

2021-04-21 - SLPG Meeting

Date & Time

20:00 to 21:00 UTC Wednesday 21st April 2021

Location

To join, please [register for the April 2021 SNOMED Business Meetings](#), and login to the event's virtual platform to join the "SNOMED Computable Languages Project Group" meeting

Attendees

- Chair: [Linda Bird](#)
- Project Group: [Kai Kewley](#), [Anne Randorff Højen](#), [Michael Lawley](#), [Ed Cheetham](#), [Feikje Hielkema-Raadsveld](#), [Peter Jordan](#), [Rob Hausam](#), [Daniel Karlsson](#)
- Observers: [Sander Mertens](#), [Ian Spiers](#), [Dion McMurtrie](#), [Márk Czotter](#), [Andrew Perry](#), [Roger Jane](#), [Mikael Nyström](#), [Patrick McLaughlin](#), [Sander Mertens](#), [Alejandro Lopez Osornio](#), [Jeff Pierson](#), [David Op de Beeck](#), [Gábor Nagy](#), [Cora Drenkhahn](#), [Vasos Scoutellas](#), [Ines Otegui](#), [Guillermo Reynoso](#), [Shahidah Adilah](#), [Lea Miharsa](#), [Renate Schmidt](#), [Elizabeth Tanya Antoun](#)
- Staff: [Ian Spiers](#), [Jon Zammit](#), [Michael Chu](#), [Steve Archbold](#), [Annie Boschetti](#)

Goals

- A brief summary of postcoordination discussions so far
- Explore further examples of transform a close-to-user form expression to classifiable form
- Consider how a dynamic template-guided approach could work
- Identify errors and warnings in the transformation processes

Presentation

[How to Process Postcoordinated Expressions - Topics for Discussion](#)

Recording

[Computable Languages Project Group - 21st April 2021](#)

Agenda and Meeting Notes

Description	Owner	Notes
Welcome and agenda	Linda Bird	

Postcoordinated Expression Transformations		• National Cancer Registry use case in the Netherlands • Brief recap of transformation process • Examples of expression transformation • Inter-attribute dependencies ◦ Acute/Chronic and Inflammation - Adding a clinical course requires specializing the inflammation morphology  ▪ E.g. Pyelonephritis : Clinical course = Chronic should be Pyelonephritis : Clinical course = Chronic , Associated morphology = Chronic inflammation ▪ E.g. Pyelonephritis : Clinical course = Sudden onset AND/OR short duration should be Pyelonephritis : { Clinical course = Sudden onset AND/OR short duration }, Associated morphology = Acute inflammation ◦ Infectious Causative Agents - Adding a causative agent = Domain Bacteria or Virus requires adding a Pathological process = Infectious process ▪ E.g. Nephritis : Causative agent = Domain bacteria should be Nephritis : Causative agent = Domain bacteria , Pathological process = Infectious process ◦ Congenital and Acquired - Adding an Occurrence of Congenital to a focus concept with an abnormal morphology, requires adding a Pathological process of Pathological development process ▪ E.g. Koilonychia : Occurrence = Congenital should be Koilonychia : Occurrence = Congenital , Pathological process = Pathological developmental process ◦ Situations with Explicit Context 1. if the procedure context = Planned , then the temporal context should be << Current of specified time 2. If the procedure context = In progress , then the temporal context should be << Current 3. If the procedure context = Performed or Done , then the temporal context should be << Current or past (actual) ▪ Note: for this use case (of Procedure with explicit context) perhaps we just recommend (or require) that the full role group is spelled out. ◦ Next steps ▪ Representation of the content rules • Who creates the complete list of rules and how? • What formalism? • Determine which are mandatory and which are optional ▪ Implementation of content rules - e.g. • Guided data entry by pre-populating role groups in expression template based on definition of focus concepts (for design-time use, such as mapping) • Mandatory content rules could be added to transform process
Postcoordinated Expression Processes	All	Postcoordinated expression processes • Generic • Use case specific ◦ Mapping (from an interface term) ◦ Terminology binding (using an expression template) ◦ Natural Language processing

Postcoordination Use Case Examples	All	Example 1 - Dentistry / Odontogram - Requires an expression template to create expressions. - Resulting expression still requires a transformation to make it classifiable Example 2 - Terminology binding - Uses a fixed expression template to combine codes entered into separate fields - The procedure+laterality example still requires a transformation to make it classifiable Example 3 - Mapping - Design-time activity - Map targets may not be able to be fully represented using concept model attributes - In many cases, an extension (with primitive concepts) should be recommended where there are gaps in the mapping - There may be some cases in which postcoordination is helpful (e.g. LOINC to SNOMED CT map) Example 4 - Natural Language Processing - Usually run-time activity. - May require manual confirmation of coding suggestions (unless low clinical risk, eg for suggesting relevant patient records for manual review)
Postcoordination Guidance	Linda Bird , Anne Randorff Højten , Kai Kewley	Practical Guide to Postcoordination Proposal - Use syntax (i.e. braces) to distinguish refinement vs new role group - There should be a syntactic distinction between refinement and constructive addition (ie adding a new role group). That is: 83152002 Oophorectomy : 405815000 Procedure device = 122456005 Laser device - is classified as (i.e. the refinement is added to the role groups in the definition of the focus concept(s)): 83152002 Oophorectomy : { 260686004 Method = 129304002 Excision - action , 405813007 Procedure site - Direct = 15497006 Ovarian structure , 405815000 Procedure device = 122456005 Laser device } 83152002 Oophorectomy : { 405815000 Procedure device = 122456005 Laser device } - is classified as: 83152002 Oophorectomy : { 260686004 Method = 129304002 Excision - action , 405813007 Procedure site - Direct = 15497006 Ovarian structure , { 405815000 Procedure device = 122456005 Laser device } - However, for attributes which are always self-grouped - i.e. Priority, Due to, After, Before, During, Clinical course, Temporally related to, and all Observable entity attributes (see Relationship Group), these must always be put into their own role group: 125605004 Fracture of bone : 42752001 Due to (attribute) = 1912002 Fall - is classified as: 125605004 Fracture of bone : { 42752001 Due to (attribute) = 1912002 Fall } - or 125605004 Fracture of bone : { 363698007 Finding site = 272673000 Bone structure , 116676008 Associated morphology = 72704001 Fracture } { 42752001 Due to (attribute) = 1912002 Fall } Proposal: Expression forms needed for this (see 3.4 Transforming Expressions) - Close to user form - e.g. 83152002 Oophorectomy : 405815000 Procedure device = 122456005 Laser device - Canonical close to user form - e.g. 83152002:405815000=122456005 - Classifiable form (SCG) - e.g. 83152002:{260686004=129304002,405813007=15497006,405815000=122456005} - PLUS Classifiable form (OWL) - e.g. - EquivalentClasses(:123063 - ObjectIntersectionOf (:71388002 - ObjectSomeValuesFrom(:609096000 ObjectIntersectionOf(ObjectSomeValuesFrom(:260686004 :129304002) - ObjectSomeValuesFrom(:405813007 :15497006)))) - Necessary normal form - e.g. 83152002+416376001:{260686004=129304002,405813007=15497006,405815000=122456005} - PLUS Necessary normal form (tables) - Relationships: (123063 116680003 83152002) - 0 (123063 260686004 129304002) - 0 (123063 405813007 15497006) - 1 (123063 405815000 122456005) - 1 - Primitive expressions - "<<<" (only useful in a mapping context) relies on the assigned identifier (which are necessarily semantically unique).

- **Proposed Transformation Rules - Refinements (in valid domain of focus concepts)**

Close-to-user-form - IF the grouping of the refinement is **not** concept model valid THEN

If there is a single (non-self-grouped) role group in the definition of the focus concept, then any ungrouped (but groupable) refinements are merged with this role group

If there is more than one (non-self-grouped) role group in the definition then flag as ambiguous and require refinement

NEED TO FIND a realistic clinical example where this may occur // Prevent failing cases from coming up // use template

ALTERNATIVE: Refinement is applied to all (non-self-grouped) role groups in the definition

Self-grouped attributes in the refinement are grouped on their own - i.e. Priority, Due to, After, Before, During, Clinical course, Temporally related to, and all Observable entity attributes (see Relationship Group)

Self-grouped attributes in the definition of the focus concept(s) are left unchanged

- **1. Single refinement**

83152002 |Oophorectomy| : 405815000 |Procedure device| = 122456005 |Laser device|

- 83152002 |Oophorectomy| :

{ 260686004 |Method| = 129304002 |Excision - action| ,
405813007 |Procedure site - direct| = 15497006 |Ovarian structure| ,
405815000 |Procedure device| = 122456005 |Laser device| }

- **2. Two groupable refinements**

83152002 |Oophorectomy| : 405815000 |Procedure device| = 122456005 |Laser device| , 36370000

3 |Direct morphology| = 367643001 |Cyst |

- 83152002 |Oophorectomy| :

{ 260686004 |Method| = 129304002 |Excision - action| ,
405813007 |Procedure site - direct| = 15497006 |Ovarian structure| ,
405815000 |Procedure device| = 122456005 |Laser device| ,
363700003 |Direct morphology| = 367643001 |Cyst | }

- **3. One groupable refinement with one self-grouped refinement**

83152002 |Oophorectomy| : 405815000 |Procedure device| = 122456005 |Laser device| , 26087000

9 |Priority| = 394849002 |High priority|

- 83152002 |Oophorectomy| :

{ 260686004 |Method| = 129304002 |Excision - action| ,
405813007 |Procedure site - direct| = 15497006 |Ovarian structure| ,
405815000 |Procedure device| = 122456005 |Laser device| }
{ 260870009 |Priority (attribute)| = 394849002 |High priority| }

- **4. Refinement attribute matches (or subsumed by) attribute in focus concept's definition**

83152002 |Oophorectomy| : 260686004 |Method| = 277261002 |Excision biopsy (qualifier value)|

- 83152002 |Oophorectomy| :

{ 260686004 |Method| = 129304002 |Excision - action| ,
260686004 |Method| = 277261002 |Excision biopsy (qualifier value)| ,
405813007 |Procedure site - direct| = 15497006 |Ovarian structure| }

- **5. Refinement explicitly in role group**

83152002 |Oophorectomy| : { 260686004 |Method| = 281615006 |Exploration - action| , 405813007

|Procedure site - direct| = 367643001 |Cyst | }

- 83152002 |Oophorectomy| :

{ 260686004 |Method| = 129304002 |Excision - action| ,
405813007 |Procedure site - direct| = 15497006 |Ovarian structure| } ,
{ 260686004 |Method| = 281615006 |Exploration - action| ,
405813007 |Procedure site - direct| = 367643001 |Cyst | }

- **Proposed Transformation Rules - Refinements (NOT in valid domain of focus concepts)**

Close-to-user-form - IF the refinement's attribute is **not** valid for the domain of the focus concept THEN

If there is a single role group in the definition of the focus concept, which has an attribute value in the domain of the refinement's attribute THEN nest the relevant attribute value with the refinement added to the attribute value

(Note: It doesn't matter if the role group is self-grouped or not (see example 1 below))

If there is more than one role group in the definition of the focus concept, which has an attribute value in the domain of the refinement's attribute THEN (non-self-grouped) role group in the definition then flag as ambiguous and require refinement

- **1. Left aural temperature**

- 415974002 |Aural temperature| : 272741003 |Laterality| = 7771000 |Left|

- 415974002 |Aural temperature| : {704327008 |Direct site| = (42859004 |Ear drum| : 272741003 |Laterality| = 7771000 |Left|)}

- **2. Malignant tumor of right ovary**

- 363443007 |Malignant tumor of ovary| : 272741003 |Laterality| = 24028007 |Right|

- 363443007 |Malignant tumor of ovary| :

{ 116676008 |Associated morphology| = 367651003 |Malignant neoplasm of primary, secondary or uncertain origin| ,
363698007 |Finding site| = (15497008 |Ovarian structure| : 272741003 |Laterality| = 24028007 |Right|) }

- **Other Example - Emergency excision of appendix**

- 1. 80146002 |Excision of appendix| :

260870009 |Priority| = 25876001 |Emergency|

- **Other Example - Fracture of bone**

		1. 125605004 Fracture of bone : 363698007 finding site = 84167007 Foot bone 2. 125605004 Fracture of bone : {363698007 finding site = 84167007 Foot bone } 3. 125605004 Fracture of bone : {116676008 Associated morphology = 72704001 Fracture , 363698007 finding site = 84167007 Foot bone } 4. 64572001 Disease : {116676008 Associated morphology = 72704001 Fracture , 363698007 finding site = 84167007 Foot bone }
The items below are currently on hold		
Other Options for Future Progress		1. URIs for draft editions 2. ECL extensions a. Primitive/Defined filters concept filter b. Concept+Description filters (e.g. effectiveTime, module, active) c. Accessing Refset attributes (e.g. historical association refsets) historical ECL d. OR use full syntax to be able to query any table (e.g. Relationship table) - ie expand ECL into something more verbose (e.g. SNOMED query language) 3. Template extensions
URIs for Extended Editions		ON HOLD - How to refer to an 'extended edition' using a URI - e.g. "International Edition plus the following 2 nursing modules: 733983009 IHSTDO Nursing Health Issues module and 733984003 IHSTDO Nursing Activities module Use Case - Need to execute an ECL, that refers to "^ 733991000 Nursing Health Issues Reference Set (foundation metadata concept) " and/or "^ 733990004 Nursing Activities Reference Set (foundation metadata concept) ", where the substrate includes the international edition, plus the modules that include these reference sets July 2020 International Edition URI: http://snomed.info/sct/900000000000207008/version/20200731 July 2020 International Edition + nursing modules URI ?? - For example: • http://snomed.info/sct/900000000000207008/version/20200731/module/733983009/time/20200131/module/733984003/time/20200131 • http://snomed.info/sct/900000000000207008/version/20200731/modules/733983009:733984003 • http://snomed.info/sct/900000000000207008:733983009:733984003/version/20200731:20190731:20200131 • Canonical order? Or order doesn't matter? • Constraints on what can go in the additional packages (only refsets and their metadata)
Querying Refset Attributes	Linda Bird	ON HOLD - Proposed syntax to support querying and return of alternative refset attributes (To be included in the SNOMED Query Language) • Example use cases ◦ Execution of maps from international substance concepts to AMT substance concepts ◦ Find the anatomical parts of a given anatomy structure concept (in Anatomy structure and part association reference set) ◦ Find potential replacement concepts for an inactive concept in record ◦ Find the order of a given concept in an Ordered component reference set ◦ Find a concept with a given order in an Ordered component reference set

- Potential syntax to consider (brainstorming ideas)
 - **SELECT ??**
 - SELECT 123 |referenced component|, 456 |target component|
FROM 799 |Anatomy structure and part association refset|
WHERE 123 |referenced component| = (< 888 |Upper abdomen structure| {{ term = "heart" }})
 - SELECT id, moduleId
FROM concept
WHERE id IN (< |Clinical finding|)
AND definitionStatus = |primitive|
 - SELECT id, moduleId
FROM concept, ECL("< |Clinical finding|") CF
WHERE concept.id = CF.sctid
AND definitionStatus = |primitive|
 - SELECT ??? |id|, ??? |moduleId|
FROM concept (< |Clinical finding| {{ term = "heart" }} {{ definitionStatus = |primitive| }})
 - **Question** - Can we assume some table joins - e.g. [Concept.id](#) = Description.conceptId etc ??
 - **Examples**
 - Try to recast relationships table as a Refset table + graph-based extension
 - Find primitive concepts in a hierarchy
 - **ROW ... ?**
 - ROWOF (|Anatomy structure and part association refset|) ? (|referenced component| , |target component|)
 - same as: ^ |Anatomy structure and part association refset|
 - ROWOF (|Anatomy structure and part association refset|) . |referenced component|
 - same as: ^ |Anatomy structure and part association refset|
 - ROWOF (|Anatomy structure and part association refset|) {{ |referenced component| = << |Upper abdomen structure| }} ? |targetComponentId|
 - ROWOF (< 900000000000496009|Simple map type reference set| {{ term = "My hospital*" }}) {{ 449608002|Referenced component| = 80581009 |Upper abdomen structure| }} ? 900000000000505001 |Map target|
 - (ROW (< 900000000000496009|Simple map type reference set| {{ term = "My hospital*" }}) : 449608002|Referenced component| = 80581009 |Upper abdomen structure|). 900000000000505001 |Map target|
 - **# ... ?**
 - # |Anatomy structure and part association refset| ? |referenced component|
 - # (|Anatomy structure and part association refset| {{ |referenced component| = << |Upper abdomen structure| }} ? |targetComponentId|
 - **? notation + Filter refinement**
 - |Anatomy structure and part association refset| ? |targetComponentId|
 - |Anatomy structure and part association refset| ? |referencedComponent| (Same as ^ |Anatomy structure and part association refset|)
(|Anatomy structure and part association refset| {{ |referencedComponent| = << |Upper abdomen structure| }} ? |targetComponentId|
 - (|Anatomy structure and part association refset| {{ |targetComponentId| = << |Upper abdomen structure| }}) ? |referencedComponent|
 - (|My ordered component refset|: |Referenced component| = |Upper abdomen structure|) ? **|priority order|**
 - ? |My ordered component refset| {{ |Referenced component| = |Upper abdomen structure| }} . |priority order|
 - ? |My ordered component refset| . |referenced component|
 - equivalent to ^ |My ordered component refset|
 - ? (<|My ordered component refset|) {{ |Referenced component| = |Upper abdomen structure| }} . |priority order|
 - ? (<|My ordered component refset| {{ term = "map" }}) {{ |Referenced component| = |Upper abdomen structure| }} . |priority order|
 - REFSETROWS (<|My ordered component refset| {{ term = "map" }}) {{ |Referenced component| = |Upper abdomen structure| }} SELECT |priority order|
 - **Specify value to be returned**
 - ? 449608002 |Referenced component|?
734139008 |Anatomy structure and part association refset|
 - ^ 734139008 |Anatomy structure and part association refset| (Same as previous)
 - ? 900000000000533001 |Association target component|?
734139008 |Anatomy structure and part association refset|
 - ? 900000000000533001 |Association target component|?
734139008 |Anatomy structure and part association refset| :
449608002 |ReferencedComponent| = << |Upper abdomen structure|
 - ? 900000000000533001 |Association target component|?
734139008 |Anatomy structure and part association refset|
{{ 449608002 |referencedComponent| = << |Upper abdomen structure| }}
 - (? 900000000000533001 |Association target component|?
734139008 |Anatomy structure and part association refset| :
449608002 |ReferencedComponent| = (<< |Upper abdomen structure|) : |Finding site| = *)

Returning Attributes	Michael Lawley	ON HOLD - Proposal (by Michael) for discussion - Currently ECL expressions can match (return) concepts that are either the source or the target of a relationship triple (target is accessed via the 'reverse' notation or 'dot notation', but not the relationship type (ie attribute name) itself. For example, I can write: <pre><< 404684003 Clinical finding : 363698007 Finding site = <<66019005 Limb structure </pre> <pre><< 404684003 Clinical finding . 363698007 Finding site </pre> But I can't get all the attribute names that are used by << 404684003 Clinical finding - Perhaps something like: ? R.type ? (<< 404684003 Clinical finding) - This could be extended to, for example, return different values - e.g. ? Simple map refset . maptarget ? (^ Simple map refset AND < Fracture)
Reverse Member Of	Michael Lawley	ON HOLD - Proposal for discussion What refsets is a given concept (e.g. 421235005 Structure of femur) a member of? - Possible new notation for this: ^ , 421235005 Structure of femur ? X ? 421235005 Structure of femur = ^ X

Expression Templates	Peter G. Williams	• ON HOLD WAITING FROM IMPLEMENTATION FEEDBACK FROM INTERNAL TECH TEAM • WIP version - https://confluence.ihtsdotools.org/display/WIPSTS/Template+Syntax+Specification ▪ Added a 'default' constraint to each replacement slot - e.g. default (72673000 Bone structure (body structure)) ▪ Enabling 'slot references' to be used within the value constraint of a replacement slot - e.g. <code>[[+id (<< 123037004 Body structure MINUS << \$findingSite2) @findingSite1]]</code> ▪ Allowing repeating role groups to be referenced using an array - e.g. <code>\$rolegroup[1]</code> or <code>\$rolegroup [!=SELF]</code> ▪ Allow reference to 'SELF' in role group arrays ▪ Adding 'sameValue' and 'allOrNone' constraints to information slots - e.g. <code>sameValue (\$site)</code>, <code>allOrNone (\$occurrence)</code> ▪ See changes in red here: 5.1. Normative Specification Examples: <code>[[+id]]: [[1..*] @my_group sameValue(morphology)] { Finding site = [[+id (<<123037004 Body structure (body structure) MINUS << \$site SELF)) @site] , Associated morphology = [[+id @my_morphology]] }</code> • Implementation feedback on draft updates to Expression Template Language syntax ◦ Use cases from the Quality Improvement Project: ▪ Multiple instances of the same role group, with some attributes the same and others different. Eg same morphology, potentially different finding sites. Note that QI Project is coming from a radically different use case. Instead of <i>filling</i> template slots, we're looking at existing content and asking "exactly <i>how</i> does this concept fail to comply to this template?" For discussion: <code>[[0..1]] { [[0..1]] 246075003 Causative agent = [[+id (< 410607006 Organism) @Organism]] }</code> Is it correct to say either one of the cardinality blocks is redundant? What are the implications of 1..1 on either side? This is less obvious for the self grouped case. Road Forward for SI 1. Generate the parser from the ABNF and implement in the Template Service 2. User Interface to a) allow users to specify template at runtime b) tabular (auto-completion) lookup STL 3. Template Service to allow multiple templates to be specified for alignment check (aligns to none-off) 4. Output must clearly indicate exactly what feature of concept caused misalignment, and what condition was not met. Additional note: QI project is no longer working in subhierarchies. Every 'set' of concepts is selected via ECL. In fact most reports should now move to this way of working since a subhierarchy is the trivial case. For a given template, we additionally specify the "domain" to which it should be applied via ECL. This is much more specific than using the focus concept which is usually the PPP eg Disease. FYI Michael Chu
Description Templates	Kai Kewley	• ON HOLD • Previous discussion (in Malaysia) ▪ Overview of current use ▪ Review of General rules for generating descriptions • Removing tags, words • Conditional removal of words • Automatic case significance • Generating PTs from target PTs • Reordering terms ▪ Mechanism for sharing general rules - inheritance? include? ▪ Description Templates for translation ▪ Status of planned specification

Query Language - Summary from previous meetings	Linda Bird	FUTURE WORK Examples: version and dialect ◦ << 64572001 Disease {{ term = "*heart*" }} VERSION http://snomed.info/sct/900000000000207008/version/20180131 ◦ << 64572001 Disease {{ synonym = "*heart*" }} VERSION http://snomed.info/sct/900000000000207008/version/20180131 ◦ << 64572001 Disease {{ FSN = "*heart*" }} VERSION http://snomed.info/sct/900000000000207008/version/20180131 ◦ << 64572001 Disease {{ FSN = "*heart*" }} VERSION http://snomed.info/sct/900000000000207008/version/20180131, DIALECT W ◦ << 64572001 Disease {{ preferredTerm = "*heart*" }} VERSION http://snomed.info/sct/900000000000207008/version/20180131, DIALECT Y ◦ << 64572001 Disease {{ acceptableTerm = "*heart*" }} VERSION http://snomed.info/sct/900000000000207008/version/20180131, DIALECT Y ◦ (* {{ term = "*heart*" }} VERSION http://snomed.info/sct/900000000000207008/version/20180131, DIALECT Z) MINUS (* {{ term = "*heart*" }} VERSION http://snomed.info/sct/900000000000207008/version/20170731, DIALECT W) ◦ X MINUS Y WHERE X = * , Y = (* {{ term = "*heart*" }}) VERSION http://snomed.info/sct/900000000000207008/version/20180131, DIALECT W Notes ◦ Allow nested where, version, language ◦ Scope of variables is inner query
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