Weekly Content Release of Singapore Drug Dictionary (SDD), a SNOMED CT SG Extension

Li Yihui Ivy, Senior Informatics Specialist
Yoong Pei Yit, Lead Informatics Specialist
Standards & Data Quality, IHiS

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SNOMED CT EXPO
Agenda

1. Overview
2. Authoring & Publication Process
3. Authoring & Publication Challenges
4. Improvement Projects
Overview
An Overview of SDD – SNOMED CT SG Extension

- A national standard to unambiguously identify, code & interpret medicines:
  - Adopted in all Singapore Public Healthcare Institutions (PHIs) for prescribing and dispensing
  - Replaced previous ‘national' procurement codes (Group Procurement Office (GPO) codes)
- SDD data set is released weekly since Nov-2016
- Available through a web-based terminology browser, SDD Lite
Public Healthcare Institutions in Singapore

<table>
<thead>
<tr>
<th>Hospitals</th>
<th>No.</th>
<th>Admissions</th>
<th>Beds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute Hospital</td>
<td>10</td>
<td>455,272</td>
<td>9,071</td>
</tr>
<tr>
<td>Psychiatric Hospital</td>
<td>1</td>
<td>9,215</td>
<td>1,950</td>
</tr>
<tr>
<td>Community Hospital</td>
<td>4</td>
<td>8,277</td>
<td>799</td>
</tr>
</tbody>
</table>

Table 1. No. of hospitals, total admissions and total no. of beds in 2018

<table>
<thead>
<tr>
<th>Primary Care Facilities</th>
<th>No.</th>
<th>Attendances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polyclinic</td>
<td>20</td>
<td>6,323,800</td>
</tr>
</tbody>
</table>

Table 2. No. of polyclinics and total attendances in 2018

Source: Ministry of Health, Singapore (14 October 2019)
Why is Weekly Content Release needed?

To provide timely access to SDD content to meet users’ operational and clinical needs

- Previous ‘national’ GPO codes turnaround time was 3 days (flat, non-relational serialized codes)
- Procurement of new drug occurs anytime in the week
Authoring & Publication Process
Overlapping Cycles to Achieve Weekly Content Release

- **1st Cycle**
  - Week 0: SDD Content Request
  - Week 1: Authoring Process
  - Week 2: Publication Process
  - Week 3: Content Release

- **Subsequent Cycle**
  - Week 1: SDD Content Request
  - Week 2: Authoring Process
  - Week 3: Publication Process
  - Week 4: Content Release

- Authoring for subsequent cycle commences whilst publication is in progress
Authoring Process

1. SDD SD Entry
   - ~60 data fields per SD
   - ~20 SDs

2. Ontology Generation
   - ~245 to 7000 concepts

3. Classification

4. Validation

SDD Content Request

Publication Process

Request Management Software

SD – Source Drug

~ 20 SDs

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Approach to creating the SDD extension from SNOMED CT

Examples of Using SNOMED CT concept in SDD

11567691000133106
Aciclovir 50 mg/1 g Topical Cream (1 x 5 g per tube) (SG product)

39751000133107
Aciclovir 50 mg/1 g Topical Cream (1 x 5 g) (SG product)

127489000
has active ingredient (attribute)

411116001
has dose from (attribute)

8681000132100
Has quantity per container units (SG attribute)

8631000132104
Has container (SG attribute)

372729009
Aciclovir (substance)

421628006
Conventional release cutaneous cream (dose form)

258682000
gram (qualifier value)

83059008
tube, device (physical object)
Publication Process

1. Generate subsets
2. Version
3. NEHR Bundling
4. Export Subsets

Authoring Process

Week 1:
- Generate subsets

Week 2:
- Version
- NEHR Bundling
- Export Subsets

Content Release

~ Upload Subsets to SDD Lite web
PHIs use SDD 13D codes compressed from SDD 18D codes
e.g. 113501000133104 → 1-to-1 → 0001-13-50X-4
Challenge 1: Intricate Authoring Process

- Increased adoption, Increases volume of demand
  - Grouping Terms
    - Group characteristics that are not clinically significant
      e.g. Chlorhexidine Gluconate has medication group Chlorhexidine Salt has medication group Chlorhexidine Acetate
  - Exempted Drug Products
  - Extemporaneous Preparations

- Availability of information to create new content

- Complex manual processes:
  - Multiple sequential tasks dependent on preceding steps
  - Manual tracking of code requests using spreadsheet
Challenge 2: Complexity of Model

- 38 use case layers to support diverse use cases
  - Over 300,000 active concepts
  - Over 2 million descriptions
- Requires **rigorous validation** to ensure accuracy

Illustration of Use Case Layers
Challenge 3: Complex Filtering

- Significant time and effort required for customised and manual filtering for diverse requirements

DPL – Drug Product List

Figures as of Sep 2019
Challenge 4: Previous Dependency on External Work Processes

1. SDD to inform vendor via email
2. Vendor pick up NEHR bundle and upload to NEHR Test
3. Vendor to send test results to SDD via email
4. SDD to verify the results and inform vendor via email
Improvement Projects
- Automate Processes
- Batch Job Scheduling
- Request Management Software
Improvement 1: Automate processes to reduce manual intervention

**Before**

1. Classification Completed
2. Run Validation
   - Manually Activated
3. Analyze Validation Result
   - Use Excel Formula
4. Generate Subset
   - Manually Activated

**After**

1. Classification Completed
2. Run Validation
   - Automatically Activated
3. Generate Subset
4. Analyze Validation Result
   - Rules Build into Script
5. Rule-based validation

Batch Job Processing
Improvement 1: Benefits

- Utilize non-productive time
  - Public holidays and weekends
- Reduce human error
  - Missed process/ intervention
- Increase accuracy
  - Rule-based validation
Improvement 2: Reduce Dependency On External Processes

Before

1. SDD Technical Team
   - Upload NEHR bundle to SFTP

2. NEHR Vendor
   - Pick Up NEHR Bundle
   - Upload to NEHR Test

3. NEHR Vendor
   - Upload to NEHR Test
   - Upload to NEHR Production

4. Verify NEHR Test results

After

1. SDD Technical Team
   - Upload NEHR bundle to SFTP

2. NEHR Vendor
   - Upload to NEHR Test
   - Upload to NEHR Production

- 1. Scheduled batch job to pick up NEHR bundle and upload to NEHR Test
- 2. Automate scripts to verify test results
Improvement 2: Benefits

- Increase efficiency
  - Reduce dependency on external processes
  - Faster deployment to the NEHR production environment
  - Rule-based verification eliminated human checks
Improvement 3: Enhance Request Management Workflow

Improvement method:

- Adopt ‘Request Management Software’:
  - To track new requests for SDD content
  - To track requests for new amendments
  - As a centralised information repository
Improvement 3: Benefits

- Increase Efficiency
  - Systematic tracking of issues based on status
  - Allows prioritization of issues

- Facilitate communication
  - Allows collaborative commenting
  - Allows assignment of issues effectively
  - Allows sharing of supporting documents
Final Outcomes: Meeting 7-day publication cycle and 14-day turnaround time

- Significant reduction of average turnaround time
  - From 17 days to 14 days
Next Steps

- Explore SDD Re-modelling
- Evaluate removal of Universal Restriction

In order to

- Reduce authoring complexity
- Further improve turnaround time
- Reduce maintenance effort