MEDINFO23
8 – 12 JULY 2023 | SYDNEY, AUSTRALIA

International Patient Summary Terminology

Warren Del-Pinto[a], Renate A. Schmidt[a], Yongsheng Gao[b], Ghadah Alghamdi[a,c], Alejandro Lopez Osornio[b] and Suzy Roy[b]

[a]University of Manchester,
[b]SNOMED International
[c]Dar Al-Hekma University, Kingdom of Saudi Arabia

This Talk

- What is the International Patient Summary…
- …in relation to SNOMED CT and…
- …how do we compute the *terminology* part of it?

International Patient Summary (IPS)

International

- Cross-border care
- Usable by anyone

Patient Summary

- Minimal
- Non-exhaustive
- Clinically relevant

Key ideas:

- Simple, implementable summary of a patient's key health information
- Speciality-agnostic, condition-independent, not tied to specific country

However:

- SNOMED CT is large (over 360,000 concepts)
- Not all of the terminology is needed for the IPS

SNOMED CT Content and the IPS

SNOMED CT IPS Reference Set

- Flat list of SNOMED CT concept IDs
- Only concepts relevant to the IPS

However, no *semantics*...

IPS Terminology

- Provides capabilities normally leveraged using SNOMED CT
- ...e.g.: *querying*, *hierarchy*...
- ...but focused on the IPS use case

Is a *subontology* of SNOMED CT

Content Extraction and Sharing

Project: SNOMED CT Content Extraction and Sharing

- Funding: UK EPSRC Impact Acceleration, University of Manchester, SNOMED International

Working Group

Warren Del-Pinto, RA, Secondee
Renate Schmidt, UoM PI
Yongsheng Gao, SI Lead
Kai Kewley, SI Technical Architect

Steering Group

WG Plus...

Rory Davidson
Jim Case
Monica Harry

Output: Subontology Extraction algorithm

- Supports the ontology language used by SNOMED CT
- Tool available at: https://github.com/IHTSDO/snomed-subontology-extraction
- Example sub-ontologies: https://iaa.snomed.tools

MANCHESTER 1824 The University of Manchester
UKRI Engineering and Physical Sciences Research Council
SNOMED International

What are Subontologies?

- Given a source ontology and a set of focus concepts, a subontology:
  - Is a standalone ontology
    - Available in OWL and RF2 formats
    - Supports querying e.g. in ECL over focus concepts
    - Can be loaded into SNOMED CT browser and other tooling
  - Preserves semantics
    - *Focus concepts* have the same *meaning*
    - *Transitive closure (hierarchy)* **is the same** up to the concepts in the subontology
  - Is focused
    - Scope of the content depends upon the *focus concepts* provided by the user
  - Is concise
    - Subontologies are generally much smaller than full SNOMED CT
    - Definitions for *supporting concepts* provided only when necessary
    - Definitions given in SNOMED CT authoring form

Computing the IPS Terminology

Subontology Extraction

Input

Source Ontology
SNOMED CT International Edition

Focus Concepts
IPS Reference Set

Key steps:

- Compute focus concept definitions (authoring form)
- Definition expansion – identify required supporting concepts and definitions
- Add top-level concepts and metadata
- Complete transitive closure and shrink hierarchies where possible

Output

Subontology (OWL format)

Subontology (RF2 format)

IPS: Size

SNOMED CT International Edition (July 2022)

- SNOMED CT Concept (SNOMED RT+CTV3) 356816
  - Body structure (body structure) 40508
  - Clinical finding (finding) 116502
  - Environment or geographical location (environment / location) 1854
  - Event (event) 3207
  - Observable entity (observable entity) 10133
  - Organism (organism) 32615
  - Pharmaceutical / biologic product (product) 24894
  - Physical force (physical force) 171
  - Physical object (physical object) 13736
  - Procedure (procedure) 58838
  - Qualifier value (qualifier value) 11666
  - Record artifact (record artifact) 504
  - Situation with explicit context (situation) 4842
  - SNOMED CT Model Component (metadata) 1859
  - Social context (social concept) 4424
  - Special concept (special concept) 635
  - Specimen (specimen) 1765
  - Staging and scales (staging scale) 1561
  - Substance (substance) 27099

IPS Subontology (July 2022)

- SNOMED CT Concept (SNOMED RT+CTV3) 15934
  - Body structure (body structure) 1825
  - Clinical finding (finding) 6713
  - Event (event) 114
  - Observable entity (observable entity) 282
  - Organism (organism) 1609
  - Pharmaceutical / biologic product (product) 1622
  - Physical force (physical force) 12
  - Physical object (physical object) 190
  - Procedure (procedure) 1108
  - Qualifier value (qualifier value) 394
  - Situation with explicit context (situation) 214
  - SNOMED CT Model Component (metadata) 108
  - Social context (social concept) 9
  - Special concept (special concept) 2
  - Specimen (specimen) 129
  - Substance (substance) 1590

	Number of concepts
IPS Subontology:	~15,934
STAR Module:	~53,708

IPS: Scope of Content

IPS Refset: ~8,658 concepts, **IPS terminology:** ~15,934 concepts, **SNOMED CT:** ~356,816 concepts

Example: supporting concepts *added*

Focus Concept (IPS Refset)	Ancestor Added (Supporting concept)
22523008 |Vasectomy (procedure)	609638001 |Operation on pelvic region of trunk (procedure)
256350002 |Almond (substance)	442571000124108 |Tree nut (substance)

Example: SNOMED CT concepts *excluded*

Focus Concept (IPS Refset)	Ancestor Excluded (SNOMED CT)
22523008 |Vasectomy (procedure)	**120013000 |Vas deferens excision (procedure)**
387517004 | Paracetamol (substance)	373216001 | Non-opioid analgesic (substance)

Resources

Subontology Extraction

Tool available at: https://github.com/IHTSDO/snomed-subontology-extraction
Example sub-ontologies: https://iaa.snomed.tools
Paper: ESWC 2022, "Extracting Subontologies from SNOMED CT"

IPS

IPS Project: https://international-patient-summary.net/
IPS Terminology (July 2022): https://ips-browser.snomedtools.org

Contact us:

Warren Del-Pinto: (warren.del-pinto@manchester.ac.uk)

Co-authors:

- **Renate A. Schmidt** (renate.schmidt@manchester.ac.uk)
- **Yongsheng Gao** (yga@snomed.org)
- **Ghadah Alghamdi**
- **Alejandro Lopez Osornio**
- **Suzy Roy**