Mapping Legacy Terms to SNOMED CT®
Challenges and Lessons Learned

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Objectives

• Overview of formal methodology for mapping client legacy content
  o Development of use case specific heuristics
  o Rigorous QA processes

• Development of Master Database containing multiple client mappings
  o Reasons for development
  o Analysis of variances
    – Across projects for lexically identical terms
    – Determine cause of variance
Mapping Use Case

- Mapping the client term

  Malignant neoplasm of ovary → Exact mapping to 363443007 | Malignant tumor of ovary (disorder) |

- Mapping the client term based on link to external code system (ICD-9)

  183.0 Malignant neoplasm of ovary → Exact mapping to 93934004 | Primary malignant neoplasm of ovary (disorder) |
Pilot Mapping

- Determine overall heuristics for project
- Small sample identified
- Heuristic document for initial discussion prior to pilot mapping
- Output is a draft heuristics document signed off by client
  - Heuristics document modified as new issues are identified
Mapping Complexity

- Exact Match mappings
  - One to One

Rett's Syndrome

Exact mapping

68618008 | Rett's disorder (disorder) |
Mapping Complexity

- Broader than mappings
  - Is_A

- Post-coordination

```
Retrocaval Rt Ureter  Is_A  95233002 | Retrocaval ureter (disorder) |

Retrocaval Rt Ureter  Exact Mapping  95233002 | Retrocaval ureter (disorder) | 272741003 | Laterality (attribute) | =24028007 | Right (qualifier value) |
```
Benefit of Broader Than Mapping

- Data aggregation
- Maintenance using new subtype query

<table>
<thead>
<tr>
<th>Release Date</th>
<th>Client Term</th>
<th>Mapping Type</th>
<th>SNOMED CT mapping</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan 2009</td>
<td>Mandibular hyperplasia</td>
<td>Broader than</td>
<td>Disorder of mandible (disorder)</td>
</tr>
<tr>
<td>July 2010</td>
<td>Mandibular hyperplasia</td>
<td>Exact</td>
<td>Hyperplasia of mandibular bone (disorder)</td>
</tr>
</tbody>
</table>
Technical Pre-processing

• Eliminate redundant client terms
• Modify client data to fit in CAP mapping tools
  o if not using standard client data import file
• Load data
• Run automated mapping tools
• Create assignments
Mapping and Review Strategies

• Sequential Mapping and Review
  o **Mapper**
    – *Reviews automated mappings*
    – *Creates primary mapping for review*
  o **Reviewer** evaluates mapper’s work and discusses the changes with the mapper

• Dual independent mapping with conflict resolution
  o Two mappers map the term independently and any conflicts are resolved between them
Technical Post-processing

- Confirm everything has been mapped or marked as unmappable
- Confirm “One-to-One” mappings have only one target
- Confirm all mappings are current for the specified terminology version and within the appropriate domain
- Perform additional metadata checks as specified in the heuristics document for the project
SNOMED CT Mapping Warehouse

- Common data format for research and future mapping guidance
  - Based on combination of previous client mappings
- Imported data from the last 4 years
- Spans multiple releases
  - Starting with January 2008 SNOMED CT Release
- Provides additional check to verify mapping consistency across clients,
  - Or identify reasons for variance
SNOMED CT Mapping Warehouse
Data Input

- Problem list mappings
- Not all client fields were used
- Client terms with outstanding unanswered questions for clients were excluded
- One client split into 3 separate client entries because of 3 separate mapping use cases
SNOMED CT Mapping Warehouse

Tables
Types of Mapping

- **62%**
  - Exact mappings

- **34%**
  - Broader than (Is_A) mappings

- **3%**
  - Required expert review

- **1%**
  - Not mappable
Preliminary Analysis

- 0.3% of mappings are to retired concepts
- 7% have the same description
- 0.4% have the same descriptions but different mappings
  - SNOMED concept did not exist at time of mapping
  - Different mapping heuristics
  - Incorrect mappings
  - Duplication in SNOMED
  - Ambiguity in SNOMED
  - Broader than choice
### Mandibular hyperplasia

<table>
<thead>
<tr>
<th>Client Term</th>
<th>Mapping Type</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Mandibular hyperplasia</td>
<td>Broader Than</td>
<td>Disorder of mandible (disorder)</td>
</tr>
<tr>
<td>Mandibular hyperplasia</td>
<td>Exact</td>
<td>Hyperplasia of mandibular bone (disorder)</td>
</tr>
</tbody>
</table>

### Facial Scar

<table>
<thead>
<tr>
<th>Client Term</th>
<th>Mapping Type</th>
<th>SNOMED CT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facial Scar</td>
<td>Broader Than</td>
<td>Scar (disorder)</td>
</tr>
<tr>
<td>Facial Scar</td>
<td>Broader Than</td>
<td>Scar conditions and fibrosis of skin (disorder)</td>
</tr>
<tr>
<td>Facial Scar</td>
<td>Exact</td>
<td>Scar of face (disorder)</td>
</tr>
</tbody>
</table>

Number of better mappings for Broader Than maps is probably much larger than the Description discrepancies.
### Same Description Different Mapping

**Different mapping heuristics**

**Map to context of the code vs. map to description**

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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Malignant neoplasm of ovary</td>
<td>Exact</td>
<td>Malignant tumor of ovary (disorder)</td>
</tr>
<tr>
<td>183.0 Malignant neoplasm of ovary</td>
<td>Exact</td>
<td>Primary malignant neoplasm of ovary (disorder)</td>
</tr>
</tbody>
</table>

**Mapping to different hierarchies**

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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Ileostomy</td>
<td>Exact</td>
<td>Ileostomy procedure (procedure)</td>
</tr>
<tr>
<td>Ileostomy</td>
<td>Exact</td>
<td>History of - ileostomy (situation)</td>
</tr>
<tr>
<td>Dog Bite</td>
<td>Exact</td>
<td>Dog bite (event)</td>
</tr>
<tr>
<td>Dog Bite</td>
<td>Exact</td>
<td>Dog bite - wound (disorder)</td>
</tr>
</tbody>
</table>
### Same Description Different Mapping

Incorrect mappings

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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Enuresis</td>
<td>Exact</td>
<td>Urinary incontinence (finding)</td>
</tr>
<tr>
<td>Enuresis</td>
<td>Exact</td>
<td>Nocturnal enuresis (finding)</td>
</tr>
</tbody>
</table>

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<tr>
<th>Client Term</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Tumor</td>
<td>Exact</td>
<td>Tumor finding (finding)</td>
</tr>
<tr>
<td>Tumor</td>
<td>Exact</td>
<td>Neoplastic disease (disorder)</td>
</tr>
</tbody>
</table>
## Same Description Different Mapping
Duplication in SNOMED

### Growth hormone deficiency

<table>
<thead>
<tr>
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<th>SNOMED CT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Growth hormone deficiency</td>
<td>Exact</td>
<td>Somatotropin deficiency (disorder)</td>
</tr>
<tr>
<td>Growth hormone deficiency</td>
<td>Exact</td>
<td>Growth hormone deficiency (disorder)</td>
</tr>
</tbody>
</table>

### Pyuria

<table>
<thead>
<tr>
<th>Client Term</th>
<th>Mapping Type</th>
<th>SNOMED CT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pyuria</td>
<td>Exact</td>
<td>Pyuria (finding)</td>
</tr>
<tr>
<td>Pyuria</td>
<td>Exact</td>
<td>Pus cells in urine (finding)</td>
</tr>
</tbody>
</table>
# Same Description Different Mapping

## Ambiguity in SNOMED

<table>
<thead>
<tr>
<th>Thoracic spine pain</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Client Term</strong></td>
</tr>
<tr>
<td>Thoracic spine pain</td>
</tr>
<tr>
<td>Thoracic spine pain</td>
</tr>
<tr>
<td>Client Term</td>
</tr>
<tr>
<td>--------------</td>
</tr>
<tr>
<td>Palatal Mass</td>
</tr>
<tr>
<td>Palatal Mass</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Client Term</th>
<th>Mapping Type</th>
<th>SNOMED CT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sinus Pressure</td>
<td>Broader than</td>
<td>Nasal sinus problem (finding)</td>
</tr>
<tr>
<td>Sinus Pressure</td>
<td>Broader than</td>
<td>Pressure (finding)</td>
</tr>
</tbody>
</table>
Lessons Learned to Improve Mapping Process

- Standardize guidance on how to handle common heuristics
  - Eliminate different ways of mapping the same description
- Recommended improvements to tooling and training for mappers
- Provides previous mappings to guide mappers
- Identifies duplicates and ambiguous terms in SNOMED CT
- Heuristic guidance to help make consistent broader than choices
Future of Mapping Warehouse

- Utilize the mappings in future projects for suggestions and QA
- Need to update mappings with new releases to fix retired mappings and updates for broader than mappings
- Representation of one to many mappings
- Add functionality to represent heuristics used for mapping
- Representation of use case for mappings
Questions