
SNOMED CT in Primary Care

**Recommendations from the sub-group of the Joint GP IT
Committee on SNOMED CT**

December 2013

Contents

Contents	2
Purpose	3
Audience	3
Executive Summary	4
Background	5
SNOMED CT	5
Policy	6
Recommendations	7
1. Mapping Tables	7
2. Synonyms and Preferred Terms	8
3. Maintaining the Integrity of SNOMED CT over time	8
3.1 Medicines	10
4. Subsets, alternative hierarchies and interoperability	11
5. Namespaces and 'local codes'	11
6. Pre/post Coordination	11
Requirements	13
Professional clinical safety requirements	13
Appendix – JGPITC Letter	17

Purpose

This document provides the conclusions of the sub-group of the Joint GP IT Committee (JGPITC) who considered the clinical safety aspects in the adoption of SNOMED CT in Primary Care systems. The document details proposed recommendations to be provided to those implementing SNOMED CT; these are for consideration by the JGPITC with a view to their endorsement and subsequent publication.

Audience

This document is written primarily for the members of the JGPITC. Its main focus is primary care systems. However, it has been written with a wider audience in mind that would include primary care suppliers, those individuals in primary care with a good health informatics understanding, and also those operating in the interoperability space with primary care.

It has been structured in two parts: the first (Recommendations) summarises the sub-group's discussions on each of the clinical safety risks raised and the rationale for the recommendations being provided; the second (Requirements) provides a clear set of recommendations that can be provided to those implementing SNOMED CT. Inevitably there is overlap between the two parts. This approach was adopted to hopefully support the JGPITC in deriving a publishable document with clear direction on requirements.

Scope

This document focuses on primary care and ensuring continued interoperability between primary care systems of patient records and patient information. Its main focus is the migration of systems from the current terminology to SNOMED CT. It is acknowledged however that some of the information and principles raised may be of interest in other areas, especially when sharing information between primary and secondary care.

Executive Summary

The 2012 strategy of the Department of Health as detailed in 'The Power of Information' is for patient healthcare data to flow around the healthcare system in a safe and interoperable way. To enable such data flows, the strategy recommends that all relevant systems should converge on one clinical terminology to exchange coded information: SNOMED CT. More recent documents from NHS England and also a number of professional body documents reiterate this strategy. Recent EU directives on cross border care as well as the collaborative agreements with the US all cite SNOMED CT as the terminology product of choice.

The Joint GP IT Committee, whilst similarly endorsing the strategy, has identified specific clinical safety risks arising from the adoption of SNOMED CT specifically in primary care systems. To examine and address these risks it convened a joint working group with HSCIC, tasked with making specific recommendations to supplement or subsequently be included in clear guidance and/or contracts. The working group discussions have had the benefit of experience from practicing GPs who are active users of the current GP systems, from those involved in GP2GP and thus current interoperability issues, and from senior terminologists within the UK Terminology Centre. Advice has been provided from Scotland and Northern Ireland on specific aspects.

The conclusion of the sub-group is that all the identified clinical safety risks can be adequately addressed in systems: this document itemises each of the clinical safety risks identified by the JGPITC and makes specific recommendations for each that, when implemented, will mitigate the risks.

The document is being presented to the Joint GP IT Committee for their consideration, but with a view to the subsequent production of a public document that can be made available to those implementing SNOMED CT in primary care and with a requirement that they address its content.

Background

Members from the JGPITC and staff from the UK Terminology Centre (UKTC) have held extensive discussions over the last few years on both the benefits for Primary Care Systems to move from the Read codes to SNOMED CT, and the requirements that would need to be provided to suppliers to ensure this was undertaken in a clinically safe and robust manner.

In December 2010 a series of Masterclasses began to look at SNOMED CT in detail and its benefits over the Read codes. In July 2012 the group had concluded its work and a presentation was given to the JGPITC outlining the benefits that could be accrued from migrating to SNOMED CT. It also requested that detailed work be undertaken on requirements to ensure appropriate clinical safety aspects were adequately addressed and recommendations well specified. The JGPITC provided in a letter to the UKTC a list of the clinical safety issues that its members had identified and needed to be considered. In 2012 the JGPITC set up a sub-group to work with the UKTC to look at these clinical safety aspects. This report details the results of that work.

SNOMED CT

The benefits of Primary Care adopting SNOMED CT are many, but the main ones considered by the group include:

- SNOMED CT is the only terminology that has the capacity and coverage for all healthcare including areas not in Read such as histopathology and radiology.
- SNOMED CT has the ability to express terms at the depth of detail required by the different specialities across all of healthcare, which Read cannot support.
- Adopting the same terminology across healthcare removes the need for mapping between coding schemes which in itself introduces clinical safety risks.
- As an international terminology with 13 European Countries already members (and this number is increasing), SNOMED CT can facilitate the transfer of patient data across European borders and thus support the EU eHealth priorities.
- The large international user community also creates economies of scale in all aspects of development, innovation, assurance and deployment of SNOMED CT as the terminology component of 21st Century clinical informatics; it may no longer be feasible for individual countries to craft their own.
- SNOMED CT provides greater expressivity than Read and thus will enable areas such as allergies and adverse reactions to be coded and transferred through GP2GP which the current Read codes do not support.
- The flow of data across the healthcare estate in the UK, without a need to change coding systems across the different EPR¹s, is highly desirable. A number of secondary care systems now use SNOMED CT and are increasingly being adopted by trusts; including Cerner Millennium, CSC Lorenzo, Rio, MediTech and EPIC as well as other systems used elsewhere in healthcare such as Advanced healthcare

¹ Electronic Patient Records Systems

Systems and, Mediqal. Some trust in-house systems such as OpenEyes and ORCHID at Nottingham University Teaching Hospitals are also known to have adopted SNOMED CT.

- Data returns such as the Cancer Outcomes and Services dataset will increasingly require SNOMED CT coded entries and the UKTC has recently been contacted by a number of lab system suppliers to help them migrate to SNOMED CT. The Renal data collaborative from January 2014 will require SNOMED CT in key data items such as diagnosis and procedures to be provided in SNOMED CT to their central register.
- A number of trusts already produce electronic discharge summaries with SNOMED CT coded data items; primary care is currently unable to take advantage of this.
- SNOMED CT is an evolution of the Read codes and contains many of the clinical phrases within Read; while incorporating structures and techniques that address the shortfalls of Read.
- For the first time this year, codes had to be deleted from the Read v2 codes due to legal reasons in how the categorisation of codes in relation to sexual orientation had been undertaken in the past. Read v2 does not provide any mechanism for managing this and we are reliant on the memory of each supplier to address this, whereas SNOMED CT provides a full history mechanism.

Policy

Over the last few years the policy to adopt SNOMED CT has become clearer in Department of Health documentation; the Head of Information Standards and Information Governance within NHS England has also been clear on the strategy to adopt SNOMED CT. The move to a single terminology of SNOMED CT is detailed in the 'Power of Information' and the 'Safer Hospitals, Safer Wards' as well as a number of historical documents from the BMA, the AoMRC and the RCP. The RCP record standards endorsed by all the health professional organisations also refers to SNOMED CT as the terminology to enable interoperability of patient information.

Recommendations

A number of safety concerns were documented by the JGPITC and the sub-group has used these as its focus for consideration as well as during its deliberations seeking to identify any others that need addressing.

The following section details the different safety issues, an outline of the result of the discussions and in some cases details of actions undertaken, along with a recommendation of how those risks should be mitigated. These are collated in the next section to a reasoned list of requirements.

1. Mapping Tables

The use of the terminology mapping tables enables a supplier to migrate to SNOMED CT as well as for patient records to be transferred between system suppliers while the primary care domain is still in a mixed terminology environment.

It is inevitable that the primary care domain will remain in a mixed terminology state for a period of time, however it was recognised that it is undesirable for that to persist for too long. The mapping tables have been created for the primary care use case and thus do not include all of SNOMED CT; it is important these maps are used within the scope and use defined within the documentation.

Actions undertaken:

- The maps from Read v2 to SNOMED CT, Read v3 to SNOMED CT, Read v2 to Read v3, and Read v3 to Read v2 have now all been clinically assured for the top 20,000 codes. The assurance has been undertaken in line with the methodology previously approved by the JGPITC.
- Assurance of the maps to or from Read v3 considers only the Read v3 preferred terms, as this is the practice within supplier systems in England. Northern Ireland has been alerted to this limitation as their systems are known to use Read v3 synonyms. UKTC have offered expertise to support any additional mapping work they may need to undertake.
- The administration codes in the Read v2 set used by Scotland have been mapped to SNOMED CT in a separate mapping table. This should be used to migrate data when the content is known to have been created in a Scottish system.
- Wherever possible, within the terminology authoring process, when new codes are added to SNOMED CT these are also created in Read v2 and Read v3. However, it became clear this is often not possible due to one or more of the following: the availability of space within Read in the right part of the hierarchy, the structure of Read and/or editorial principles. This means that increasingly there are SNOMED CT terms being used within other care settings that are not available to primary care and cannot be mapped into Read.

With these actions now completed, the sub-group recommend that the JGPITC require the appropriate terminology maps to be used in any data migration or record transfer through GP2GP in line with the stated use of that map and the recommendations that :

- The original source code and text must be retained within the record

- An audit trail of the releases of the maps used with effective dates and times must be maintained by the supplier
- That the existence of a mixed terminology domain with all three terminologies is not feasible in the long term. As SNOMED CT is an international terminology, new terms become available to users of SNOMED CT that cannot be mapped to the Read codes without loss of information. The maintenance of Read v2 in particular is increasingly problematic because of its fixed structure, with particular chapter areas already being full, and the inability to retire problematic codes.

2. Synonyms and Preferred Terms

The sub-group recommends that when adopting SNOMED CT:

- A system must be able to support synonyms for any data that is received and must not change a synonym that is received into the system to the preferred term.
- Synonyms must be available for a user to search; subsequently the actual term then selected by the user for recording into the patient record must be maintained.
- As a minimum the system should store the descriptionId and the description text; optimised reporting performance may require that the conceptId is also stored
- The description text not be restricted to an arbitrary length, in order to support future expectations in relation to SNOMED CT expressions.

3. Maintaining the Integrity of SNOMED CT over time

SNOMED CT is an actively maintained terminology; this means that over a period of time the following changes can be made to concepts and relationships in the SNOMED CT terminology:

- New concepts can be added
- A concept can become inactive (but not removed)
- The parent of a concept can change
- The children of a concept can change
- New synonyms to existing concepts can be created
- Existing synonyms can become inactive (but not removed)
- The modelling of a concept may change (eg. the body site)
- A new hierarchy may be created or a new high level concept created

The sub-group considered which of these types of change suppliers already encountered and addressed in their existing implementations of READ v2 or v3. For those changes not currently encountered or addressed, the sub-group sought to identify credible, documented products capable of addressing them and to identify what, if any, were the associated risks of both using or not using such products..

The sub-group was particularly concerned to consider the consequences of SNOMED CT concepts becoming inactive, or changing their parents. The features of Read v2 and Read

v3 are different; neither change is possible in Read v2 whilst, although technically supported, Read v3 makes such changes only very rarely by comparison with SNOMED CT.

Historically, concerns have also been raised in general on the practicalities of reporting using SNOMED CT. The sub-group noted, however, that SNOMED CT is now successfully used extensively in a number of hospitals nationally and internationally, including for reporting both in support of national returns and clinical requirements such as patient retrieval for patient selection, clinical audit and clinical log books. It was agreed by the sub-group that the types of reports currently required from primary care systems and using the hierarchical features of terminologies (IS-A relationships), are already well accommodated by SNOMED CT.

Reports that extensively use the modelling of SNOMED CT are currently not in common use (this feature is not provided by Read v2); however any modelling changes that could be made were felt to largely contribute to improving the quality of queries rather than detracting.

To address the challenges specific to concept inactivation, although documented how to do this within the international documentation, the UKTC already release a product called the 'Substitution Table'. This table enables a system to look up each inactive concept and determine why it was inactivated and any concepts that replace it. UKTC has now developed a further derivative product called the 'SNOMED CT Query Table'. This enables suppliers to fully address the consequences of concept inactivation by means of a relatively simple extension to normal querying mechanisms (eg. queries should also retrieve any inactive duplicate concepts; for inactive ambiguous concepts ~ any queries should retrieve all concepts that replace it). These two products, and detailed documentation published by the UKTC, have already been shared with a wide range of suppliers.

All suppliers have experience of the requirement for code inactivation and as highlighted earlier have been required to retire some terms in Read v2. This was undertaken following a number of discussions with suppliers who dealt with the requirement as a one off activity. Such changes remain documented only with the supplier and the UKTC, whereas in SNOMED CT they are visible and published in perpetuity within the terminology files.

To address the challenges specific to concepts changing their parents or children, a new release format file for SNOMED CT (available from October 2013) details the changes between a current release and all previous releases. The sub-group noted that changes to a concept's relationships would normally, in the general case, be expected to lead to improved querying responses. However it is understood that the new release format would support a direct computation of any differences in behaviour that will result from running the same report specification against the same data, but over different releases of SNOMED CT.

It was agreed that:

- Suppliers already address: new concepts, new synonyms and the children of concepts changing.
- Changes to the structure of the SNOMED CT top level hierarchies are very rare, as are concept moves between them, and will only be undertaken to improve the usability of SNOMED CT. Any significant future change would be consulted upon comprehensively and responsibly by the IHTSDO and UKTC and of course clinical safety assessments should be undertaken in regards to any implementations.
- .

- Concept moves *within* top level hierarchies (e.g. de- or reclassifications of a particular disorder as an 'autoimmune' or a 'cardiac' disorder) are more common **and** do not trigger **any specific notification**. They usually reflect a more precise or accurate definition being applied to the concept, and so should normally act only to reduce any clinical safety risk that may have existed before the change.
- Any changes to a concept's modelling were felt in the main to improve the quality of information on the concept and thus ensure it is more likely to be identified in queries when it should be and not if it shouldn't.
- Any changes can potentially have an impact to reports and queries to retrieve particular patients, and although this is already the case, this fact needs to be visible to end users so they are fully aware.
- Given the diversity of solutions and providers that will in time utilise SNOMED CT in exchanging information across healthcare, suppliers should adopt an approach to be able to process inactive codes in the patient record thus ensuring queries can address any codes that are now inactive but have been available for recording previously.
- The Query Table from the UKTC should be used to process inactive content. The sub-group assessed the 'Query Table' produced by the UKTC and recommend its use in undertaking queries – both for managing inactive codes in query statements as well as in patient records.

Recommendations:

- Suppliers need to address the changing aspect of SNOMED CT and be able to process inactive concepts
- Suppliers should use the products and guidance provided by the UKTC and the IHTSDO. The Query Table should be used as the method to manage inactive concepts in queries.
- The requirement for the 'Query Table' is made clear and UKTC requested to ensure this remains part of the product suite they deliver.

3.1 Medicines

GP suppliers are all currently required to adopt dm+d through the Electronic Prescription Service contracts. The UK Drug extension provides additional complementary data items to dm+d such as trade family and relationships to the clinical Edition of SNOMED CT. Both dm+d and the UK Drug extension use the same identifiers for the same concepts.

The UK Drug extension is a UK SNOMED CT extension and as such complies to the same features as the UK Clinical Extension which have been addressed above. Relationships exist from the UK Drug extension into the clinical release (core content), but not the other way. Any retired relationships are audited in the same way as in the clinical extension.

Discussions have centred on allergies; data items such as causative agent are held within the clinical extension. Currently the different suppliers deal with allergies using different models and there are on-going discussions to better align these so they can be transferred through GP2GP. It is therefore currently difficult to definitively mitigate the risk associated with inactive content due to the different supplier approaches. Our recommendation therefore is that this aspect is factored into the GP2GP discussions and that guidance is published as part of that.

4. Subsets, alternative hierarchies and interoperability

Data entry in systems may use subsets of SNOMED CT as appropriate within their system and use case. However, the system should not restrict its scope of awareness to a subset.

The sub-group recommends that:

- Any system receiving a SNOMED CT term (whether from international, UK or another namespace), must store the specific code system, code and term text and be able to transfer this set of data items to another system, and must display the term text as received (see section 5 on oids);
- A system should be able to process the SNOMED CT code and term received from another GP system within the subset of terms as defined by the Read v2 and Read v3 scope.

Note. Navigation subsets (alternative hierarchies) are available from UKTC that would enable suppliers to present SNOMED CT in a way that is similar to how they currently present Read v2 or Read v3. Alternatively suppliers may have developed a fast 'search and select' approach they feel is more suited to their user base. Either approach was considered acceptable.

5. Namespaces and 'local codes'

The sub-group recommends that:

- A system with its own SNOMED CT namespace must use an identifier (known as an object identifier or 'oid') for their namespace and not the current SNOMED CT oid. All content in the UK Edition (whether international or UK extension) should use the same SNOMED CT oid. The reason for this is to fit in with the current processing that is already part of GP2GP; while SNOMED CT may have its own method of identifying which namespace a code comes from, this would require additional processing not currently in GP2GP and may not be permanently stable.
- User generated local codes should continue to be dealt with as now.

6. Pre/post Coordination

The sub-group recommends that:

- Data migration to SNOMED CT must use only pre-coordinated concepts whilst current terminology mapping table designs do not support post co-ordination.

- Post-coordination in messages should only be used where the sender, receiver and message structure can support its use; these patterns will be detailed and agreed across the active supplier domain in advance and will not impose any particular internal approach.
- No general requirements for post-coordination should be required of systems when in the mixed terminology phase.

Any introduction of post-coordination should only be undertaken when interoperability issues have been specifically addressed.

Requirements

This section details the requirements it is recommended that the JGPITC provide to those adopting SNOMED CT within their primary care system. This uses as its source content from the original communications between the JGPITC and the UKTC, enhancing this with the outcomes for the sub-groups work.

Professional clinical safety requirements

1. Data Migration

Suppliers should be strongly encouraged to migrate to SNOMED CT within the next few years.

When a GP system is migrated to SNOMED CT it is expected that all coded information contained within patient records, excluding that associated with medications, will be translated into SNOMED CT. It is further expected that all appropriate measures will be taken to avoid loss of clinical information or change of meaning. Measures to be taken must include the following:

- The national clinically assured terminology mapping tables must be used in any translation or data migration process.
- An audit of the releases of the maps used with effective dates and times should be maintained.
- The particular term text specified in the mapping table for the target SNOMED CT code must be displayed.
- The original source code and term code (i.e. as entered by the original author) must be retained within the patient record; the original term text must be displayed (i.e. in association with the new SNOMED CT term) unless it is a lexical exact match to the new SNOMED CT term text.

The terminology mapping tables must be used in line with the guidance and purpose within which they have been clinically assured.

2. SNOMED CT Concepts in systems

- Systems adopting SNOMED CT must support both preferred and synonym SNOMED CT terms; it follows that these must be preserved during any subsequent migration or data translation process.
- A system must be able to support synonyms for any data that is received and must not change a synonym that is received into the system to the preferred or another synonym term. Where the sent coded item comprises a recognisable concept code, but a non-standard term and descriptionId (e.g. authored within the sending supplier namespace) then the received item should be degraded to text only, unless a clinician validates a code or term substitution.

- Synonyms must be available for a user to search. The term then selected by the user for recording into the patient record must be maintained.
- As a minimum the system should store the descriptionId and the description text; it is recommended that the conceptId is also stored.
- The description text should not be restricted to an arbitrary length, in order to support future expectations in relation to SNOMED CT expressions.
- Any SNOMED CT system using its own namespace should register for an HL7 oid for their namespace and send this when sending data to external systems.
- Any system receiving a SNOMED CT term (whether from international, UK or another namespace), must store the specific code system (oid), code and term text and be able to transfer this set of data items to another system, and must display the term text received (see section 5 on oids);
- A system should be able to process the SNOMED CT code and term received from another GP system within the subset of terms as defined by the Read v2 and Read v3 scope.
- Systems should, where able, undertake some validation on data received from other systems:
 - in using the translation set data to ensure these are accurate against current maps;
 - taking appropriate action if receiving inactive codes to ensure these are appropriately visible within their system;
 - that the correct type of SNOMED CT term is received if this is critical for processing (eg. a procedure in a procedure field).

3. Interoperability

One of the prime reasons for migrating systems to SNOMED CT is to enhance interoperability. It is vital that this opportunity should not be lost. It is therefore expected that all appropriate measures will be taken to promote interoperability and to avoid developments that could be detrimental to current or future interoperability. In particular the following should be taken into account in the system:

- All SNOMED CT based systems, whether or not they employ subsets, must be able to import and process *any* SNOMED CT code that exists either in International SNOMED CT or in the UK Edition such that:
 - The Description is human readable in the record;
 - The Code is capable of being retrieved by local system searches;
 - It is possible locally for users to set up searches that can include these codes;
 - Note that there is no expectation that imported codes should necessarily be added to data input picking lists.
- Local codes that are purely local to one organisation must not be propagated outside of that organisation.

- Local codes that are system wide (e.g. centrally curated by a Vendor) may be propagated where 'same' systems can import them and correctly interpret them provided that they are always exported with the appropriate HL7 message identifier (OID) that distinguishes them clearly from National SNOMED CT. This approach should also be adopted where the local codes are SNOMED CT codes but within a local namespace. The OID used must reflect the local namespace and not be the SNOMED CT OID.
- Wherever SNOMED CT post coordination is contemplated it must never be carried out in a way that puts future interoperability at risk.
- Data migration to SNOMED CT will use only pre-coordinated concepts to support data interoperability. This is the approach used within the terminology mapping tables.
- Post-coordination in messages will only be used where the sender, receiver and message structure can support its use; these patterns will be detailed and agreed across the active supplier domain in advance and will not impose any particular internal approach.
- No general requirements for post-coordination will be required of systems when in the mixed terminology phase.
- Any introduction of post-coordination will only be undertaken when interoperability issues have been specifically addressed.

4. Up-to-date

As with any other coding scheme there is a professional expectation that as SNOMED CT is updated systems will be kept up to date. GP users have a particular requirement to be able to search their historical data going back many years. Both SNOMED CT itself and systems must be designed in a way that facilitates updates without detriment to the historical record or to searches performed on historical records.

- Systems need to be able to take new releases of SNOMED CT in a timely manner and be able to manage the dynamic nature of SNOMED CT.
- **For both medico-legal and clinical safety reasons any updating process must leave the original term description plus its original coding intact and undisturbed in the historical record as recorded by the original author.**
- Where SNOMED CT terms or concepts are rendered 'inactive' it must continue to be possible for users:
 - To run searches in a timely fashion on historical data where either the data, or the search specification, or both, contains those 'inactive' terms / concepts
 - To design new searches or edit existing searches that explicitly include those 'inactive' terms / concepts
- Where SNOMED CT terms or concepts are rendered 'inactive' they should be removed from data input picking lists in an appropriate timescale.

The UKTC provide guidance and products to support the management of inactive terms and concepts; due attention should be taken to the up to date information and products provided

by the UKTC. In particular, the Query Table provided by UKTC should be used to manage inactive content in queries and in running queries across records that contain inactive content.

5. Search and Select

Navigation subsets are available from UKTC that would enable suppliers to present SNOMED CT in a way that is similar to how they currently present Read v2 or Read v3. This approach is supported by the JGPITC if required. Alternatively suppliers may have developed a fast search and select approach they feel is more suited to their user base.

Providing functionality to enable users to enter actual codes into the system to find terms is to be discouraged, but it is accepted that in the early stages of implementation this may be necessary. For data entries the user should always be able to view and select / reject based on the term text.

6. System Adoption of SNOMED CT

Where the principal coding scheme used by a clinical information system is changed the system will inevitably also need to be modified in other ways. It is not unusual for these collective changes to result in the development of a new system. When this is the case, there are regulatory instruments to be considered in such circumstances (e.g. GP Systems of Choice). Notwithstanding the content of this paper, such regulations must be applied in equal measure to all suppliers and systems.

7. Medicines

In addition to the use of dm+d in systems, it is recommended that serious consideration be given to also utilising the data in the UK Drug Extension. Both use the same identifiers for identical medicines, but the UK Drug Extension provides additional, complementary data that may be useful in decision support and for other application features.

Appendix – JGPITC Letter

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Joint GP IT Committee
BMA & RCGP

Our Ref: JGPITC – CTV3-SNOMED-CT

8th March 2012

Dear Ian,

The Joint GP IT Committee is aware of the stated intent to close down Read v2 and CTV3 and move all systems to SNOMED CT by 2015, and wishes to draw your attention to a set of clinical safety concerns that it firmly believes should be fully taken into account before migrating any GP system from its current coding scheme to SNOMED CT. These concerns have been brought into sharp focus by recent work led by the NME, understood to be principally driven by contractual considerations, to force CSC to instruct TPP to move SystemOne from CTV3 to SNOMED CT.

Three clinical safety leads have performed a safety hazards assessment based on experiences to date with data migration and GP2GP record transfer. The resulting paper outlines seven areas of concern, describes seven clinical safety issues and mitigations for all of them.

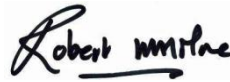
There is one issue that we particularly wish to highlight. This relates to serious difficulties with data retrieval. We believe that this problem stems from the current practice of removing 'Is a' relationships when SNOMED CT terms are inactivated. This leads to a retrieval hierarchy that from our perspective is deeply flawed because it cannot at present fully deliver our data retrieval requirements in a 'user friendly' and timely manner. This problem is clearly not intractable and the paper does indicate a possible mitigation albeit one that is very unlikely to receive the International support that would be required. Before this Committee endorses the use of SNOMED CT in GP systems it must first be convinced that a satisfactory solution has been put in place for this problem. Please see Appendix II for the full safety issues paper.

Based on experience to date, we are aware that the above paper may provoke lengthy, detailed and inconclusive technical discussion. To aid resolution, the safety issues and their mitigations have been taken from the above paper and translated into a concise set of clinical safety related professional requirements. The Joint GP IT Committee has endorsed these requirements (please see Appendix I below) and expects that they will be met wherever the migration of any GP system from Read v2 or CTV3 to SNOMED CT is contemplated.

Please note that this particular set of requirements only relates to clinical safety. The Committee may in due course wish to develop a further set of requirements extending beyond safety related issues.

We look forward to hearing how we can work with you to ensure that these requirements are met

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Paul Cundy', with a horizontal line underneath.A handwritten signature in black ink, appearing to read 'Robert Milne', with a horizontal line underneath.

Dr Paul Cundy
Co Chairmen

Dr Robert Milne

Enc.

Appendix I

GP System migration to SNOMED CT:

Professional clinical safety requirements

When a GP system is migrated to SNOMED CT it is expected that all coded information contained within patient records, excluding that associated with medications, will be translated into SNOMED CT. It is further expected that all appropriate measures will be taken to avoid loss of clinical information or change of meaning. Measures to be taken must include the following:

- Clinically assured cross mapping tables must be used in the translation process
- The term text of the target SNOMED CT code must be displayed
- The original term text associated with the source code (i.e. as entered by the original author) must be preserved and displayed (i.e. in association with the new SNOMED CT term) unless it is a lexical exact match to the new SNOMED CT term text
- Very serious consideration should be given also to preserving the original source code and term code
- SNOMED CT systems must support both preferred terms and synonyms and it follows that these must be preserved during the migration process

One of the prime reasons for migrating systems to SNOMED CT is to enhance interoperability. It is vital that this opportunity should not be lost. It is therefore expected that all appropriate measures will be taken to promote interoperability and to avoid developments that could be detrimental to current or future interoperability

- All SNOMED CT based systems, whether or not they employ subsets, must be able to import and process any SNOMED CT code that exists either in International SNOMED CT or in the UK namespace such that:
 - The Description is human readable in the record
 - The Code is capable of being retrieved by local system searches
 - It is possible locally for users to set up searches that can include these codes
 - NB – there is no expectation that imported codes should necessarily be added to data input picking lists
- Local codes that are purely local to one organisation must not be propagated outside of that organisation
- Local codes that are system wide (e.g. centrally curated by a Vendor) may be propagated where 'same' systems can import them and correctly interpret them *provided that* they are always exported with the appropriate HL7 message identifier that distinguishes them clearly from National SNOMED CT
- Wherever SNOMED CT post coordination is contemplated it must *never* be carried out in a way that puts future interoperability at risk

As with any other coding scheme there is a Professional expectation that as SNOMED CT is updated systems will be kept up to date. GP users have a particular requirement to be able to search their historical data going back many years. Both SNOMED CT itself and systems must be designed in a way that facilitates updates without detriment to the historical record or to searches performed on historical records.

- **For both medico-legal and clinical safety reasons any updating process must leave the original term plus its original coding intact and undisturbed in the historical record as recorded by the original author**
- Where SNOMED CT terms or concepts are rendered 'inactive' it must continue to be possible for users
 - To run searches in a timely fashion on historical data containing those 'inactive' terms / concepts
 - To design new searches or edit existing searches that include those 'inactive' terms / concepts
- Where SNOMED CT terms or concepts are rendered 'inactive' they must be removed from data input picking lists

Where the principal coding scheme used by a clinical information system is changed the system will inevitably also need to be modified in other ways. It is not unusual for these collective changes to result in the development of a new system. There are regulatory instruments to be considered in such circumstances (e.g. GP Systems of Choice). Notwithstanding the content of this paper, such regulations must be applied in equal measure to all suppliers and systems.

Appendix II

System migration to SNOMED CT:

Clinical safety issues

Meeting Whitehall, Leeds, July 5th 20011

Present:

Leo Fogarty

Alan Hassey

Jeremy Rogers

John Williams

Aim of meeting:

To identify hazards to patient safety that may arise in association with system migration to SNOMED CT (SCT) and their mitigations.

Background:

CSC as LSP is setting about meeting its contractual obligation to Connecting for Health to get TPP to migrate SystmOne to SCT. There is a risk that this will be done in isolation from the rest of the GP domain. Emis is already engaged in migrating its users to EmisWeb.

1 Use of cross mapping tables

It is unclear at this stage precisely what 'migrating SystmOne to SCT' really means. However, it is assumed that information currently coded in CTV3 will be translated to SCT codes using the CTV3 to SCT cross mapping table available from TRUD just as Emis are assumed to have used / to be using the Read v2 to SCT cross mapping table.

1.1 Safety issue:

These cross mapping tables have not been through a clinical safety assurance process². They are known to contain erroneous maps. Erroneous maps can lead to a) the wrong Terms being displayed to the user and b) the wrong codes being placed in the record. This could put patient safety at risk. EmisWeb avoids this through being dual coded (SCT and Read v2). The original Read v2 code and Term are retained and all processing currently continues to depend on Read v2. However safety issues could arise if processing were switched to the SCT codes

² The Read v2 to SCT map has had a limited assurance of the top 1000 most commonly used terms

1.1.1 Mitigation:

After translation the Term Text of the resulting SNOMED code must be displayed and the Original Term Text (i.e. from the original source code) must be preserved and displayed to the user unless it is a lexical exact match to the SCT Term. This would enable the human reader to detect discrepancies and take any necessary remedial action³ but would not on its own remove the risk from background machine processing

1.1.2 Mitigation:

Assure the cross mapping tables as already requested by GPSoC. This would reduce but not eliminate the frequency of erroneous maps and resulting erroneous codes for both human and machine readers⁴

1.1.3 Mitigation:

Modify GP2GP guidance on the processing of HL7 translation sets so that a receiving system validates all of the codes that it can 'understand' against each other. This would only be a partial mitigation because it would only work in circumstances where the sending system had preserved the original source code and even then, only in those circumstances where the cross mapping table had been changed AFTER the original translation had taken place⁵

2 Preferred terms and synonyms

2.1 Safety issue:

It is known that even in SCT not all synonyms are true synonyms. Some of these problems have been inherited from CTV3. Clinical safety could be put at risk if a system substituted a 'synonym term' with the 'preferred term'

2.1.1 Mitigation:

All SCT systems must support preferred terms and synonyms and must at least preserve DescriptionIDs and be capable of exporting them. Preserving ConceptIDs alone is not enough⁶

³ This assumes that users have had appropriate training and also that the system permits the user to make changes

⁴ This should apply to the Read v2 to SCT mapping table, which has so far only had the top 1000 most frequently used codes assured, and the CTV3 to SCT map

⁵ This adds to the desirability for systems migrating to SCT to preserve the original code and term ID (i.e. from the original coding scheme)

⁶ In SCT DescriptionIDs are unique and tightly and unambiguously bind the term text to a single ConceptID. Conversely a single ConceptID which may have 1 or more DescriptionIDs pointing at it

3 Maintaining the integrity of SCT over time

Over time both SCT Terms and Concepts have been, and will continue to be, rendered inactive. It appears that once a Term has been added to the Descriptions table with its unique DescriptionID it is never removed and likewise once a Concept has been added to the Concepts table it is never removed; in both cases attributes are changed in the tables to signify inactivity and the category of that inactivity (e.g. retired, duplicate, outdated, ambiguous, erroneous, limited). All DescriptionID associations between Terms and their underlying Concepts are therefore preserved. However when a Concept is rendered inactive, typically all of its original Relationships table entries are lost and replaced with a relationship represented by an 'inactive concept' subtype; its original hierarchical position is therefore completely lost

3.1 Safety issue:

There is a risk that inactive terms may disappear from the historic record

3.1.1 Mitigation:

The terms that appear in the human readable record must always be preserved intact in their original human readable form whatever happens to the entry in the Descriptions table and the link to the underlying Concept (e.g. via DescriptionID to Concepts table) must be preserved⁷

3.2 Safety issue:

When a Concept previously entered into the record is rendered inactive in the Concepts table the original Concept entered must be preserved in the record⁸. Any retrieval process that directly depends on the original hierarchical position of the Concept in SCT (e.g. as defined in the Relationships table) will fail, leading to the significant risk that important historical entries in the record will not be found (e.g. decision support)

3.2.1 Mitigation:

This risk could be mitigated in a variety of ways that might for example involve expanding all searches, once authored, down to individual Concepts or Terms, or by some means retaining the original Relationships table entries that prevailed before a Concept was rendered inactive but continuing to deprecate it for data entry. An alternative solution, at least perhaps for the short to medium term, might be to utilise a fixed external hierarchy (e.g. Read v2). ***The solution(s) adopted will need to support interoperability across the GP domain and beyond and therefore can only be arrived at after appropriate consultation. This will also need to take into account 'mixed economy working' during the transition.***

⁷ Every entry in the Concepts table carries the Fully Specified Name of the Concept to which the Term is related

⁸ It is considered unsafe to attempt any automatic replacement of Concepts because there is no robust clinical safety assurance of such suggested replacements and in any case in a significant number of cases either no alternative or more than one alternative may have been prescribed

4 Subsets, alternative hierarchies and interoperability

GP system suppliers may opt to use defined subsets of SCT (e.g. based on Read v2 vocabulary and hierarchy)

4.1 Safety issue:

Where two system suppliers opt to use different subsets of SCT there is a danger that a receiving system will treat SCT codes outside its defined subset as record transfer degrades, or worse simply ignore them⁹

4.1.1 Mitigation:

*All systems must be able to import and recognise / process genuine SCT codes so that they are visible to users and retrievable by system searches¹⁰ (note: this does **not** mean that these codes need to be added to picking lists offered for record entries)*

5 Namespaces and 'local codes'

For the purposes of this report two categories of 'local code' can be distinguished. The first category consists of codes that are local to a particular practice or organisation. The second category consists of codes that are available system-wide. The latter category may be placed in a proprietary SCT 'namespace'

5.1 Safety issue:

Codes that are local to an organisation may be uninterpretable, or worse be interpreted with a different meaning if transferred to another organisation

5.1.1 Mitigation:

Codes that are local to an organisation must not be propagated to any other organisation. They should be handled following the rules for GP2GP record transfer degrades. Note that with appropriate user involvement it may be possible to translate such codes to a National coding scheme during a data migration

5.2 Safety Issue:

System wide local codes may be inappropriately processed by receiving systems (e.g. failure to handle them properly according to GP2GP record transfer degrades and instead generating error messages) if the coding scheme that they belong to is incorrectly identified

5.2.1 Mitigation:

⁹ This has already been observed in GP2GP testing

¹⁰ Genuine SCT in this context would include International SCT, UK Namespace and any other centrally curated National Namespace

System wide local codes must be identified with unique OID¹¹ following HL7 v3 rules. They must never be sent under SCT OID. Codes that have been placed in a proprietary SCT 'namespace' are NOT exempt from this and use of the Namespace extension does not obviate the need to use OIDs appropriately. Receiving systems that recognise the OID will be able to process such codes appropriately while systems that do not recognise the OID must treat such codes as record transfer degrades. This system behaviour depends on appropriate use of OIDs

6 Pre-coordination and post-coordination

It would make sense for initial migration into SCT to be carried out using pre-coordinated terms only. Attempts to use post-coordination can then follow later and be carefully managed to ensure that resulting post-coordinated statements are interoperable across different systems

7 Other considerations

Where the principal coding scheme used by a system is changed there will inevitably be other changes to the system. Typically this results in the development of a new system. We understand that there are GP Systems of Choice rules to be followed for any new system (e.g. as applied to EmisWeb). Such rules should be applied in equal measure to all suppliers.

¹¹ In HL7 an OID is a unique identifier for a coding scheme. Every coded entry should be accompanied by the OID representing its parent coding scheme