

# Interdisciplinary Terminology for Health Care and Social Care in Sweden

Bengt Kron

Interdisciplinary Terminology

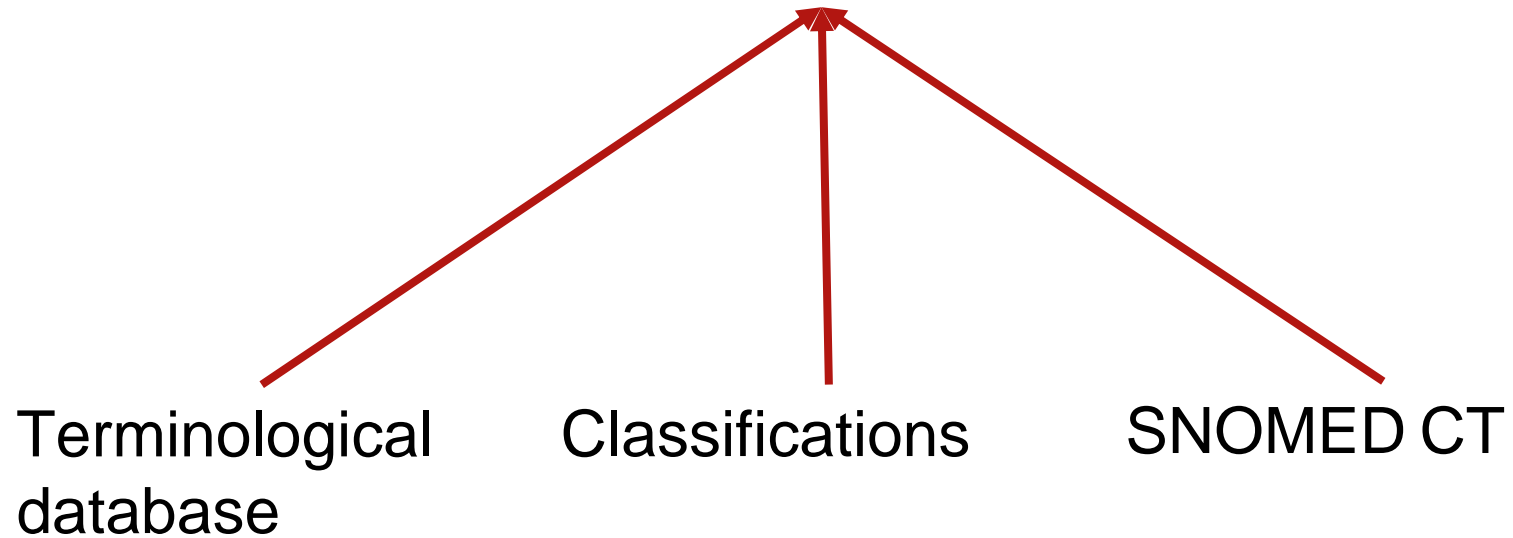
National Board of Health and Welfare

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# Interdisciplinary Terminology for Health Care and Social Care

- A project by order of the Ministry of Health and Social Affairs and a part of the greater project for National eHealth
- Started 2007 – ends in March 2011
- Covers several fields
  - translation of SNOMED CT to Swedish
  - mapping
  - terminology binding
  - making plans for maintenance
  - and others

# Interdisciplinary Terminology for Health care and Social care



# Translation of SNOMED CT

Karin Ahlsén

# The Swedish Translation Project

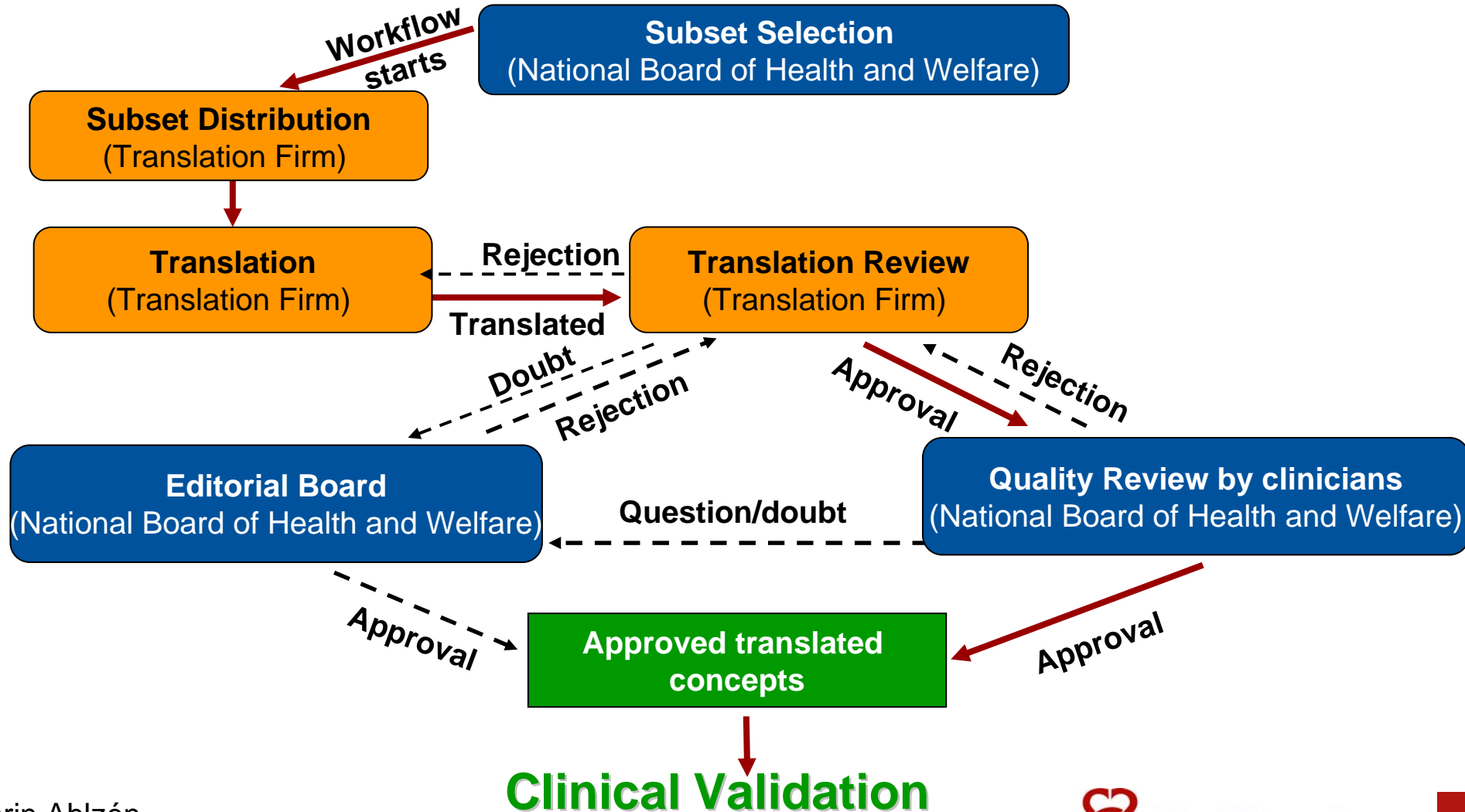
- Started in October 2007
- The objective was to translate all active concepts in SNOMED CT (except “veterinary medicine” concepts), i.e. about 280,000 concepts
- Finished in August 2010

# Human resources

- 15 medical translators (translation firm)
- 15 quality controllers (clinicians, employed by the National Board of Health and Welfare )
- 7 members of the Editorial board (translators, terminologists, clinicians)

Total number of resources directly involved in workflow processes = 37

# Workflow Processes, Roles



# Linguistic guidelines for translation consistency

- **Classifications (Swedish ICD-10 e.g.)**
- **Medical dictionaries**
- **Linguistic guidelines in Swedish**
  - general linguistic guidelines for medical translation
- **Editorial Decisions**
  - decisions of principle for specific issues, an accumulated list of terms which is developed during the Editorial Board

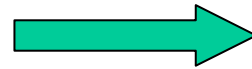
# Coming activities related to translation

- Translate concepts in new releases to Swedish
  - A new release of SNOMED CT twice a year
- Validation of the translation
  - Is the right term chosen as preferred term?
  - Which synonyms do we need to add in the national extension?
- Translation to English
  - Concepts that are added in our national extension

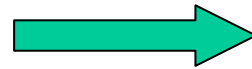
# Strategic planning for the interdisciplinary terminology

# The long-term aim is to have one terminology for health care and social care

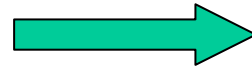
ICD-10



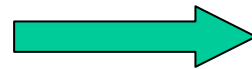
Procedure classifications



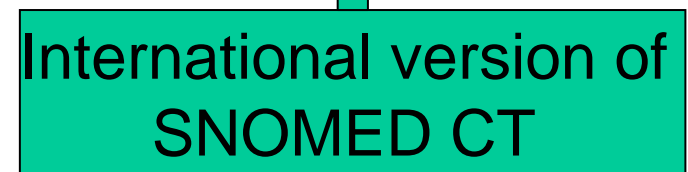
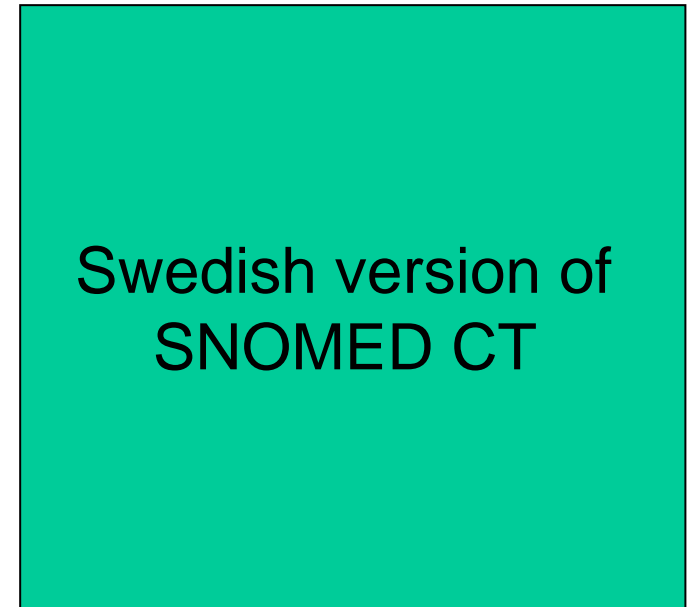
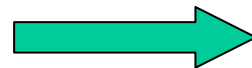
ICF



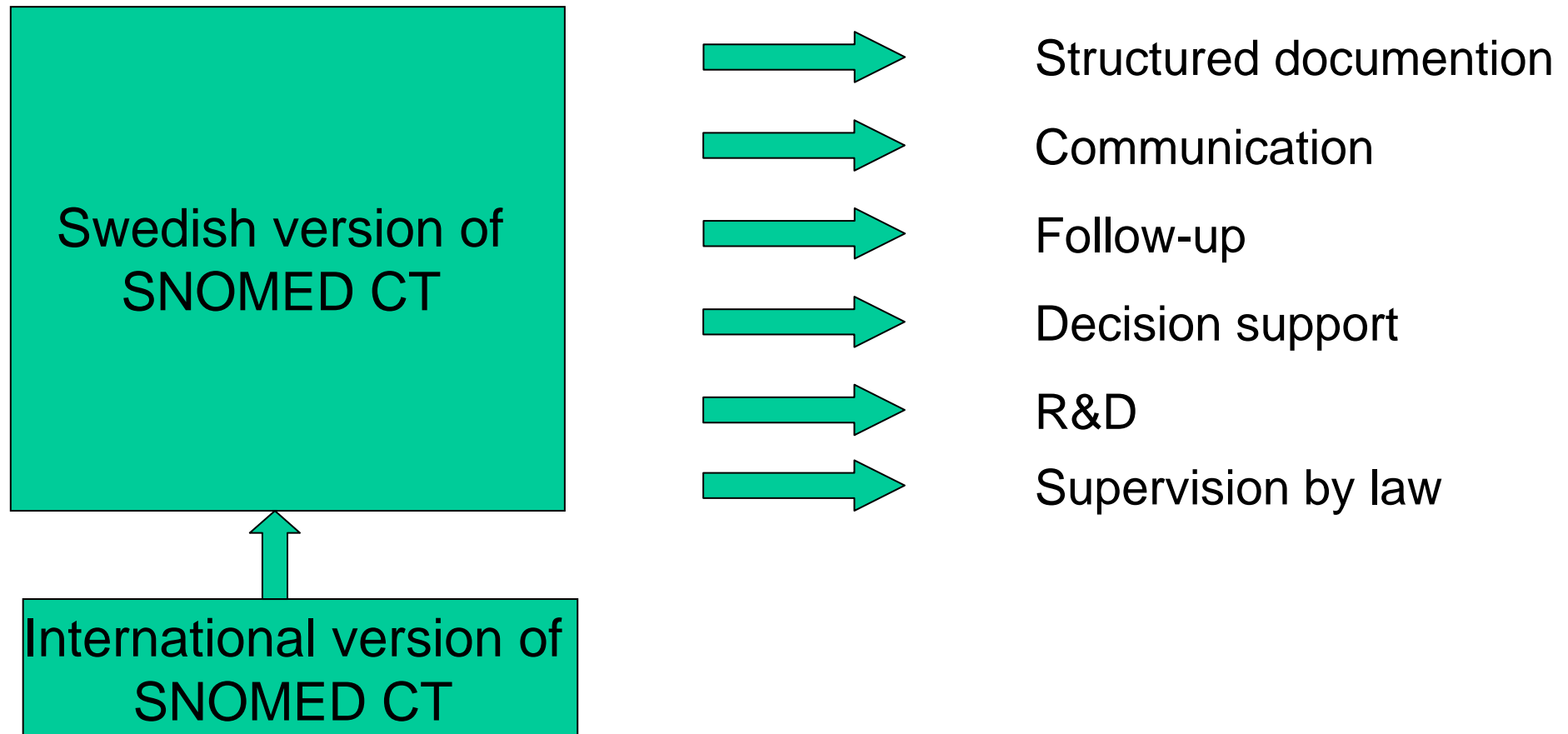
Terms with national coverage



Code systems



# Use cases for the interdisciplinary terminology



# Mapping between terminologies, classifications and SNOMED CT

*Mapping represents perhaps the biggest cost of enterprise-wide terminology deployment. There is a large initial investment as interfaces are built.*

Robert Dolin, Kaiser Permanente, in Testimony to the National Committee on Vital and Health Statistics. May 22, 2003

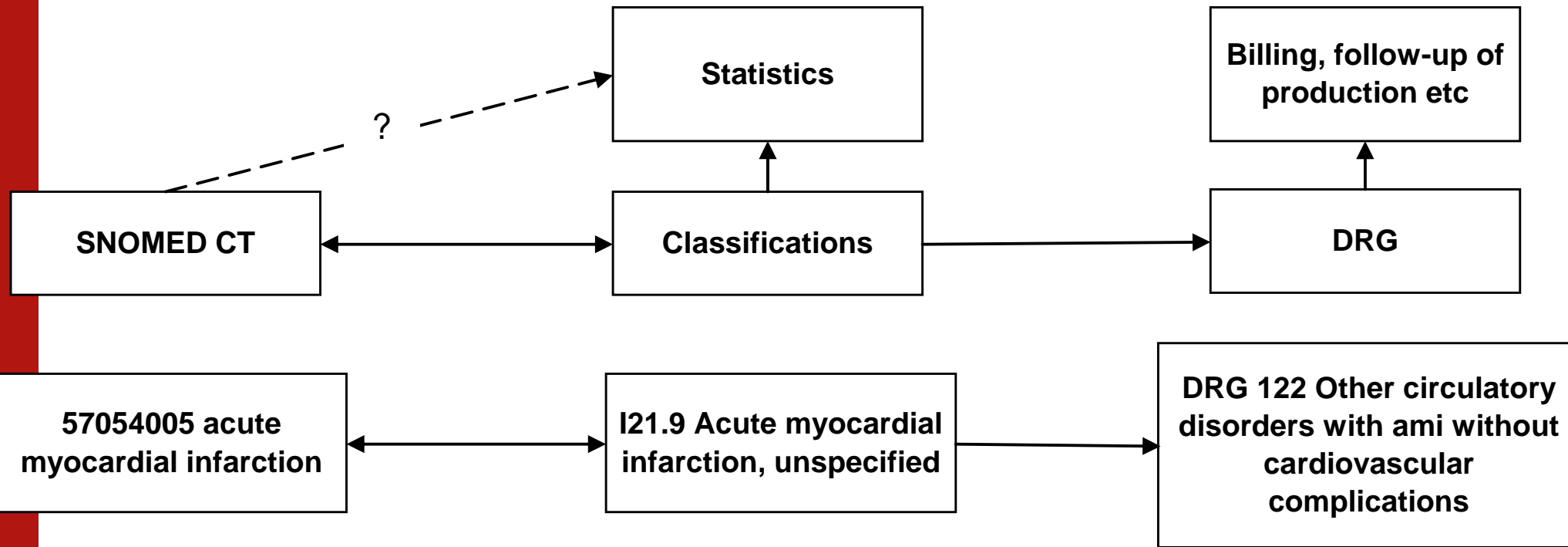


# Presumptions

- The introduction of SNOMED CT will go on for several years
- During the introduction there must be opportunities to use parallel systems (terminologies and classifications) for the documentation in patient records
- We don't know to which extent SNOMED CT can replace the classifications and other code systems

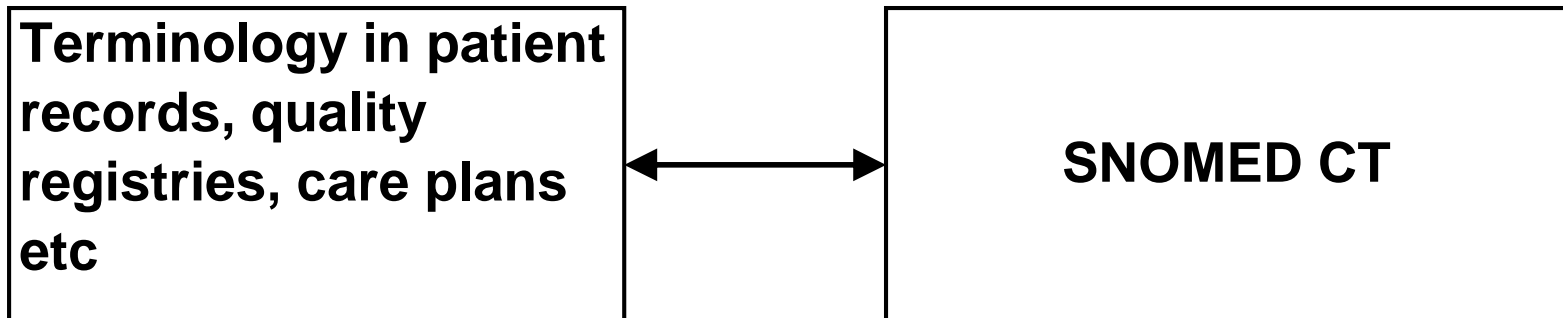
# 1. Mapping between SNOMED CT and classifications

1. Information expressed by SNOMED CT must be exchangeable with information expressed by classifications
2. The national and international morbidity and mortality statistics based on ICD-10 have to be put together with the same content and structure as before even if the information in the patient record is represented by SNOMED CT-codes
3. Further use of DRG for in- and outpatients demands medical information represented by codes from ICD-10 and the procedure classifications



## 2. Legacy mapping

- Concepts and terms already used in health care and social care have to be mapped to SNOMED CT

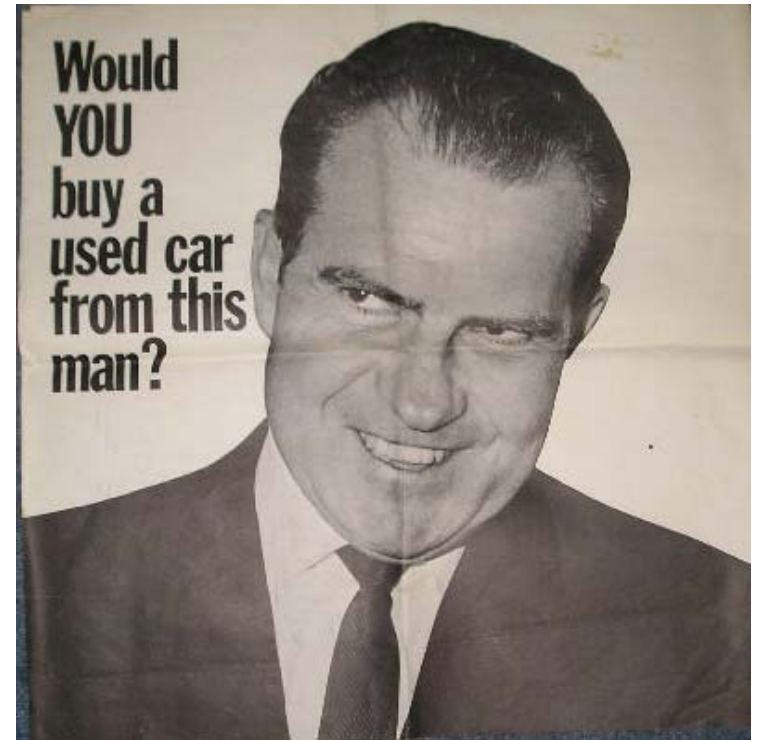


# Reliability of maps

Studies of mapping show high variation between mappers:

i.e. the reliability is low

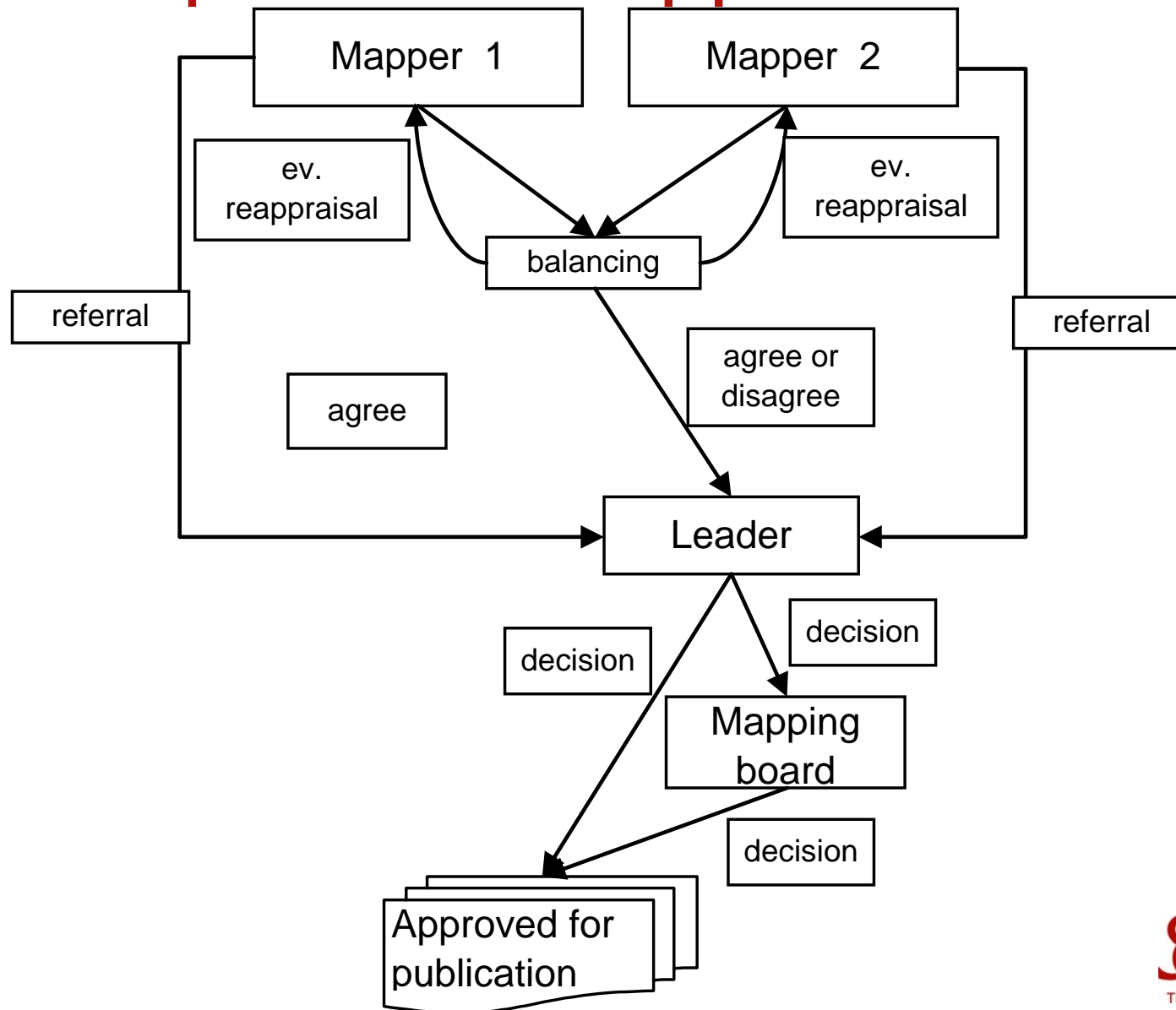
Measures in order to achieve higher reliability are necessary



# National measures for increased reliability

1. General recommended methods for conceptbased mapping concerning
  - roles, flowcharts, processes etc
  - how to educate, certify and manage mapping personnel to ensure the quality and integrity of the map
2. Recommendations to elaborate rules adjusted for every specific map project
3. Education - as much as possible

# Workflow for mapping with two independent mappers



# The present national map projects

- National administrative terms within health care and social care
- The "non-surgical" procedure classification
- The quality registry for heart failure
- Follow-up of infections complicating medical care

# Mapping between SNOMED CT and ICD-10

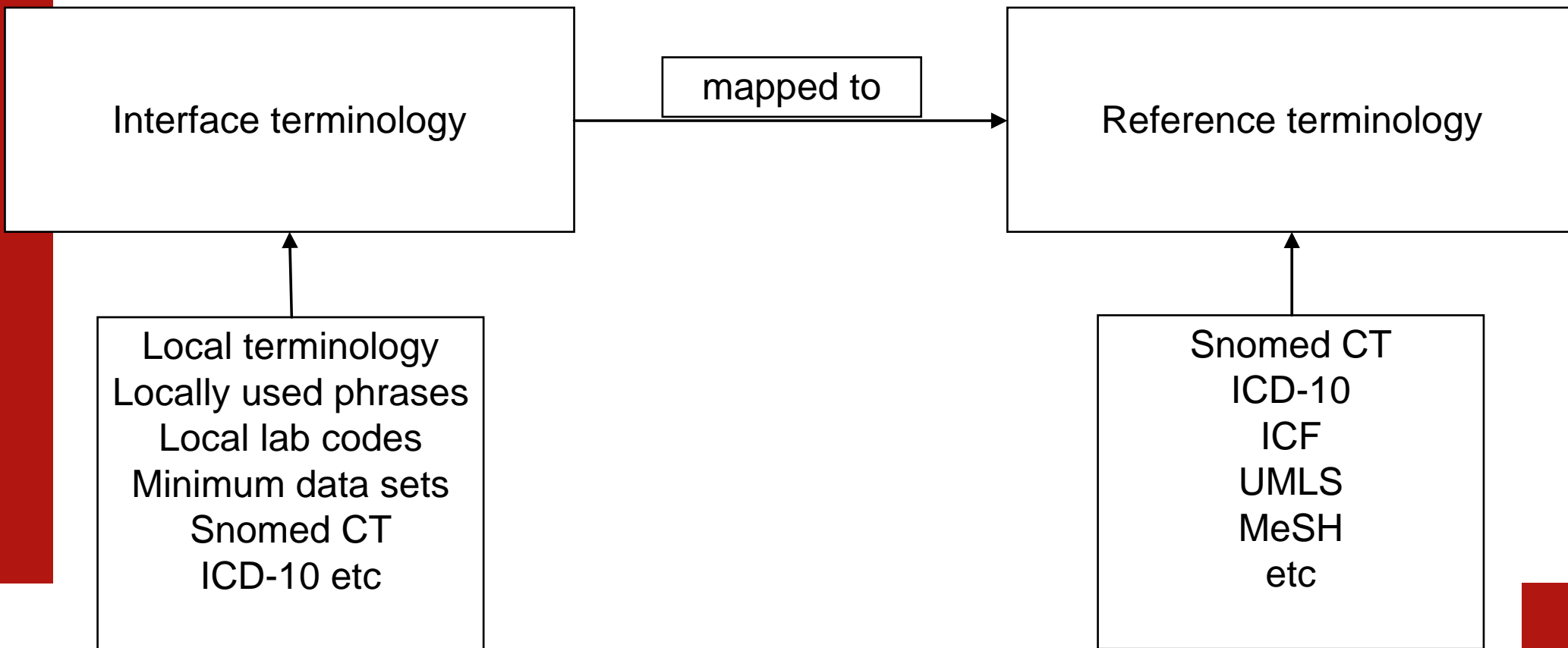
- A collaborative project between IHTSDO and WHO
- Sweden has participated in the preparations
- Phase I of the project (10 000 concepts) will start in November 2010
- The whole project includes 110 000 concepts from the following hierarchies: clinical finding, event and situation with explicit context
- The member countries of IHTSDO, among them Sweden, supply with map specialists

# SNOMED CT – interface or reference terminology?



Some code systems/terminologies are used mostly for local clinical documentation. They are adapted to the everyday clinical language and function as interfaces to the user.

Then there are reference terminologies. Behind the scenes the local terms are mapped to concepts in the reference terminology to allow data aggregation and communication when different local terminologies are used.



## Local terminology

- Stress test
- ICD
- Bottom of the eye, nothing noteworthy

## Reference terminology

- 26046004 |cardiovascular stress test using bicycle ergometer (procedure)|
- 72506001|implantable defibrillator|
- 398637008|Retina-normal|

# Option A. SNOMED CT as the only alternative - use both as interface and as reference

- Extremely difficult in the short term to change the everyday language of health professionals
- Make demands on terminology education and perhaps even indoctrination

# Option B. Use SNOMED CT as a reference terminology only

- The local vocabulary is preferred for data entry
  - Capture data via local term
  - Convert to SNOMED concept
  - Transmit to repository
- Easy to handle in respect to end users
- A map is necessary between local terminology and SNOMED CT
- Make demands on resources for mapping both initially and for maintenance

# Interface or reference terminology – positions taken so far

- SNOMED CT can be used as a interface terminology in most instances, but probably not in all of them
- SNOMED CT should always be used when transmitting data between systems
- There has to be a map between the local interface terminology and SNOMED CT but who is responsible for maintaining those maps?

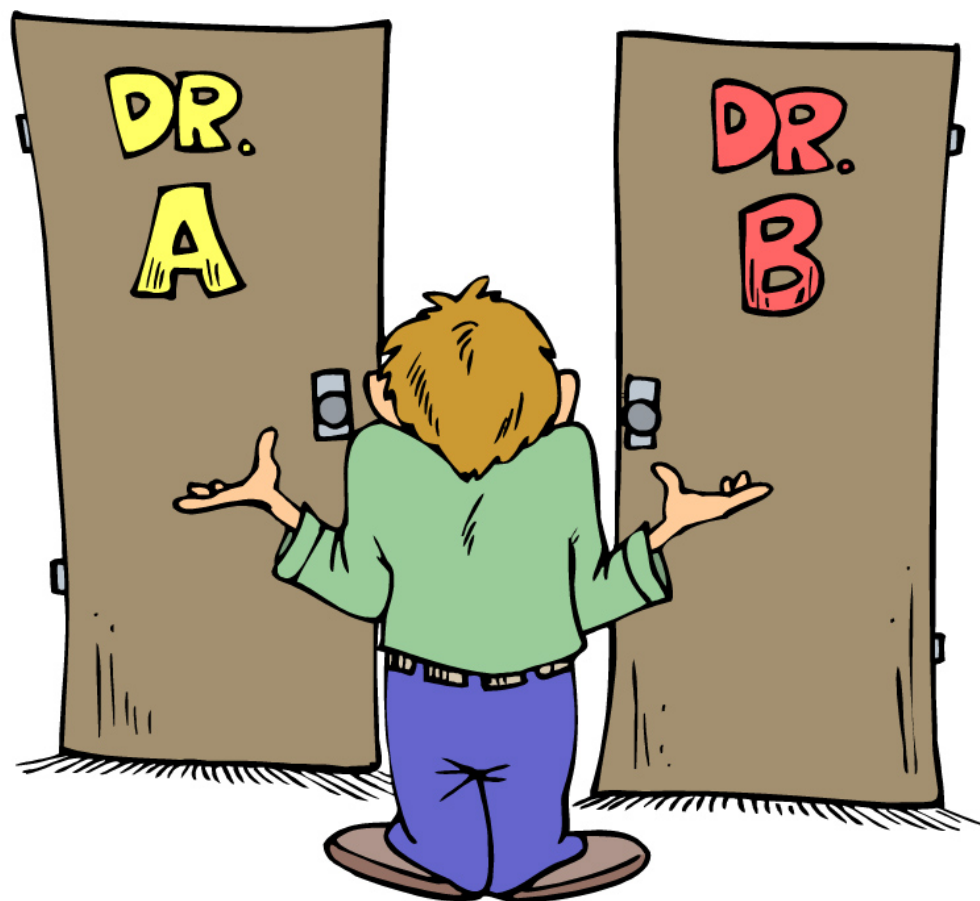
# Pennies From Heaven



The abundance of concepts  
in SNOMED CT - how to  
handle?

# The fundamental problem

Which concept to chose?



# Two concepts rather like each other

- 282028001 | multiple-resistant Staphylococcus aureus infection (disorder) |
  - is a infection due to resistant organism
  - is a infection due to Staphylococcus aureus
  - causative agent = Staphylococcus aureus
  - causative agent = resistant organism
  - pathological process = infectious process

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- 266096002 | methicillin resistant Staphylococcus aureus infection |
  - is a infection due to Staphylococcus aureus
  - is a infection due to resistant bacteria
  - causative agent = methicillin resistant Staphylococcus aureus
  - pathological process = infectious process

# The concept 57054005 [acute myocardial infarction] has 37 subtypes – some of them shown below

Acute anteroapical infarction  
(disorder)

Acute anteroapical  
myocardial infarction  
(disorder)

Acute anteroseptal  
myocardial infarction  
(disorder)

Acute atrial infarction  
(disorder)

Acute infarction of papillary  
muscle (disorder)

Acute myocardial infarction  
of anterior wall (disorder)

Acute myocardial infarction  
of anterolateral wall  
(disorder)

Acute myocardial infarction  
of apical-lateral wall  
(disorder)

# Use of SNOMED CT

- Should not be used to represent the meaning of free text by use of NLP - (at least not in contexts when "real" patients are treated)
- Only to be used when the information is in a structured context
- The end-user can only chose concepts belonging to predetermined subsets adjusted to the context – i.e. the use has to be constrained
- The predetermined subsets
  - is to be compiled in collaboration with the profession
  - desirable if they have (inter)national range

# Terminology binding



# How to describe this?

The patient has malignant melanoma. He is treated with an excision. A wound infection supervenes after the operation.

CONRAD BARSKI, M.D.

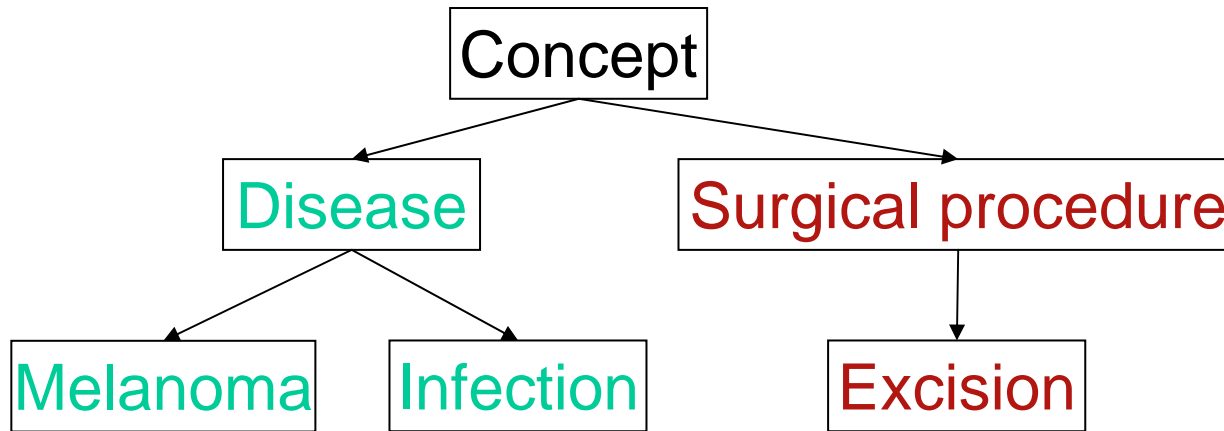


# HOW TO TELL STUFF TO A COMPUTER



THE ENIGMATIC ART OF KNOWLEDGE REPRESENTATION

# Described with terminology only



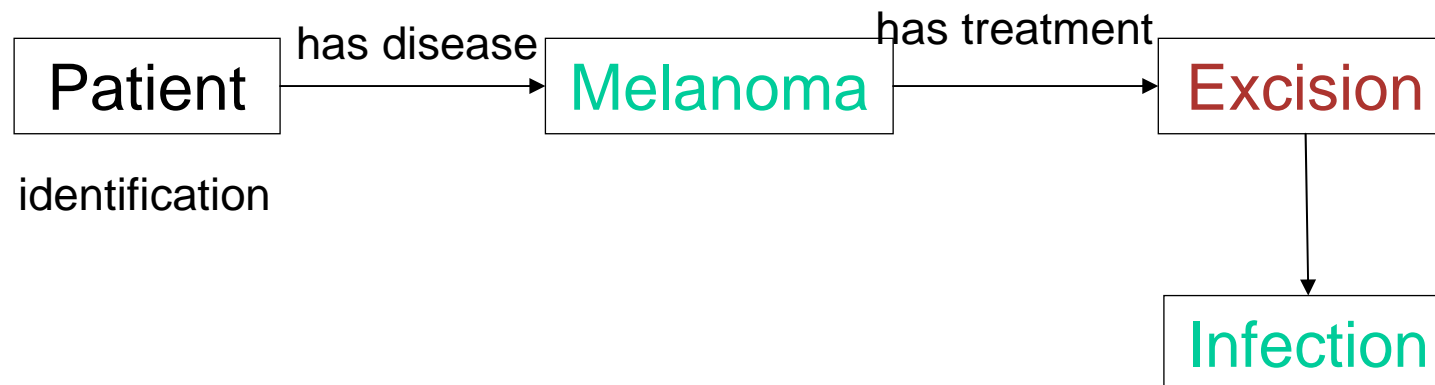
Missed information:

Identification of patient

Timestamps

Relations

# Described with the same terminology but embedded in an information structure



identification

timestamps  
explains  
relation

# Capabilities of terminologies like SNOMED CT

- Represent meaning in a consistent way; give a semantic basis
- Represent knowledge which is true for all instances
- Allow aggregation
- Have an ontological perspective
  
- Terminologies need information models
  - to link information expressed with a terminology to contextual information like time, date, identities etc

# Capabilities of information models

- Information models are good at
  - specifying structures which represents instances
  - collecting contextual information on dates, time, identities etc in meaningful entities
  - constraining possibilities to express the same meaning in different ways
- Information models need terminologies
  - to populate classes, attributes, nodes with codes which represents meanings which are uniform and unambiguous

# The problems

- The development of information models and terminologies has largely been going on independent of each other
- Information specialists and terminologists lack to some extent knowledge of each other's provinces
- The same meaning can be represented in several different ways by using varying combinations between the information model and the terminology; i.e. there are overlaps between them
- There is an obvious risk for insufficient uniformity – communication and retrieval of information are obstructed or brought to nothing

It is a grave error to think that it will work if elements from a terminology, without any rules, are put into an information model

We need to specify how to connect the terminology and the information model; that is what we call terminology binding

# Concept and code

- The SNOMED CT concept is represented by a code
- The SNOMED CT code 71620000 means "fracture of femur"
- Depending on where the code is placed in the patient record it may have different meanings, for example:
  - The patient has a fracture of femur (at this moment)
  - The patient has had a fracture of femur
  - The patient has a suspected fracture of femur
  - The mother of the patient has a fracture of femur
  - The mother of the patient has had a fracture of femur
  - etc

# The solutions should be governed by the requirements for reuse

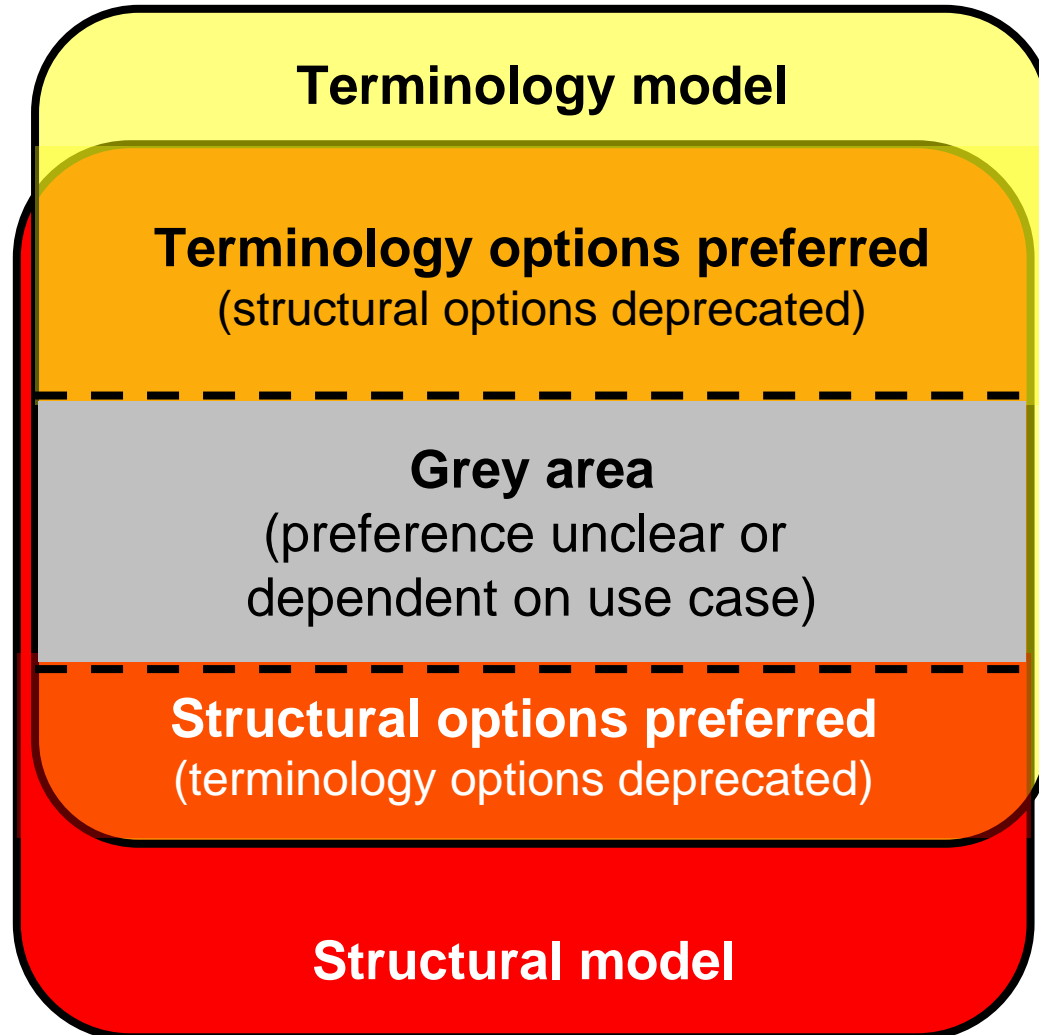
- We always document for later retrieval and for no other reason
- The way the information is represented, i.e. which combination between information model and terminology to be used, should be governed by:
  - the use cases for retrieval
  - the required level of accuracy
  - how fast the system is expected to answer

## Unfortunately – no standard

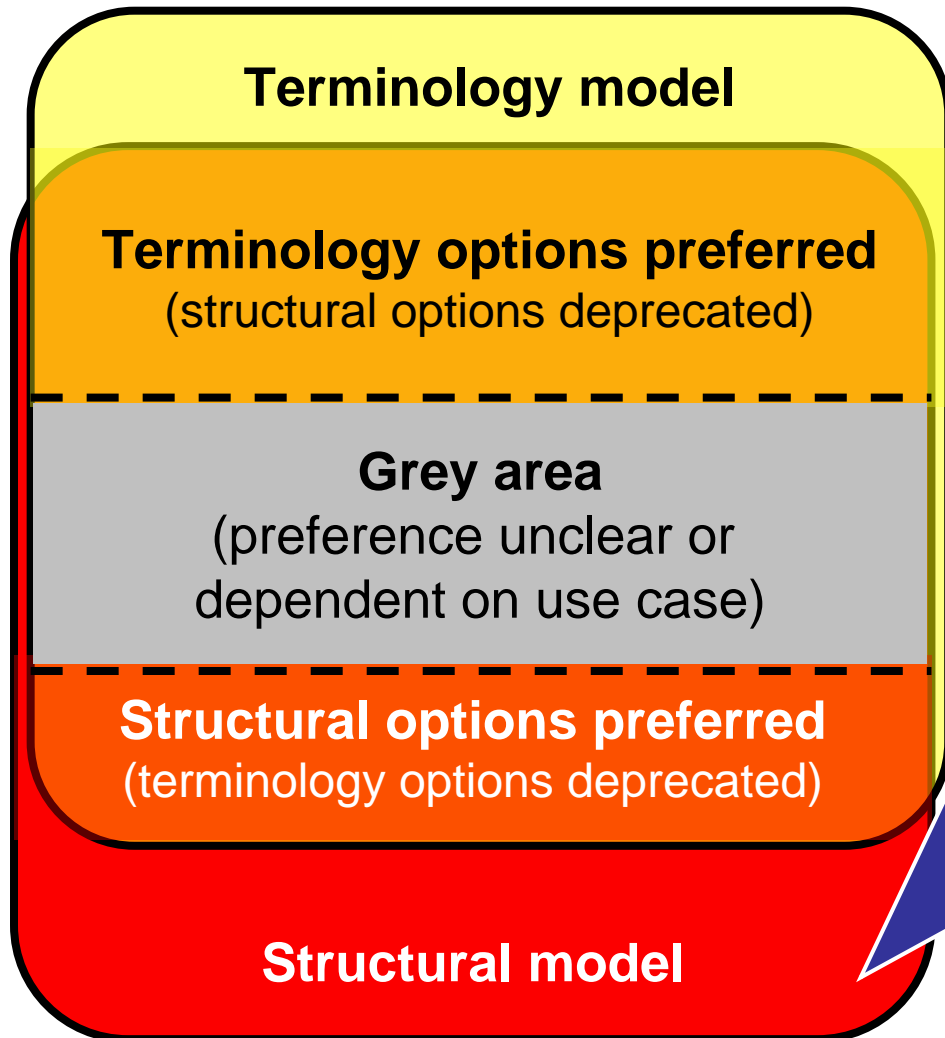


There is no international standard for this field. There are ongoing projects in other countries, but due to differences between the information models, the resultat can not be easily transferred.

# Balancing structure and terminology



# Balancing structure and terminology



## Structural model

Attributes with specific data types

- ☞ Dates, times, durations, quantities, text markup

Identifiable instances of real-world entities

- ☞ People, organisations, places

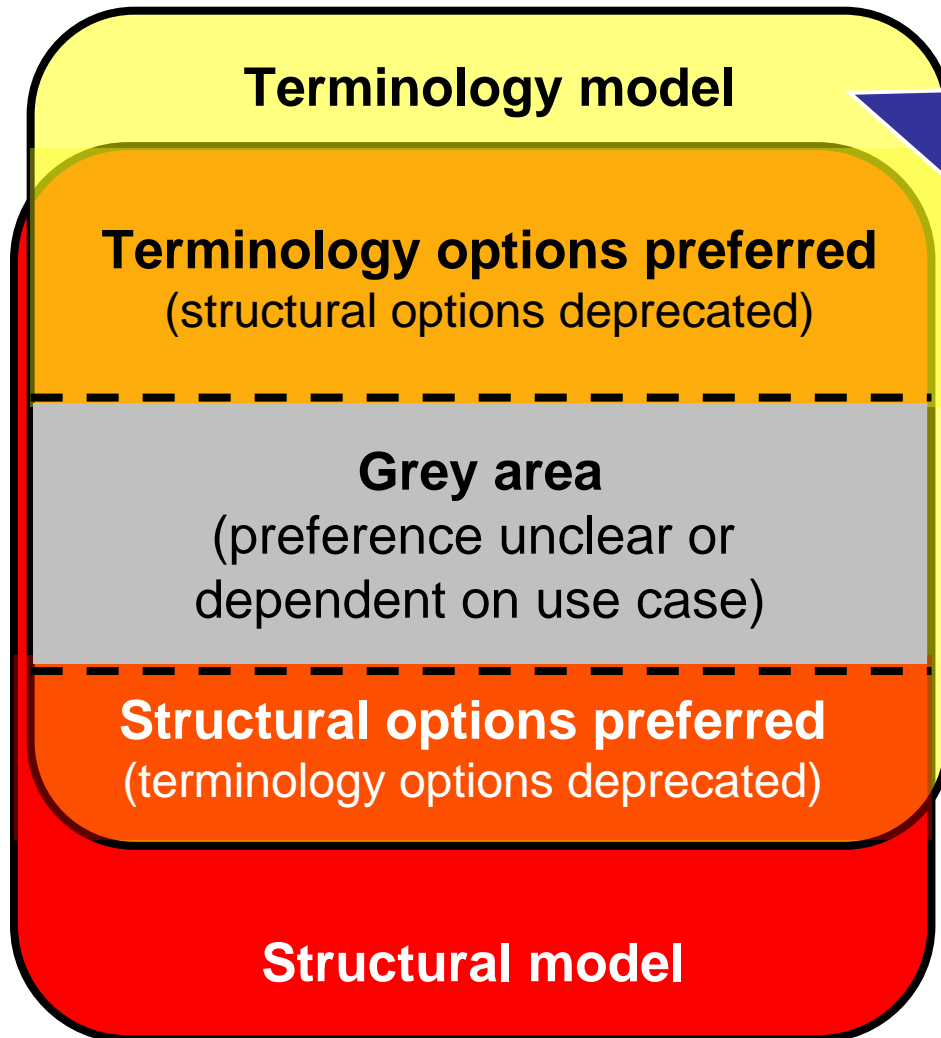
Overall record and/or communication architecture

- ☞ EHR extract, EHR composition, openEHR reference model, CDA documents, HL7 messages

Representation of constraints on use of particular classes or attributes in given use cases

- ☞ Formalism for templates applied to constrain openEHR archetypes or HL7 CDA documents

# Balancing structure and terminology



## Terminology model

Specific concepts:

- ☞ Diseases, symptoms, signs, procedures, drugs, etc.

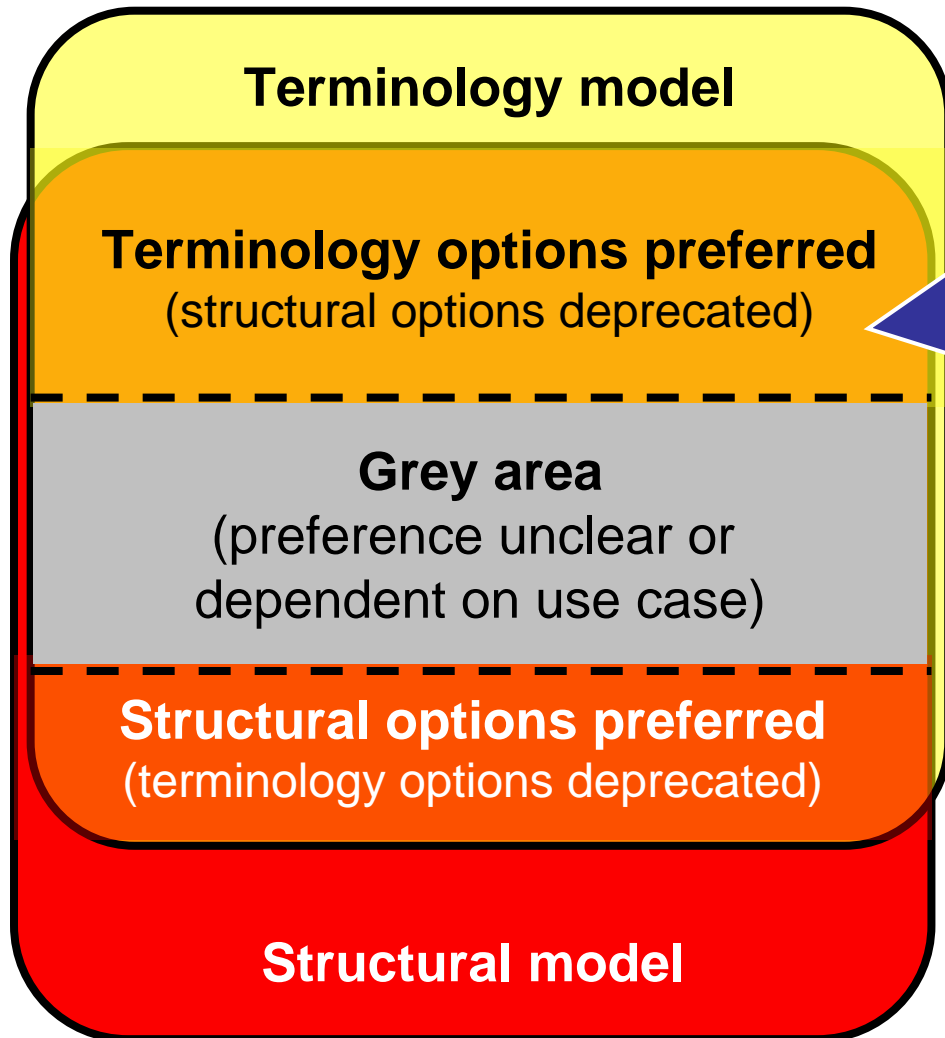
Semantic relationships between concepts

- ☞ Relationship between "viral pneumonia", "lung", "virus", "infectious disease"

Representation of constraints on use of terminology

- ☞ Concept model and value-set definition formalism

# Balancing structure and terminology

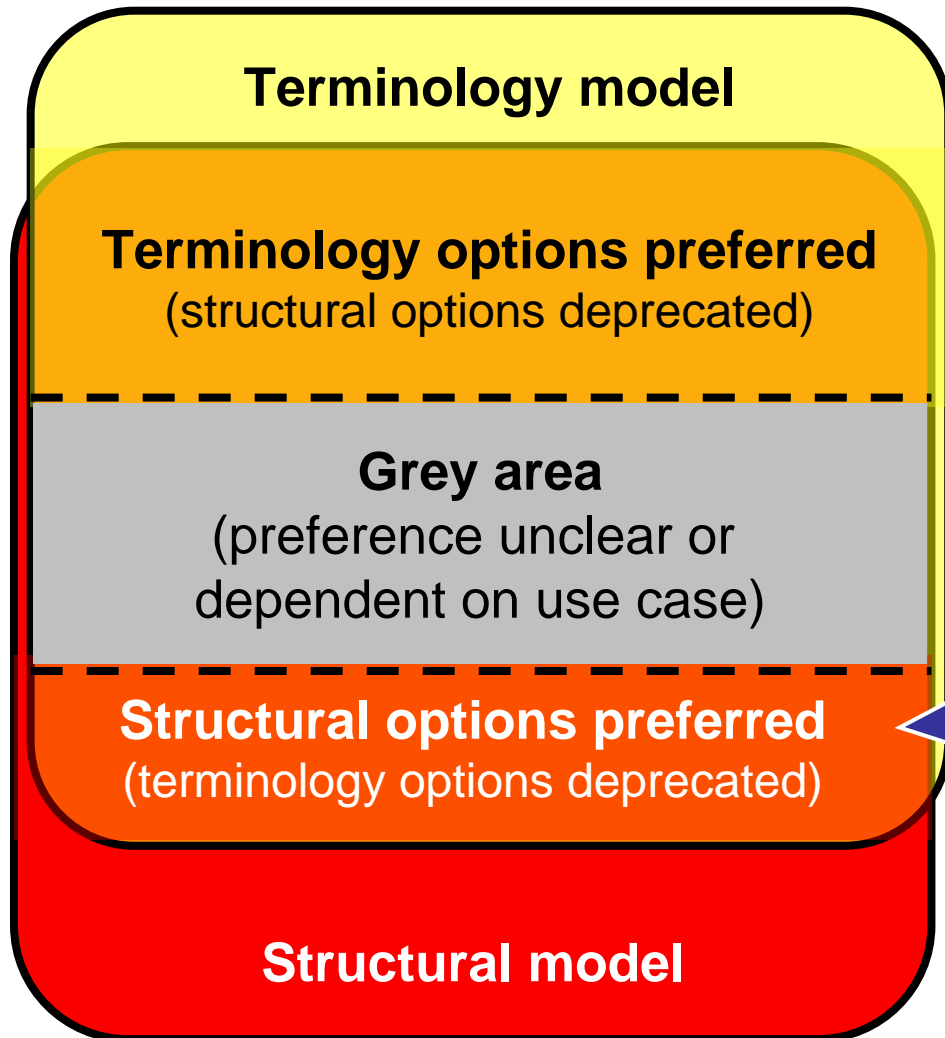


## Terminology model preferred

Constraints on combination of concepts in instances including abstract model of post-coordination and permissible attributes and ranges for refinement of concepts in specified domains:

- ❏ Restrictions on "finding site" refinement of "appendicitis", conventions on representation of laparoscopic variants of procedures

# Balancing structure and terminology

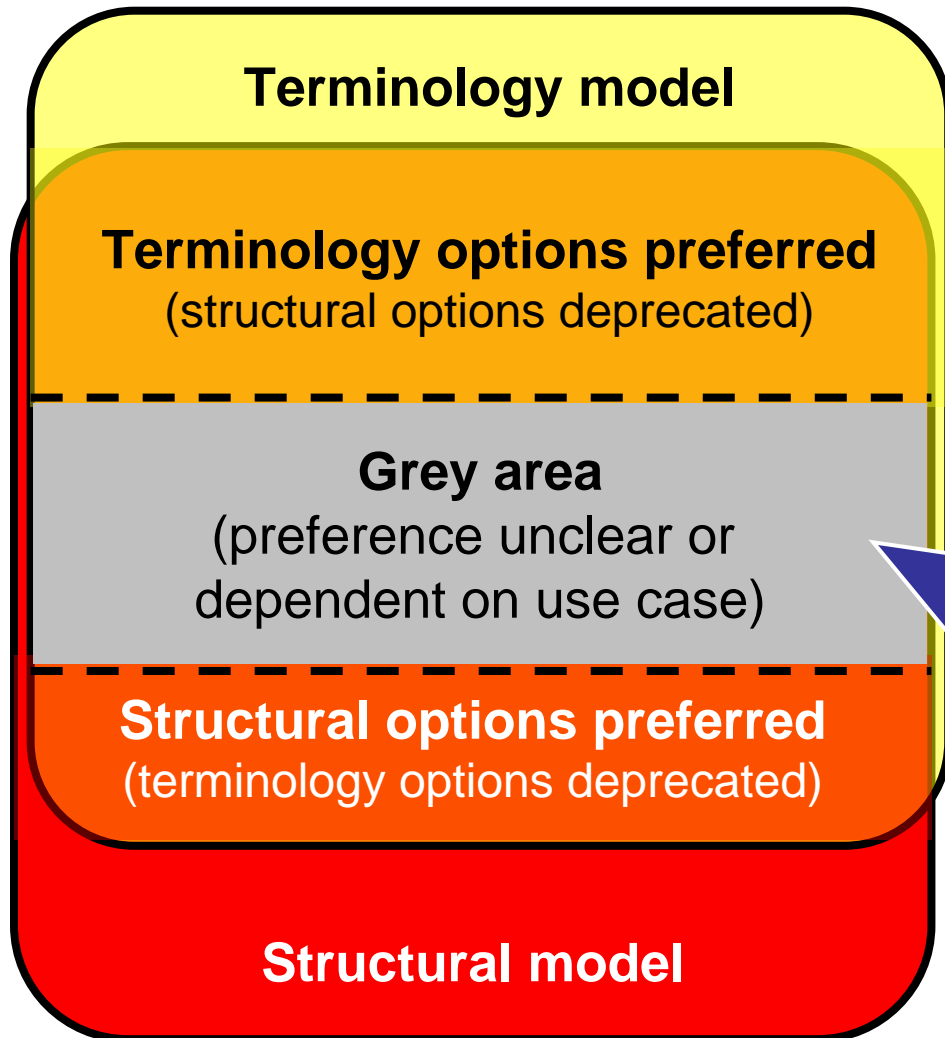


## Structural model preferred

Representation of relationships between distinct instances of record entries and other classes

- “ Grouping of record entries related by timing, problem or other organising principles.

# Balancing structure and terminology



## Grey area

Representation of contextual information related to instances of clinical situations

- Family history, presence/absence, certainty, goals, past/current, procedure done/not-done, etc.

# Conclusions

1. The way the information is be represented should be governed by the requirements for reuse
2. The information model and the terminology should be adjustable to each other
3. There must be rules and regulations to avoid the fallacies which follows if the same information is allowed to be represented by various combinations between the model and the terminology

# HL7 V3 TERMINFO



- Started 2004 on the initiative of NASA
- Ended in a document which gives advice on the use of SNOMED CT together with HL7 V3 - latest revision 2009
- The first attempt to describe the interface between HL7 and SNOMED CT
- Contains normative parts
  - Detailed advices on how to handle overlaps
  - Constraints on the use of SNOMED CT in relation to HL7
- Constitutes a natural starting point for further work even if we have another information model

# Standardization of clinical information – the division of labour in Sweden

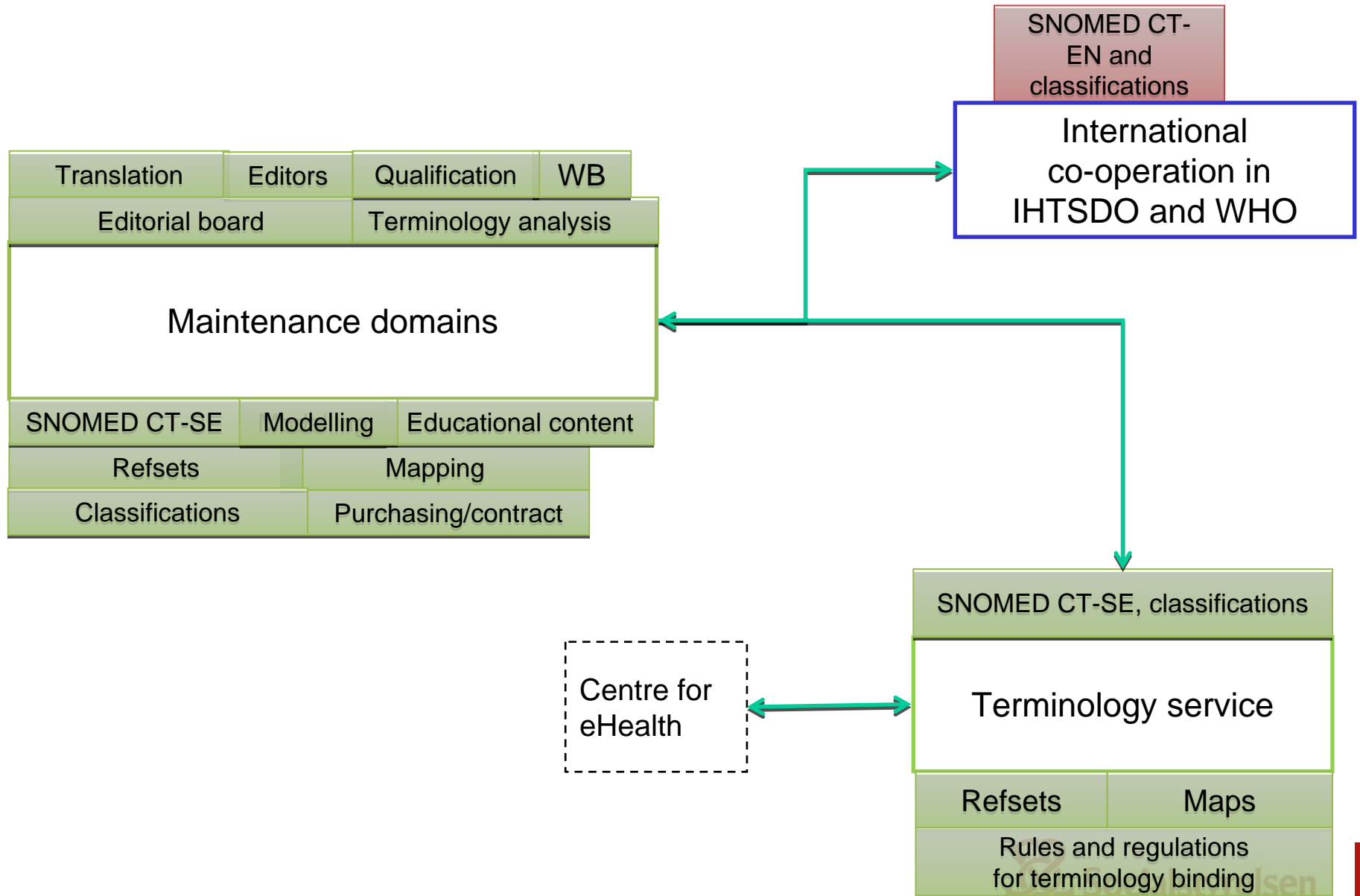
- The domain for the National Board
  - National information structure (NI) and terminology systems
- The domain for the Centre for eHealth
  - Models for representation i.e. ISO/EN 13606, openEHR RM, reference archetypes
- Mutual working space
  - Terminology binding – agreements on recommended representation based on models and terminology systems

# Ongoing terminology binding work on the national level

- Analysis of
  - how different combinations between the model and SNOMED CT affect possibilities of data retrieval
  - how and to which extent post-coordination can be used in a Swedish context (now and in the future)
  - if the attributes in the SNOMED concept model can be used in the construction of reference archetypes

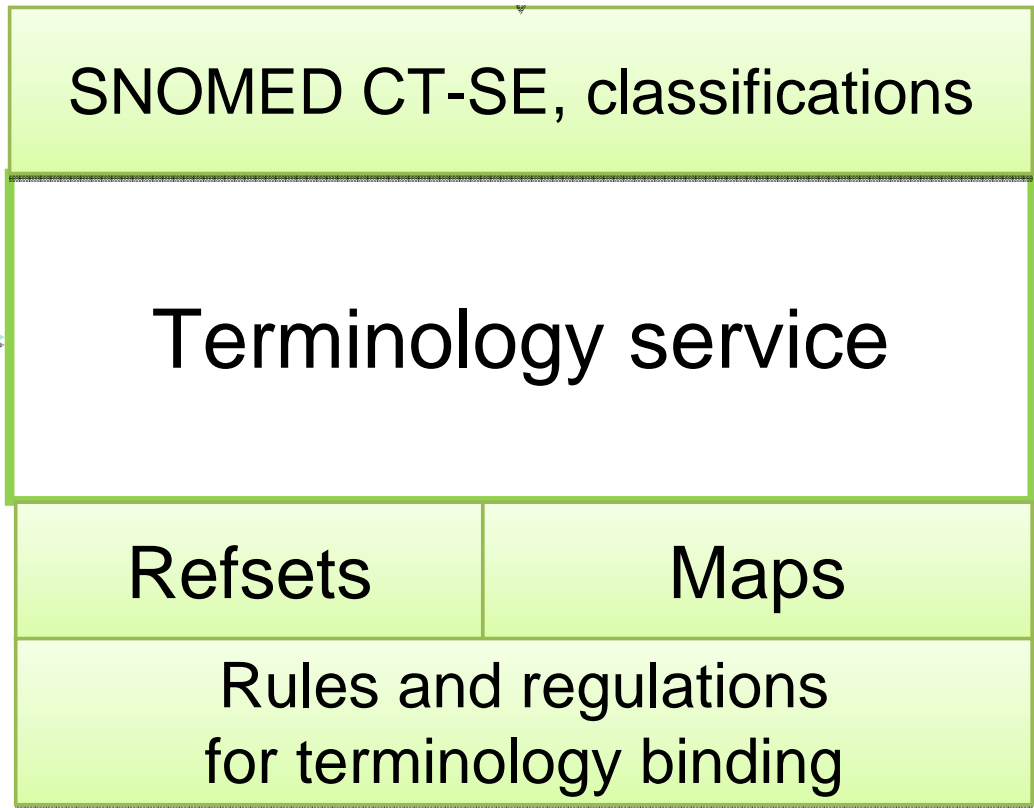
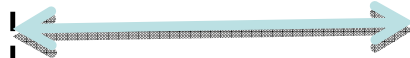
# Maintenance issues

# Maintenance of the interdisciplinary terminology – a sketch



Translation	Editors	Qualification	WB
Editorial board		Terminology analysis	
<h1>Maintenance domains</h1>			
SNOMED CT-SE	Modelling	Educational content	
Refsets		Mapping	
Classifications		Purchasing/contract	

Centre for  
eHealth



# Ideas of implementation of SNOMED in Sweden

- Start with the easy ones e.g.
  - Replace the Swedish non-surgical classification with a refset from SNOMED CT
  - Let SNOMED CT be the terminology basis in projects with national range i.e. quality registries, follow-up of infections complicating medical care
- Continue with more complicated areas e.g.
  - Design of structured data entry forms utilizing refsets and hierarchies for constrained use of SNOMED CT
  - Make post-coordination on demand possible - a pilot project aiming at a repository for storing post-coordinated expressions

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*end* [*fin*]