2.b Health data standard

Prof. Jimeng Sun

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Outline

- Health data standards
  - ICD, NDC, CPT
- Medical ontology

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Health Data Standards

LOINC

Logical Observation Identifiers Names and Codes

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Health Data Standards

ICD

International Classification of Disease

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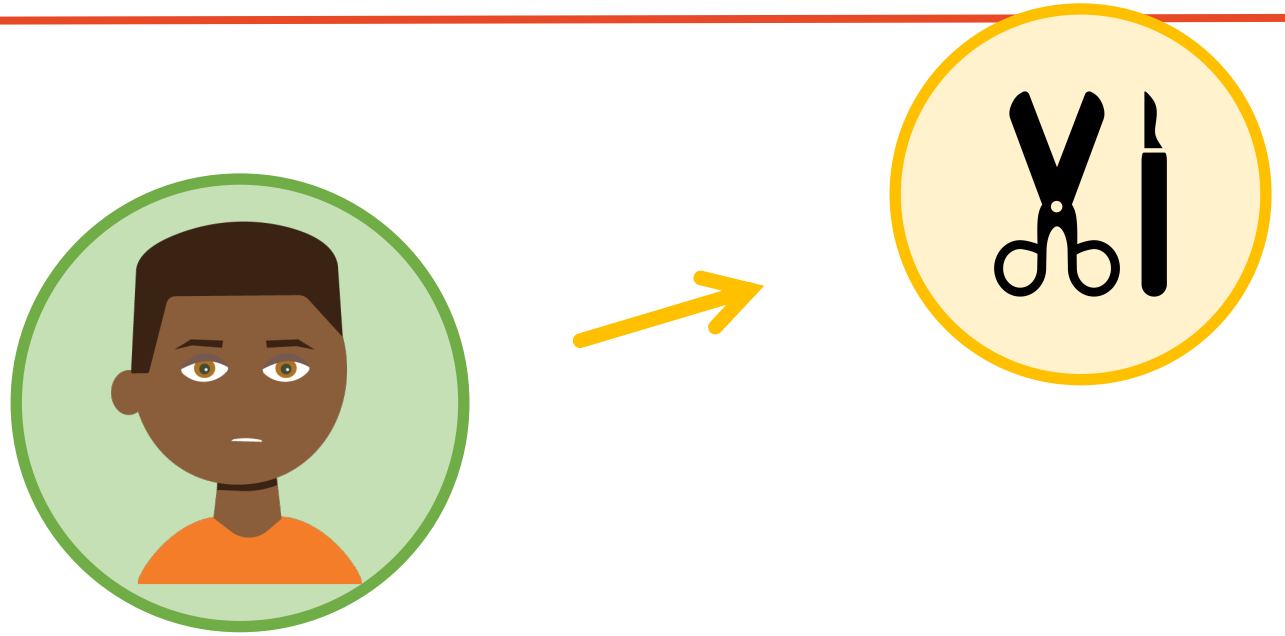
Health Data Standards



CPT

Current Procedural Terminology

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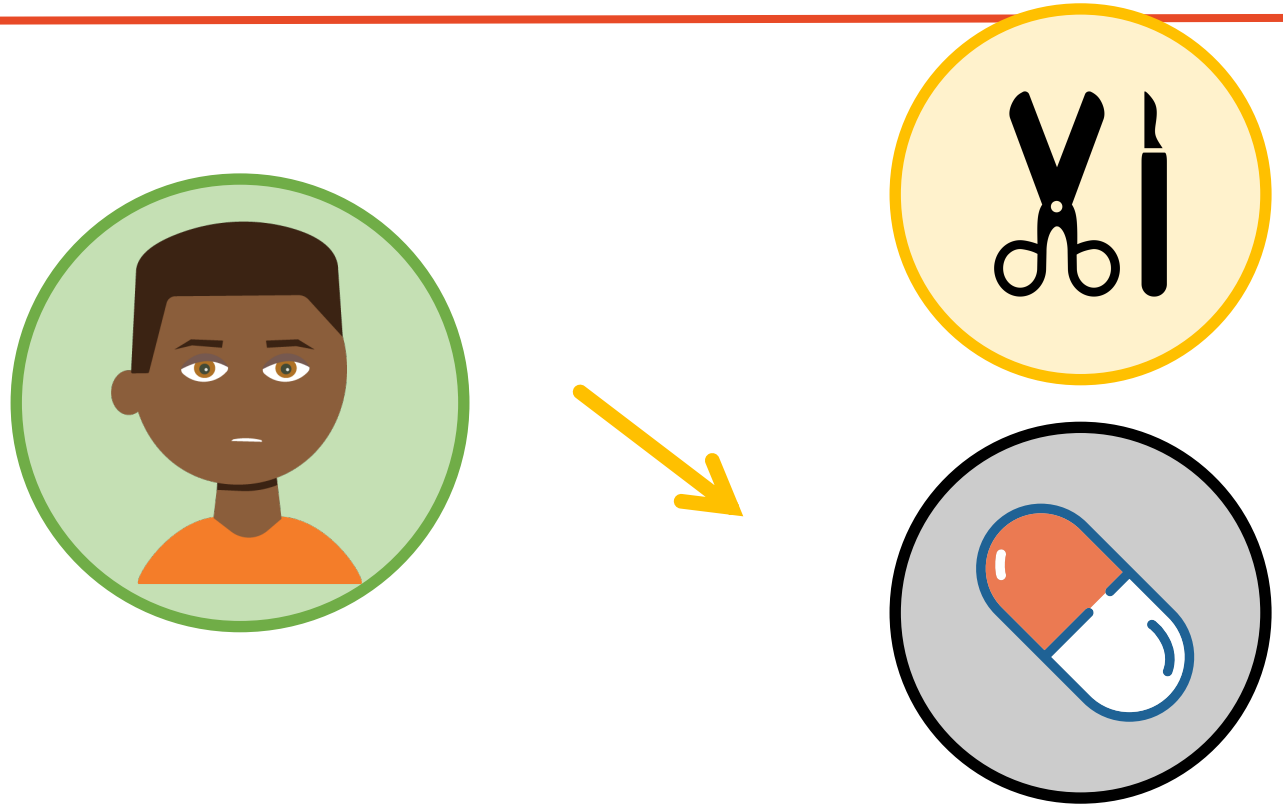

NDC

National Drug Code

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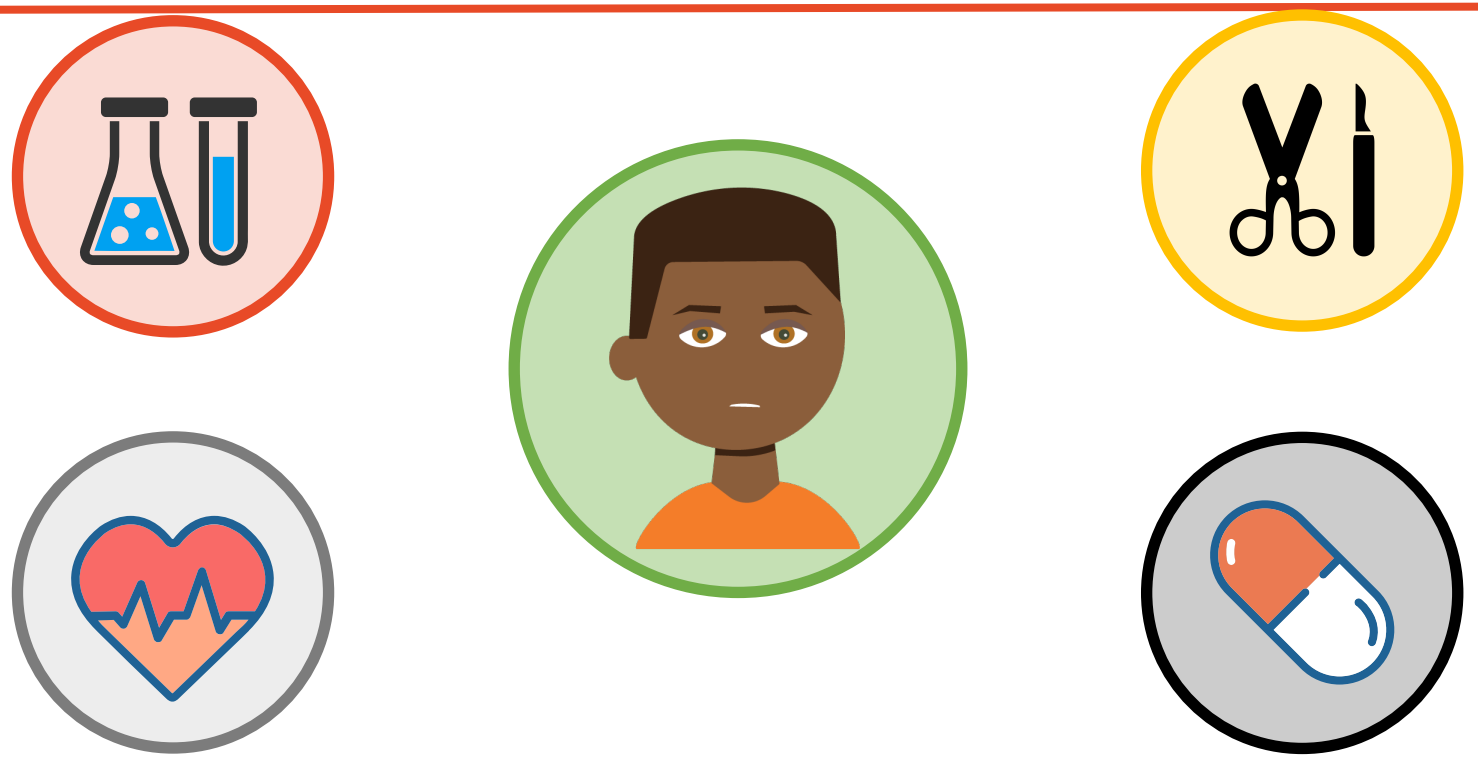

SNOMED

Systemized Nomenclature of Medicine

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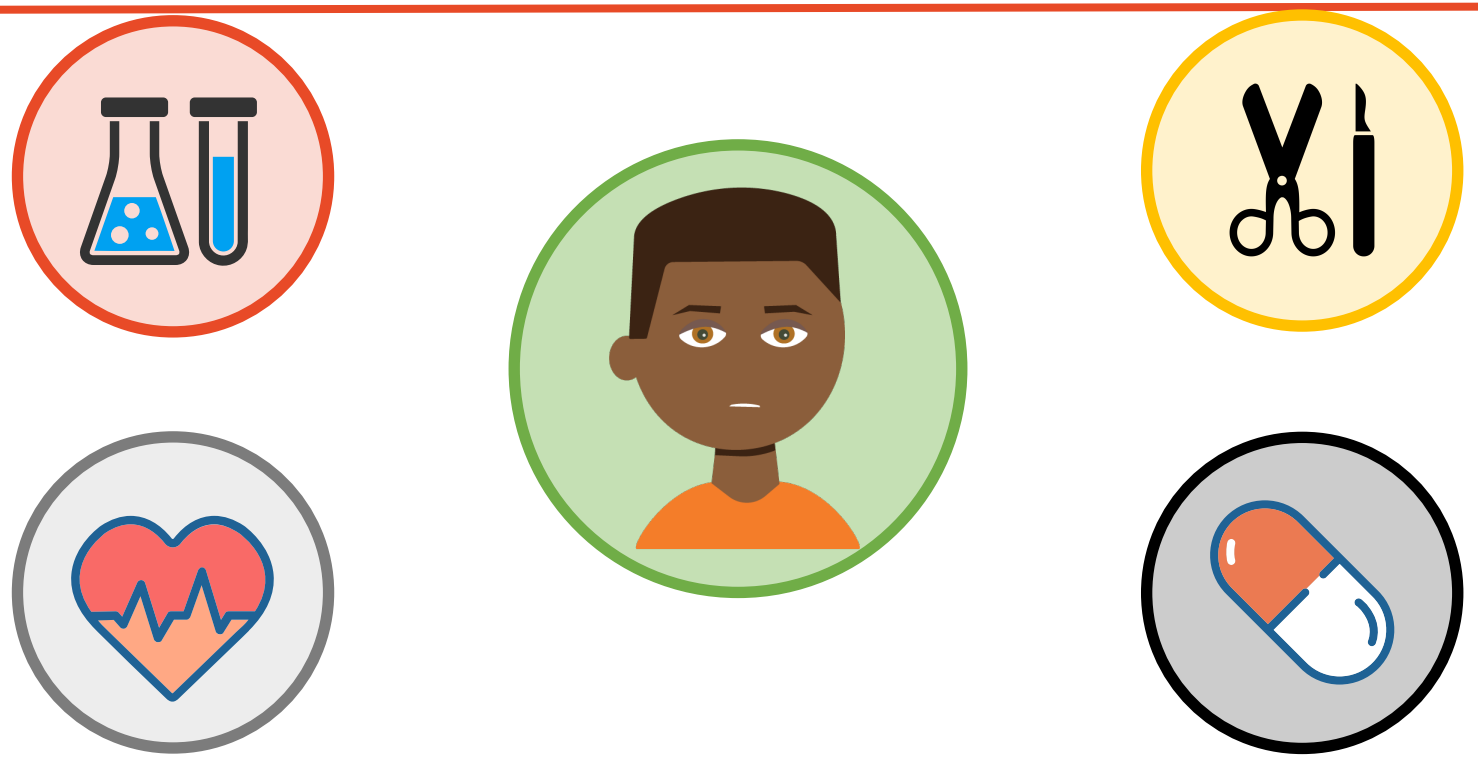

UMLS

Unified Medical Language System

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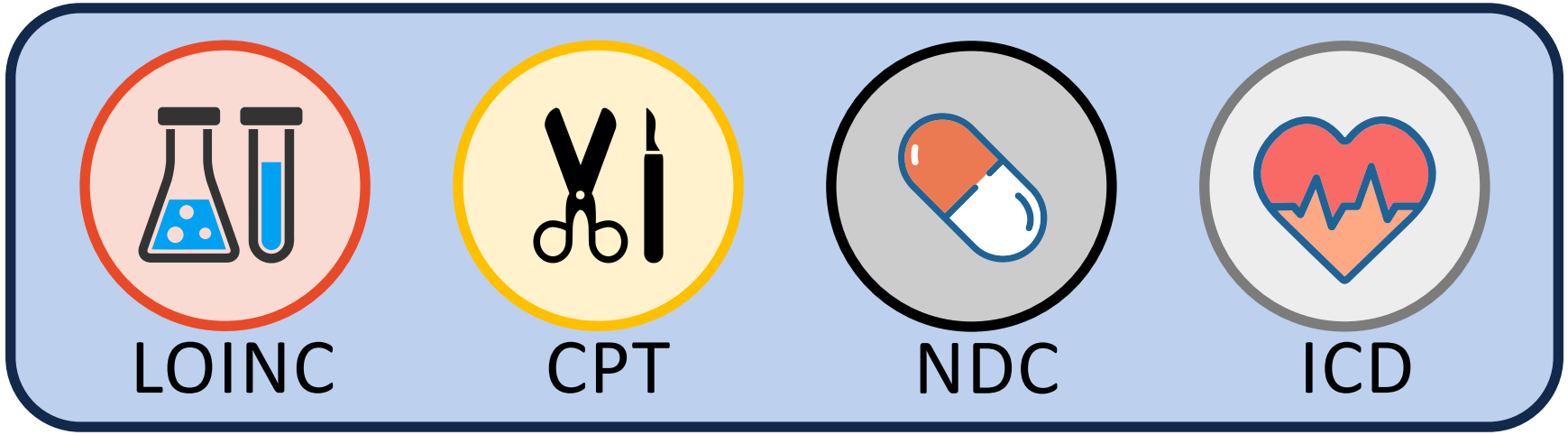
Health Data Standards



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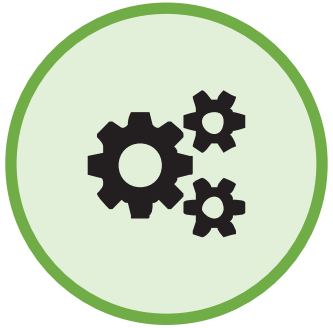
UMLS

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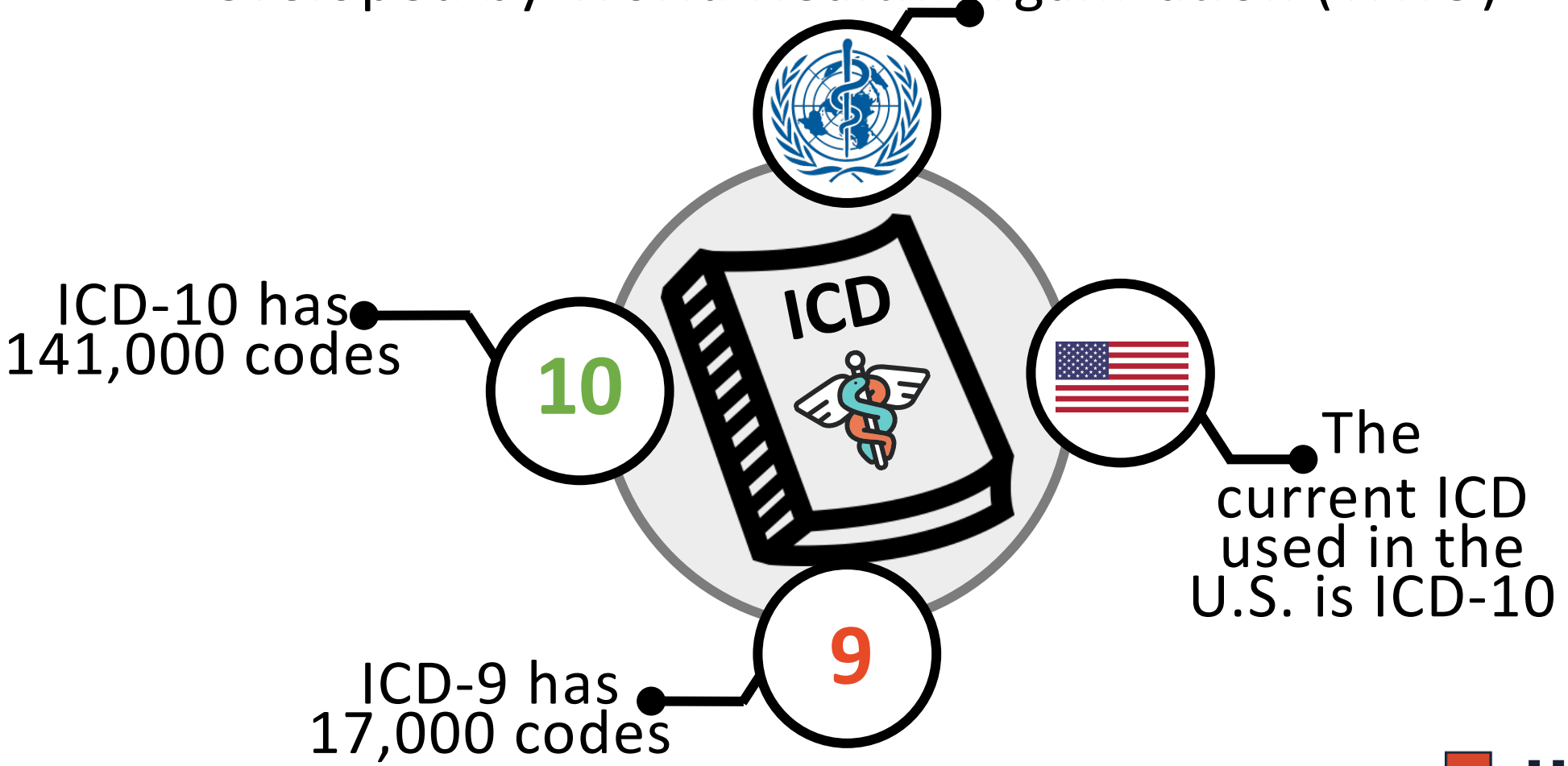
Health Data Standards

LOINC CPT NDC ICD SNOMED UMLS

ICD

Developed by World Health Organization (WHO)



ICD-10 has 141,000 codes

The current ICD used in the U.S. is ICD-10

ICD-9 has 17,000 codes

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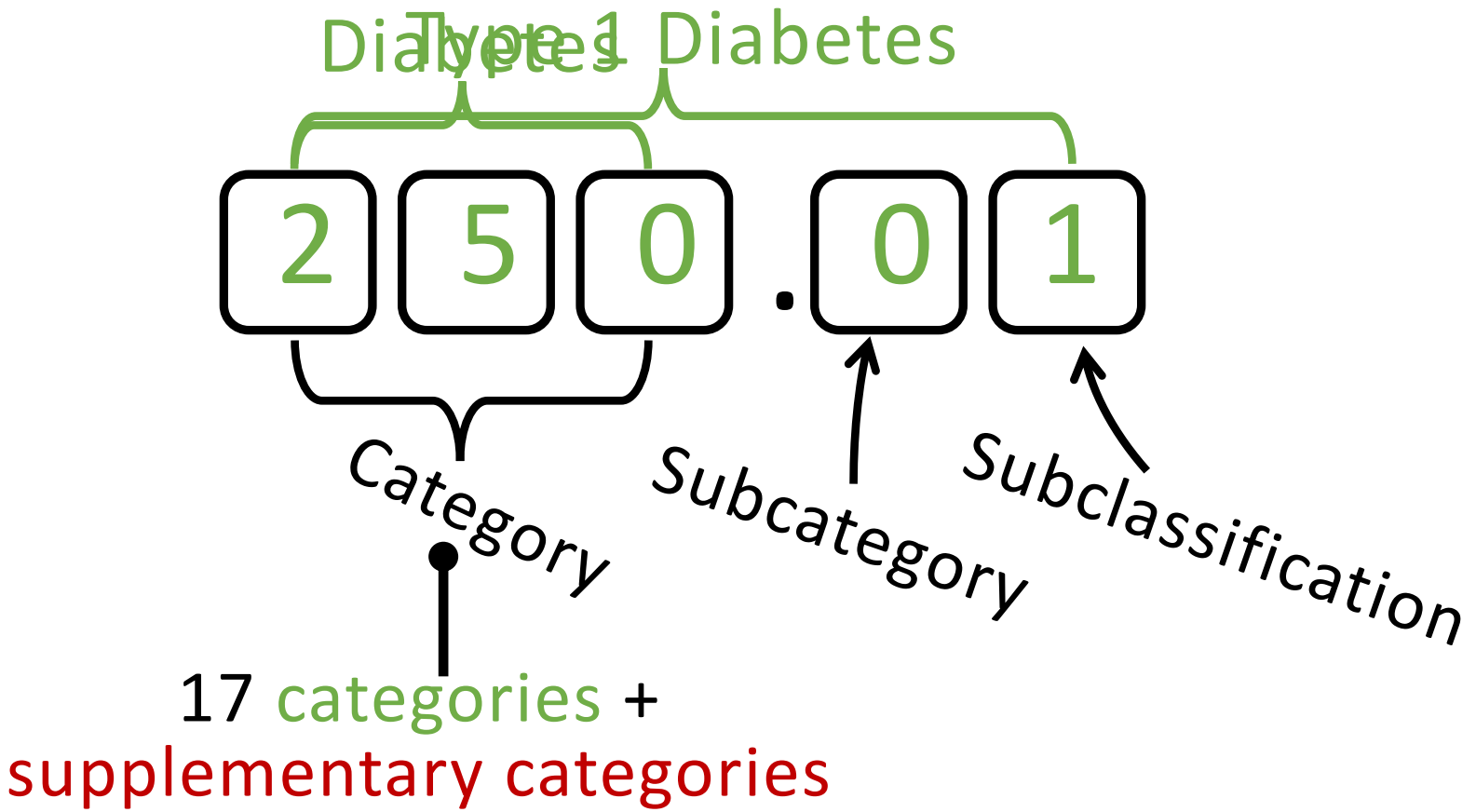
ICD-9



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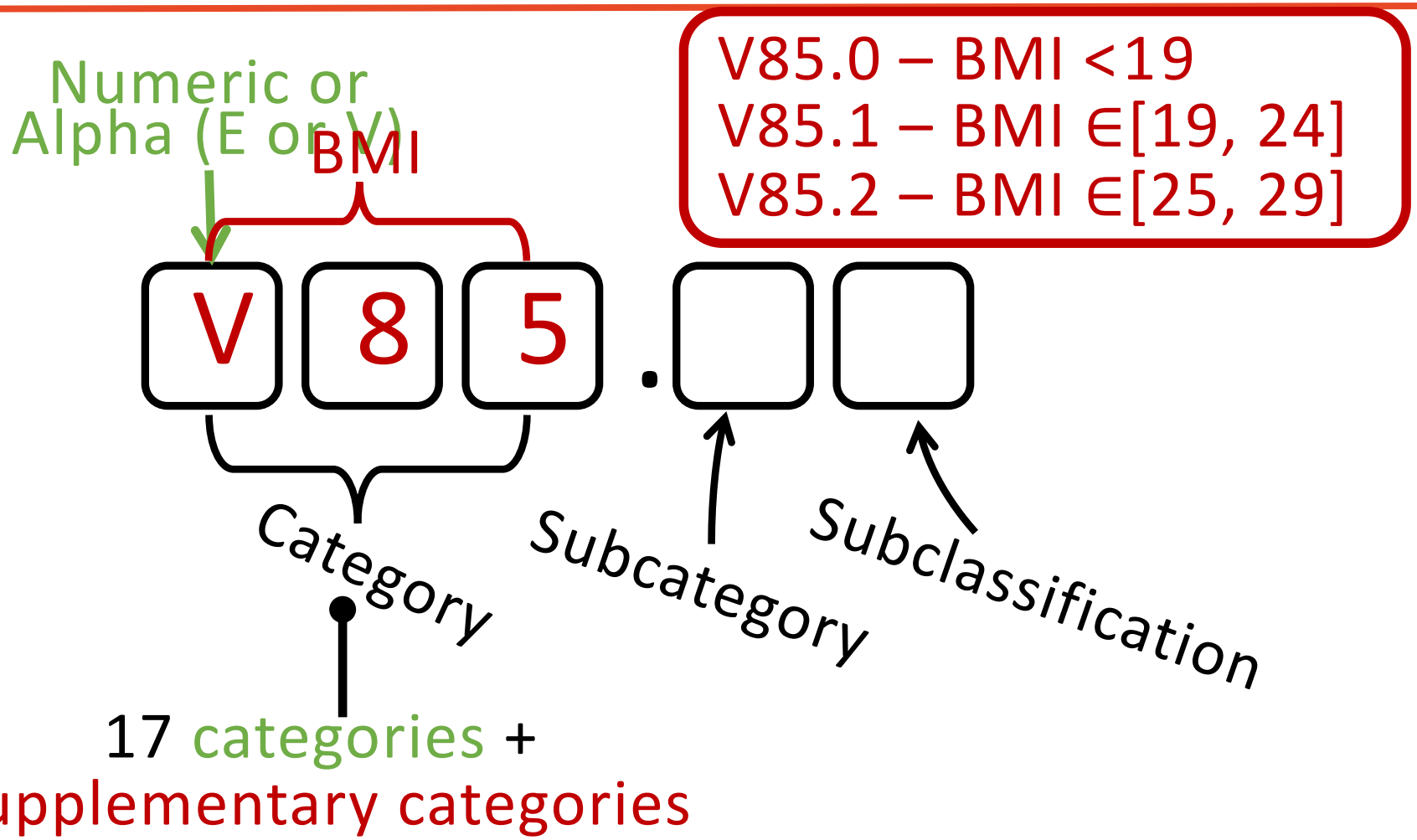
ICD-9



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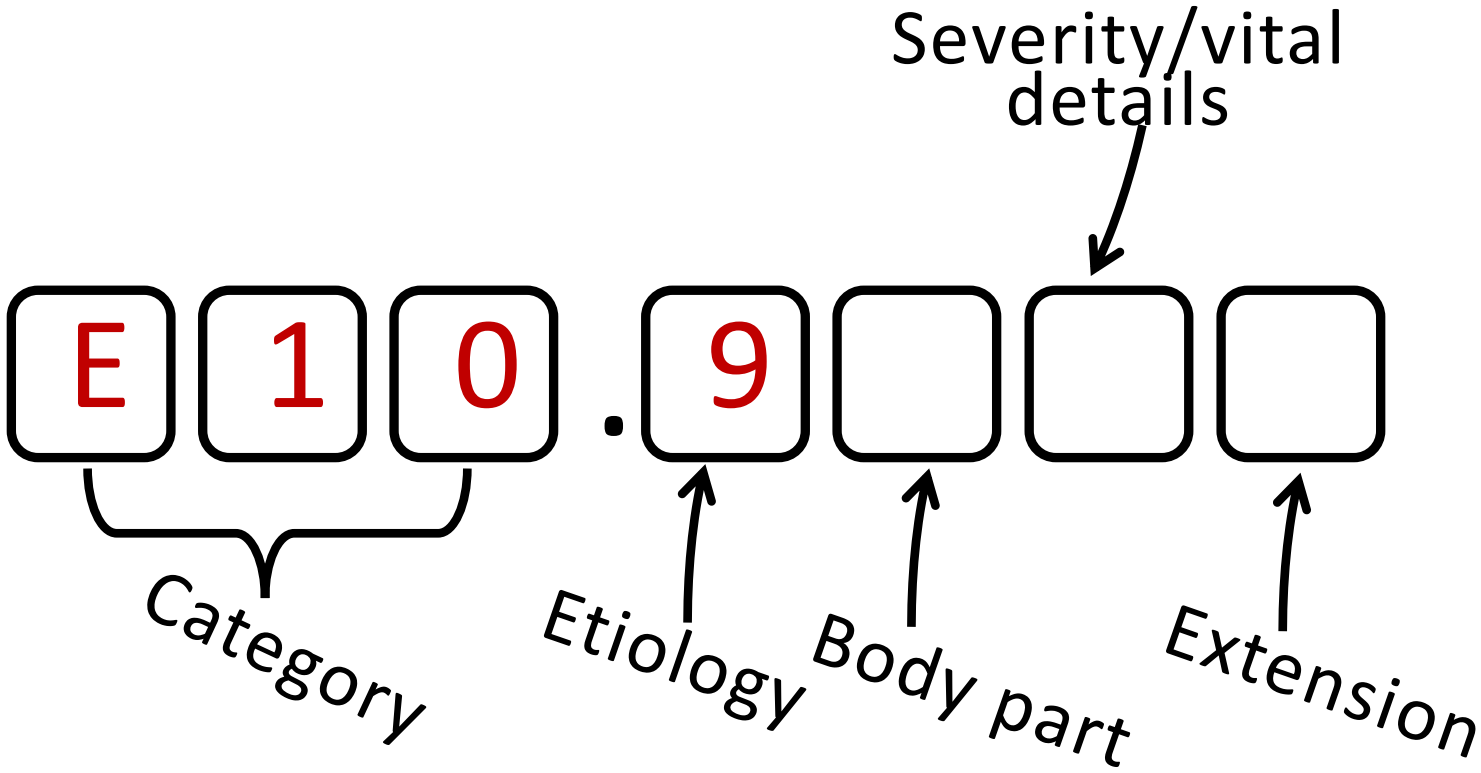
ICD-10



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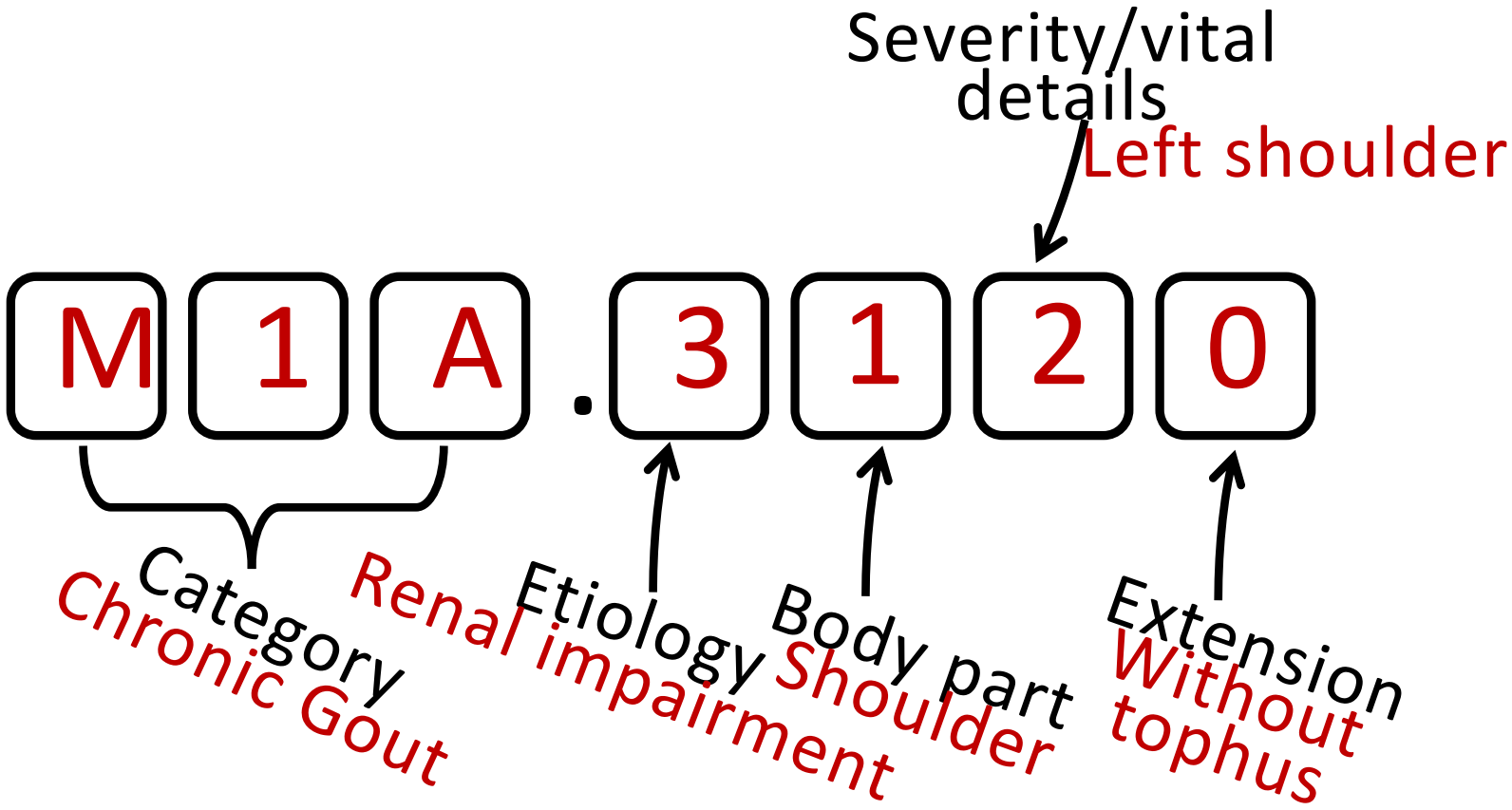
ICD-10



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ICD-9 TO ICD-10 MAPPING

One-to-Three Mapping	
ICD-9-CM	**ICD-10-CM**
649.51 (spotting complications during pregnancy)	026.851 (spotting complications during pregnancy, first trimester)
	026.852 (spotting complications during pregnancy, second trimester)
	026.853 (spotting complications during pregnancy, third trimester)

One-to-One Mapping	
ICD-9-CM	**ICD-10-CM**
733.6 (Tietze's Syndrome)	M94.0 (Tietze's Syndrome)

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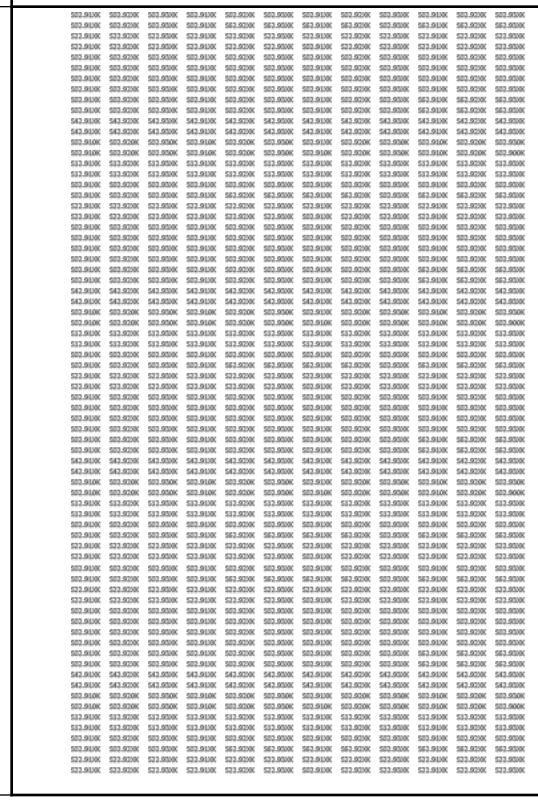
ICD-9 TO ICD-10 MAPPING

One-to-2,530 Mapping	
ICD-9-CM	ICD-10-CM
733.82 (other disorders of bone and cartilage, non-union of fracture)	

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ICD-9 QUIZ

Which of following are NOT a ICD-9 code?

- [ ] 501
- [x] U80.1
- [ ] 802.3
- [ ] V70
- [ ] E82.0
- [x] 5A0.01

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ICD CODE QUIZ 1

Find the ICD-9 and ICD-10 codes for Influenza.

ICD-9 487.1

ICD-10 J11.1

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ICD CODE QUIZ 2

Find the ICD-10 code for Coronavirus.

ICD-10 B34.2

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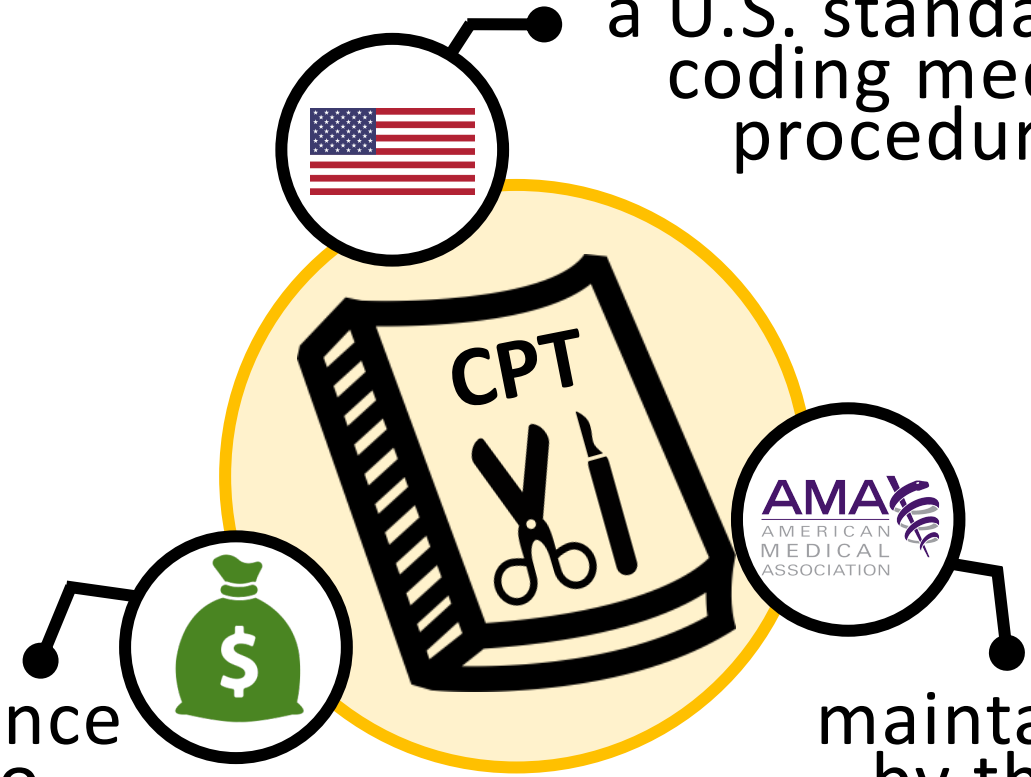
CPT

a U.S. standard for coding medical procedures



Used by insurance companies to determine how much physicians will be paid

maintained and copyrighted by the American Medical Association (AMA)

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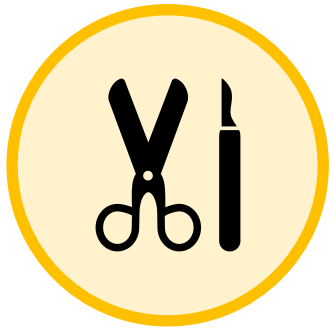
CPT



- Category I → 5 digits
  widely performed
- Category II → 4 digits
  + ‘F’ for quality metrics
- Category III → 4 digits
  + ‘T’ for experimental use

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Category I CPT

Evaluation and Management
Anesthesia
Surgery
Radiology
Pathology and Laboratory
Medicine

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CPT CATEGORY II CODE

Composite measures	0001F-0015F
Patient management	0500F-0575F
Patient history	1000F-1220F
Physical examination	2000F-2050F
Diagnostic/screening process or results	3006F-3573F
Therapeutic, preventative or other interventions	4000F-4306F
Follow-up or other outcomes	5005F-5100F
Patient safety	6005F-6045F
Structural Measures	7010F-7025F

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CPT Category II Code

Composite measures	0001F-0015F
Patient management	0500F-0575F
Patient history	1000F-1220F
Physical examination	2000F-2050F
Diagnostic/screening process or results	3006F-3573F
Therapeutic, preventative or other interventions	4000F-4306F
Follow-up or other outcomes	5005F-5100F
Patient safety	6005F-6045F
Structural Measures	7010F-7025F

Blood pressure measured: 0001F

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CPT Code Quiz

Find the CPT code for detailed office visit.

99201-99205

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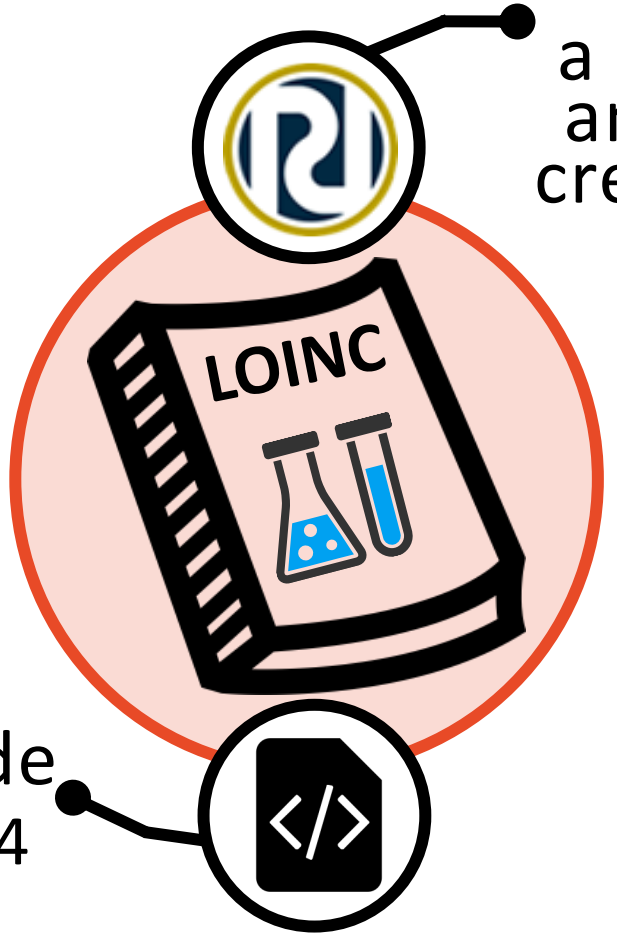
LOINC



a standard for laboratory and clinical observations created by the Regenstrief Institute

LOINC Code
E.g. 2865-4

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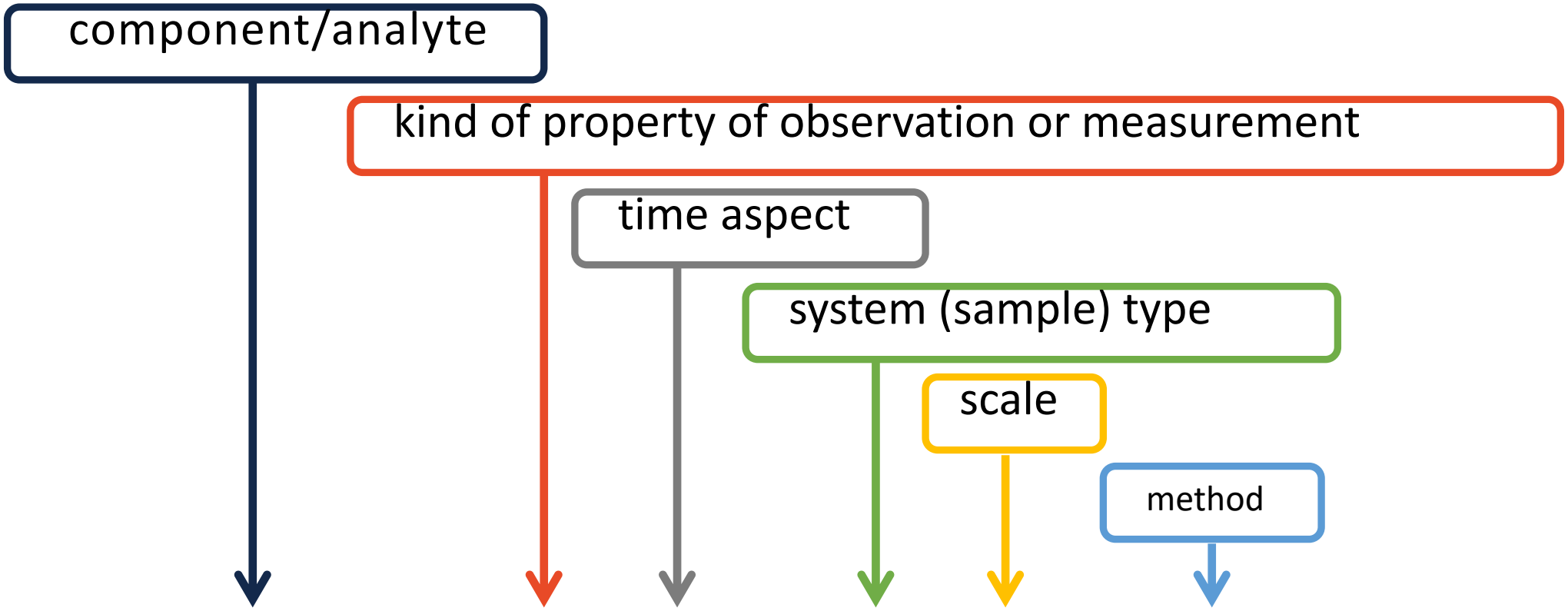
LOINC Attributes And Numbers



Alpha 1 globulin:MCnc:Pt:Ser/Plas:Qn:Electrophoresis

LOINC #: 2865-4

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LOINC CODE QUIZ

Find the LOINC code for Creatinine.

2160-0

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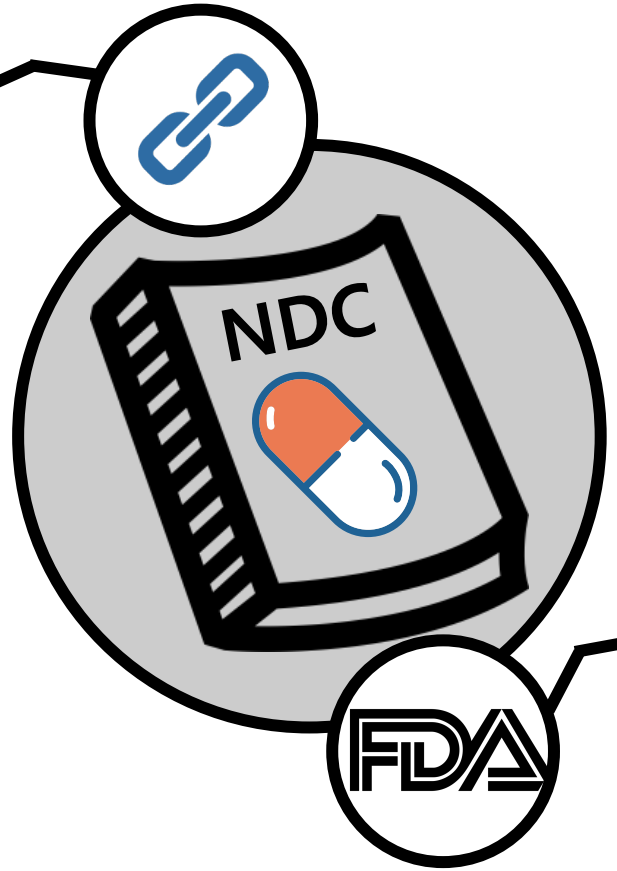
NDC

NDC numbers are used throughout the drug supply chain



Registered by Food and Drug Administration (FDA)

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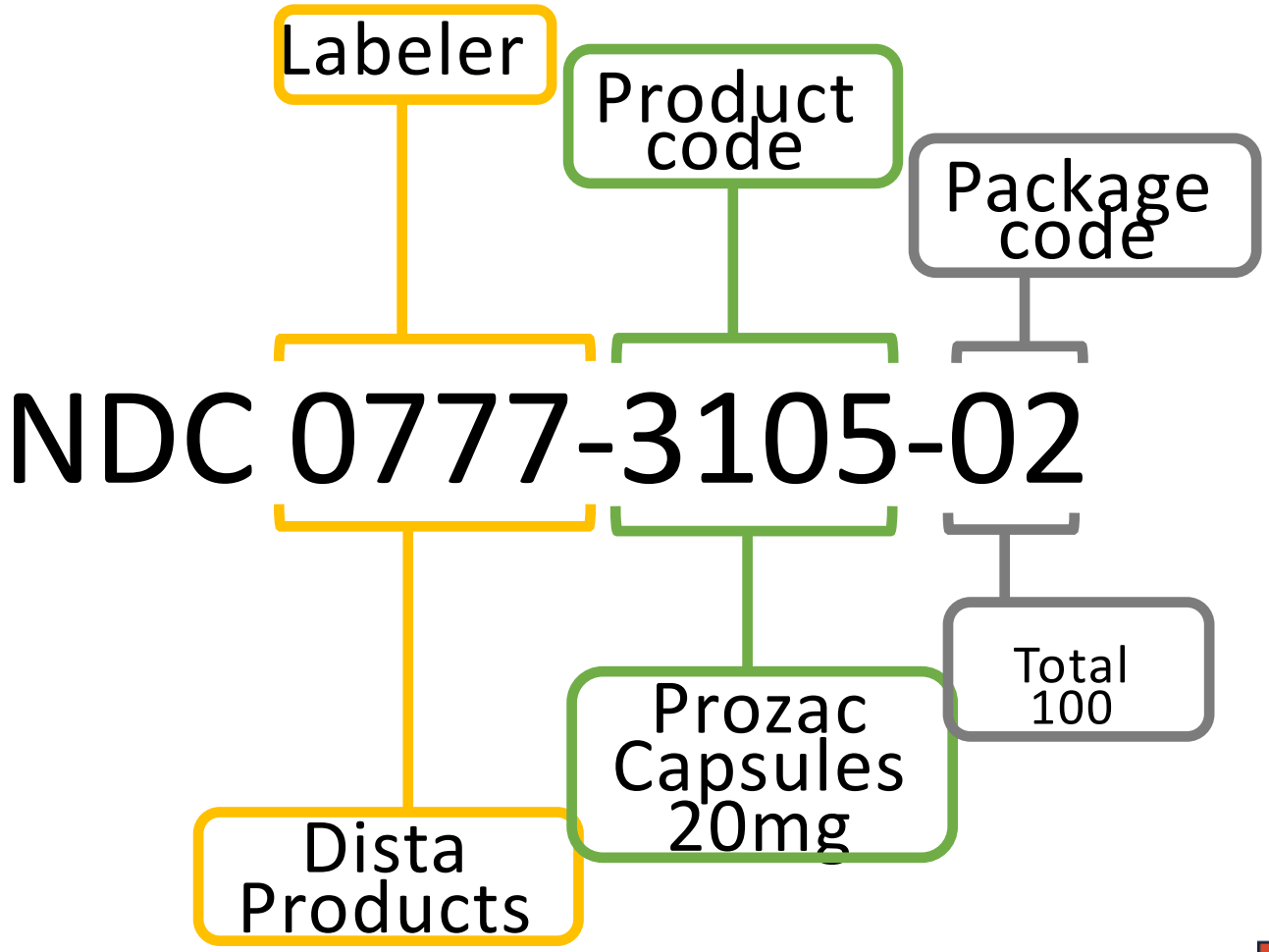
NDC



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NDC CODE QUIZ

Find the NDC code for METFORMIN HYDROCHLORIDE 500mg.

0093-7214-01

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SNOMED

Most comprehensive, multilingual clinical healthcare terminology

Objectives:

- to encode the meanings of health information
- to support effective clinical recording of data

maintained by the IHTSDO, an international non-profit organization in Denmark

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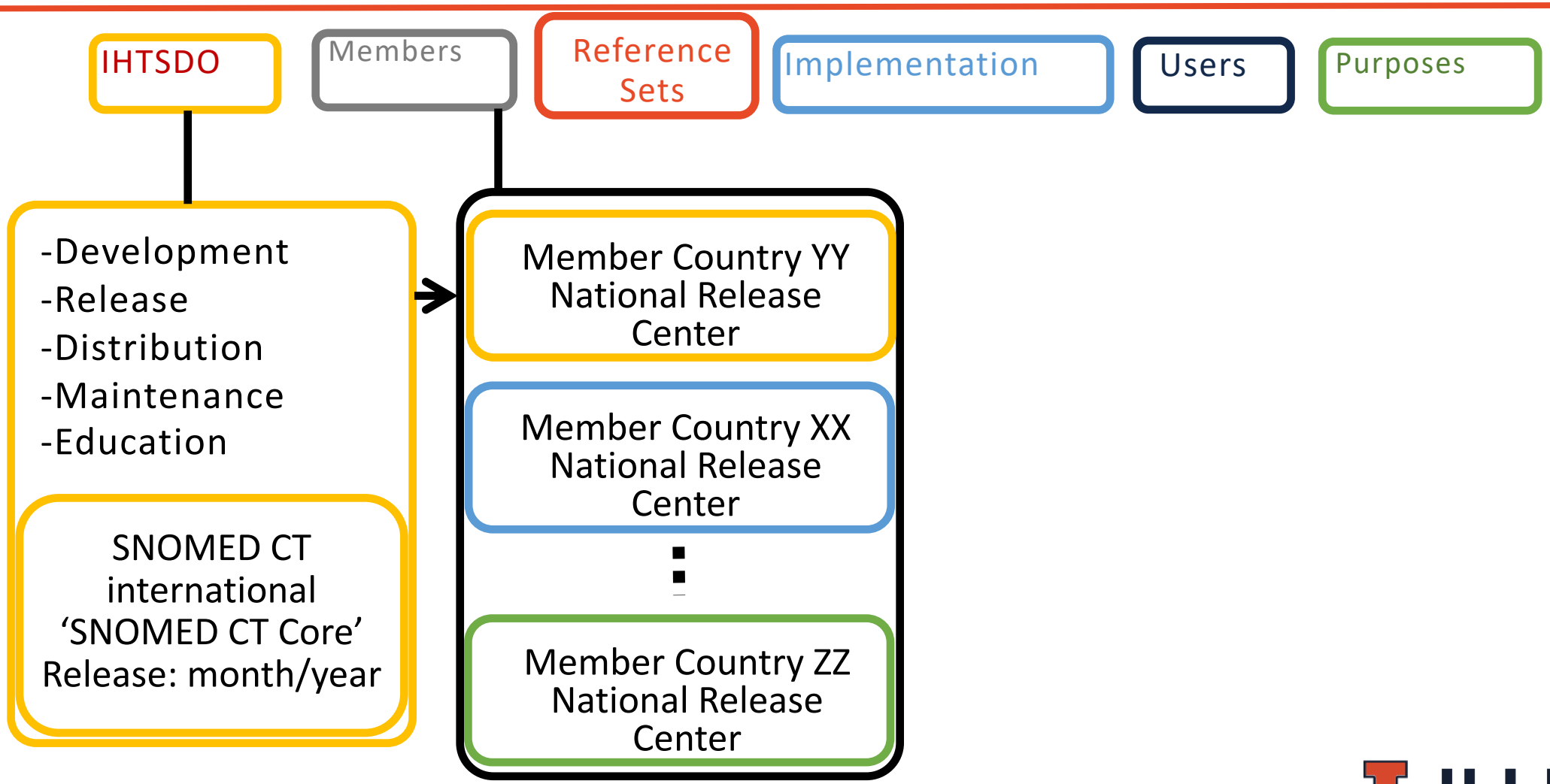
SNOMED DEVELOPMENT PROCESS



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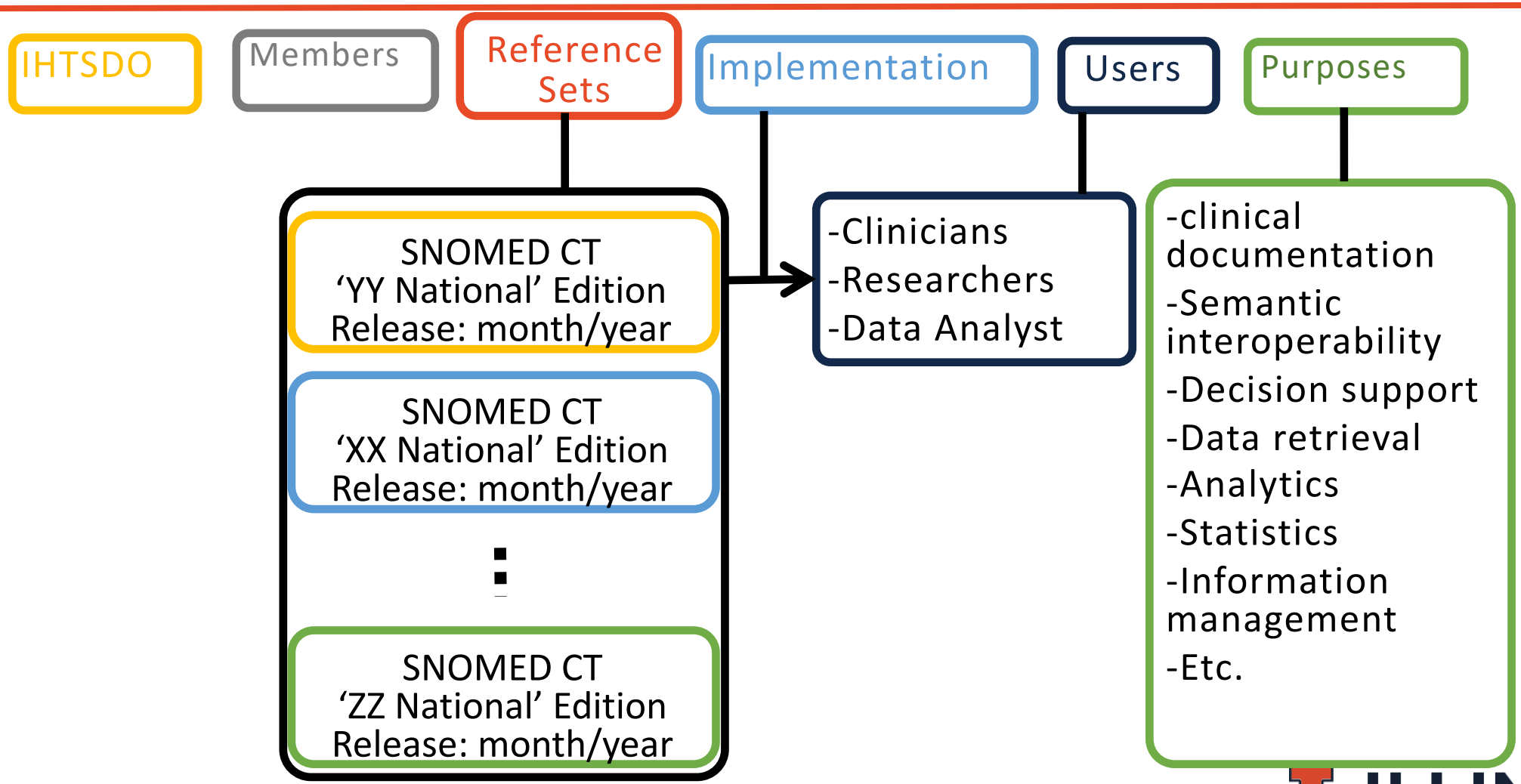
SNOMED DEVELOPMENT PROCESS



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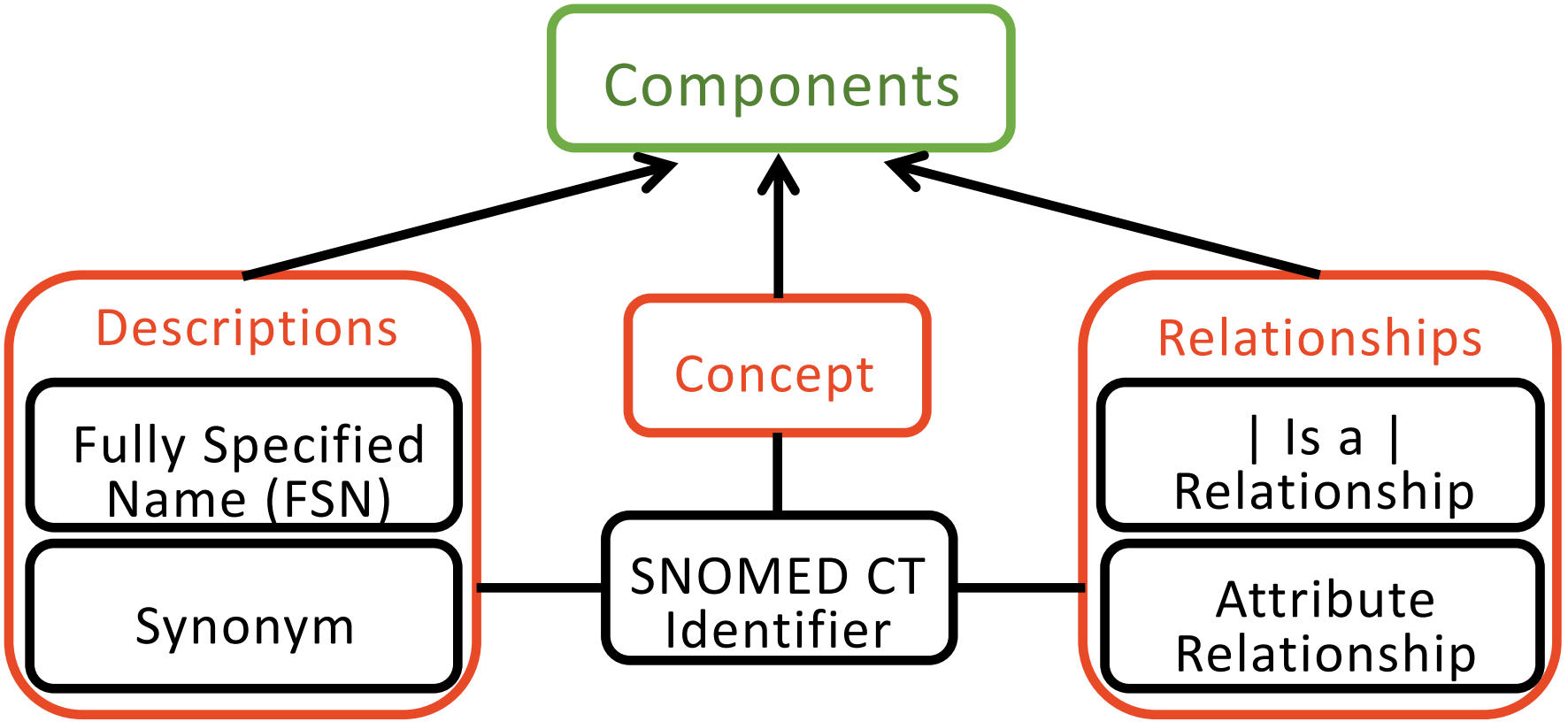
LOGICAL MODEL OF SNOMED CT



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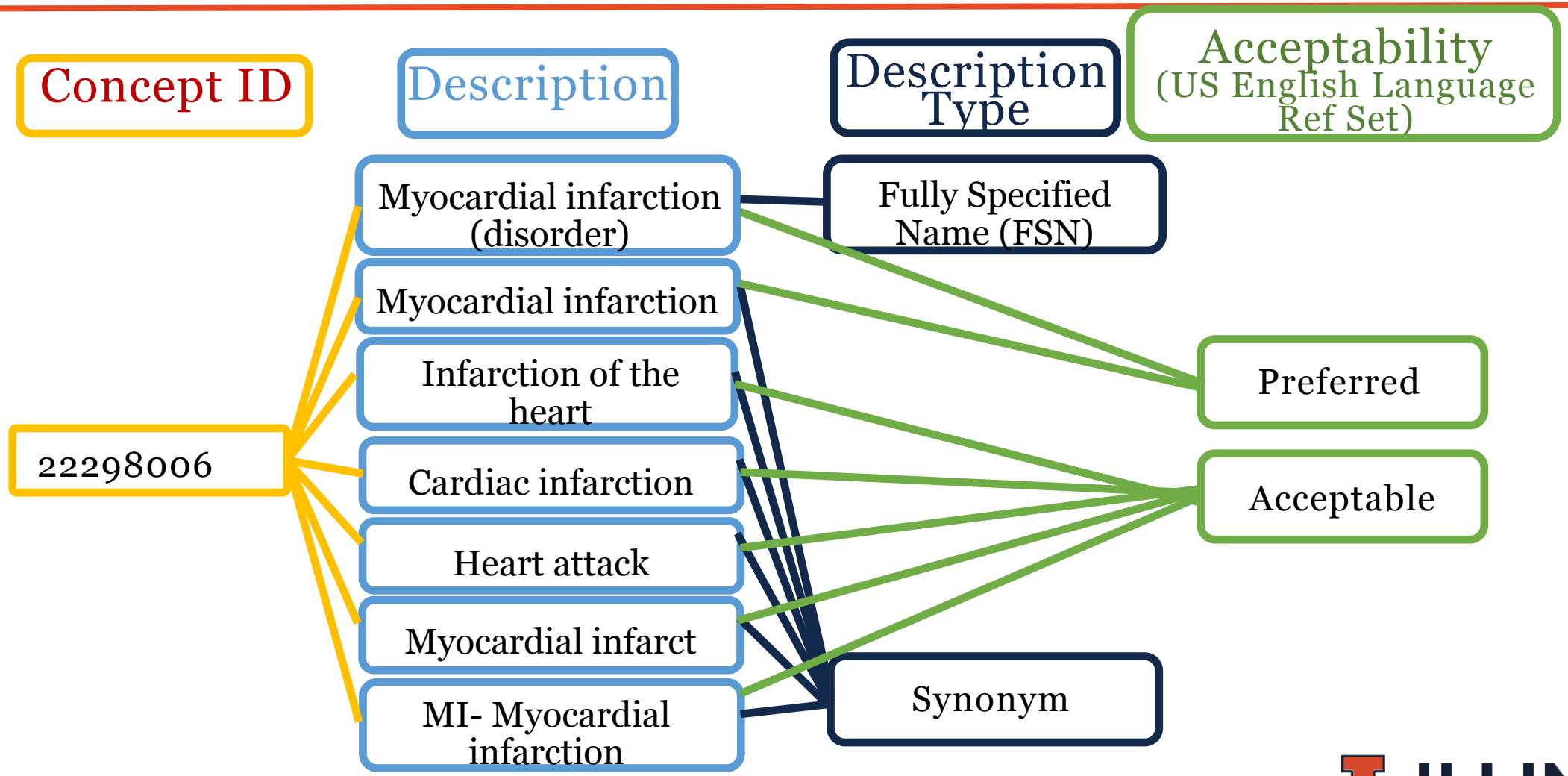
SNOMED EXAMPLE



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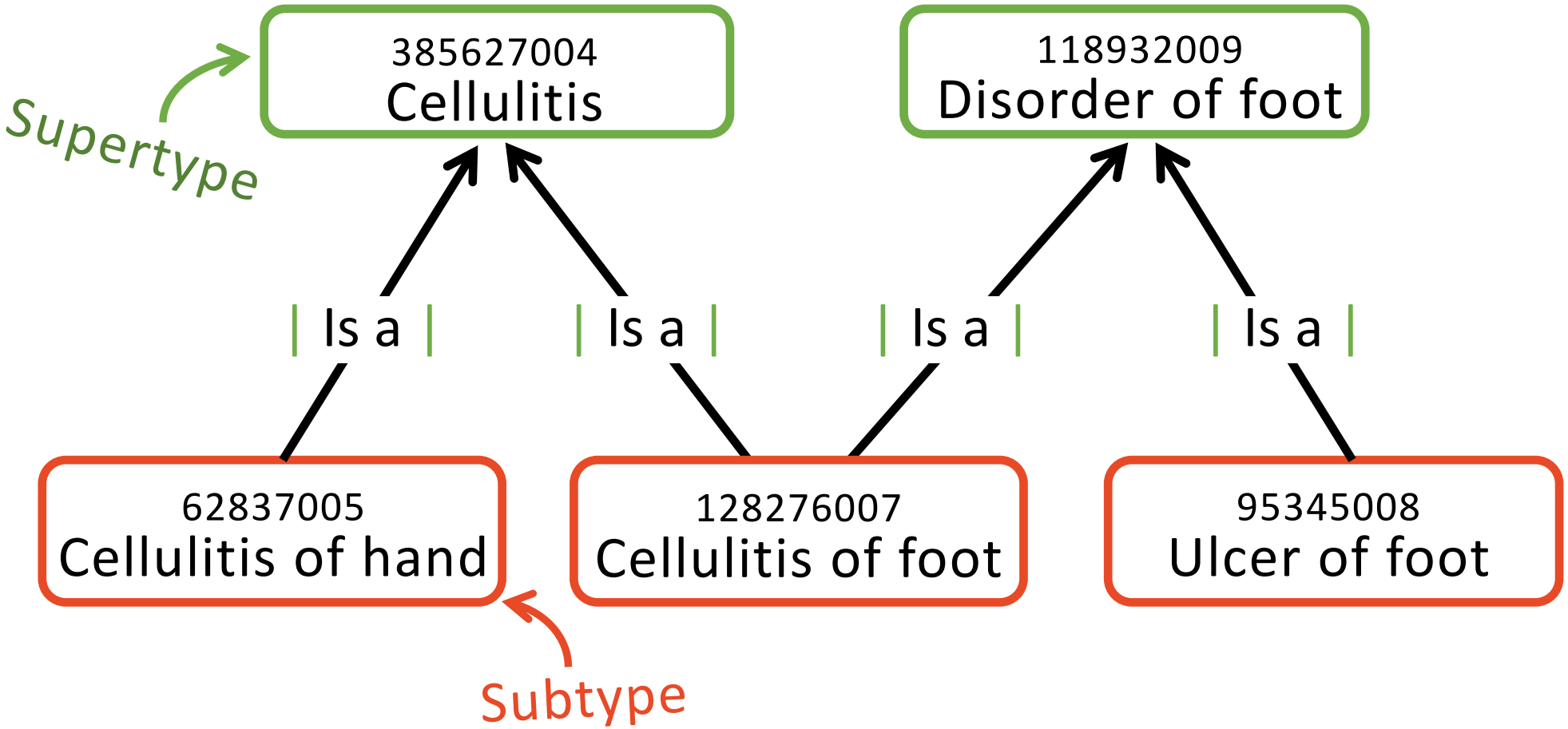
Is-a Relationship



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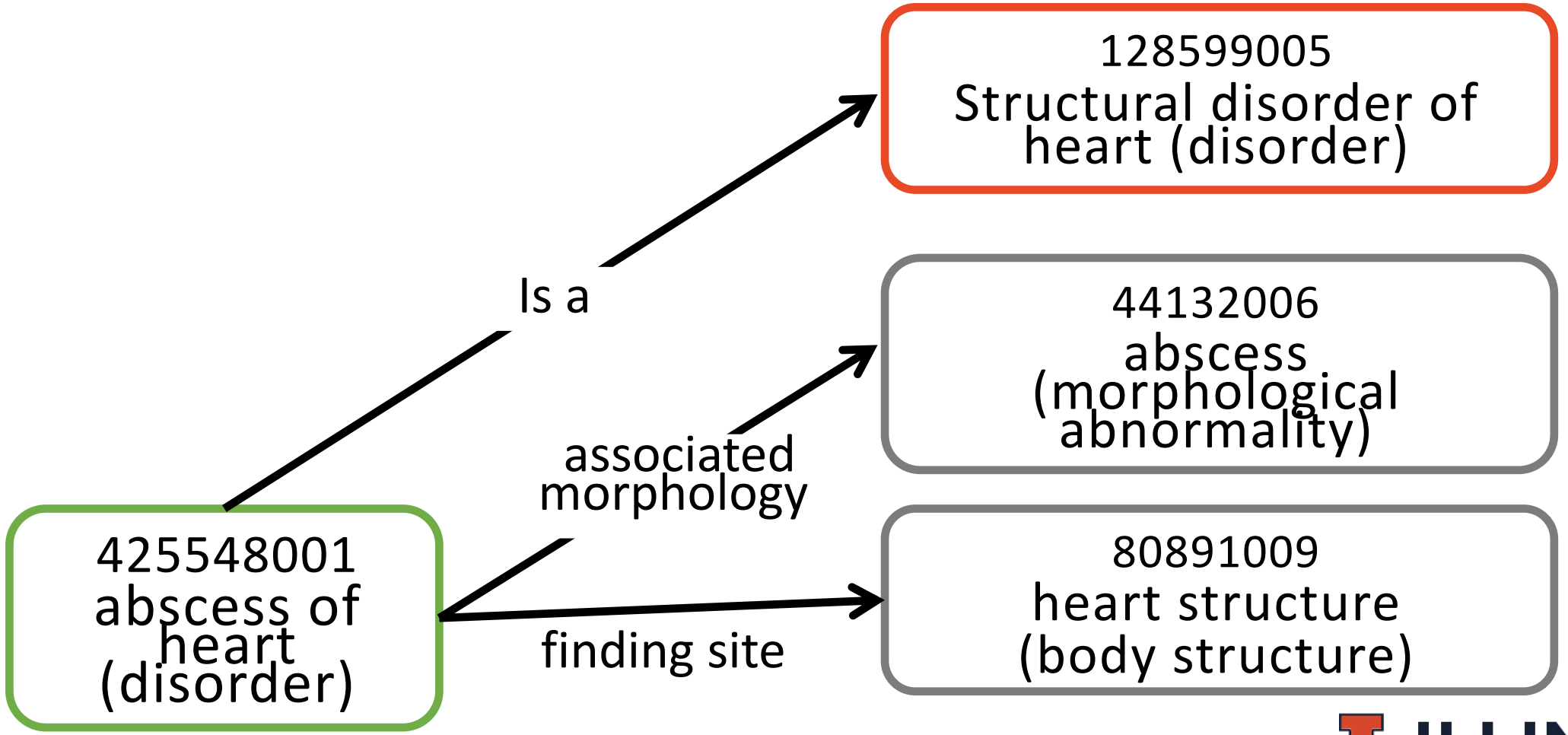
Other Relationships In SNOMED



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SNOMED DESIGN

Concepts | Hierarchies | Attributes | Identifiers | Descriptions | Relationships

1. Body structure
2. Clinical finding
3. Environmental or geographical location
4. Event
5. Linkage concept
6. Observable entity
7. Organism
8. Pharmaceutical/ biological product
9. Physical force
10. Physical object
11. Procedure
12. Qualifier value
13. Record artifact
14. Situation with explicit context
15. Social context
16. Special concept
17. Specimen
18. Staging and scales
19. Substance

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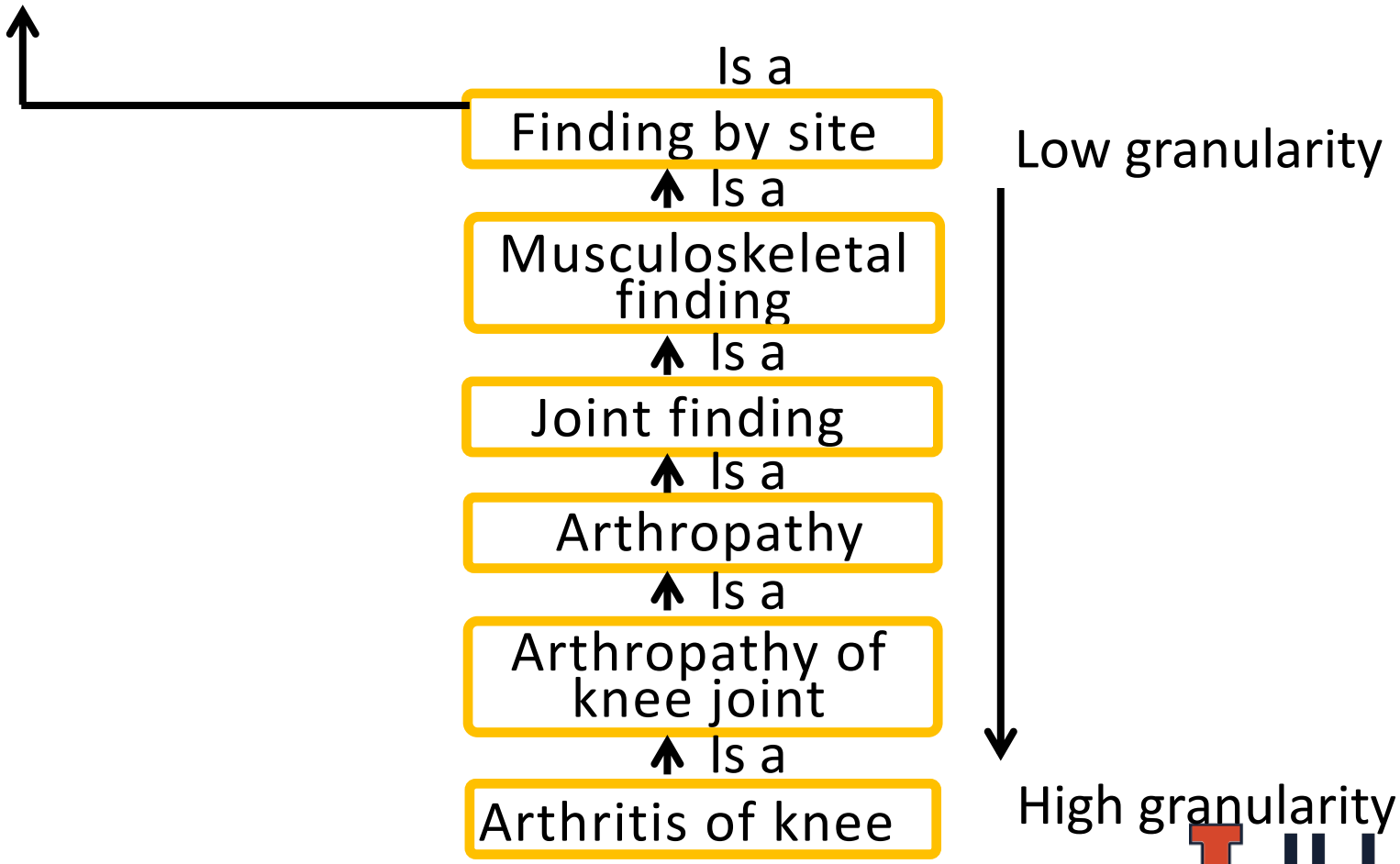
SNOMED DESIGN

Concepts | Hierarchies | Attributes | Identifiers | Descriptions | Relationships



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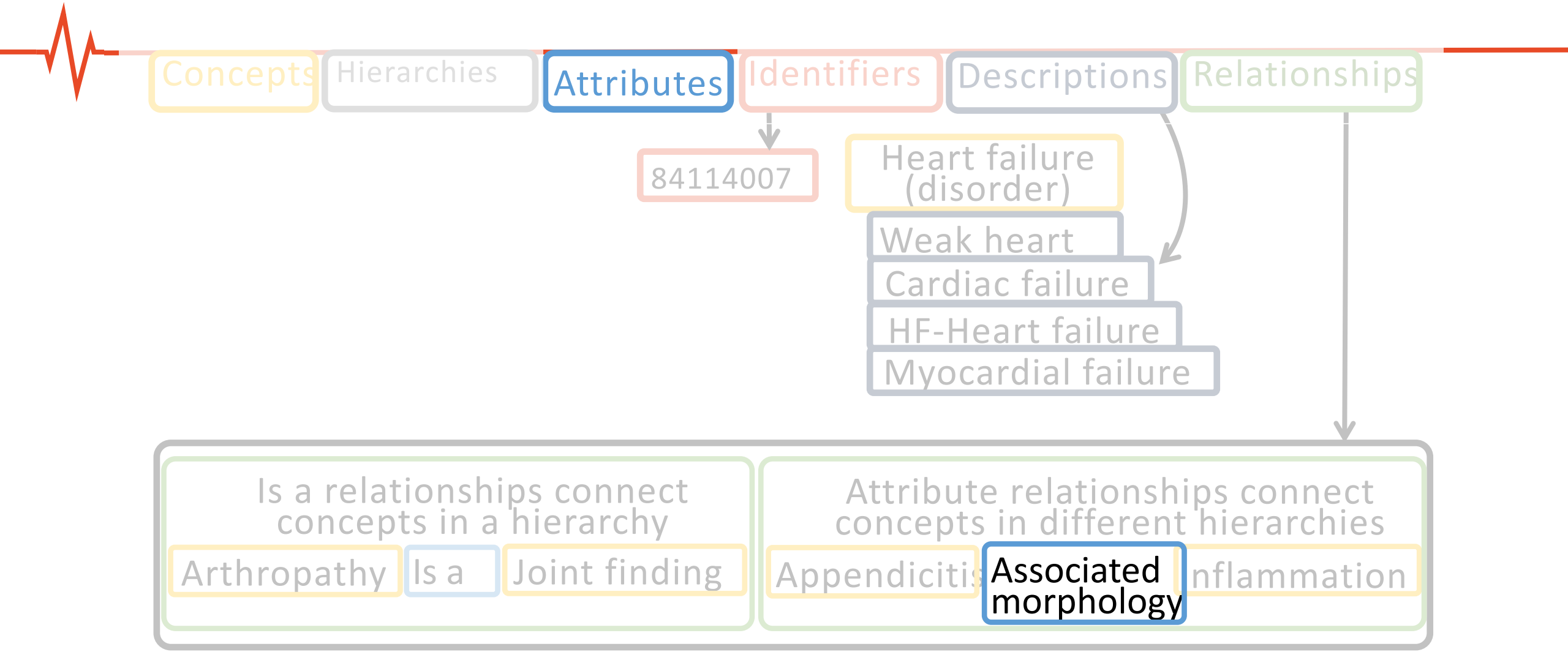
SNOMED DESIGN



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SNOMED CODE Quiz

Find the SNOMED code for chronic gouty arthritis (disorder).

68451005

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SNOMED Quiz

What is the resulting structure of all ISA relationships?

- ☐ A. Undirected graph
- ☐ B. Tree
- ☑ C. Directed graph without cycles
- ☐ D. Undirected graph with cycles

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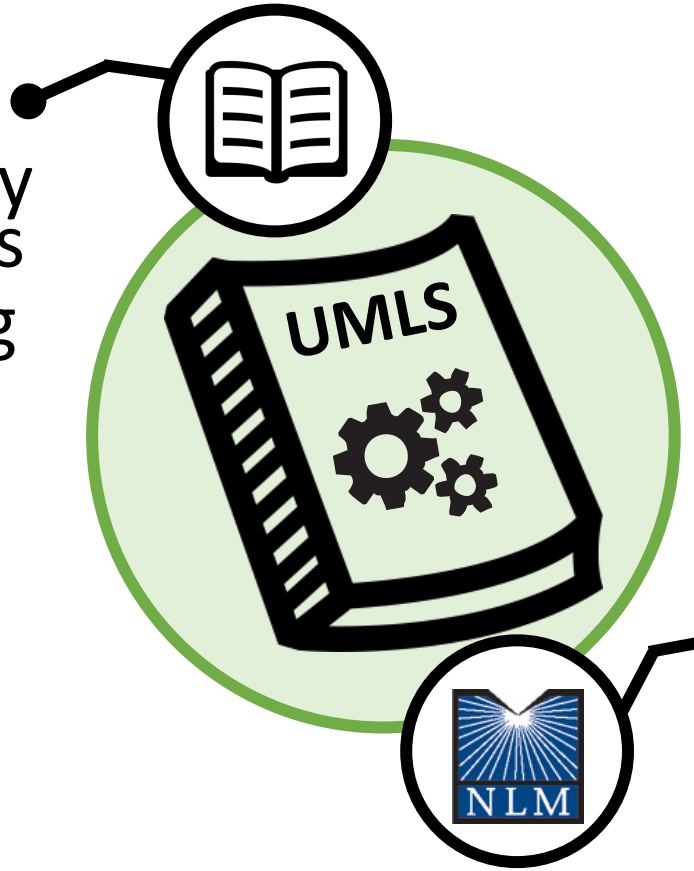
UMLS

A comprehensive thesaurus and ontology of biomedical concepts (integration of existing standards)



Maintained by US National Library of Medicine

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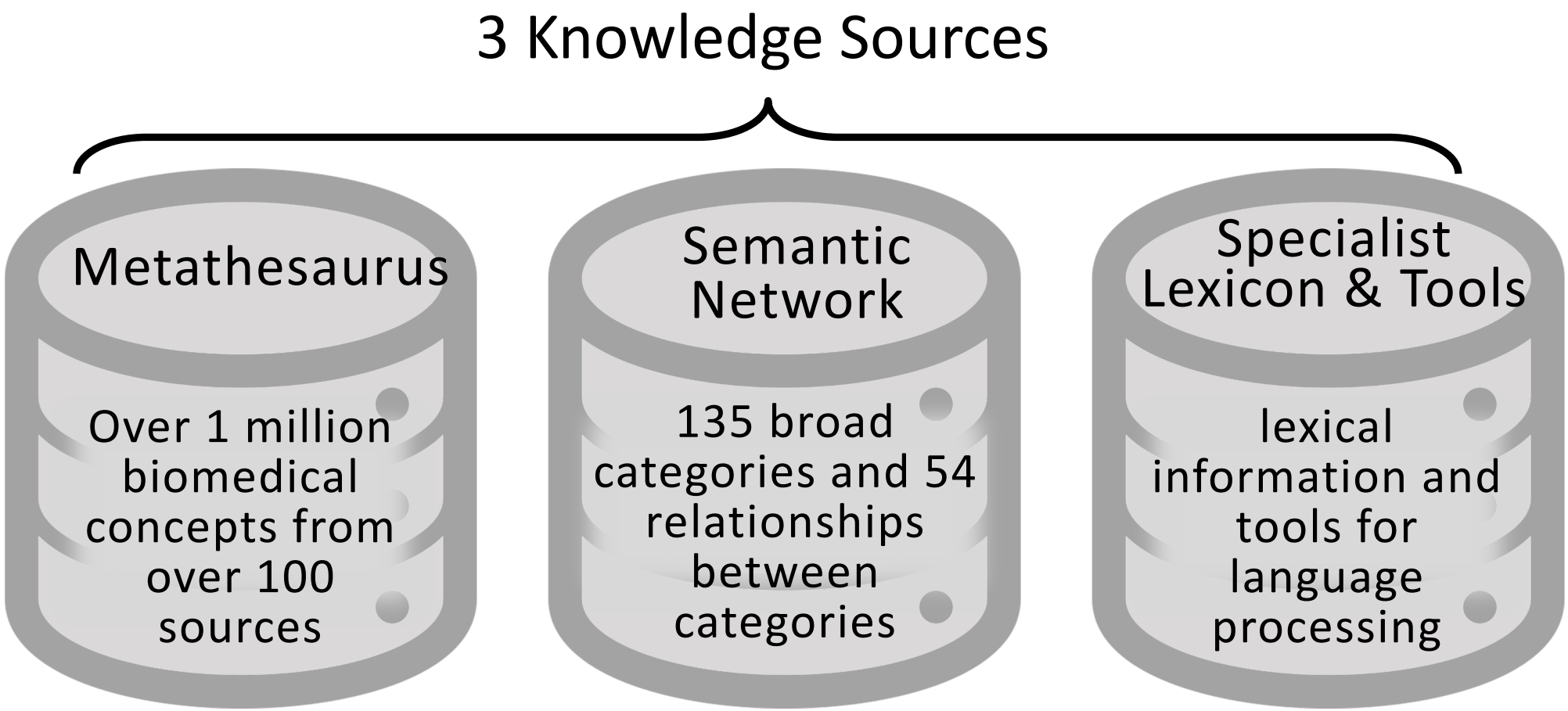
UMLS COMPONENTS



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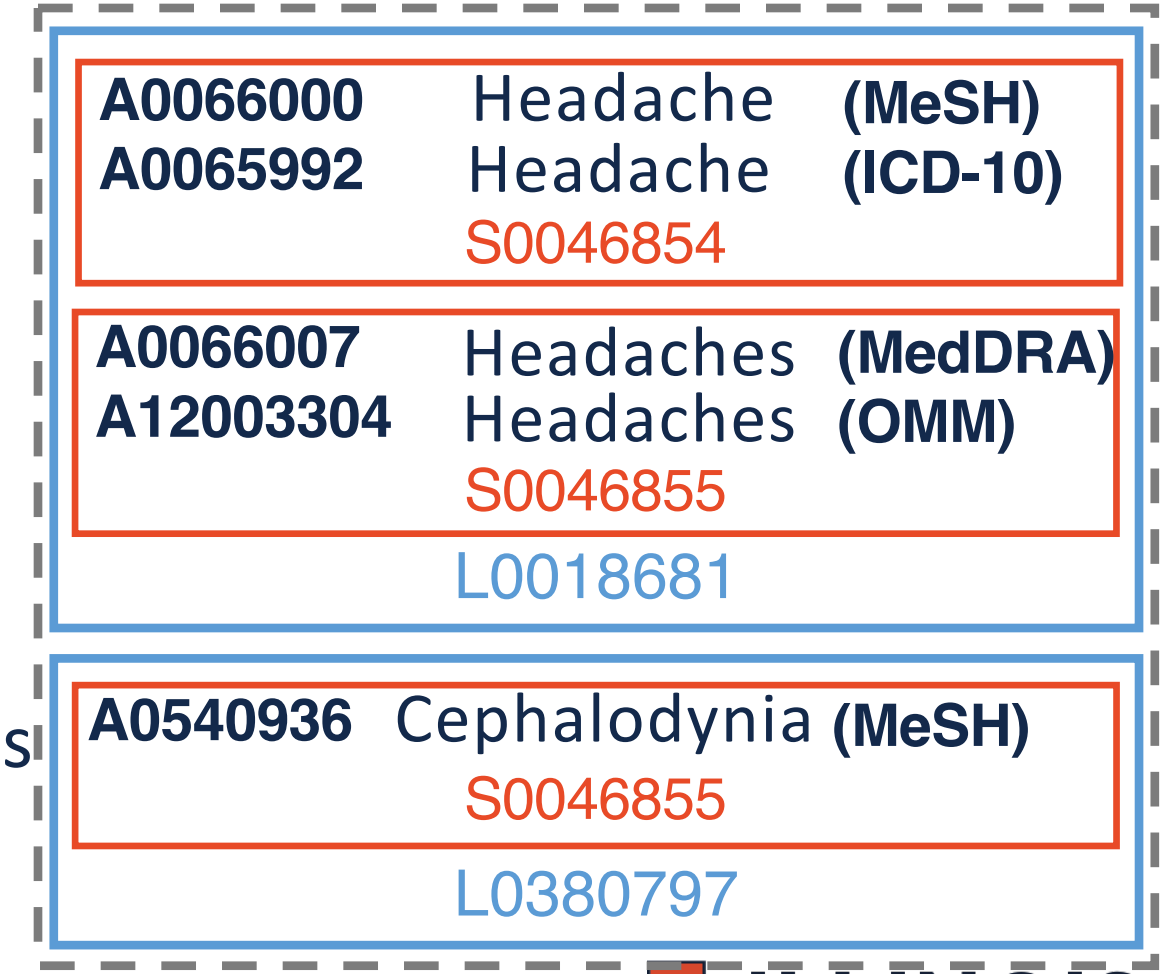
METATHESAURUS CONCEPTS

- Atom (~ 7.4M) AUI
  - Concept name in a given source
- String (~ 6.1M) SUI
  - Distinct concept name
- Term (~ 5.5M) LUI
  - Set of normalized names
- Concept (~ 1.5M) CUI
  - Set of synonymous concept names



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SEMANTIC NETWORK

135 Semantic Types

e.g. Disease or syndrome, clinical drug

54 Semantic Relationships

e.g. causes, treats

Types + Relationships = Semantic Network

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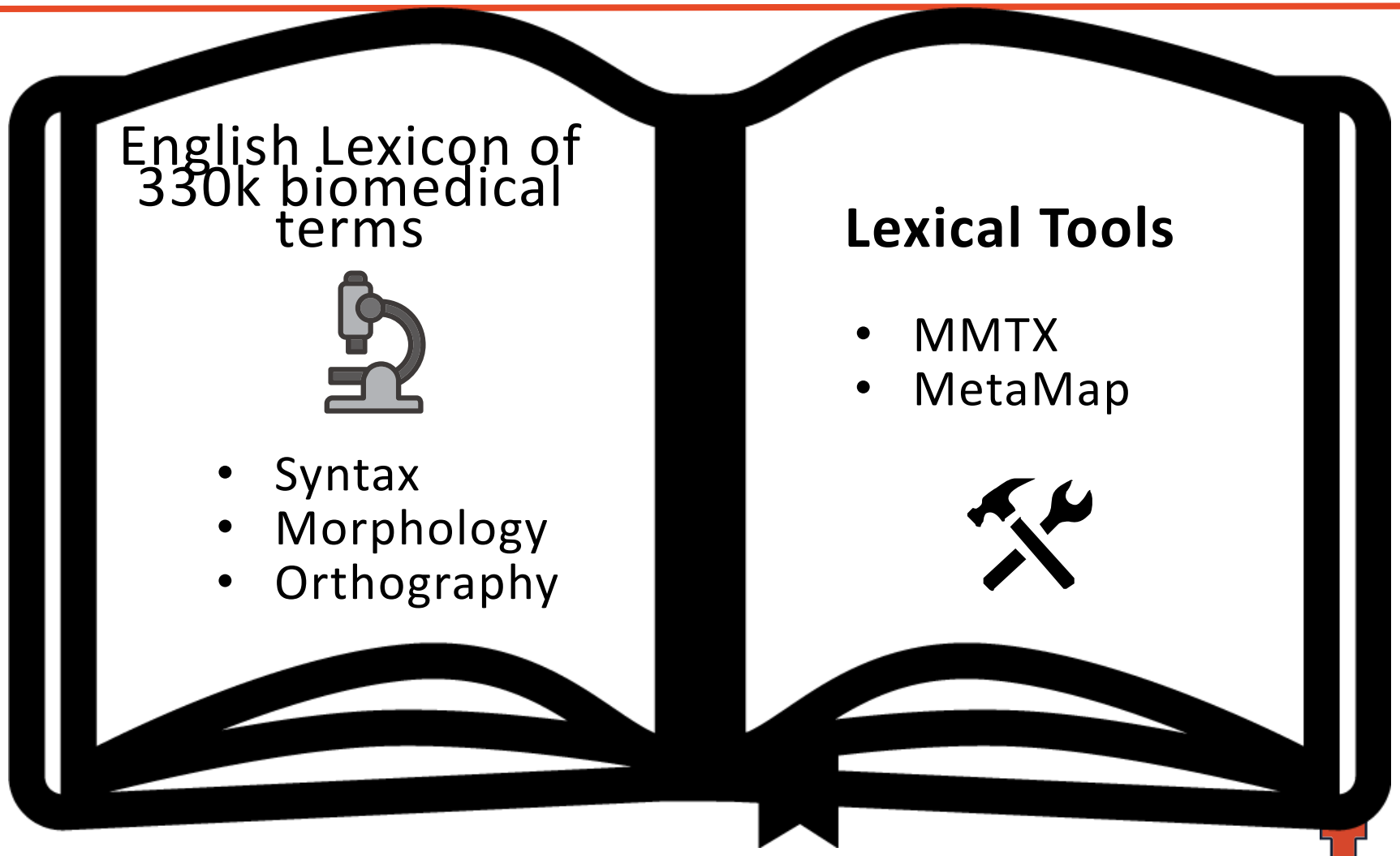
SPECIALIST LEXICON



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