Implementing SNOMED CT

Practicalities and Challenges

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What do I mean when I talk about implementing SNOMED CT?

National Implementation considerations
Healthcare strategy and policies
Clinical practice/delivery differs by country.
Language.
Content.
Other reference coding schemes.
Level of interoperability/integration.
Clinical system suppliers.

Clinical Systems (design and build)
SNOMED CT is a computable terminology.
It is meant to be used in electronic patient records for recording clinical information.
Therefore it follows that the route to getting SNOMED used, (implemented), is via healthcare information systems.
Healthcare information systems typically have their own record architecture.
These systems currently have to conform to a wide variety of other standard coding schemes, information models, etc.
They are not and never will be SNOMED centric.
This means that the target audience for getting SNOMED implemented is by educating and influencing the suppliers of these systems

Clinical Systems (Users)
These fall into three broad categories:
1. Those using clinical systems as part of the day to day care process i.e. recording problems, ordering tests, recording interventions...
2. Those responsible for maintaining the configuration of the system i.e. people who are responsible for maintaining reference data within a clinical system.
3. Those responsible for extracting data from clinical systems for clinical audit, clinical activity, research, management, etc.
Systems Design Challenge
Design Challenges

- How do we get SNOMED CT data into the system?
- How should we use the various elements of SNOMED CT?
  - Subsets
  - Hierarchies
  - Relationships
  - Synonyms
- What data items should contain SNOMED CT data (Searching / Tagging / Binding)?
- How should we present SNOMED CT data to the end user?
  - How are we going to handle the idea of Interface terminology vs Reference terminology.
- What should we physically store in the database?
- How are we going to deal with the ‘other’ NHS standard coding schemes (ICD10/Read/OPCS4)?
- How should we deal with ‘free text’ data entry?
- What is our policy on handling the nuances of SNOMED CT?
  - Modelling issues
  - Textual / language issues
- How should we deal with ‘Not Found’ conditions?
  - What is our policy on ‘Local’ generation of terms?
  - What is our policy on use of Temporary codes?
- How should we handle reporting?
- How should we approach post coordination?
- Physical Implementation – SNOMED server or store in LZO format?
Design Vision

To provide effective support to generate the greatest accuracy and quantity of structured (codified) data entry, with minimum impact on the user.
Design Principles (1)

- SNOMED CT is the primary clinical reference terminology and is to be used wherever possible as the primary reference terminology to record clinical information.
- Clinical Terming will be done at the point of data entry.
- There will be no interface terminology used for data entry.
- The system will only deal with fully sanctioned/modelled SNOMED CT concepts.
- The system should not need to cater for inadequacies of the coding schemes provided.
- The end user should not be aware they are using SNOMED CT:
  - The words ‘SNOMED CT’ should not appear on any end user clinical screens or reports.
  - Searching for SNOMED terms should not be designed as a ‘stand alone’ function that interrupts the flow of data entry, but should be seamlessly integrated into applications.
  - The system must always manage the interface between SNOMED CT and the end-user using the systems User Interface standards.
  - Post coordination will not be handled at the user interface.
Design Principles (2)

Use of Subsets:

- Subsets need to be used to restrict the use of inappropriate data entry
- SNOMED CT subsets should drive the generation of context relevant lists
- Nationally provided subsets will be the default at implementation where no other subsets have been defined
- End Users/individuals will not be able to define their own personal subsets for use within the system *(Individuals may be asked to contribute to subset development within their particular care setting by whatever NHS management process is required for subset governance)*
- The content of health organisation level subsets will be defined and managed by clinical communities at the appropriate level in the organisation hierarchy
- The NHS / CFH allows the creation of subsets specific to all levels in the organisation hierarchy and provides a governance and management process
Design Principles (3)

- If terms are not found in SNOMED CT then the system has to decide what action to take.
- If a data item is specified such that it must contain a SNOMED term then CFH guidance will be followed; (users should enter the closest term to what they want to record.)
- The rendering of SNOMED CT expressions will follow CFH published guidelines
- Use of temporary codes will not be supported
- Use of locally defined terms will not be supported
- Standard CFH published cross maps will be supported
- Identifying SNOMED terms within a body of ‘free text’ will be used to ‘tag’ and prompt for formal recording. (They will not be used to formally record clinical data in the patient record).
**SNOMED CT in action display**

<table>
<thead>
<tr>
<th>Drug Allergy</th>
<th>Allergen</th>
<th>Reaction</th>
<th>Severity</th>
<th>Onset</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Penicillin V</td>
<td>Skin rash</td>
<td>Mild</td>
<td>02/04/2008</td>
<td>Active</td>
<td></td>
</tr>
<tr>
<td>Drug Adverse...</td>
<td>Diclofenac</td>
<td>Skin rash</td>
<td>Mild</td>
<td>02/04/2008</td>
<td>Active</td>
</tr>
<tr>
<td>Adverse react...</td>
<td>Wheat</td>
<td>Vomiting</td>
<td>Mild</td>
<td></td>
<td>Active</td>
</tr>
</tbody>
</table>

Locally registered patient, data shown may be incomplete.
SNOMED CT in action  
data entry/display

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Excision of cyst of kidney</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approach</td>
<td></td>
</tr>
<tr>
<td>Direct device</td>
<td></td>
</tr>
<tr>
<td>Method</td>
<td></td>
</tr>
<tr>
<td>Priority</td>
<td></td>
</tr>
<tr>
<td>Body site</td>
<td></td>
</tr>
<tr>
<td>Laterality</td>
<td></td>
</tr>
</tbody>
</table>

**Record Procedure**

- Performed date and time: 18/06/2008 16:10
- Problems (Onset date): [Options]
- Performed by: [Options]

**Legend**
- TRIBAL

**SNOMED CT**
Subsets and context sensitive lists
Initial list generated from intersection of all subsets

- **UK SNOMED CT release (too many terms...)**
- **Specialty** related SNOMED CT concepts agreed at NHS level and published via TRUD
- **Data item subset**
  CT concepts agreed at NHS level and maintained at cluster level
- **Role** related SNOMED CT concepts agreed at RBAC role levels
- **Organisationally** related SNOMED CT concepts agreed at organisation hierarchy levels.
UK SNOMED CT release (too many terms....)

Specialty related SNOMED CT concepts agreed at NHS level and published via TRUD.

Data item subset: CT concepts agreed at NHS level and maintained at cluster level.

Organisationaly related SNOMED CT concepts agreed at Organisationaly levels.

Subsets and context sensitive lists Increase search drops Role subset
Subsets and context sensitive lists
Increase search drops Organisation subset

UK SNOMED CT release
(too many terms....)

Specialty related SNOMED CT concepts agreed at NHS level and published via TRUD

Data item subset
CT concepts agreed at NHS level and maintained at cluster level
Subsets and context sensitive lists
Increase search drops Specialty subset

UK SNOMED CT release (too many terms....)

Data item subset
CT concepts agreed at NHS level and maintained at cluster level

Is it right to constrain, And if so who decides?
SNOMED CT in action
Basic searching

SNOMED CT

Use of search strings (language) are key...
e.g. try intravenous cannula

SNOMED SFS

Basic search display sequencing?
• Alphabetic
• Preferred Terms 1st
• Duplicate synonyms
SNOMED CT in action
advanced searching
SNOMED CT in action

Term Not Found ...

What happens to this info?
Interesting things being discovered
Implications of using Model, Subset or Hierarchy

 Dropdown populated from?
- SNOMED model
- Subset
- Hierarchy

Who decides content of subsets?
- eg
- Pruritic Rash vs Rash
Interesting things being discovered
Implications of using Model, Subset or Hierarchy

Selected via the SNOMED SFS

Dropdown populated from SNOMED model using Laterality relationship based on body site chosen

Decisions then required:
• Take all children?
• Take first level children?
• Take first level children where no descendents plus descendents of first level children
• Take only preferred terms?
• Take all active concepts?
• Use of Bilateral?
Interesting things being discovered
Synonyms – useful or hindrance?

Which Fundus?
Interesting things being discovered
Implications of search text

Get specific
Challenges: Who needs to know what?

Systems designers/builders and ‘Content’ builders
- Need to know about subsets/associations
- Need to understand technical infrastructure
- Need to know everything 😊

System config, Info Analysts, and Support staff
- Need to understand search functions
- Need to understand how searches work
- Don’t need to understand SNOMED structure

Trainers
- Need to understand how to search
- Don’t need to know anything about SNOMED

Clinical end users
Content Configuration Challenge

Suppliers:
- embed/use ‘codes’ within systems design and interface messages

Suppliers:
- feedback any problems to suppliers
- via LSP/CFH helpdesks

Users:
- verify if problem is with their systems or ‘codes’ need changing?

Systems Deployed

NHS (local)
- Change Subset data?

National Release Centre:
- Governance
- Creation
- Maintenance
- Distribution
- Guidance

Where coding systems require to be updated
1. New release data

2. Changed subsets

3. Check subsets for changes

4. Transfer to ‘live’ systems

5. Tell CFH data now ‘live’
1. New release data

2. Changed subsets

3. Check/fix reported issues

4. Tell LSP application now ready

CHECK for changes in Application

Check subsets for changes

Record 'Ready'/deploy

Check/fix reported Application issues

New release data

Checked subsets

Check/fix reported issues

Tell LSP application now ready
Getting info out:
- Understanding supplier system data structures
- Understanding how SNOMED is used in that system
- Understanding SNOMED structures
Categories of Implementation issues:

- **Training**
  - System Designer (requirements and business analysis)
  - System Builder (technical design and build)
  - System QA (quality assurance/testing)
  - System Technical Implementer (Configuration of system parameters and ‘content’)
  - Expert Clinical Informatician (Content)

- **SNOMED CT**
  - Core product (eg
    - modelling not there/ambiguous
    - concepts not there at level of detail required
    - Synchronisation of releases – eg dm+d
  - Subsets
    - National vs system vs user (eg in Reaction subset : pruritic rash)
    - Guidance on UK usage - Concept based, Description based….
  - Namespaces (use of)
    - Localisation, by supplier, by domain, by regions.

- **Clinical professions**
  - How should they record clinical information (symptoms and diagnosis)
  - Use of language (synonyms vs preferred terms)

- **Clinical systems**
  - Search functions
    - Search tool - not a browser
    - How much ‘intelligence’ do we give it
  - Snomed model vs system model of clinical info (what bits to use where)
National Implementation.

1. Ensure there is a national organisation to own and maintain the country namespace.
2. Ensure that the national organisation also has responsibility for all the coding schemes/reference sets used in healthcare in that country.
3. Make it clear to all suppliers and health services where and why you expect it to be used.
4. Make it clear its relationship to other coding schemes/reference sets.
5. Define a set of standards and guidance for how you expect SNOMED to be used in your country.
6. Define a set of compliance levels and a roadmap that shows everyone how you expect them to get to compliance.
7. Measure implementation against that roadmap.
System Dev Process ➔

Requirements Analysis
- Process Analyst
- Business Analyst
- Reqm Analyst
- Domain Specialists

Design
- What other coding schemes do we use?
- What should we use as the Reference coding scheme?

Development
- What data items need SCT
- How do we get SCT into the System

QA
- QA analysts
- Systems Analysts
- Early Adopter users

Configuration
- How do I manage subsets, National, local, domain specific, supplier specific?
- How do I manage new releases?
- How do I manage maps?

Operational
- Clinical user creating/maintaining patient records
- Information Analyst
- Researcher

SNOMED Artefacts
- SNOMED implementation Guidance matrix
- What other coding schemes do we use?
- What should we use as the Reference coding scheme?
- What data items need SCT
- How do we get SCT into the System
- Best practice guidelines on storage
- Best practice guidelines on presentation
- How to guide on aspects of SNOMED CT eg. Subsets, Relationships, Synonyms/Preferred terms, statuses, etc.
- Education products
- Distribution / import mechanisms
- Education on detail of how SNOMED CT structured.
- How do I manage subsets, National, local, domain specific, supplier specific?
- How do I manage new releases?
- How do I manage maps?
- Can't find concept – is it subset content, SCT content?
Email to Anne Casey:

A number of thoughts:

- I think it will be fairly straightforward to produce curriculum items based on work done to date and the split I outline below.
- I think the problem comes in getting them agreed and having some form of assessment process if required (see next bullet).
- The difference between this piece of work and the Editors / Mapping curriculum projects is that IHTSDO has a need to have a career/role structure that assesses/QAs those people responsible for producing the content.

Whereas, I see Implementers in 2 main categories:

1. Those that are in the Design/Developing/QAing SNOMED enabled systems. For these people I cannot see how we can assess/accredit them as they will be people working for supplier organizations who will use any material produced by IHTSDO as guidance for their internal training processes. Therefore I see the material produced as guidance only, for any system supplier to use as it sees fit.

2. Those that are involved in managing/configuring and getting info out of these systems. I think this group are similar to the Editors in that they are dealing with SNOMED Content and using it to create subsets and maps that are used to configure systems. How they do this will affect the operation of the system, how data is extracted, validation of data entered. It is a much wider group than those in 1 above and I think some formal assessment of people in this category is necessary (maybe something similar to clinical coding training/assessment that occurs in the UK)
4 - Imports SNOMED Concepts, descriptions, relationships, subsets, and x maps.
The application record architecture has been validated against the SNOMED model.
It uses the SNOMED model to search, validate, select and record clinical information using SNOMED CT terms.

5 - Imports SNOMED Concepts, descriptions, relationships, subsets, and x maps.
The application record architecture has been validated against the SNOMED model.
It uses the SNOMED model to search, validate, select and record clinical information using SNOMED CT terms.
It uses SNOMED CT as its base reference terminology.
It uses SNOMED CT concepts wherever possible as its reference data lists.
It can handle multiple different interface terminologies and their mappings to SNOMED CT concepts.
It can receive and send messages containing SNOMED CT content (as long as that content conforms to SNOMED CT model and rules).

0 - No use of SNOMED

1 - Uses its own internal coding scheme.
Uses SNOMED externally to generate lists that are then used for creating its internal coding schemes.

2 - Imports SNOMED concepts and descriptions into its reference database as a flat list.
Uses SNOMED reference data alongside other coding schemes in its reference database.

3 - Imports SNOMED Concepts and Descriptions and Relationships into its internal reference database.
Applications utilise these structures to allow users to navigate and select terms.