue / CLUE (CIC Look-Up Engine)

Rogers J, Bodenreider O. SNOMED CT: browsing the browsers.

In: Proceedings of KR-MED 2008

http://www.nlm.nih.gov/research/umls/Snomed/snomed_browsers.html

SNOB

- Ontwikkeld:
 - Sinds 2007, (interface) gebaseerd op GALEN software, specifiek voor SNOMED CT
 - Door Egbert van der Haring
- <http://snob.eggbird.eu/>
- Gebruikt SNOMED-distributie .txt files

CliniClue

- Ontwikkeld:
 - Sinds 1995, eerst voor READ codes (NHS), later (ook) voor SNOMED
 - Door Clinical Information Consultancy (CIC)
- <http://www.clinical-info.co.uk>
- SNOMED in specifiek bestandsformaat vereist
 - Verkrijgbaar via CLUE website
 - Niet meer onderhouden (?)

Demo Nictiz terminologie browser

- <http://terminologie.nictiz.nl>

Implementatie van SNOMED CT



Implementatie

- Wat?
 - Mapping
 - Subsetting
 - Extensie
 - Vertalen
- Waarom?
 - Kosten en Baten



Van **referentie** terminologie
naar **interface** terminologie

Mapping – Voorbeeld

- Vaccines
 - Mumps
 - Poliomyelitis
 - Influenza

C vaccine

- C mumps live virus vaccine
 - + C measles + mumps + rubella + varicella vaccine
 - + C measles, mumps and rubella vaccine
 - C mumps virus vaccine live 1 dose injection solution 0.5mL vial
 - C mumps virus vaccine live injection solution 0.5mL vial

C vaccine

- C poliovirus vaccine
 - + C inactivated poliovirus vaccine
 - C live poliovirus vaccine
 - C poliomyelitis live vaccine 0.5mL oral solution

C vaccine

- C influenza virus vaccine
 - + C inactivated Influenza surface antigen sub-unit vaccine
 - + C inactivated Influenza surface antigen virosome vaccine
 - C inactivated Influenza vaccine (split virion) prefilled syringe 0.5mL
 - C inactivated Influenza vaccine (surface antigen) prefilled syringe 0.5mL
 - + C influenza split virion vaccine
 - C influenza vaccine injection 0.5mL
 - C influenza vaccine prefilled syringe 0.5mL
 - C influenza vaccine Vials 25mL
 - C influenza vaccine Vials 5mL
 - + C influenza virus H5N1 vaccine
 - C influenza virus vaccine 45mg injection
 - C influenza virus vaccine 45mg injection 0.5mL

Mapping – Waarom

- SNOMED CT is GEEN vervanging voor
 - Internationale classificaties (ICD, ICPC, DSM)
 - Nationale codestelsels (DBC's)
 - Lokale (specialisme-specifieke) codestelsels
- ... maar kan hier wel een aanvulling op zijn

Mapping – Hoe

- Handmatig
 - Begrippen van “eigen” stelsel opzoeken in SNOMED
- Automatisch
 - Gebruik maken van taal en/of structuur
- UMLS Metathesaurus

Mapping – UMLS Metathesaurus

- Integreert > 150 internationale stelsels
- Mapping door middel van relaties:
 - Broader than
 - Narrower than
 - Equivalent
- <https://uts.nlm.nih.gov/>

Mapping – Toepassing

- Registratie op basis van ICPC
- Informatie-uitwisseling op basis van SNOMED CT
- Registratie op basis van SNOMED CT
- Afleiden van ICPC code

Subsetting – Wat is het

- Het creeren van een set van concepten, termen en relaties uit SNOMED CT die relevant zijn voor een specifiek doel / data item
 - Bijv. Cardiochirurgische verrichtingen

Subsetting – Voorbeeld

- ↳ vaccine
 - ↳ influenza virus vaccine
 - + inactivated Influenza surface antigen sub-unit vaccine
 - + inactivated Influenza surface antigen virosome vaccine
 - ~~+ inactivated Influenza vaccine (split virion) prefilled syringe 0.5mL~~
 - ~~+ inactivated Influenza vaccine (surface antigen) prefilled syringe 0.5mL~~
 - + influenza split virion vaccine
 - ~~+ influenza vaccine injection 0.5mL~~
 - ~~+ influenza vaccine prefilled syringe 0.5mL~~
 - ~~+ influenza vaccine Vials 25mL~~
 - ~~+ influenza vaccine Vials 5mL~~
 - + influenza virus H5N1 vaccine
 - ~~+ influenza virus vaccine 15mg injection~~
 - ~~+ influenza virus vaccine triv 15mcg/0.5mL injection solution 0.5mL~~
 - ~~+ influenza virus vaccine trivalent 45mcg/0.5mL injection solution 5mL~~
 - + intranasal influenza live virus vaccine
 - ~~+ swine influenza virus vaccine~~

Subsetting – Waarom

- SNOMED CT bevat
 - ± 385.000 (in-)actieve concepten
 - Termen in het Engels
- Het aanbieden van “heel SNOMED CT” is vaak suboptimaal; (klinisch) focus is vereist

Subsetting – Hoe

- Handwerk
 - Het bepalen van de relevante concepten, termen en relaties in SNOMED CT
- Onderhoud
 - Voor een nieuwe release van SNOMED CT moet de accuraatheid van een subset opnieuw bepaald worden

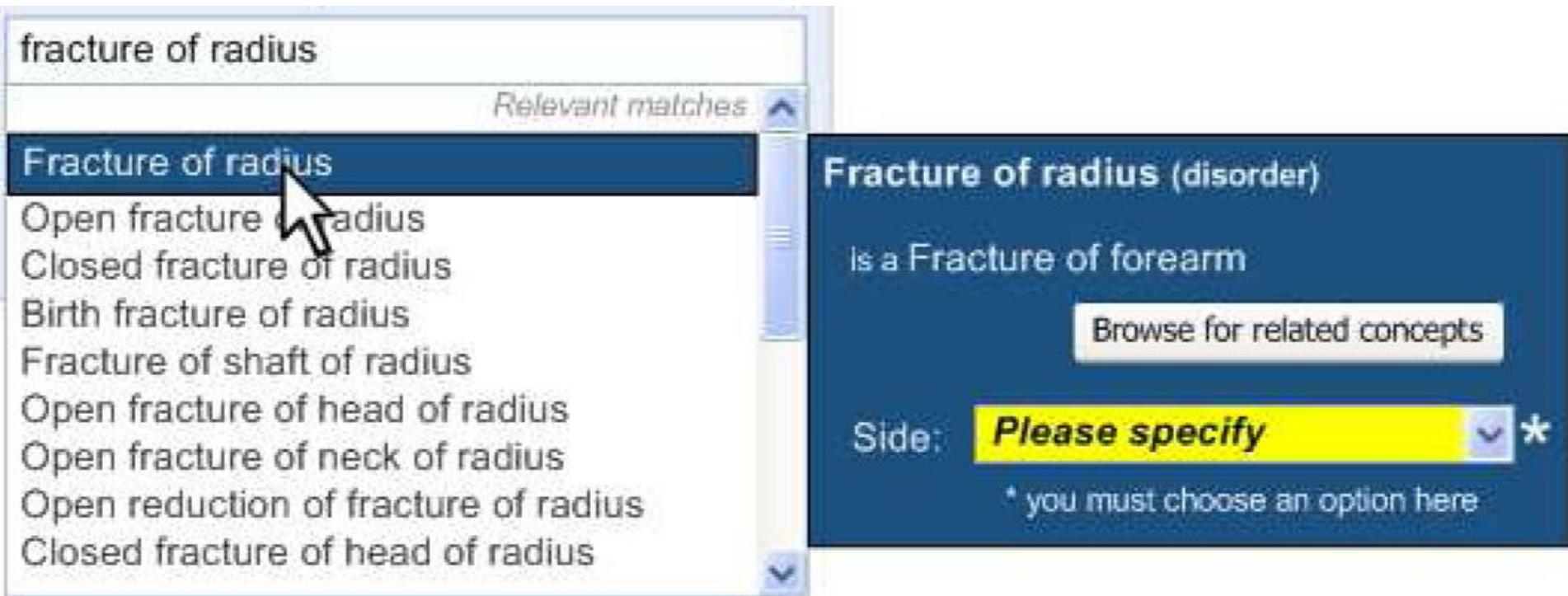
Subsetting – Toepassing

- ↳ **C 138875005 SNOMED CT Concept**
 - ↳ **C 363787002 observable entity**
 - ↳ **C 278844005 general clinical state**
 - ↳ **C 263495000 gender**

- ↳ **C 138875005 SNOMED CT Concept**
 - ↳ **C 404684003 clinical finding**
 - ↳ **C 365860008 general clinical state finding**
 - ↳ **C 365873007 gender finding**
 - ↳ **C 248152002 female**
 - ↳ **C 302081005 finding of sex of baby**
 - ↳ **C 394743007 gender unknown**
 - ↳ **C 394744001 gender unspecified**
 - ↳ **C 248153007 male**
 - ↳ **C 405242009 castrated male**
 - ↳ **C 407375002 surgically transgendered transsexual**

Subsetting – Toepassing

- Zichtbaar
 - Picklists met SNOMED termen/concepten
 - Samenstel-mogelijkheden ondersteunen



The screenshot shows a clinical information system interface. On the left, a search bar contains the text "fracture of radius". Below it, a list of "Relevant matches" is displayed, with "Fracture of radius" highlighted in blue and selected. A cursor arrow points to the left side of this highlighted item. The right panel provides detailed information about the selected concept:

Fracture of radius (disorder)

Is a Fracture of forearm

Side: Please specify * * you must choose an option here

Browse for related concepts

Extensie – Wat is het

- Het creëren van nationale/regionale/lokale uitbreidingen op SNOMED CT

Extensie – Voorbeeld

- +  part of European country
 - +  Counties of Republic of Ireland
 - +  Islands in region of Italy
 - +  Islands in region of Portugal
 - +  Islands in region of Spain
 - +  Islands of Greece
 - +  Islands of Netherlands
 - +  Islands of Spain
 - +  Regions of France
 -  Regions of United Kingdom of Great Britain and Northern Ireland
 - +  British Overseas Territories
 - +  Dependent territories of United Kingdom of Great Britain and Northern Ireland
 -  Great Britain
 - +  Islands of United Kingdom of Great Britain and Northern Ireland
 - +  Regions of England
 - +  Regions of Northern Ireland
 - +  Regions of Scotland
 -  Regions of Wales
 -  Welsh counties
 -  Clwyd
 -  Dyfed
 -  Gwent
 -  Gwynedd
 -  Mid Glamorgan

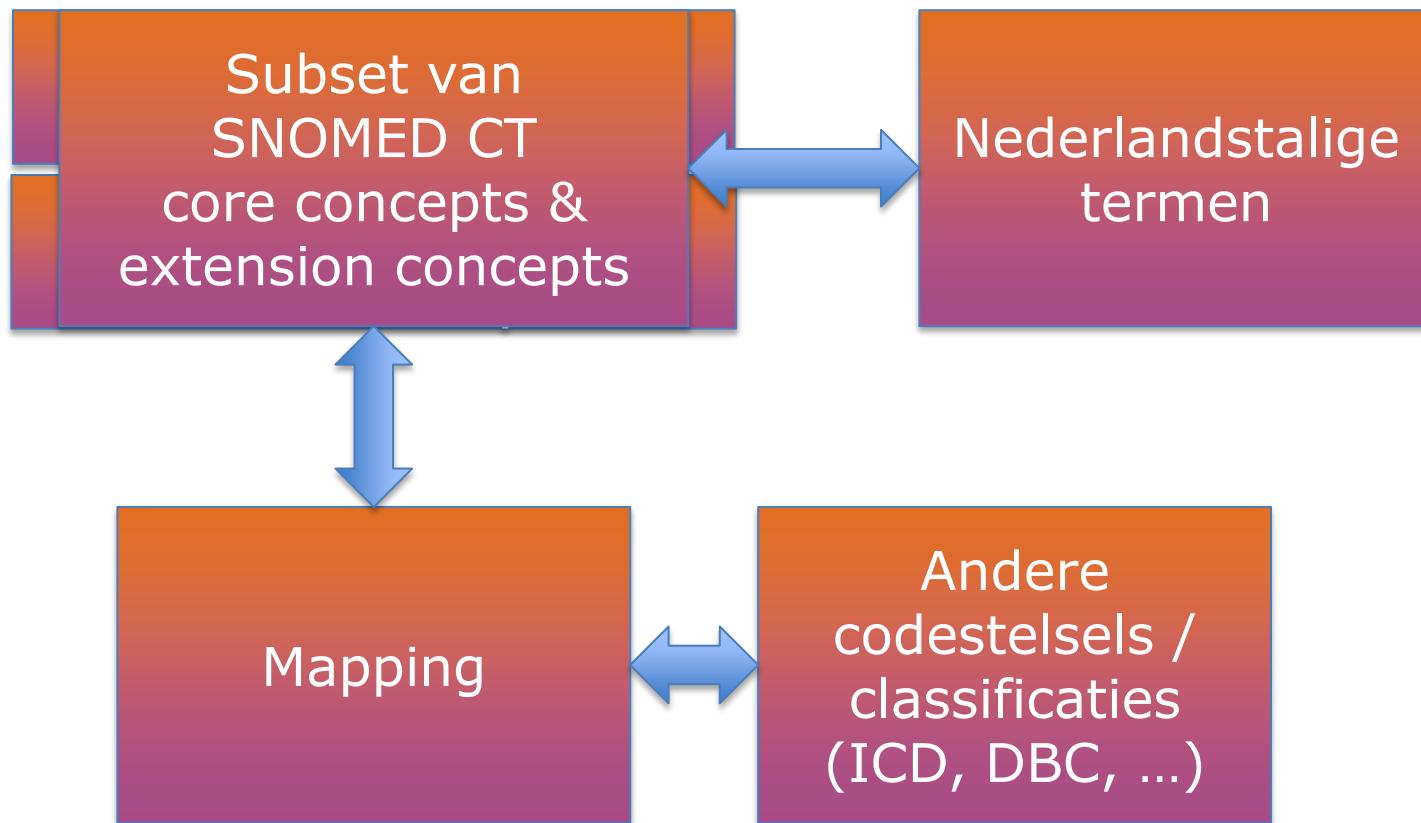
Extensie – Waarom

- Specialisatie
 - Specialisme-specifieke items toevoegen die in SNOMED CT ontbreken
- Lokalisatie
 - Representatie van concepten die nationaal/lokaal relevant zijn (US Drugs)
 - Nederlandse termen

Extensie – Hoe

- Eigen concepten, relaties en termen toevoegen door middel van toekenning van lokale identifiers
 - onderscheidbaar van “core” identifiers
- Onderhoud
 - Voor een nieuwe release van SNOMED CT moet de accuraatheid en adequaatheid van een extensie opnieuw bepaald worden

Samenhang



Vertalen

- In Denemarken (en Zweden) is een (integrale) vertaling van SNOMED CT gemaakt
- In Nederland zal een “incrementele vertaling” worden gemaakt
 - Interface terminologie

SNOMED CT – Kosten

- Implementatie
- Onderhoud
 - Eigen onderhoud
 - Controle bij nieuwe release van SNOMED CT (2x per jaar)

SNOMED CT – Baten

- Kwaliteit van Zorg
 - “**Digitizing medical records** in the **U.S.** could save the health care industry as much as **\$81 billion a year** and help medical practitioners **avoid mistakes**.”
 - Electronic medical records systems save money by **reducing redundant care, speeding patient treatment** and **improving safety**”

Can Electronic Medical Record Systems Transform Healthcare? An Assessment of Potential Health Benefits, Savings, and Costs” - Sep. 14, 2005 Hillestad R, Bigelow J, Bower A, Girosi F, Meili R, Scoville R, and Taylor R (Rand Corp.) Health Affairs, Vol. 24, No. 5

“Digitizing medical records”

- Semantische interoperabiliteit:
 - Interoperabel dossier-model (Record Architecture)
 - Interoperabele terminologie
- Benutten van interoperabiliteit:
 - Beslissingsondersteuning
 - Resource allocation
 - Quality assessment

Bron

- The Value Of Health Care Information Exchange And Interoperability
 - *There is a business case to be made for spending money on a fully standardized nationwide system*

Jan Walker, Eric Pan, Douglas Johnston,
Julia Adler-Milstein, David W. Bates, and
Blackford Middleton

Health Affairs – 2005 January 19th, 10-18

What has Implementation meant for Kaiser Permanente's Members?

- Dramatically lowered cardiac disease mortality
- Improved use of preferred drugs
 - COX-II inhibitor story
- Better Syndromic Surveillance
 - Rotavirus Vaccine and Intussusception
- Data about Clinician Performance
- Improved Clinical Research Capabilities
- More to Come
 - Adult oncology standardization and protocol improvement

University of Sydney

SNOMED CT Concept
Qualifier
Negation Phrase
Administration Entity
Acronym/Abbreviation

A 46-year-old lady was referred to the haematology clinic [the haematology clinic] for evaluation of lymphocytosis in May 1993. She had severe lethargy [severe lethargy] and intermittent right upper abdominal discomfort without any significant loss in weight. Her past medical history [Her past medical history] included essential hypertension controlled on atenolol 100 mg once daily and was also on frusemide 40 mg once daily. She had no significant surgical history other than having undergone cholecystectomy [undergone cholecystectomy] in 1972. She had never smoked nor consumed alcohol [consumed alcohol]. Physical examination showed no evidence of lymphadenopathy. Complete blood count showed normal haemoglobin concentration 14.8 g/dl, macrocytosis (MCV [MCV 100.1] 100.1), raised white cell count at 13.4 109/L [13.4 109/L], lymphocytosis (absolute number 6.3 109/L [absolute number 6.3 109/L]), and normal neutrophil count (absolute number 5.6 109/L [absolute number 5.6 109/L]). Peripheral blood showed numerous Howell-Jolly bodies within erythrocytes. Thyroid function tests, protein electrophoresis, C-reactive protein, immunoglobulin levels and autoimmune screening were normal. Ultrasonography and computed tomography scan of the abdomen and pelvis [the abdomen and pelvis] did not reveal retroperitoneal or mediastinal lymphadenopathy [retroperitoneal or mediastinal lymphadenopathy], but the spleen [the spleen] was noted to be very atrophic. Gastroscopy showed multiple gastric erosions and the initial [the initial impression] impression was of celiac disease complicated by lymphoma and lymphocytosis [lymphoma and lymphocytosis].

Implementatie - Conclusie

- Implementatie is maatwerk, er zijn geen off-the-shelf oplossingen
- Specifiek:
 - Mappen
 - Subsetten
 - Uitbreiden
 - Vertalen
- Er zijn (nog) geen plug-and-play producten

Implementatie – Aanpak

- Inventarisatie best practices
- Kleinschalig meer ervaring opdoen
 - Evaluatieprojecten
- Onderzoek naar beschikbare en benodigde software
- Inventarisatie gebruikte coderingen
- On-demand vertalen

Huidige ontwikkelingen

- Ontwikkelen interfaceterminologie:
DHD Diagnosethesaurus &
Verrichtingenthesaurus
- Subsets: Oogartsen, optometristen, ...
- SNOMED CT gebruiken in
informatieuitwisseling UMC's
(GenOGeg, NFU-programma)
- Verkenning toepassing SNOMED CT in
richtlijnen / indicatoren

Licentiehouders

ICT-leveranciers:

- Advanced Health And Care
- B&F Optics B.V.
- BrightONE Healthcare Solutions B.V.
- Chipsoft
- CSC iSOFT Nederland B.V.
- Digitalis BV
- Epic
- Finalist Noord Nederland c.v.
- G2 Speech
- Gerrit Boers
- McKesson
- Medicore B.V.
- MI Consultancy
- MIPS NV (België)
- Nedtalk B.V.
- OO2
- Palmade B.V.
- Philips Nederland Healthcare
- Siemens Healthcare
- Tieto
- TM7 B.V. / TM7 IT Innovators
- Visbion Ltd
- VitalHealth Software
- ZorgGemak B.V.

Overige organisaties:

- Algemeen Medisch Laboratorium AML (België)
- De Praktijk Index B.V.
- Dutch Hospital Data
- Furore
- Gezondheidsdienst voor Dieren
- GGD Brabant-Zuidoost
- Health Base
- IPT Medical Services
- Maastro Clinic
- Ministerie van Defensie
- Practocol B.V.
- Rijksinstituut voor Volksgezondheid en Milieu
- SNOB/Eggbird
- Springer Media
- Stichting Zorgdraad

Algemene ziekenhuizen:

- Canisius-Wilhelmina Ziekenhuis
- Isala Klinieken
- Maasstad ziekenhuis
- Ny Smellinghe
- Onze Lieve Vrouwe Gasthuis
- Samenwerkende Ziekenhuizen Zeeland
- Van Weel - Bethesda ziekenhuis

Universitaire ziekenhuizen:

- Academisch Medisch Centrum
- Erasmus MC
- Leids Universitair Medisch Centrum
- Universitair Medisch Centrum Groningen
- Universitair Medisch Centrum Utrecht
- Vrije Universiteit en VU MC

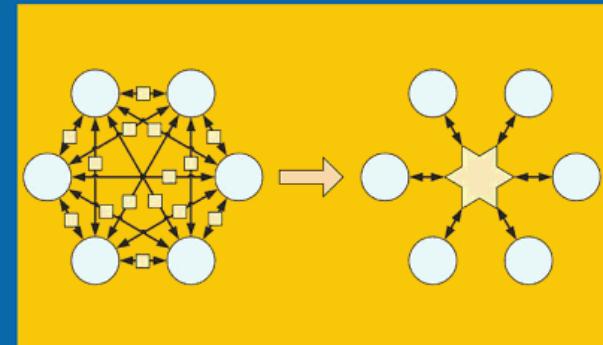
Meer info

- Tim Benson

Principles of
Health Interoperability
HL7 and SNOMED

Tim Benson

**Principles of Health
Interoperability
HL7 and SNOMED**



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