



SNOMED CT to ICD-10 Project

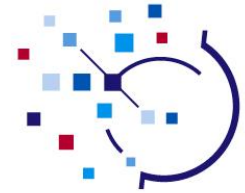
Mapping Tool – Feature
Highlights, Demonstration
and Adaptation for Other
Mapping Work

IHTSDO Implementation
Showcase

Sydney

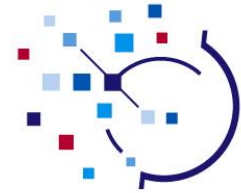
13 October 2011





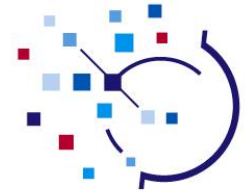
Content

- Introduction and Background
- Introduction to the Tool and Workflow
- Examples of Phase 1 MAPS
- Demonstration of the CTS2 Map Browser
- Adaptation for other mapping work



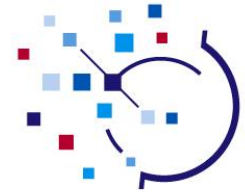
Introduction & Background





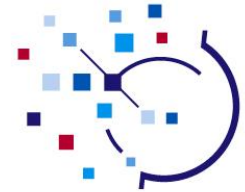
ICD-10 Mapping Objectives

- Develop a collaborative working relationship with worldwide standards development organizations promoting interoperation with SNOMED CT
- Design and deploy an extensible architecture for knowledge-based interoperation between healthcare records encoded in SNOMED CT and epidemiologic aggregate reporting employing WHO classifications
- Produce a resource map from SNOMED CT to ICD-10
- Support IHTSDO member nations in their needs for interoperation and derivative maps in service of their national terminology requirements



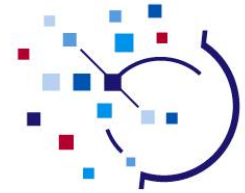
Timeline

- **2007:** April - IHTSDO assumes ownership of SNOMED CT
 - : Technical development for ICD-10 map begins
 - : Negotiations for collaboration begin with WHO
- **2009 :** June – Guidance for training of mapping personnel
 - : September – Technical protocols concluded
- **2010:** July - agreement between IHTSDO and WHO concluded
 - : October - Volunteer project staff training in Toronto
 - : Joint Advisory Group meets
- **2011 :** March – project staff training; mapping begins
 - : September – preview publication of phase 1 issued
 - : October - Content validation work concludes



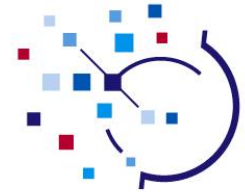
Use Case

MAP with patient context management: Patient Jones is being discharged from the hospital. The attending physician has maintained a diagnosis and health-related problem list coded in SNOMED CT during the stay and updates the entries at discharge. The vendor software employs the MAP, which uses a knowledge-based algorithm of sequential computable Map Rules. These rules evaluate context (data recorded about the patient in the electronic health record) and co-morbidities in the electronic record to identify the most appropriate candidate ICD-10 code list based on ICD-10 exclusion / inclusion guidance and other conventions. Vendor software which cannot employ these knowledge based features can employ the helpful Map Advice to provide a readable and understandable list of step-by-step instructions for the physician to support a choice of an ICD-10 code. The ICD-10 coding professional later reviews and edits the classification list prior to submission for statistical morbidity reporting. The Map Advice data further guides them with information regarding additional WHO rubrics and requirements.



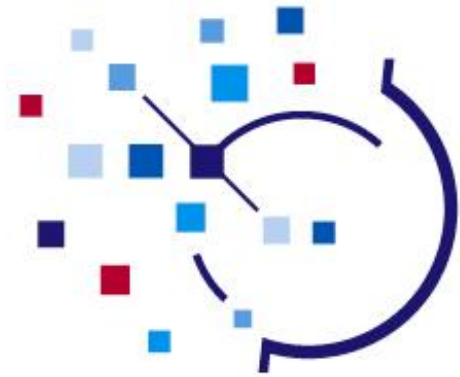
Use Case

- Assumes SNOMED CT encoded diagnosis (problem) list:
 - Clinical findings
 - Events
 - Situations (Patient and Family History)
- Assumes demographic and co-morbidity data accessible to vendor EHR
 - Date of birth
 - Gender
 - Concurrent problems



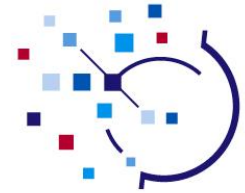
Use Case

- Evaluates patient contextual information from remainder of record in accordance with WHO guidelines
- Supports knowledge-based redirection of MAP in support of WHO guidance:
 - Automated patient context re-mapping for vendors which support a rules engine
 - Map advice summarizes logic and guidelines for vendors not offering decision support and to manage non-classifiable cases
- Presumes classification expert as final editor



Exemplar: Menarche

Doctor Able renders a consultation regarding patient Baker, an 18 year old female with report of recent onset of menstruation. After evaluation he updates the problem list, adding menarche to concurrent problem of type 1 diabetes. He notes his primary diagnosis and the vendor EHR must report the appropriate ICD-10 codes for the encounter to the national registry.



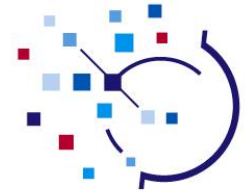
Problem List

- Healthcare maintenance
- Type 1 diabetes mellitus
- ✓ Menarche



Problem List (Core EHR)

- 24441001 Health maintenance alteration (finding)
- 44635009 Diabetes mellitus type 1 (disorder)
- ✓ 20016009 Menarche (finding)



ICD-10 Alphabetic Index

Memory disturbance, lack or loss (*see also* [Amnesia](#)) [R41.3](#)

– mild, following organic brain damage [F06.7](#)

Menarche

– delayed [E30.0](#)

– precocious [E30.1](#)

Mendacity, pathologic [F60.2](#)

Mendelson's syndrome (due to anesthesia) [J95.4](#)

– in labor and delivery [O74.0](#)

– in pregnancy [O29.0](#)

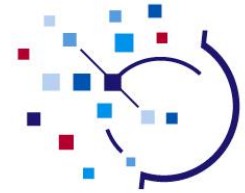
– postpartum, puerperal [O89.0](#)

Ménétrier's disease or syndrome [K29.6](#)

Ménière's disease, syndrome or vertigo [H81.0](#)

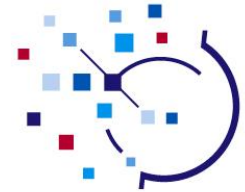
Meninges, meningeal – *see condition*

Meningioma (M9530/0) – *see also* [Neoplasm, meninges, benign](#)



MAP Refset Data

Concept ID	Description			Map Rule	Map Advice	ICD-10	ICD-10 Description
20016009	Menarche (finding)	1	1	IFA 83017007 Late menarche (finding)	IF LATE MENARCHE CHOOSE E30.0	E30.0	Delayed puberty
20016009	Menarche (finding)	1	2	IFA 44062003 Early menarche (finding)	IF EARLY MENARCHE CHOOSE E30.1	E30.1	Precocious puberty
20016009	Menarche (finding)	1	3	OTHERWISE TRUE	MAP CONCEPT IS OUTSIDE SCOPE OF TARGET CLASSIFICATION		



Vendor Clinical Interface

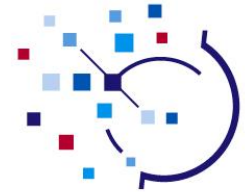
- Healthcare maintenance
 - Type 1 diabetes mellitus
 - ✓ Menarche
- E10.9 Type I diabetes
Cannot compute

USER ADVICE:

IF LATE MENARCHE USE E30.0

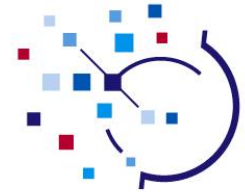
IF EARLY MENARCHE USE E30.1

OTHERWISE OUT OF SCOPE FOR ICD-10



Prior Work

- **SIEB SNOMED maps:**
 - ICD-9-CM (rules-based reimbursement map, US)
 - ICD-O3 (morphology and topography)
 - LOINC integration map
- **Existing maps of SNOMED to ICD-10**
 - ICD-10 (UKTC)
 - UMLS Metathesaurus (NLM)



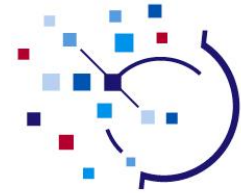
Project Overview

- Due to substantial costs for mapping 110,000 concepts of clinical findings, events and situations, organize in phases to maximize utility
- To promote reproducibility, proceed with dual mapping of all source concepts (either legacy or map specialist work)
- Organize map activity by teams of map specialists working in parallel supervised by map leads who distribute work and review map concordance
- Manage mapping discordance with consensus review by WHO/IHTSDO panel
- Publish work in stages to encourage community review and input



Educational Development

- Training and skill development for map specialists is essential to reproducibility of map products
- June 2009: Education SIG developed *Guidance on the Preparation of Terminology / Classification Mapping Personnel*
- Prototype map tooling environment confirmed
- Project role, competencies and training curriculum developed for the project as collaboration between Education and Mapping SIGs
- Training program required of all mapping project personnel



Tooling Development

INTERNATIONAL HEALTH TERMINOLOGY STANDARDS DEVELOPMENT ORGANISATION

File Edit Navigate Search Project Run Window Help

SNOMED CT Tree View Project Explorer

Rheumatic-mitral-stenosis-86466006.sct2icd

Source Concept : [86466006 : Rheumatic mitral stenosis (disorder)]

Rules	Concepts	Exemplar	Notes
Map Group / Rule			
Group 1			
IF A [71799002 : Rheumatic mitral valve stenosis AND aortic valve insufficiency]			108.0 : Disorders of both mitral and...
IF A [787001 : Rheumatic mitral stenosis with regurgitation]			105.2 : Mitral stenosis with insuffici...
IF A [44993000 : Rheumatic mitral valve AND aortic valve stenosis]			108.0 : Disorders of both mitral and...
ELSE			105.0 : Mitral stenosis

SNOMED Detail View

71799002 : Rheumatic mitral valve stenosis AND aortic valve insufficiency

Defined

Supertypes

- Mitral stenosis and aortic insufficiency (disorder)
- Rheumatic mitral AND aortic valve regurgitation
- Rheumatic mitral stenosis with regurgitation

Descriptions

- fsn Rheumatic mitral valve stenosis AND aortic valve insufficiency
- pt Rheumatic mitral valve stenosis AND aortic valve insufficiency
- Attribute Role Group 0
- RO Finding site : Structure of cusp of aortic valve
- RO After : Streptococcus pyogenes infection
- RO Due to : Abnormal aortic cusp
- Attribute Role Group 1
- RO Finding site : Mitral valve structure
- RO Associated morphology : Stenosis

Map Rule

Type concept

Rule IF A [71799002 : Rheumatic mitral valve stenosis AND aortic valve insufficiency]

Concept

Concept 71799002

Rheumatic mitral valve stenosis AND aortic valve insufficiency

Target

Type ICD-10 Class

Advice 1

Advice 2

Advice 3

Target Class 108.0

Disorders of both mitral and aortic valves

ICD-10 Tree View

108

IX : Diseases of the circulatory system

105-109 : Chronic rheumatic heart diseases

108 : Multiple valve diseases

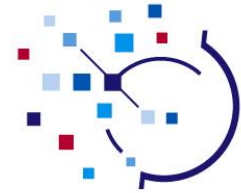
- 108.0 : Disorders of both mitral and aortic valves
- 108.1 : Disorders of both mitral and tricuspid valves
- 108.2 : Disorders of both aortic and tricuspid valves
- 108.3 : Combined disorders of mitral, aortic and tricuspid valves
- 108.8 : Other multiple valve diseases
- 108.9 : Multiple valve disease, unspecified

ICD-10 Detail View

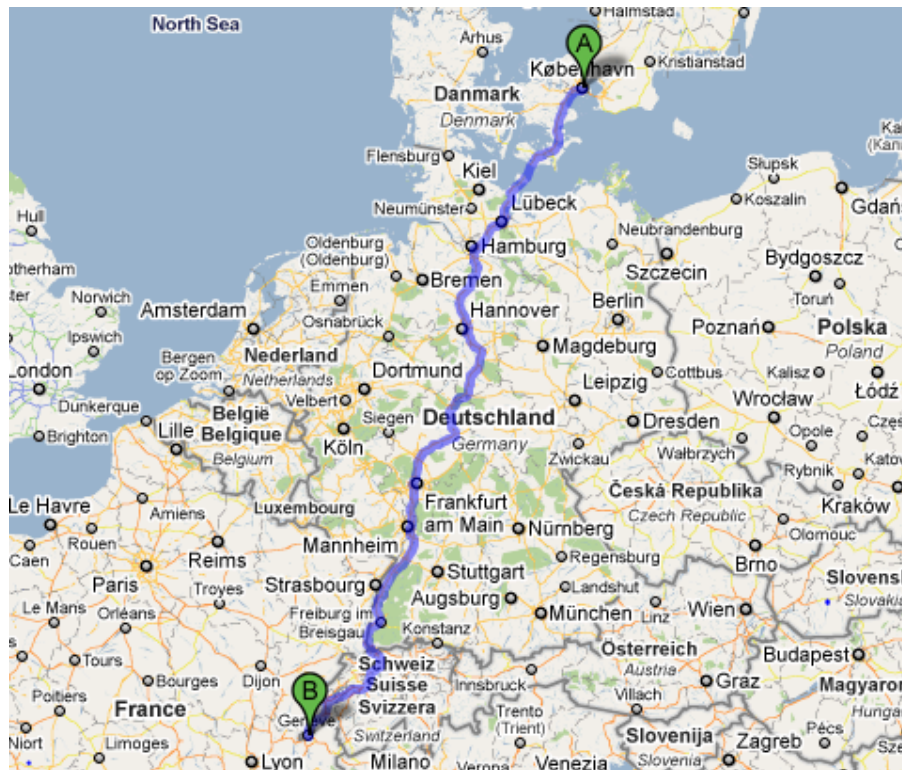
108.0 : Disorders of both mitral and aortic valves

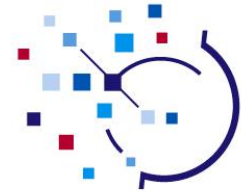
Inclusion

- Involvement of both mitral and aortic valves whether specified as rheumatic or of unspecified origin



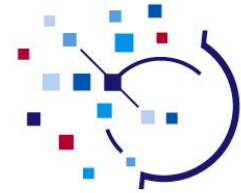
Introduction to the tool – live demonstration including workflow



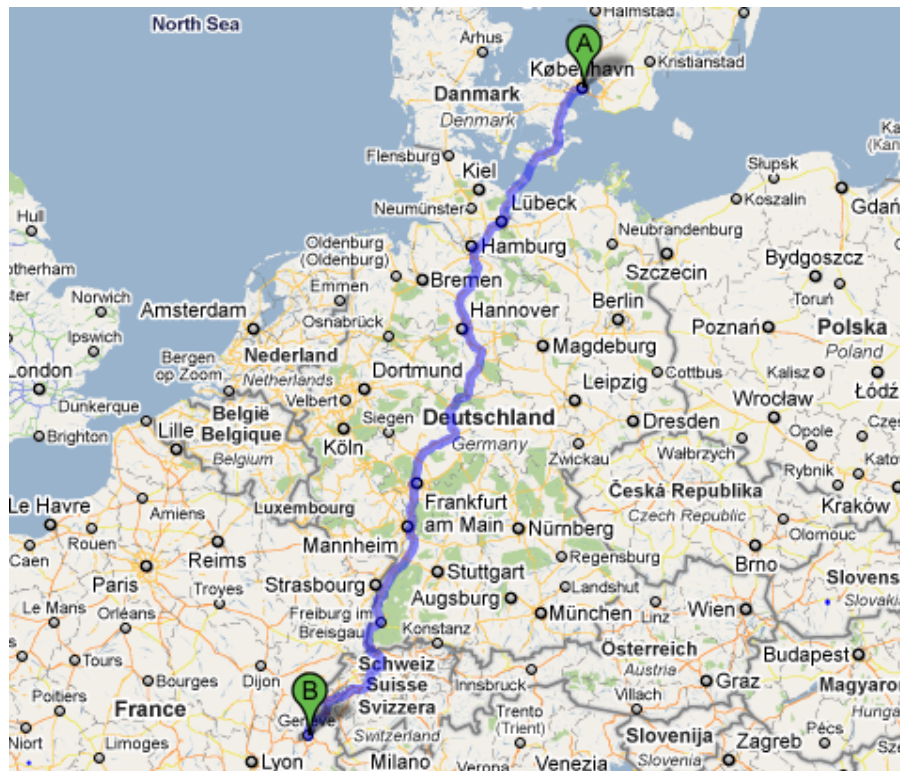


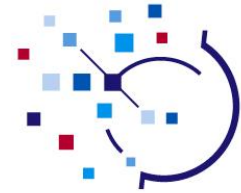
Examples of Phase 1 MAPS





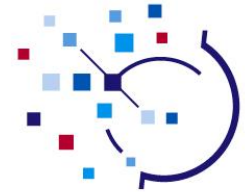
Live demonstration of the CST2 Map Browser





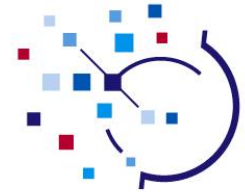
Adaptation for Other Mapping Work





Mapping to ICD-10-CM

- Purpose of the SNOMED CT to ICD-10 map
 - To serve as a SNOMED CT to ICD-10 map validated and sanctioned by WHO and the IHTSDO which may serve as a source for development of maps to ICD-10 extension classifications developed and maintained by a member country
- The US National Library of Medicine is leading an effort to map from SNOMED CT to ICD-10-CM (to replace ICD-9-CM in Oct 2013)
- Heavy re-use of
 - Mapping principles and methodology
 - Tools
 - Published map records



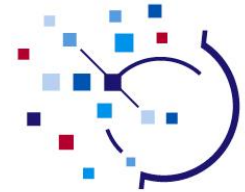
Differences between ICD-10 and ICD-10-CM

- Number of codes: 11,000 vs. 68,000
- Much more granular codes e.g.
 - Episode of care
 - Laterality
 - Trimester
- ICD-10-CM mostly based on refinement of ICD-10 codes, but there are exceptions, even at the category (3 character) level
 - ICD-10 code deleted e.g. E14 Unspecified diabetes mellitus (included in E11 Type 2 diabetes mellitus)
 - New ICD-10-CM category e.g. K68 Disorders of retroperitoneum



Adaptation of mapping methods (1)

- Episode of care
 - Mostly not specified in SNOMED CT concept
 - No default code available in ICD-10-CM e.g.
 - S00.01XA Abrasion of scalp, initial encounter
 - S00.01XD Abrasion of scalp, subsequent encounter
 - S00.01XS Abrasion of scalp, sequela
 - Solution: placeholder code added
 - S00.01X? Abrasion of scalp, episode of care unspecified
 - Map advice: EPISODE OF CARE INFORMATION NEEDED



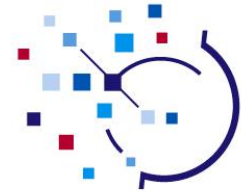
Adaptation of mapping methods (2)

- For other situations that involve additional information not usually expressed in SNOMED CT e.g. Laterality
 - Usually there is a default ICD-10-CM “unspecified” code
- New map advice to alert user about possible refinement
 - CONSIDER LATERALITY SPECIFICATION
 - CONSIDER TRIMESTER SPECIFICATION
 - CONSIDER WHICH FETUS IS AFFECTED BY THE MATERNAL CONDITION
- ‘Use additional code’ notes
 - Identify target code if possible - new map group
 - Otherwise use map advice: CONSIDER ADDITIONAL CODE TO IDENTIFY SPECIFIC CONDITION OR DISEASE

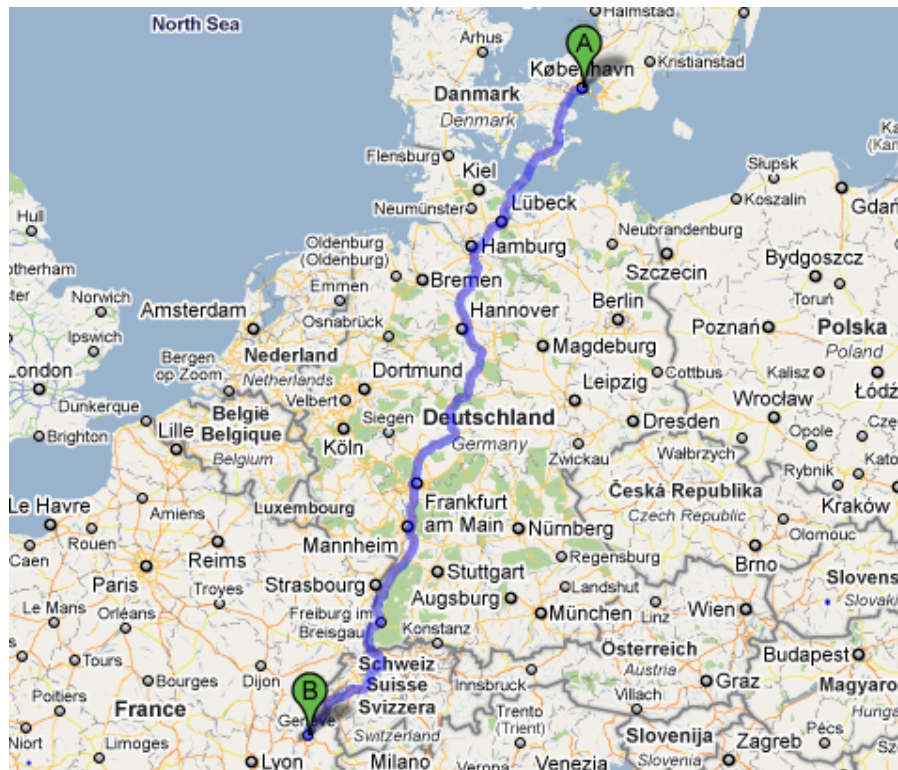


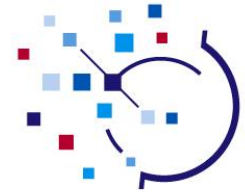
Adaptation of tools

- **Prototype mapping tool**
 - The existing standalone mapping tool can be used with minor modifications – add new types of map advice
 - ICD-10-CM data need to be transformed before loading
- **Index browser**
 - No electronic searchable version of ICD-10-CM index
 - Custom-built index browser
 - Only covers main alpha index, other indexes (drugs, neoplasm, external cause) not a priority for now
 - Index browser will be made publicly available at NLM website (requirement of license to use ICD-10-CM)



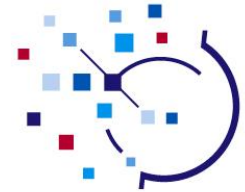
Live demonstration of ICD-10-CM mapping tool





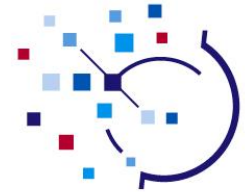
Re-use of published ICD-10 maps

- Despite differences between ICD-10-CM and ICD-10, some ICD-10 maps can be used to generate ICD-10-CM candidate (legacy) maps
 - ICD-10 codes that are also codable in ICD-10-CM (leaf nodes) e.g. K70.0 Alcoholic fatty liver
 - Codable 'unspecified' default target is present among descendants of an ICD-10 code in ICD-10-CM e.g. M75.5 Bursitis of shoulder -> M75.50 Bursitis of unspecified shoulder
 - Algorithm defined to derive ICD-10-CM candidate maps based on length and terminal digit of ICD-10 code
- Significant reduction of workload for concepts with legacy maps (needs 1.3 maps (vs. 2 maps)/concept on average)



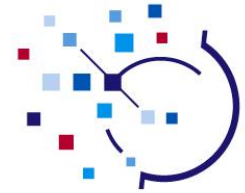
Scope of ICD-10-CM map

- Priority list of 8,000 SNOMED CT concepts identified from
 - NLM CORE Problem List Subset
 - Donated CMT content (that are already in International release)
 - Top 2,500
 - Subspecialty subsets – cardiology, neurology, mental health, musculo-skeletal
- Final map will cover about 15,000 concepts because of exhaustive mapping of low level concepts
- Source of candidate (legacy) maps
 - ICD-10-derived maps
 - CMT maps (for all subspecialty subsets)
 - Derived from UMLS



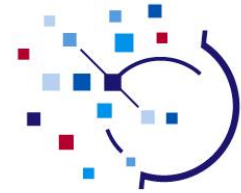
Time-line

- Mapping work already started (slowly) with available in-house staff
- Recruitment of map specialists and map lead – ongoing
- Deliverables (tentative)
 - Preview release of a sample by the end of this year
 - Full release in Spring 2012



Questions?





Hands on session with the tool – mapping real examples

