IHE LAB face to face meeting
Usage of reference terminologies SNOMED-CT, LOINC - UCUM

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Product Manager GLIMS
15 October 2013

IHE Integrating the Healthcare Enterprise

History : IHE Chicago 4 Febr. 2013 by Filip Migom

IHE-LABORATORY : TERMINOLOGY

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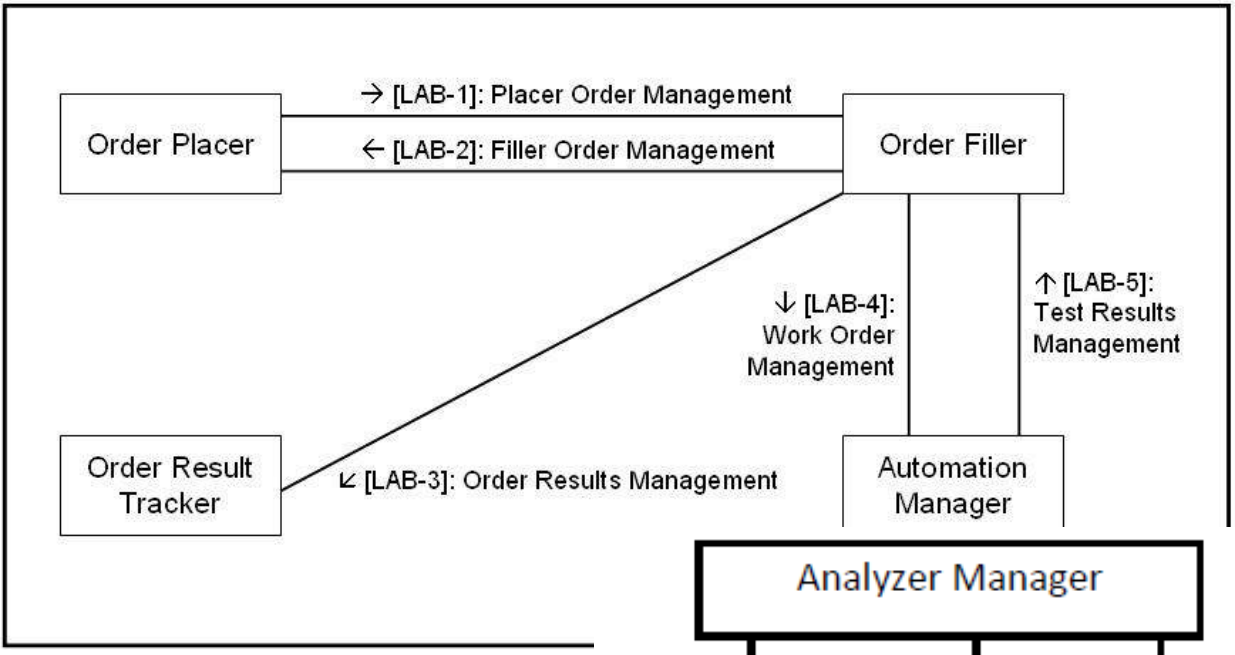
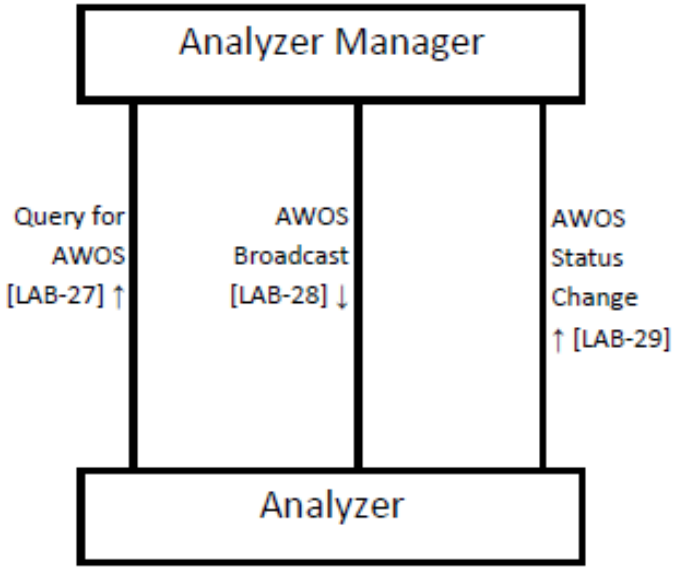
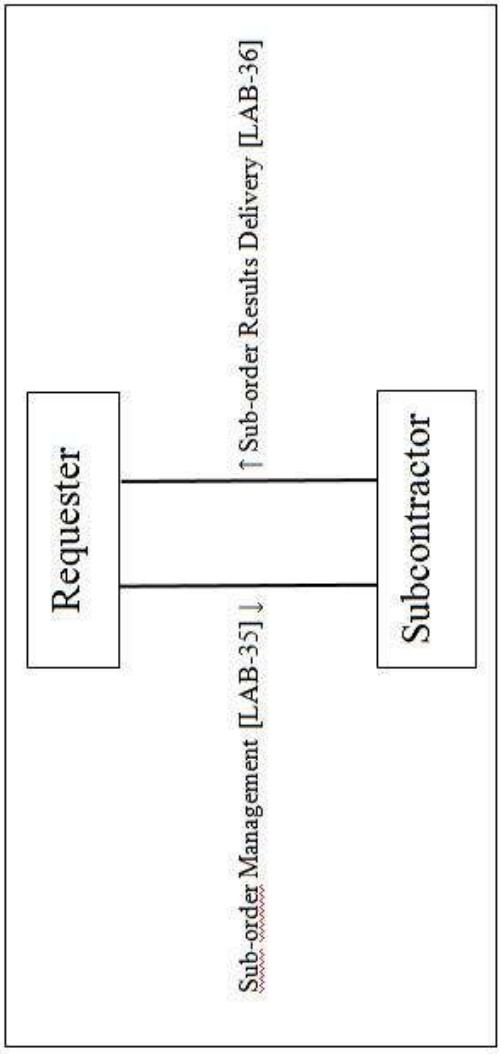
IHE-LTW + LDA/LAW + ILW … LCSD







IHE Laboratory.
Do we have to plan something with LOINC ? SNOMED ? ..

Belgium Netherlands Luxemburg

BENELUX

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Usage of reference terminologies (SNOMED CT, LOINC, UCUM) for LAB in the Benelux

Belgium
Netherlands
Luxemburg

SNOMED-CT

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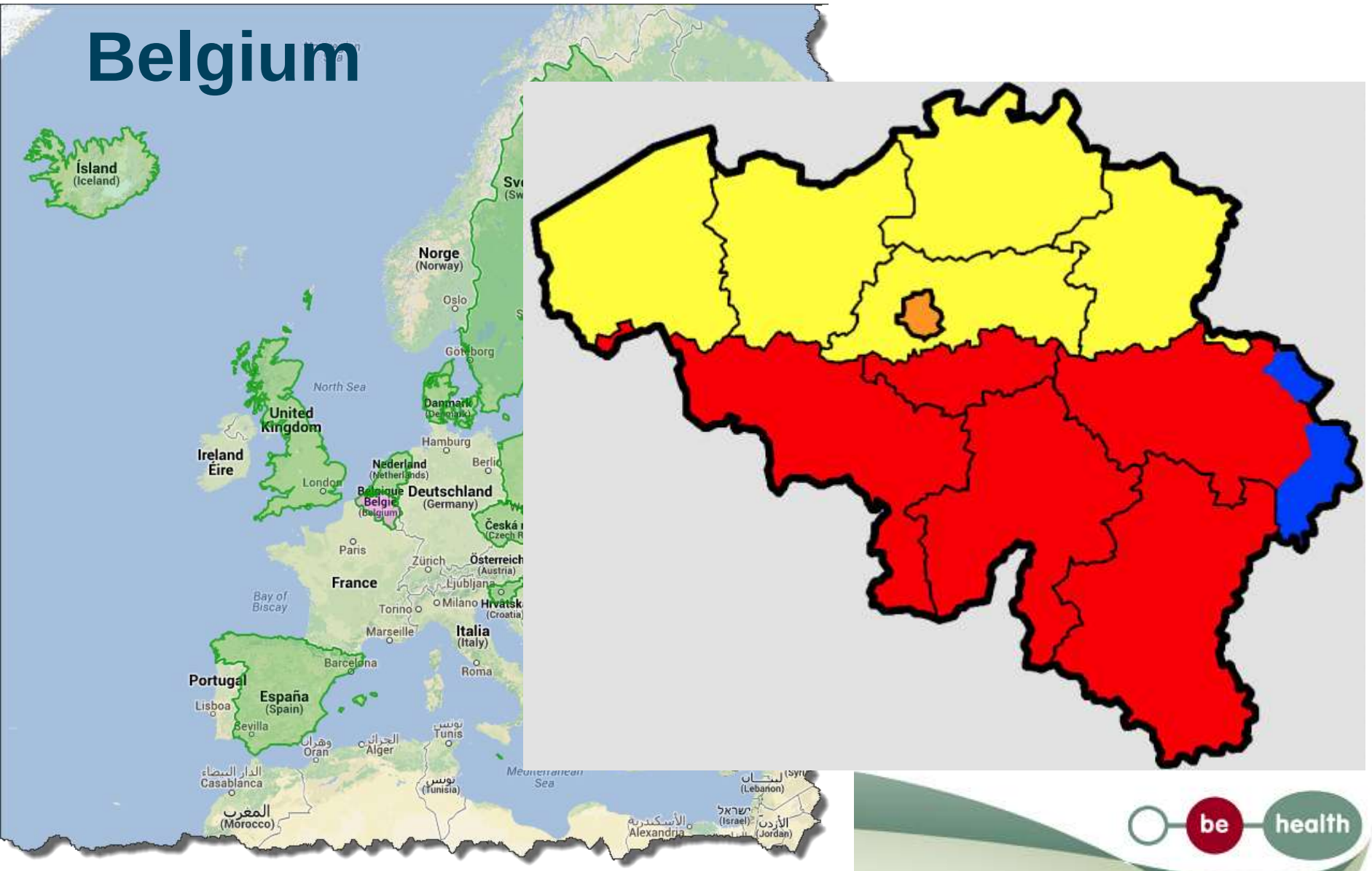
Belgium



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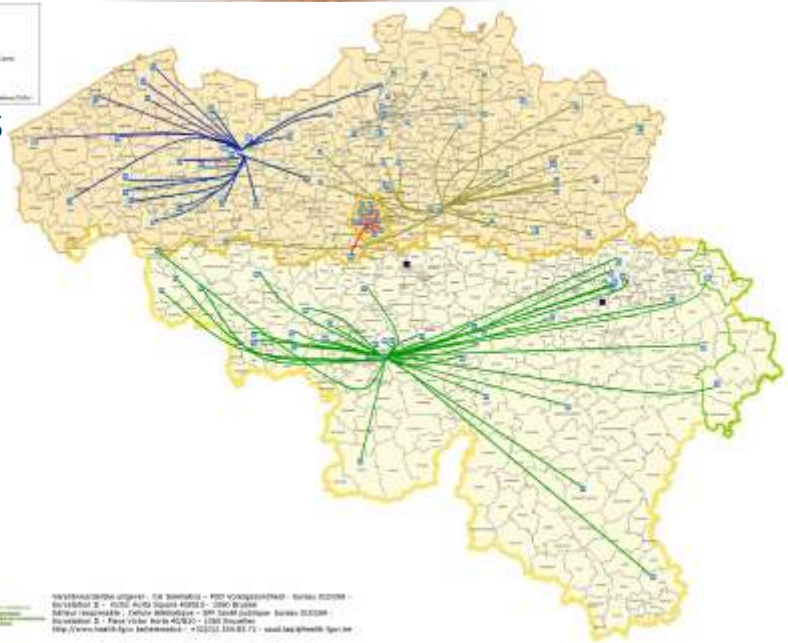
Point to Point Communication

Private / Hospital Lab

GP / Specialist

Architecture: Mediring, Medimail, Hector [<> IHE-ITI]
Structure: H1, Medidoc, Medar (+ dialects) [<> IHE-LAB-LTW]
Semantics: Propietary, ACTH, medidoc codes [<> LOINC]

Non targeted communication



- Currently many independent result viewers
- Integrate visualisation through HUBmetaHUB network
  - For GP & Specialists, visualisation integrated in EPR
  - Progressing well for hospital labs
  - eHealth roadmap for private lab's: connect to HUB's (direct or indirect)
- Cave: As such does not solve PDF & Old dino formats

Structure & Semantics

- Not quite a happy love story

	14/01/2013	7/11/2012	4/06/2012	29/11/2010	13/11/2009	5/02/2009	16/09/2008	3/08/2007
Bloedbezinking 1 uur	6	2	9	5	7		4	8
Hemoglobine	13.8	13,9	14,7	14,9	14,1		14,5	14,7
Hematocriet	41.0	41,6	42,2	45,2	42,7		44,1	44,2
Erythrocyten	4.74	4,87	4,99	5,16	4,98		5,04	4,96
MCV	86.5	85	85	88	86		88	89
MCH	29.1	29	30	29	28		29	30
MCHC	33.7	33	35	33	33		33	33
Leukocytentelling	5.37	6830	8060	6210	5590		5020	6160
LEUKOCYTEN FORMULE								
Segmentkernigen								
Eosinofielen	300	191	193	193	168		141	129
Basofielen	30	20	16	19	28		10	37
Lymfocyten	1310	1742	1668	1627	1610		1310	1349
Monocyten	360	669	693	509	442		472	468
Neutrofielen	3340	4207	5489	3863	3343		3087	4176
Trombocyten	254	250	275	276	296		289	314
CRP	1.1				<1,0			
Glucose nuchter	107	81				96	97	99
Hb A1c	5,9							
Creatinine	0.60	0,58		0,62	0,59	0,62	0,86	0,91
eGFR (MDRD)		>90		>90	>90	>90	72	68
Ureum	36				30,1	41,4		31,9
Urinezuur	6.1	5,5		4,9	5,4	5,2	5,0	5,5

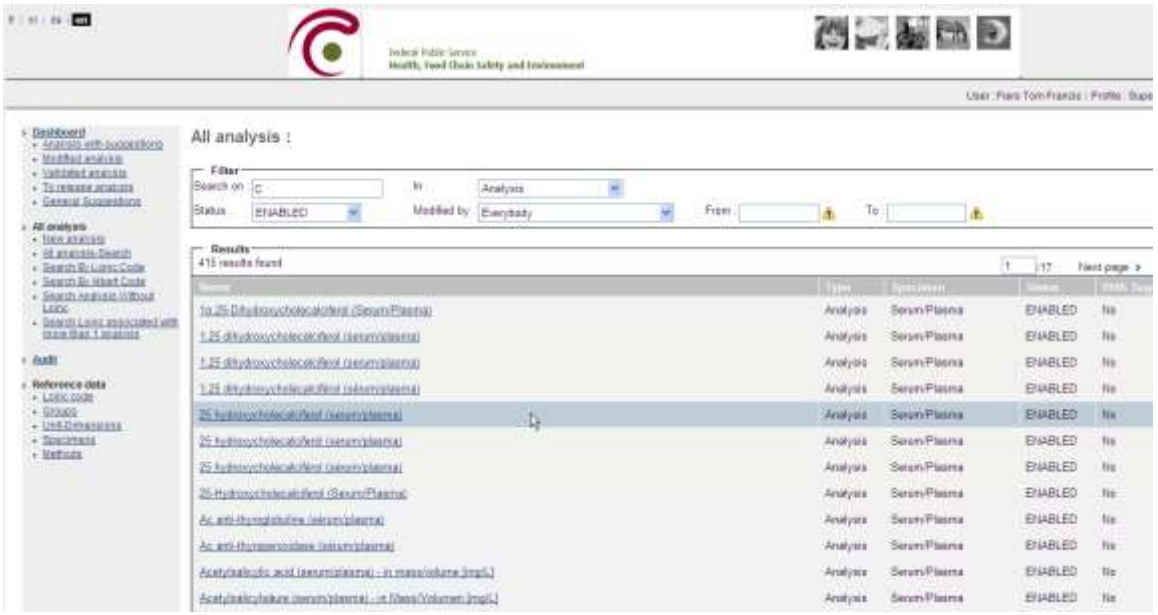
Structure & Semantics

- Coding systems
  - LOINC (one code, one concept)
    vs SNOMED (pre/post coordination)
  - The case for LOINC:
    - Covers most lab concepts
    - Most important axes covered (analyte, specimen, scale, kind of quantity (method))

16527-4	ACTIVE	Calcium/Sodium	MRto	Pt	Ser/Plas	Qn		Cal; Ca; Na+; Na; Mass concentration ratio; Mass ratio; MCRto
17861-6	ACTIVE	Calcium	MCnc	Pt	Ser/Plas	Qn		Cal; Ca; Mass concentration; Level; Point in time; Random; Ser
17862-4	ACTIVE	Calcium	MCnc	Pt	Urine	Qn		Cal; Ca; Mass concentration; Level; Point in time; Random; Ur;
17863-2	ACTIVE	Calcium.ionized	MCnc	Pt	Ser/Plas	Qn		; Ca-I; Calcium free; iCa; Calcium active; Coagulation factor I; C
17864-0	ACTIVE	Calcium.ionized	MCnc	Pt	Ser/Plas	Qn	ISE	; Ca-I; Calcium free; iCa; Calcium active; Coagulation factor I; C

  - Problems with LOINC:
    - Too much (eg 68 times ‘glucose’, 734 starting with ‘glucose’, 72000 concepts)
    - Too little sometimes (eg calculations, specialised hemato, some method specific things)
  - Code + specimen + unit (Kind of Quantity)
  - detailed unit: UCUM vs SNOMED (probably UCUM with mapping to SNOMED)

Coding



- Federal working group (± 10 people currently) : NL,FR,GE,EN
  - **Sponsored by FOD: Progressing well (finally)**
  - **Link to LOINC, specimen (and method if applicable)**
- Notes & remarks
  - Double validation of codes in progress by different pathologists + release
- Personal Remark :
  missing Link within Europe (France, Germany, The Netherlands)
  - Like with France : SFIL

Coding

Labels

Label FR : Sodium (sérum/plasma) [mmol/L]
Label NL : Natrium (serum/plasma) [mmol/L]
Label DE : Natrium (Serum/Plasma) [mmol/L]
Label EN : Sodium (serum/plasma) [mmol/L]

Synonyms

Syn fr :

Syn nl :

Syn de :

Syn en :

Na (serum/plasma) [mmol/L]

Associated LOINC code

Number :	2951-2
Component :	Sodium
Property :	SCnc
Time_aspect :	Pt
System :	Ser/Plas
Methode type :	None
Scale type :	Qn
Relat nms :	Na+; Na; Substance concentration; Level; Point in time; Rand
Common name :	Sodium [Moles/volume] in Serum or Plasma

Albert code

24746

Properties

Specimen :	Serum/Plasma
Unit :	Substance Concentration
Method :	None

Other codes

ACTH :	DA05
Medidoc :	57225A.B
Medigest :	bGEA

Groups

Ionogram
Chemistry
Preferred unit

- Preferred units
- Synonyms
- Remarks and preferred usage if necessary
- Also deprecated but commonly used concepts
- Grouping: it's a free world

Structure & semantics. Next ?

- Transactions under eHealth flag for order entry/reporting
  - Different options exist , but largely unused by lack of architecture & sematics -> to be clarified how & what by eHealth structure WG (soon).
  - Embed into existing eHealth WS framework
  - Make obligatory in GP soft certification criteria
  - Lab's must be ready when certification kicks in
    - LIS support (direct or indirect) for eHealth webservices and lab messages
    - Connect (direct or indirect) to HUBmetaHUB

- Semantics: choice of coding systems
  - >> LOINC (& national code) supersedes ACTH, medigest and medidoc, Snomed for germs / additional
  - Authentic source under eHealth umbrella
  - Currently ± top 300 concepts released + backward coding
  - Make obligatory in GP soft certification criteria
  - Lab's must be ready when certification kicks in
    - LIS mapping to LOINC and some SNOMED

Belgium became a Member of IHTSDO

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The Netherlands

NICTIZ
Nationaal ICT Instituut in de Zorg

eHealth.nl

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“EENHEID VAN TAAL”

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Terminology Explorers

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SNOMED-CT on wikipedia

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SNOMED-CT vs. SNOMED-RT

History

SNOMED was started in 1965 as a Systematized Nomenclature of Pathology (SNOP) and has further developed into a logic-based health care terminology.[6][7] SNOMED CT was created in 1999 by the merger, expansion and restructuring of two large-scale terminologies: SNOMED Reference Terminology (SNOMED RT), developed by the College of American Pathologists (CAP); and the Clinical Terms Version 3 (CTV3) (formerly known as the Read codes), developed by the National Health Service of the United Kingdom (NHS).[8][9] The final product was released in January 2002.

The historical strength of SNOMED was its coverage of medical specialties. SNOMED RT, with over 120,000 concepts, was designed to serve as a common reference terminology for the aggregation and retrieval of health care data recorded by multiple organizations and individuals. The strength of CTV3 was its terminologies for general practice. CTV3, with 200,000 interrelated concepts, was used for storing structured information about primary care encounters in individual, patient-based records.[10] Currently, SNOMED CT contains more than 311,000 active concepts and provides the core general terminology for the electronic health record (EHR).[11]

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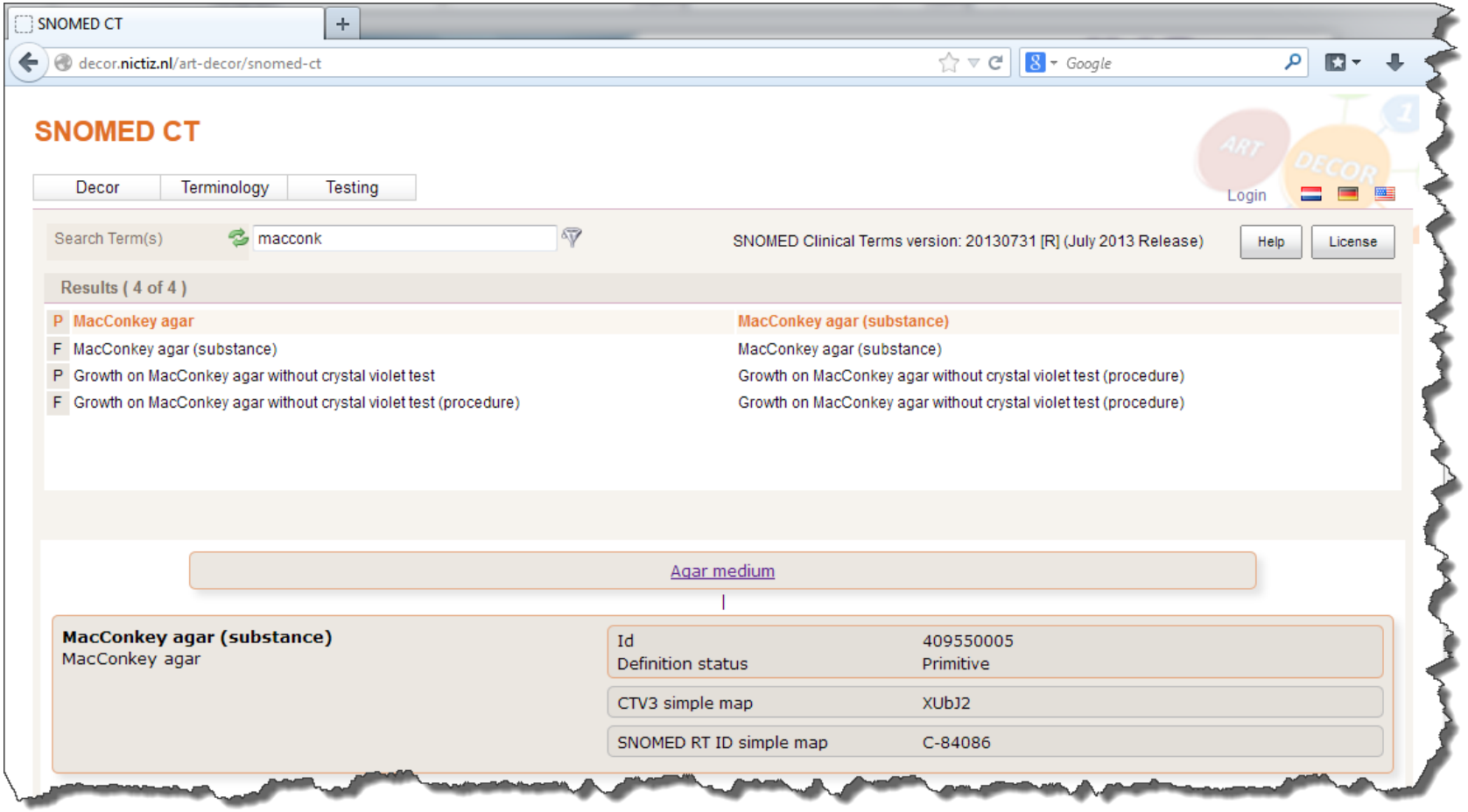
SNOMED-CT



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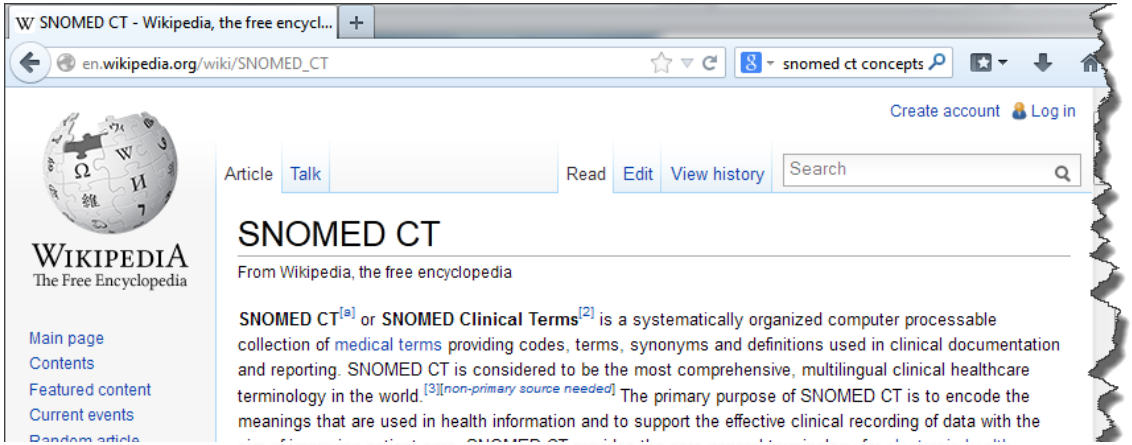
SNOMED-CT : CONCEPT



SNOMED CT consists of four primary core components:

Concept Codes - numerical codes that identify clinical terms, primitive or defined, organized in hierarchies

Descriptions - textual descriptions of Concept Codes

Relationships - relationships between Concept Codes that have a related meaning

Reference Sets - used to group Concepts or Descriptions into sets, including reference sets and cross-maps to other classifications and standards.

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Precoordination and postcoordination

SNOMED CT provides a compositional syntax[18] that can be used to create expressions that represent clinical ideas which are not explicitly represented by SNOMED CT concepts.

For example, there is no explicit concept for a "third degree burn of left index finger caused by hot water". However, using the compositional syntax it can be represented as

```
284196006 | burn of skin | :
   116676008 | associated morphology | = 80247002 | third degree burn injury |
 , 272741003 | laterality | = 7771000 | left |
 , 246075003 | causative agent | = 47448006 | hot water |
 , 363698007 | finding site | = 83738005 | index finger structure
```

Such expressions are said to have been 'postcoordinated'. Post-coordination avoids the need to create large numbers of defined Concepts within SNOMED CT. However, many systems only allow for precoordinated representations. Reliable analysis and comparison of post-coordinated expressions is possible using appropriate algorithms machinery to efficiently process the expression taking account of the underlying description logic.

For example, the postcoordinated expression above can be transformed using a set of standard rules to the following "normal form expression" which enables comparison with similar concepts.

```
64572001 | disease | :
   246075003 | causative agent | = 47448006 | hot water |
 , 363698007 | finding site | = ( 83738005 | index finger structure | :
          272741003 | laterality | = 7771000 | left | )
 , { 116676008 | associated morphology | = 80247002 | third degree burn injury |
 , 363698007 | finding site | = 39937001 | skin structure | }
```


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Terminology vs. Classification

SNOMED CT is a clinical terminology designed to capture and represent patient data for clinical purposes.[27] International Classification of Diseases (ICD) is a statistical classification system used to assign diagnostic and procedural codes in order to produce coded data for statistical analysis, epidemiology, reimbursement and resource allocation.[28] Both systems use standardized definitions and form a common medical language used within the electronic health record (EHR) systems.[29] SNOMED CT enables information input into EHR during the course of patient care, while ICD facilitates information retrieval, or output, for secondary data purposes.[29][30]

	SNOMED CT	ICD
Type	Terminology System	Classification System
Purpose	Information Input	Information Output
Function	Describes and defines clinical information for primary data purposes	Aggregates and categorizes clinical information for secondary data purposes

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USE-Cases

More specifically, the following sample computer applications use SNOMED CT:

- Electronic Health Record Systems
- Computerized Provider Order Entry CPOE such as E-Prescribing or Laboratory Order Entry
- Catalogues of clinical services; *e.g.*, for Diagnostic Imaging procedures
- Knowledge databases used in clinical decision support systems (CDSS)
- Remote Intensive Care Unit Monitoring
- Laboratory Reporting
- Emergency Room Charting
- Cancer Reporting
- Genetic Databases

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License !

- SNOMED CT is maintained and distributed by the IHTSDO, an international non-profit standards development organization, located in Copenhagen, Denmark.
- The use of SNOMED CT in production systems requires a license.
  - On the one hand SNOMED CT can be achieved by national membership in the IHTSDO (charged according to the GNP).
  - On the other hand it can be used via a corporate business license (dependent on the number of end users). LDCs (least developed countries) can use SNOMED CT without charges.
- For scientific research in medical informatics, for demonstrations or evaluation purposes SNOMED CT sources can be freely downloaded and used.
- The original SNOMED CT sources in tabular form are accessible by registered users of the Unified Medical Language System (UMLS) who have signed an agreement. Numerous online and offline browsers are available .
- Those wishing to obtain a license for its use and to download SNOMED CT should contact their National Release Centre, links to which are provided on the IHTSDO web site .

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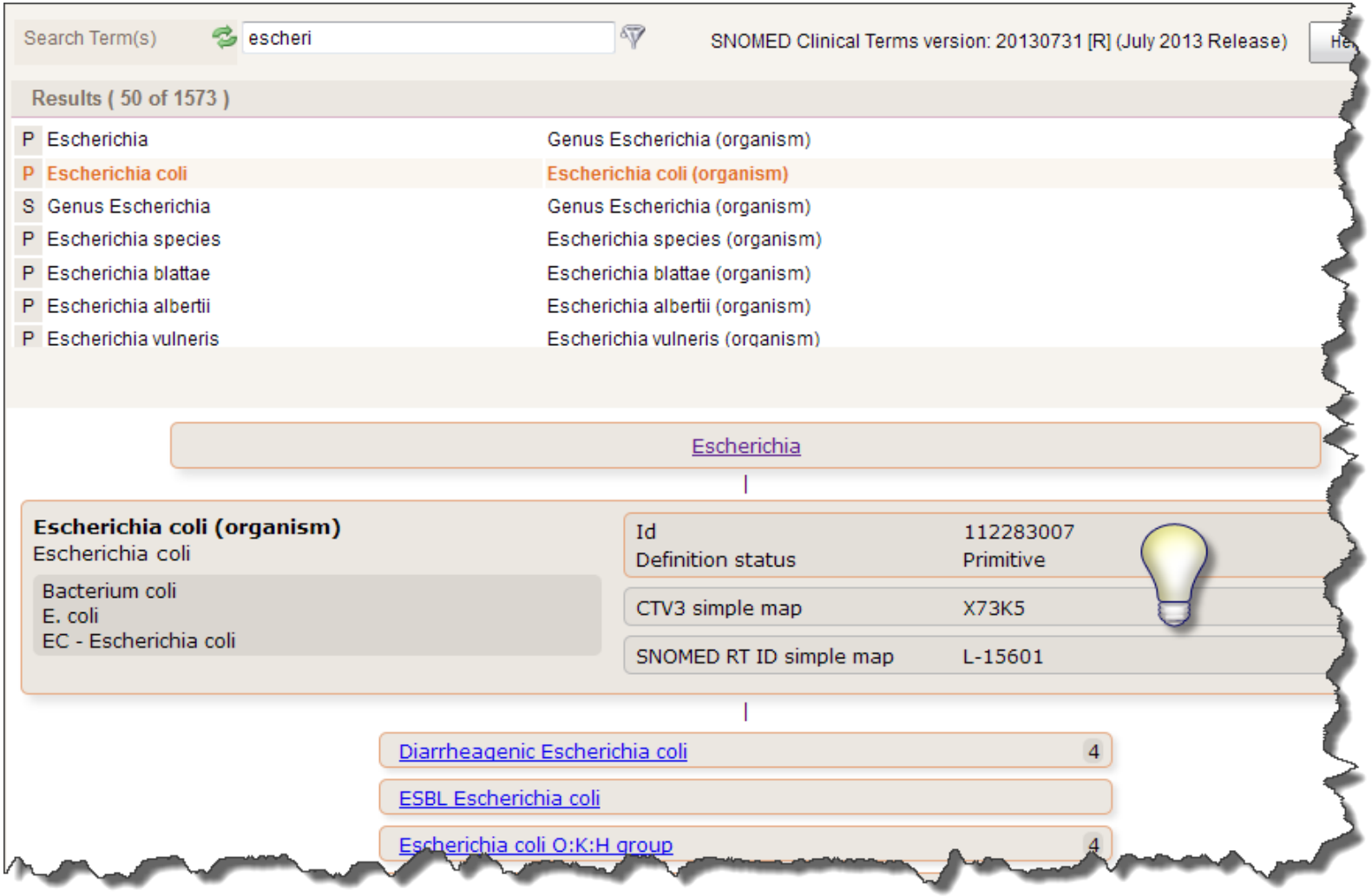
Microbiology Organism



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Microbiology Organism

- Warning : MALDI uses the SNOMED RT
  - Reference Terminology

	A	B	C	D
1	Waarde	Record	MALDI	GLIMS naam
1650	L-1E702	eryton	Erysipelothrix tonsillarum DSM 14972T DSM	Erysipelothrix tonsillarum
1651	L-156C0	erv	Escherichia albertii DSM 17582T HAM	Escherichia albertii
1652	L-15601	esccol	Escherichia coli ATCC 25922 CHB	Escherichia coli
1653	L-15601	esccol	Escherichia coli ATCC 25922 THL	Escherichia coli
1654	L-15601	esccol	Escherichia coli ATCC 35218 CHB	Escherichia coli
1655	L-15601	esccol	Escherichia coli B421 UFL	Escherichia coli
1656	L-15601	esccol	Escherichia coli DH5alpha BRL	Escherichia coli
1657	L-15601	esccol	Escherichia coli DSM 30083T HAM	Escherichia coli
1658	L-15601	esccol	Escherichia coli ESBL_EA_RSS_1528T CHB	Escherichia coli
1659	L-15601	esccol	Escherichia coli MB11464_1 CHB	Escherichia coli
1660	L-15601	esccol	Escherichia coli Nissl VML	Escherichia coli
1661	L-15601	esccol	Escherichia coli RV412_A1_2010_06a LBK	Escherichia coli
1662	L-15601	esccol	Escherichia coli W3350 MMG	Escherichia coli
1663	L-15606	escfer	Escherichia fergusonii DSM 13698T HAM	Escherichia fergusonii
1664	L-15604	escvul	Escherichia vulneris DSM 4564T DSM	Escherichia vulneris
1665	L-1E819	eubbra	Eubacterium brachy DSM 3990T DSM	Eubacterium brachy
1666	L-1E846	eubbra	Eubacterium callanderi IBS_MS_40 IBS	Eubacterium callanderi
1667	L-1E803	eublim	Eubacterium limosum 11 RLT	Eubacterium limosum
1668	L-1E803	eublim	Eubacterium limosum DSM 20517 DSM	Eubacterium limosum

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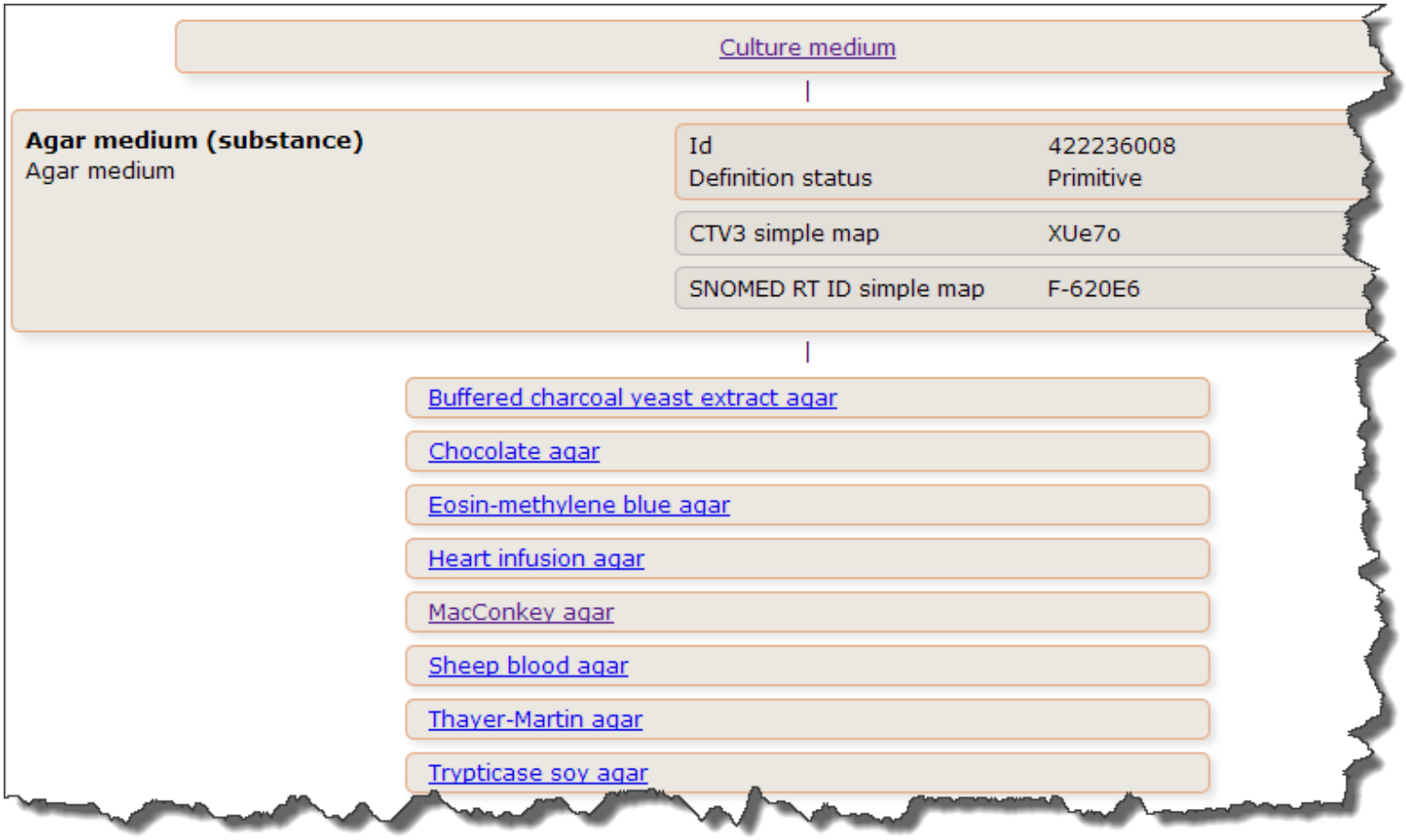
Microbiology Culture Medium



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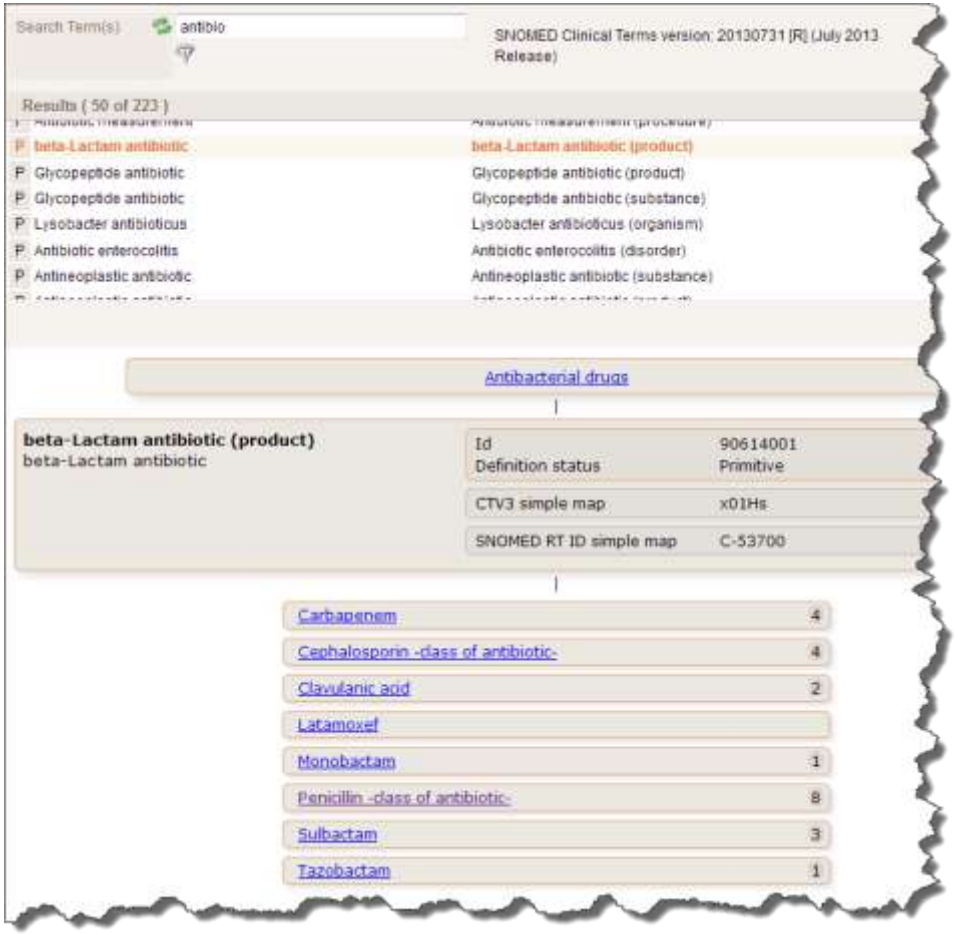
Microbiology Antibiotics



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Microbiology Qualifier Values

From: ihe-laboratory-committee@googlegroups.com on behalf of Riki Merrick <rmerrick@iconnectconsulting.com>
To: ihe-laboratory-committee@googlegroups.com
Cc:
Subject: Re: [ihe-laboratory-committee:1077] IHE-LAB3 : Microbiology : How to transmit AST results ?

Laurent,
I like the fact that you use CE for the interpretation OBXes - yes there are SNOMED codes for the common ones:
131196009^Susceptible (qualifier value)^SCT
30714006^Resistant (qualifier value)^SCT
11896004^Intermediate (qualifier value)^SCT

we don't have a code for:
nonsusceptible
Susceptible-dose dependent
Insufficient evidence
Synergy - susceptible
Synergy - resistant

Riki

Ulrike "Riki" Merrick, MPH

Contractor to The Association of Public Health Laboratories
PH Information Specialist

rmerrick@iconnectconsulting.com

Intermediate (qualifier value)
Intermediate

Between
In between
Inter-

Id	11896004
Definition status	Primitive
CTV3 simple map	X907g
SNOMED RT ID simple map	G-A114

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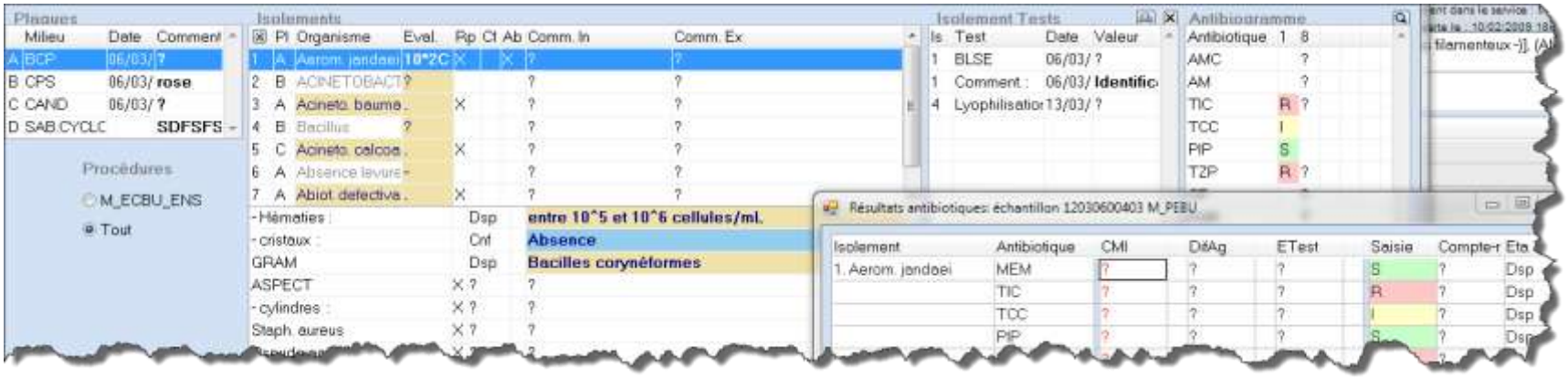
Microbiology

Culture Medium Organism Organism Supplemental tests Antibiotics



Antibiotics

Antibiotics Qualifier Values

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