Implementing the SCCI Standard: SNOMED CT

An up-to-date version of this document can be found at on the [UKTC web pages](https://www.uktc.nhs.uk).
Document Management

Revision History

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## Glossary of Terms

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<th>What it stands for</th>
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<tr>
<td>CTV3</td>
<td>Clinical Terms version 3; also known as Read v3. CTV3 was developed as part of the Clinical Terms project and extended the content from Read v2. This is a clinical terminology that provides the vocabulary for electronic record systems. CTV3 provided over 60% of the original SNOMED CT content.</td>
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<tr>
<td>EHR</td>
<td>Electronic Health Record. Also referred to as the EPR (electronic patient record)</td>
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<tr>
<td>FSN</td>
<td>Fully specified name. The fully specified name is one of the Concept descriptions, is unambiguous and provides the point of reference for the meaning of the concept. Every concept has a FSN.</td>
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<tr>
<td>GPES</td>
<td>The General Practice Extraction Service; collects information from general practice (GP) clinical systems in England and forms part of HSCIC’s GP Collections service.</td>
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<tr>
<td>GPSoC</td>
<td>GP Systems of Choice.</td>
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<tr>
<td>ICD-10</td>
<td>International Classification of Diseases Version 10</td>
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<tr>
<td>IHTSDO</td>
<td>International Health Terminology Standards Development Organization. IHTSDO is a not-for-profit organization that owns, administers and develops SNOMED CT; the UK is a member of the IHTSDO.</td>
</tr>
<tr>
<td>Clinical Classifications Service</td>
<td>The Clinical Classifications Service is part of the Provider, Support and Integration Directorate within NHS Digital. The service manages, maintains and provides national guidance on OPCS-4 and the version of ICD-10 implemented in the UK.</td>
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<tr>
<td>PBCL</td>
<td>The Pathology Bounded Code List (formerly known as the Laboratory Messaging Subset) provides a defined or bounded subset of Read codes for use in lab to GP messaging.</td>
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<tr>
<td>OPCS-4</td>
<td>The Classification of Interventions and Procedures, formerly from the Office of Population Censuses and Surveys. Version 4</td>
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<tr>
<td>QOF</td>
<td>Quality Outcomes Framework, the annual reward and incentive programme detailing GP practice achievement results</td>
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<tr>
<td>Read v2</td>
<td>Read v2 is the terminology developed in the UK for primary care systems; it provides the clinical vocabulary for electronic systems.</td>
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<td>RF1</td>
<td>Release Format 1. The file structure specified by the IHTSDO for the files used to distribute SNOMED CT content in 2002.</td>
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<tr>
<td>RF2</td>
<td>Release Format 2. The file structure specified by the IHTSDO for files used to distribute SNOMED CT content from 2011.</td>
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<tr>
<td>SCCI</td>
<td>Standardisation Committee for Care Information, SCCI replaced the previous Information Standards Board ISB and issues ISNs (information standard notices)</td>
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<tr>
<td>SNOMED CT</td>
<td>SNOMED CT is the clinical vocabulary for use in electronic record solutions in health and care. SNOMED CT has been adopted as the standard clinical terminology for the NHS in England. A standard clinical terminology is essential for the interoperability of electronic health records. Earlier legacy terminologies in use are The Read Codes Version 2 and Clinical Terms Version 3 (The Read Codes)</td>
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<tr>
<td>TRUD</td>
<td>Technology Reference data Update Distribution site; this distribution site for NHS Digital which provides the SNOMED CT release files as well as SNOMED CT derivative products and tools.</td>
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<tr>
<td>UKTC</td>
<td>The UK Terminology Centre is part of the Provider, Support and Integration Directorate within NHS Digital. The service manages, maintains and provides guidance on the use of terminology within the UK.</td>
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1 Introduction

Note. This document should be read alongside the Product Specification. An up-to-date version can be found on the UKTC Documentation webpages.

1.1 Overview

SNOMED CT is the fundamental standard for healthcare terminology. SNOMED CT provides the vocabulary for recording structured data in electronic records that relate to the health and care of an individual; as such its use in systems is wide ranging and thus account of the standard will be needed in all systems that are used in the direct management of care.

SNOMED CT enables standard clinical phrases to be recorded and understood by the user, as well as enabling sophisticated interpretation by the computer. It provides features that enable powerful analytics and a high level of expressivity of information about the health and care of an individual; reporting and data extraction solutions need to be able to take account of SNOMED CT encoded data. The use of SNOMED CT will also enable data exchange in a safe and managed way between different systems in the health and care environment.

To implement the standard requires SNOMED CT to be used as the vocabulary within systems:

- if the system is provided by a vendor then SNOMED CT needs to be specified as a requirement of the solution;
- if the system is in-house, the internal development team need to utilise SNOMED CT in the solution.

This may either be the full set of SNOMED CT or a subset of SNOMED CT.

As a fundamental standard, SNOMED CT will be required in other standards that are approved by SCCI. New standards such as data collections, message specifications, and information standards will have to use SNOMED CT as the source content for data items that relate to the health and care of an individual. These items include data such as diagnosis, procedures, symptoms and interventions; further details are provided in Sections 4 and 8.

It should be noted that implementation dates are for full adoption across the NHS and that individual standards and/or collections may require the use of SNOMED CT before these dates.

The UK is at the early stages of the Paperless agenda and interoperability. It is expected that use in systems will increase in sophistication over the next few years as its use becomes intrinsic to all electronic health and care systems. System providers should take account of this in their development roadmap.

1.2 Purpose of Document

This document aims to provide a general understanding of SNOMED CT and the requirements in relation to its effective implementation in systems. It is provided to support the SCCI¹ Information Standards Notice for SNOMED CT as the mandated standard for terminology within health and care systems in England.

¹ Standardisation Committee for Care Information: http://www.hscic.gov.uk/isce
While its prime role is to support those with responsibility to meet the SCCI ISN (e.g. procurement, roll-out and systems suppliers), it also provides a general overview of SNOMED CT.

This document alone will not provide all the information required; its aim is to give an overview and to signpost additional materials providing greater detail. This will ensure that individuals can access the most up to date information.

SNOMED CT is an international standard, managed by the International Health Standards Development Organisation (IHTSDO) and there is significant documentation from the IHTSDO. This document augments the international documents with specific UK requirements as well as signposting key aspects that need to be addressed within UK implementations.

1.3 Scope

This document addresses the UK Edition of SNOMED CT. For convenience the document refers to the electronic health record (EHR), but SNOMED CT provides content for care in its widest sense including social care requirements.

The UK Drug Extension is derived from the dictionary of medicines and devices (dm+d) with additional content such as relationships to the clinical extension and additional concepts such as Trade Family names but with some attributes omitted e.g. price. The UK Drug Extension is part of the UK Edition and thus included within this document. dm+d is a separate standard ISB 0052 with its own implementation guidance; anyone requiring specific details in relation to medicines and devices should also consult documentation on the dm+d standard.

1.4 Audience

The document aims to address the needs of those with responsibility for ensuring the effective adoption of the fundamental standard SNOMED CT, as well as for those who will subsequently utilise the standard. Specific details on applicability of the standard can be found in the Information Standards Notice.

As such this document includes information for those responsible for policy, procurement, commissioners of care, audit, development of software solutions, analysis and training; whether they are receiving, sending, processing data or producing specifications.

It applies to all NHS organisations, arm’s length bodies, commissioners of care for the NHS, and to all providers of care for the NHS. Private patient care in private organisations may use the standard; where the flow of information for the direct management of patient care comes into the NHS then they must use this standard. Its use in social care is also under active discussion. SNOMED CT is provided under license but there is no fee for its deployment within the UK; for more information see the section on licensing.

It is planned that specific sections of this document will be of interest to a range of individuals including clinicians, developers, information analysts, business analysts and those procuring solutions that state requirements in relation to SNOMED CT.

It is not expected that everyone reads every Chapter and so each is written to stand alone with its own references to relevant further information. Inevitably this introduces some repetition of content.
1.5 The UK Terminology Centre

The UK Terminology Centre (known as the UKTC) manages the UK Edition of SNOMED CT and represents the UK within the International Health Terminology Standards Development Organisation (IHTSDO); the organisation that manages and maintains SNOMED CT internationally. UKTC includes the services that undertake terminology development and support implementation. The Terminology and Classifications Development Service authors and makes changes to content on behalf of the UK as well as providing the releases that constitute the data files of the terminology. The UKTC has representation on its governance board from all UK countries.

The UKTC provide a number of resources to support organisations who wish to use SNOMED CT within their systems and products. If after reading this guide you require further advice please contact the UKTC helpdesk by emailing information.standards@nhs.net.
2 Background

It is widely acknowledged that an electronic health record (EHR) is essential to meeting the increased challenges for healthcare professionals to provide effective care. Examples of improved resource management and improved decision making when electronic records are available are already in evidence. When clinically relevant data can also processed by the computer and the data shared between systems without loss of meaning or understanding, additional gains such as drug alerts, graphing of test results, triggering completion of an assessment form, pre-populating a clinical letter, can also be achieved. To attain such processing of data requires that clinically relevant data is captured in a nationally consistent way through the use of a single national vocabulary within an electronic record system.

SNOMED CT is the product that provides such a vocabulary; it provides clinical phrases for capturing relevant aspects of health and care by all clinical and care professionals across all specialties. SNOMED CT is much more than a vocabulary of clinical phrases; it provides additional information and features that support more sophisticated reporting, electronic decision making and enables the incorporation of business rules and process management within systems. SNOMED CT is known as a terminology and is currently the only international terminology available with the capability to support the requirements of all our health and care professions for EHRs.

SNOMED CT is owned and managed by the International Health Terminology Standards Development Organisation (the IHTSDO). The UK is one of the founder members of the organisation and continues to work collaboratively as a member to support the international maintenance and adoption of SNOMED CT. The IHTSDO currently (June 2016) has 28 member countries who contribute to its development and use within their own health environments; this number is increasing year on year.

SNOMED CT was first stated as the national standard in 1999, and has been re-enforced as the national standard in all subsequent strategies and policy documents. It is one of the 5 priority standards to be implemented as part of the electronic health record and is documented as an action within the policy document: ‘Personalised Health and Care 2020: a framework for action’ published by the National Information Board (NIB). The ability to meet requirements in future national information standards, interoperability programmes and data collections will require systems to have adopted SNOMED CT.
3 Implementing the standard

Implementation of the standard must be undertaken as part of undertaking paperless at the point of care. The national requirement for structured records that support the health and care of an individual and allow data to be transferred between systems must be implemented using this fundamental standard for clinical content. As such the standard is required in a wide range of applications, not restricted to but including:

- The electronic patient record system
- Electronic health records
- Electronic care plans
- Specialist systems such as Cancer MDT systems
- Decision support tools
- Clinical Knowledge Resources
- Clinical Guidance
- Care Pathways
- Messages between care solutions

To achieve implementation, health care providers must specify in the solutions they procure or develop in-house the requirement for the clinical vocabulary within that system to be provided by SNOMED CT. Development of a local dictionary is both wasteful of resource but requires new staff to learn alternative terms and structure while preventing electronic records being communicated outside the enterprise without some process of mapping which inevitably introduces clinical risk. The requirement for interoperability is part of national policy.

As well as requiring SNOMED CT in all systems within the organisation that relate to the health and care of an individual, it will also require that reporting and analysis tools can utilise features provided by SNOMED CT so that benefits over and above straight lexical matching can be undertaken for data extraction and reporting.

In overview, adoption of SNOMED CT means:

- The end user can enter data using terms from within SNOMED CT;
- Data can be communicated outside the organisation with appropriate data items coded using SNOMED CT codes;
- National query specifications written using SNOMED CT can be processed by the system.

The implementation approach within systems, design of the user interface and utilisation of the features of SNOMED CT may vary between applications. The requirements section (8) in this document provides aspects to consider when developing or procuring solutions that utilise SNOMED CT and Section 9 aims to provide information for those developing systems to consider. Section 11 provides a look at different solutions that already incorporate SNOMED CT.

It is therefore not possible to provide a detailed step-by-step guide on implementation; however Chapter 6 outlines a structured set of questions to assist the decision making for those required to implement the standard in their organisation, and Chapter 7 provides a set of questions to help developers adopt SNOMED CT within the solutions they provide. This document highlights aspects for consideration by those procuring solutions or those developing solutions that must incorporate this standard.
4 An Overview of SNOMED CT

4.1 Why do we need a common national terminology

Most electronic systems provide a pre-existing list for data entry for particular data items the system requires, for example Title, Country of residence, their product catalogue. Such lists are provided for many reasons: for example they can speed up data entry; they can eliminate typographical errors; and for something like ordering a product they ensure consistency and clarity on which product is being ordered.

For similar reasons, in electronic health record systems if say diagnosis was entered as free text, it is questionable whether the computer could interpret and thus process the response with a high degree of confidence. While clinical language is more predictable, any interpretation by a computer would still need confirmation by the user if just free text is allowed; much like web searching gives a list of alternatives or asks ‘did you meant xyz’. In clinical systems we require a very high level of confidence that the computer can interpret correctly what has been written. It is therefore necessary that clinical content for data items such as diagnosis, procedure, allergies, medications, family history is selected from a pre-defined vocabulary. If that data is to be exchanged with other systems and move data in real time between different health care professionals using different EHRs; it is essential that vocabulary is the same across the health and care estate.

Electronic health records will only be able to meet expectations nationally in terms of data exchange and supporting the end user in their care of the patient (for example through decision support and access to knowledge resources) if all systems use a common single national terminology. It has been determined for the NHS in England that this is SNOMED CT. While only mandated in England, its use is encouraged in all the UK countries.

4.2 What does the terminology provide

The clinical phrases (known as clinical terms) that a health care professional would want to record in a patient record in relation to aspects of their care are provided within the terminology. In addition, the different phrases used by clinicians to refer to the same thing are accommodated by providing for multiple terms linked to the same clinical concept. The clinical concepts provided cover a wide range of data including diagnoses, clinical findings and observations, anatomy, procedures, medicines and devices, causes of disease as well as administrative terms such as ‘Did not attend’. All terms authored within the terminology must have evidence of use in clinical care and unambiguously represent clinical thoughts. They must have national relevance and in many cases they are internationally relevant; the UK has the ability to add clinical terms that are relevant to the UK only such as for national screening programmes.

Terms within the SNOMED CT terminology range from things like left and right, leg, leg ulcer, blood pressure, appendicitis, appendicectomy to very specific diseases such as von Recklinghausen’s bone disease and cochlear Ménière syndrome. These illustrate just a few of the terms within SNOMED CT but hopefully illustrate the depth and breadth of the terminology. In the UK Edition of SNOMED CT there are currently (April 2016) over 650,000 different clinical concepts.

In the previous section we highlighted that a terminology was more than just a dictionary of clinical terms and concepts. In addition SNOMED CT contains relationships between the clinical concepts: for example toe is-a foot structure, Ménière’s disease is-a peripheral
vertigo which is a labyrinthine disorder. These relationships enable systems to provide users with a powerful mechanism to select patients according to the criteria they are looking for, for example when searching for all stroke patients, a patient with a diagnosis of *infarction of basal ganglia* will be matched as the terminology ‘knows’ this is a type of stroke.

In addition to these relationships, the terminology also holds other information: for example that *appendicitis* has a finding-site of ‘appendix structure’ and that the associated morphology is ‘inflammation’; that carpal tunnel syndrome has a finding site of ‘median nerve at wrist’ and an associated morphology of ‘entrapment with compression’. These are known as attribute relationships or defining relationships.

Relationships (is-a and attribute) enable sophisticated processing by software that can support decision support as well as reporting. As systems become more mature, the terminology will also enable the expression of complex health scenario’s by combining the different clinical phrases: for example the first episode of a severe myocardial infarction.

So the terminology provides software systems with a comprehensive vocabulary for use in the application (for example the EHR), in addition relationships within the terminology support how that vocabulary may be made visible to the user (e.g. all procedures) and also provides a powerful mechanism for identifying patients for a particular requirement (e.g. all stroke patients). To the end user, the terminology may be just a long list of data but there are applications available called browsers that enable a user to search through the terminology and examine the relationships that link the clinical phrases. Some systems also use these relationships to help the end user ensure they have the right term(s) for the activity they are undertaking (e.g. entering data or searching for patients).

In healthcare, different clinicians may use a different clinical phrase to another, yet mean the same thing. SNOMED CT supports this by allowing more than one clinical term for the same clinical ‘thought’ or concept. There is one preferred term for each concept and optionally one or more synonyms. It also contains nationally common abbreviations such as COPD, though never without being expanded in full (this means when data is transferred it is still interpreted correctly).

So a terminology at its simplest provides a dictionary of clinical terms for use in clinical applications, but contains many features that enable sophisticated management and processing of patient data.

### 4.3 What content does SNOMED CT provide

SNOMED CT evolved from the legacy terminologies: *the Read codes* and was combined with SNOMED RT in the USA. The work undertaken in the 1990’s as part of the UK clinical terms project was brought into SNOMED CT. As such, the content within SNOMED CT has been under development and actively maintained for over 30 years. Since then efforts both nationally and internationally have expanded content and kept content current. As interest has increased significantly over the last few years a number of clinical volunteers representing their professional body have worked with the IHTSDO and the UKTC to develop the content to support their requirements. The work being undertaken by the World Health Organisation (WHO) to develop ICD-11, which will utilise SNOMED CT, has also resulted in enhancing the terminology. This means that for most clinical specialities SNOMED CT provides the required clinical terms, and work is ongoing to ensure the content remains current and relevant. Individuals may also request content. Currently, at the time of writing, there are 28 countries committed to using SNOMED CT and contribute financially to its maintenance.
SNOMED CT provides content to support all health and care professions, and all clinical specialties. A number of clinical specialties in the UK have created subsets of the clinical terms (terms identified from within SNOMED CT that are relevant to the specialty) to highlight to their members terms to be used. Some systems also enable these subsets to be available as part of the approach for data entry. The number of these is growing as the professional bodies develop their strategy for standard record keeping. To illustrate the diversity here are just some clinical specialties that have engaged with the UKTC: renal, rheumatology, thoracic, paediatrics, gastroenterology, dietetics, speech and language, orthopaedics, occupational therapy, physiotherapy, ophthalmology, cosmetic surgery, pathology, urology, cardiology, radiology, dentistry, oncology, …

For further information on subsets available nationally please refer to the Data Dictionary for Care which provides a searchable repository of all the national subsets: https://dd4c.hscic.gov.uk/dd4c/.

The data items that can be captured using SNOMED CT currently vary from system to system. Those items currently prioritised by the Transfer of Care programme for example include diagnosis, procedures/interventions (including therapeutic), allergies and medications. The UKTC would suggest these are the minimum and that organisations and clinicians should also consider to record symptoms, current problems (comorbidities), family history, body site, observables/clinical findings (for example blood pressure). In addition, where organisations are implementing care planning records then goals/outcomes should also be recorded using SNOMED CT.

### 4.4 Pre and post coordination

It is undesirable for every single possible clinical phrase to be authored within the terminology; this increases the content significantly and thus the results of data entry searches making finding the required term more difficult. For example, if every possible area of anatomy was provided with versions for left, right and bilateral, this would increase the number of terms within the terminology almost three-fold. This would make the terminology inordinately large. Many systems therefore provide laterality as a separate field to be added when appropriate.

Clinical concepts provided within the SNOMED CT release are known as pre-coordinated concepts, for example ‘fracture of the femur’ is a pre-coordinated concept. SNOMED CT provides the ability to express detailed clinical information in a structured manner without having to create a pre-coordinated concept for every detailed clinical phrase. This approach is called ‘post-coordination’. The grammar defined as part of SNOMED CT defines how clinical phrases can be expressed by combining two or more concepts together to create a post coordinated expression.

So in our fracture of femur example, the expression for ‘fracture of left femur’ would be ‘fracture of femur’; laterality=left. These can be more complex such as the example, “third degree burn of left index finger caused by hot water”. Using the grammar (or compositional syntax) of SNOMED CT it can be represented as: burn of skin; morphology = third degree burn injury; laterality = left; causative agent = hot water; finding site = index finger structure. We would not expect a clinician to write such an expression, but software can be designed to facilitate the creation of such expressions. Such expressions held within a data warehouse can significantly increase the ability for sophisticated analysis.

Further illustrations are provided within the IHTSDO Technical Implementation Guide.
4.5 Browsing the terminology

SNOMED CT is provided simply as a set of data files; to be able to view and search the clinical terms available one needs to use either a clinical application or to use a generic browser that allows you to simply navigate around the terminology. There are a number of free to use browsers available. These are either on-line or can be downloaded onto your computer. The advantage of an on-line browser is that the organisation that hosts this applies the updates when a new release is available. If this is on your computer, you will have to do this yourself using features in the application and downloading the appropriate data files.

Details of browsers that provide the UK Edition of SNOMED CT can be found on the UKTC website at: http://systems.digital.nhs.uk/data/uktc/snomed/browser.

4.6 Subsets

Subsets provide for a part of the terminology to be provided. Subsets are therefore a useful method for helping to restrict the content of SNOMED CT made available for some function in the application; for example only providing 'left, right and bilateral' for a field for laterality; providing a list of procedures for the stroke clinic data entry form.

Subsets can be specified by listing the terms to include or by a query on the terminology (e.g. the concept 'stroke' and all children of stroke). This means that subsets are also dynamic; terms can be made inactive and if using a query new terms may become part of the subset.

The UK Edition of SNOMED CT includes a number of subsets; some are to support system functionality (e.g. document types), others support user interaction (e.g. Renal subset).

Further information is available on subsets on the UKTC webpages, of interest may be the report from the Professional Bodies subset project. In addition, further reference is made to subsets at various points in this guide.

4.7 Requesting Content Changes

SNOMED CT is dynamic and designed to accommodate the constantly evolving needs of health and care so that it can be updated to reflect those changes. Content must be nationally relevant rather than only having meaning to a region or locality. The UKTC authors new content or makes changes to existing content in response to requests from individuals, solution providers, professional bodies or national organisations such as NICE, Public Health England and NHS England. New requests are assessed against ‘editorial principles’ that are applied internationally and nationally.

If you wish to request changes to existing content please use the Request Portal which can be found at: https://isd.hscic.gov.uk/rsp-snomed/user/guest/home.jsf

Requests for change to national subsets are also submitted through the same portal.

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6 http://systems.hscic.gov.uk/data/uktc/snomed/subsets
4.8 Licensing

SNOMED CT is issued under licence but is free to deploy within the UK. Organisations deploying SNOMED CT within their product need to register for a licence; but the individual users do not. Any individuals downloading the SNOMED CT data files for use say in research will need to register for a licence.

UK organisations deploying their solutions outside the UK need to establish whether that country provides an Extension, and whether they are a member of the IHTSDO, but typically should not deploy the UK Edition. For further details see the licensing information on the UK and the IHTSDO websites.

4.9 Further information

The above provides a brief overview of SNOMED CT, if you would like more information and/or the ability to ask questions you may find the following of interest:

- The UKTC Training and Resources
- The IHTSDO Starter Guide
- Live WebEx (available monthly) providing an ‘Introduction to SNOMED CT’ (Note. A recorded version of this is also available)
- To help find clinical terms within SNOMED CT attend the Live WebEx ‘Finding Content in SNOMED CT’ (Note. A recorded version of this is also available)
- FAQ’s on the adoption of SNOMED CT in primary care: http://systems.digital.nhs.uk/gpsoc/snomedct
- Raising questions or requesting other training information: snomed@nhs.net
- The IHTSDO learning resources
- The SNOMED CT document library

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7 http://systems.hscic.gov.uk/data/uktc/snomed/licensing
8 http://www.ihtsdo.org/snomed-ct/get-snomed-ct
9 The UK Terminology Centre training and resources: http://systems.digital.nhs.uk/data/uktc/training
10 The IHTSDO learning resources: http://www.ihtsdo.org/snomed-ct/learn-more
5 Rationale for a single national terminology

5.1 Benefits of a single national terminology

Many benefits can be accrued simply from having an electronic health record, for example being able to review the information in multiple places at the same time, records not going missing, speed of electronic communication vs paper and being able to find information quickly. Implementing an EHR without a national standard vocabulary would mean that important data such as current health issues, allergies and procedures undertaken cannot be exchanged in a way that enables systems to reliably process such data. This would severely restrict the expected benefits we have of an EHR in providing decision support, clinical alerts and supporting business processes.

The use of terminology within a patient record can also be utilised to support the allocation of classification codes to a completed episode of care. With the current situation where the classification business rules are held within text, cross-maps provided by the National Classifications Service can be incorporated within encoder software to improve the efficiency of the allocation of ICD-10 and OPCS-4 codes. It should also be noted that SNOMED CT is integral to the WHO plans to develop ICD-11 (see Section 10).

The benefits from using SNOMED CT itself over any of the other terminology coding schemes available can be summarised as follows:

- **It provides a single clinical language for direct care across all care settings, all professionals and all clinical and care specialties:** Clinicians often use multiple systems; a single language ensures that clinical information is recorded in the same way across all systems thus providing consistency and ease of use. A single language enables specifications for clinical tools, data extracts, clinical audit etc. to be written once; having multiple terminologies introduces clinical risk, increased cost from managing multiple specifications and it is not always possible to produce equivalent specifications across different terminologies.

- **An enabler for Interoperability:** The use of SNOMED CT across all systems ensures that data can be transferred between systems without the need for mapping and can reliably be processed and interpreted by both systems. A single terminology prevents the need for systems to map between the different terminologies which introduces clinical risk, additional resource and thus costs.

- **Extensive Analytics capability:** SNOMED CT is more than just a vocabulary; it contains additional features and data that enable extensive analytics of clinical data using a wide range of analysis techniques to support clinical audit and research work.

- **International:** SNOMED CT is an international terminology; this gives the potential to support cross-border data communications and overcome language barriers; but also provides a more efficient market for vendors developing systems. As an international terminology many countries contribute to the development of content enabling development in relation to rare diseases and genetics to be a shared effort, thus reducing the overall cost compared with maintaining a national terminology.
• **Building for the future:** SNOMED CT has been developed to ensure it can support current and future requirements. Its design has addressed challenges experienced in earlier terminologies such as running out of actual codes in the right place (as with Readv2, but also experienced with postcodes, number plates and telephone STD codes previously), the inability to deal with out of date content, the ability to categorise a clinical term in more than one way (e.g. Respiratory Infection is an infection and is a respiratory disease).

### 5.2 Risks from multiple terminologies

There are three terminologies in active use currently within the NHS: Read v2, Read v3 (also known as CTV3) and SNOMED CT. The Read codes are both deprecated standards and on schedule for retirement and final withdrawal; SNOMED CT is the only current standard. SNOMED CT has evolved through developments initiated through the use of the Read codes, with the intention that the legacy terminologies were superseded with SNOMED CT.

Currently the NHS has to implement methods at the interfaces between data exchanges to deal with the scenarios where different systems use the different terminologies. This incurs additional products such as mapping tables as well as requiring clinical assurance. Inevitably it is not possible to eliminate all clinical risk from translating between different coding schemes. As well as clinical risk, there is additional resource burden on those processing such data as generally query specifications and code cluster specifications have to be developed for each terminology. In the situations where it is not possible to map, then these have to be manually addressed, for example in GP2GP a member of staff has to resolve all items that could not be mapped.

SNOMED CT has evolved to address shortfalls identified with the Read codes and to take advantage of technology improvements. There are a number of reasons why it is not viable to use the Read codes across the whole NHS estate for all clinical specialities; it is for these reasons that the decision was made to migrate all systems to use SNOMED CT. Continuing to use multiple terminologies across the health and care system brings with it clinical risk, additional resource costs but also prevents some of the technology improvements in development to facilitate an interoperable electronic NHS.

Further information on why we need to adopt SNOMED CT in place of the Read codes is provided in the FAQs on the GPSoC webpages.
6 Steps to Implementation: Care Providers

This chapter walks you through a series of questions to consider in relation to adopting the standard across your organisation. As SNOMED CT provides the clinical vocabulary to be used across all systems that relate to the direct management of care, the standard will need to be adopted in every such system used by clinical users. Each system must comply with the standard.

6.1 Planning Adoption of the standard

Which systems will be impacted within your organisation? If you have multiple systems how will you plan the adoption of the standard?

Adoption of SNOMED CT is part of the achievement of ‘Paperless 2020’; as part of your current plans to achieve electronic health and care records you need to ensure that all solutions implemented utilise SNOMED CT.

Are these provided externally or through in-house development?

If external:
- Can your current supplier(s) provide a SNOMED CT solution?
- Can you obtain a SNOMED CT solution under the current contract?
- SNOMED CT has been a mandated standard since 2011; we would expect all major suppliers to be able to offer a solution that meets the requirements for this standard.

If internal:
- Ensure the internal development team have this in the development roadmap within the required timeframes

What senior management briefing / training needs to be undertaken to ensure there is an understanding of the requirements, impact and benefits that can be gained?

Implementation of the standard should be undertaken as part of the ‘Paperless’ initiative. Experience has shown it is useful to discuss what can be achieved by implementing SNOMED CT to ensure appropriate messages are given and that plans are in place for integrated health records, electronic discharge letters etc. Implementations benefit from undertaking management of business change, as inevitably the introduction of systems that directly impact clinical processes lead to business change.

It is also useful to understand if the organisation would benefit from obtaining specialist skills in SNOMED CT to support the organisations adoption of the standard. Some organisations have employed a SNOMED CT lead and others have undertaken training of key clinical and administrative leads, as well as impacted teams such as clinical coders in hospitals. It is recommended that senior management leading the introduction of the standard have an appropriate briefing to ensure benefits are realised, contact information.standards@nhs.net if you require further guidance.

6.2 Implementation and roll-out of the electronic solution

Can the system be configured to use subsets?

Depending on the solution selected, it may be possible to configure the system to use subsets of SNOMED CT for particular users, particular specialist areas and/or particular data
entry forms. Note that some national datasets already have specified subsets for particular data items; these are detailed in the NHS Data Dictionary. These subsets may restrict what data is to be sent nationally, but do not necessarily imply you should restrict data entry to just that subset.

The UKTC provide as part of the release a number of specialty subsets, most have been developed in liaison with a professional body. As these are developed to be nationally relevant, it is highly likely that these will need tailoring for your organisation. If no national subsets are available, these may need developing in-house. Speak to your supplier who may have a standard set of subsets that can be used as a starting point and can be refined for your organisation. This aspect needs to be planned within the preparation for system configuration.

How will you provide training to end users?

Some training on SNOMED CT needs to be provided to all end users; experience has shown that if no training or understanding of SNOMED CT is provided, this hampers end users in their use of the system. The on-line presentations provided by the UKTC (An introduction, and Finding content) have been reported as being sufficient end-user training. You can contact the UKTC for downloadable copies of these that can be hosted on-site either on the web or as part of a Learning Management System.

Specialist teams such as the clinical coders in hospitals, summarisers in GP practices, data quality facilitators and information analysts/those writing reports, will inevitably need more training in SNOMED CT. This is available from a number of external training companies but the presentations provided by the UKTC also give a good grounding. The eLearning courses from the IHTSDO also cover the knowledge requirements; but probably go beyond what is needed (the IHTSDO are currently investigating making the course material open and freely accessible).

6.3 Implementing a new release of SNOMED CT

The content of SNOMED CT is continually updated with a new release being provided every 6 months. To keep systems up-to-date it is recommended that a new release is implemented within 2 months of the release date. As part of the requirements of the system, organisations should ensure that updating the release of SNOMED CT in the system is addressed.

Does your solution provider update the release of SNOMED CT in the system or is it something that must be undertaken within the organisation?

In many managed solutions the update to the terminology is undertaken as part of the service provision; where a solution is implemented on the organisations own infrastructure, it may be that the update has to be undertaken in-house. If the update needs to be undertaken in-house, ensure that tools are provided to assist.

If in-house, the first time this is undertaken will take longer than subsequent updates. Organisations should use a team of IT and clinical staff, as a number of decisions will need clinical oversight. Feedback from a large hospital trust suggests that the first time this is undertaken will take between 1 and 3 weeks of time including planning and testing. Subsequent updates are reported to take 2-4 days.
What type of changes in a release can happen that I need to take account of?

The following components may change in the following ways:

- Concepts: new concepts added, concepts made inactive.
- Terms (descriptions): new terms added, terms made inactive, terms changed (minor typing mistakes may have been corrected).
- Relationships: new relationships, relationships made inactive, additional inferred relationships from classifying the terminology.
- Subsets: new subsets, new members to a subset, members made inactive within a subset, a subset being ‘retired’ (made inactive)

These may impact your pick-lists and reports; tools provided with the solution should enable you to identify changes and address these.

If a component has been made inactive, can that still be used?

Components are made inactive for a number of reasons, but generally this is an indication that they should no longer be used. It is accepted for reporting that it might still be necessary to use inactive components. Part of the process of managing an update is to decide what to do about inactive content – when content is made inactive replacement terms are suggested. It is recommended that the clinical lead(s) review terms that have been inactivated and either accepts the replacement that has been suggested or otherwise defines their own replacement for the inactivated term.

How can the technical team inspect what changes have occurred between this and the next release?

The release files for the UK Edition of SNOMED CT contain a release type Delta which provides all the components that have changed between this release and the previous. For example the delta concepts file provides just the concepts where changes have occurred; the delta relationships file is just changes to SNOMED CT relationships etc.

Where in the system might these changes impact?

Changes could impact aspects of the system that directly use the terminology. The following lists the main things to consider:

- Decision support rules (e.g. drug alerts)
- Subsets used to support data entry
- Data Entry Forms e.g. pick-lists
- Favourites lists
- Standard pick-lists lists such as theatre procedures with resource allocations
- Future Orders / booked procedures in patient records
- Reports / data extractions
- Formularies / shortcodes / abbreviations
- Business protocols / mail merge documents
- Content in systems that derive their data such as data warehouse
- Encoder software for allocating the classification codes (ICD-10 and OPCS-4)
**What do we do about inactive content in patient records?**

Inactive content can be left as is in patient records and systems must still be able to retrieve this OR (with appropriate audits) content can be over-written with what is clinically agreed as the most appropriate current term. The supplier must provide appropriately for inactive content. Consult your supplier as to how the system deals with inactive content and what your organisation needs to do. Advice can be sought from the UKTC Implementation team via snomed@nhs.net.

**What might a typical update process involve?**

a) Upload the new release to the test environment.

b) Using system tools identify inactive terms/concepts in use within the system: this could be any of the items listed in the section that illustrates how a system might be impacted.

c) Identify the replacement term(s) and obtain clinical sign off: when terms/concepts are made inactive then possible replacement terms/concepts are usually indicated. These can be provided to representatives of the end user community allowing them to decide or confirm which terms the system is to use.

d) Using the relationships in SNOMED CT identify possible new terms that might be in scope for existing subsets or to communicate to end users as available for data entry.

e) Consult the IHTSDO and UKTC release notes for areas within the terminology that have changed, and inform specialty leads.

f) If temporary codes are available within the system and have been requested for authoring, match these with the authored terms and update the temporary codes with the appropriate SNOMED CT term throughout the system.

g) Identify inactive terms in future orders/tasks that will need replacing.

h) Test the changes proposed in data entry (both forms and live data entry).

i) Test the changes to reports and data extractions.

j) Test the changes to business rules such as drug alerts.

k) After all tests have been passed, communicate the changes to end users in a timely manner with notice of planned live update.

l) Promote the updates to the live system.

m) Inform end users of the change as they may wish to browse the terminology in relation to their specialty for new terms that have been added.

**Note.** Your system may also incorporate third party products (for example for decision support, encoder software) which may also require updating.
7 Steps to Implementation: Developers

This Chapter walks you through a series of questions to consider in relation to adopting the standard in an application. These decisions need to be made irrespective of whether you are developing a new product or incorporating into an existing product. Further details are provided within other Chapters of this guide, especially Chapter 9; the aim is not to clutter this checklist detail.

**Does the system have to support SNOMED CT use now, or is it expected to in the near to medium term?**

- SNOMED CT has replaced the Read codes; if your current solution uses Read codes (either Read v2 or CTV3/Read v3) you will need to use SNOMED CT instead of the Read codes.
- Does your application use coded or pre-defined entries for data relating to the direct management of care of the individual? If so you should consider replacing these with SNOMED CT.

**Do you have a basic understanding of SNOMED CT?**

The first step is to understand what SNOMED CT can offer to enable you to make the appropriate design decisions in relation to your application. The following presentations are designed to help you gain that understanding. They are available as live presentations via WebEx and as pre-recorded versions:

- An Introduction to SNOMED CT will provide an overview of the structure, the type of content it provides and a look at its use in some applications.
- Finding Content in SNOMED CT will enable you to explore the content within SNOMED CT as well as understand its structure.
- An Introduction to the data files in RF2 will illustrate how the data files that constitute SNOMED CT are structured and provides information about the release file types provided (currently only available as a recorded version).
- Clinical Data Analytics – will introduce what is possible using SNOMED CT and go through a demonstration using a demonstrator tool that is available free under OGL.

**Does the application need all of SNOMED CT?**

There are a number of approaches to the use of SNOMED CT in applications and this depends on the needs of your application. The following provides key decisions to be made:

- Which data items in your application are required to use SNOMED CT, consult the data dictionary in relation to any standards or datasets you need to comply with.
- Which data items are to be completed using pre-defined content and is this in scope of SNOMED CT, if so it is better to commit to using SNOMED CT than defining your own dictionary which you will need to maintain.
- Is your application aimed at a particular speciality and so only needs speciality specific content (so may only need a subset of SNOMED CT. Note more than one subset may be needed for if content such a current problems, symptoms etc. are also required) or is it a general EPR (so needs all of SNOMED CT). If you application is...
say an mobile application or you have established you just need one or more subsets, is there a subset provided nationally that meets your needs, will this be defined by those who use the application, or is this something to be raised with those procuring the product?

**How will users access and select the terms within SNOMED CT?**

Will the terms available for a data item be configurable by the user or determined by the application (e.g. as part of the IP of the product or via a national standard)? It may be that a combination of approaches is required depending on the actual data item.

What support for subsets will your application provide and how will these be configured. Will the application make any of the national subsets available either at configuration time or user specified? Consider the provision of favourites that are user configurable and if so how will these be structured and searched.

If using a subset, depending on its size you may decide to use radio buttons (e.g. laterality), pick lists (e.g. operations undertaken in a particular theatre), or search techniques (e.g. a diagnosis). If the subset is large, do you also require relationships from SNOMED CT to help structure the subset to assist users in their selection approach?

If using all of SNOMED CT how will users search and select from SNOMED CT, what methods of ordering search results will the application use? Guidance exists on techniques.

**How will the application data tables/data model accommodate SNOMED CT?**

Firstly will you upload the terminology (or a subset of it) into the application, or will you use a 3rd party product to provide the terminology functionality within the application?

If you plan to incorporate in the product, SNOMED CT is distributed in an application agnostic way. It is therefore important to design the data model necessary to most efficiently enable the application to access the terminology. Once this has been done an import routine will need to be developed to obtain subsequent releases.

How will the application store the selected code(s) to ensure end users see the description they selected and to be able to effectively retrieve data? (Concept Id and/or Description Id).

Will the application use particular data archetypes / data models for specific data items? For example national specifications exist for allergies and document types.

What message specifications exist that require SNOMED CT content for the particular data items, will the application reflect this model or translate from the application data model when sending data? What implications does that have for system reporting/extraction?

**How will the application deal with new releases?**

SNOMED CT is distributed via three different types of files: full, snapshot and delta. You need to decide which approach you will use to obtain the content of the next release.

Whichever approach you use: subsets or the full release, the content in SNOMED CT changes. New content is added and content may become inactive. This has implications for the data already in the database, in the design (e.g. data entry forms) and reports/business rules. Planning your design so that you can manage this aspect of the terminology is critical.
Are there existing dictionaries/keywords in the application

If adopting the standard in an existing product that already uses a dictionary, terminology or keyword lists:

- Is the terminology a national standard (Read v2, CTV3, SNOMED RT, SNOMED II or SNOMED 3.5); if so mapping tables are provided nationally to help map existing data to SNOMED CT. (See 9.8)
- Are the keyword lists / dictionary locally defined (either specific to the application or by the end user), how will these be mapped and clinically assured as equivalent, and at what point will these maps be applied (e.g. when sending data externally, or migrating existing data). It is appreciated systems have many man years of investment in their development and business rules so how best to accommodate SNOMED CT needs to be decided. It may be useful to review the Advanced Guidance documentation for primary care where the requirements for the replacement of Read codes by SNOMED CT are provided.

Are there any national products or open source routines available that may help development?

The UK Terminology Centre provides some products to aid implementation, for example national subsets and a prototype product the Data Migration Workbench; consult the UKTC website for information in relation to the standard. Note. The UKTC operate a life cycle approach for products and not all products are fully supported on an ongoing basis.

There are a number of open source platforms that may provide useful components for you to use in your application. The IHTSDO also make a number of their tools available as open source, for example their browser.
8 Requirements

SNOMED CT is a fundamental standard; as the national terminology in relation to direct management of care, its required use is widespread. Requirements can therefore only be expressed at a general level.

New and updated national information standards approved by SCCI are required to take account of SNOMED CT; information standards will therefore increasingly contain specific requirements on SNOMED CT. A number of current datasets require SNOMED CT and/or indicate data items that will be required in SNOMED CT in future revisions.

SNOMED CT is not a stand-alone standard but incorporated within electronic systems, it is critical that all future procurements and system developments take account of the high level requirements and require that SNOMED CT is used within systems deployed.

It is not planned to develop instantiations of this standard; these requirements must therefore be addressed in all systems that are within scope (see Product Specification for details).

8.1 High Level Requirements

In essence, the requirement is that health and care systems must use SNOMED CT to provide standard phrases utilised within the software solution. Where an application simply uses a vocabulary or dictionary rather than the full set of features provided by the terminology (for example an app for completion of an asthma review), those terms provided (along with the relevant codes) must be valid terms from within SNOMED CT.

The national requirements are that:

- SNOMED CT to be the terminology utilised for terms within all electronic communications. National message specifications will require data relevant to the health and care of the individual to be captured using SNOMED CT when transmitted between systems.
- Staff to be able to enter data into the clinical system using the terms from within SNOMED CT. National guidance and national recording requirements will increasingly specify requirements utilising the terms within SNOMED CT. For example NICE guidelines in relation to medical technologies; PHE national screening programmes; NHSE national guidelines in relation to frailty; and national consent models – all contain requirements expressed using the terms within SNOMED CT.
- Data extractions (including reports) to be specified using SNOMED CT for clinical and care related content. National dataset reporting; national extractions to organisations such as national registries; national data returns (for example QOF - Quality Outcomes Framework) or GPES (General Practice Extraction Service) in primary care, to be specified using SNOMED CT and thus systems must provide reporting functionality that can incorporate queries written using SNOMED CT.

This must be done in such a way that both the term text and the code of the concept within SNOMED CT are available for processing and onward communication.
8.2 Timelines

The use of SNOMED CT across solutions within the health and care environment is a key action for Paperless 2020 and is highlighted in the ‘Personalised Health and Care 2020: Framework for Action’ to enable interoperability.

As such the SCCI standard requires:

- Systems used by General Practice service providers must adopt SNOMED CT as the healthcare terminology within the system before the 1 April 2018. SNOMED CT must be utilised in systems in place of the Read codes before 1 April 2018.
- Secondary Care, Acute Care, Mental Health, Community systems, Dentistry, Optometry and other systems used in the direct management of care of an individual must use SNOMED CT as the healthcare terminology before 1 April 2020 within all electronic patient level communications across the health and care environment.
- Other providers of health related services where the flow of information for the direct management of patient care comes into the NHS must use this standard by 1st April 2020.

SNOMED CT within social care is under active discussion and may be used by systems in this environment as the terminology for health and care related terms; this is not currently within scope of the standard but may be included in future updates.

8.3 Clinical Safety

Implementation of SNOMED CT may require modification to the health IT system in which the code is recorded. The safety implications of any such modifications must be considered by the system manufacturers under SCCI 0129 and by system user organisations under SCCI 0160. Both SCCI 0129 and SCCI 0160 are mandated for use by NHS England under Section 250 of the Health and Social Care Act 2012.

It is expected that Manufacturers and Organisations will take ownership of this risk and make the necessary additions to their respective Clinical Safety Case Reports. User Organisations are mandated to ensure that the Manufacturer and the health IT system comply with SCCI 0129.

Implementation of SNOMED CT in GP systems is being managed through a programme within NHS Digital; safety hazard logs, test requirements and test artefacts are, at the time of writing, in development. These are available through the GPSoC supplier website (a username is required) or by contacting SnomedPrimaryCare@nhs.net. An overall assurance framework is provided on the GPSoC website.

8.4 Specific Published Requirements

The NHS Data Model and Dictionary provides details of information standards and any data items within those standards that are required to be provided coded using SNOMED

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11 Implementation of SNOMED CT in an organisation may be achieved through purchasing a system that has been designed to incorporate SNOMED CT, or by modifying an existing system.

CT. Where subsets are also required to be used these will be detailed within the NHS Data Model and Dictionary.

The specific requirements for adoption of SNOMED CT in systems needs to be set by the particular use case and associated contract. To aid those responsible for providing SNOMED CT compliant systems, as list of requirements has been created and is published on the UKTC Documentation webpage within Training and Resources. This will be actively maintained and we would welcome feedback from anyone using these requirements via emailing snomed@nhs.net.

The requirements for solutions operating within GP Practices have been specified within the GPSoC framework and are published on the GPSoC webpages for the SNOMED CT in primary care programme. Those producing GP solutions must meet the requirements provided here. To access the full set of specifications contact the GPSoC helpdesk for access via gpsoct.technicalimplementationguide@nhs.net; specifications are then available at: https://www.portal.nss.cfh.nhs.uk/sites/gpsoct/supp/default.aspx.

8.5 Detailed Requirements

This section provides information pertaining to the specific requirements for those deploying solutions in the UK.

8.5.1 UK Edition of SNOMED CT

Within the UK, systems must use the UK Edition of SNOMED CT. The UK Edition contains UK English descriptions in addition to the US descriptions provided in the International Release; it also provides UK concepts with UK descriptions and relationships.

UK acceptable descriptions only may be provided in solutions; to obtain these suppliers should utilise the UK Realm Description reference set (provided as part of the release; see UK release notes and the Technical Implementation Guide for more details). Technical details on the use of the UK Realm Description Refset is provided on the UKTC Documentation webpage.

8.5.2 Applying Release updates

The UK Edition is updated every 6 months; a new release being valid for use from 1st April and 1st October each year. Systems should be updated within 2 months of a release; but depending on the specific use case this may differ.

Those procuring solutions must specify the update timeframe required and ensure they have the appropriate mechanism in place to manage new releases. Those using SNOMED CT within a standard e.g. a dataset should specify any update requirements. It should be noted that without this requirement being made explicit, systems may not have some terms available to end users for data entry. Tools should be provided by suppliers providing solutions to enable new releases to be incorporated into the solution OR the supplier should provide this service.

Suppliers must not update the subsets in a system without updating the release of SNOMED CT in use in a system.

The national dictionary for medicines and devices, often known as dm+d, is the required standard for medicines and devices. dm+d content is provided in two formats: an xml format

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and as part of the UK Edition of SNOMED CT (UK Drug Extension). There are differences in the data items provided between the two (e.g. prices are in dm+d but not UK Drug Extension) and it should be established which product meets the solutions requirements. The UK Drug Extension is updated every 4 weeks. Further details are in the dm+d and UK Drug Extension release documentation. Further information can be obtained from information.standards@nhs.net.

8.5.3 Data Entry

End users must be able to enter clinical terms direct into the electronic patient record. How those terms are made available is part of the user interface design of the solution, and may vary considerably depending on the application. Techniques such as:

- searching using the beginning of words in the clinical term, for example ‘fract femur’ for ‘fracture of femur’ (in any order)
- subsets to provide just procedures or just paediatric terms,
- shortcodes, abbreviations, equivalent terms etc.
- Graphical user interfaces
- Natural Language Processing approaches (possible linked to digital dictation)

can be used in order to provide a good user experience for data entry. For more information see the IHTSDO Search and Data Entry Guide in the IHTSDO document library.

Users must be able to search on the Fully Specified Name (FSN) or any of the synonyms where text searching is the method for data entry. It should be possible for the user to select and enter any of the SNOMED CT descriptions, although it is generally advised that systems should not utilise the FSN in a patient record. Users should see on future viewing of the record the term they entered. It is useful to see the FSN on say a hover over of a synonym as that provides the hierarchy information to help ensure an end user selects the correct term. The UK Edition does provide preferred terms for each concept which represent the most commonly used description; this is provided by the Realm Description Refset which is part of the release files.

Systems should wherever possible, restrict the terms available based on the context of the data item, for example only allow procedures in a procedure field. Care should be taken with diagnosis that this isn’t too restrictive as often symptoms may be entered if a diagnosis has not been possible.

8.5.4 Data Items

As a minimum, systems that incorporate any of the following data items should be using SNOMED CT to capture their content:

- Symptoms
- Diagnosis
- Procedures
- Assessment Scales
- Family History
- Medications
- Allergies
- Blood pressure
- Documentation Type and documentation care setting
- Laterality
- Body Site
Note. There is an increase in the use of Data Archetypes for particular data objects such as blood pressure and allergies. Suppliers should check via the HSCIC interoperability webpages\(^\text{14}\) or HSCIC help desk enquiries@hscic.gov.uk with a request to the messaging team for any such specifications.

### 8.5.5 Subsets

Where subsets are required as part of a national data collection, the details will be provided in the NHS Data Model and Dictionary.

Requirements for systems may specify the ability to use subsets and import these as part of system configuration.

It should be remembered that subsets are be dynamic. Provision needs to be made to update these when a new release is incorporated into the product; requirements should ensure tools are available to enable this.

### 8.5.6 Reporting and data extraction

Solutions should provide functionality to enable queries to be written in SNOMED CT. The current priority is for retrieval based on the ‘is-a’ relationships, but developers should plan for querying on attribute relationships in the near future.

Where the terminology has replaced an existing terminology or vocabulary, it is important that existing reports can still be run. All searching and reporting functionality MUST be able to be specified in SNOMED CT where appropriate. Existing reports MUST provide correct results after the introduction of new content into the system captured using SNOMED CT, and new reports specified in SNOMED CT must operate correctly over historic data.

Developers should use the operators in the IHTSDO document ‘SNOMED CT Expression Constraint Language Specification and Guide v1.00’; this describes operators (for example this concept and all its children) to use for writing reports and data extractions, as well as the internationally agreed symbols for such operators.

### 8.5.7 Inactive Content

SNOMED CT is a dynamic terminology; as well as adding new terms it is possible to also make concepts, terms and relationships inactive.

Systems **must** support the ongoing view/retrieval of terms that exist within records which are inactive within the current release of the UK Edition of SNOMED CT. Users **should** only be able to enter active Clinical Terms, and **should** be prevented from data entry of inactive Clinical Terms into a Patient’s Record.

Systems **must** ensure that functionality such as the graphing of results is not inappropriately impacted by concepts becoming inactive.

Tools **should** be provided to support organisations manage inactive content in reports, templates and aspects of the system that may rely on active content such as planned procedures.

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\(^\text{14}\) [http://systems.hscic.gov.uk/interop](http://systems.hscic.gov.uk/interop)
8.6 Further information

The document Requirements of Systems (PDF, 189.3kB) includes sample statements for use in procurement of systems that incorporate SNOMED CT; this is also useful for those developing systems to understand expected functionality.

For details on requirements to include in procurement and system specification documents, as well as techniques for developers, the following may also be of interest:

- GP Systems of Choice Principle Systems Requirements
- SNOMED CT in Primary Care: Advanced Guidance for Implementation
- UK Terminology Website: Training and Resources (Documentation)
- IHTSDO Document library
- User Interface Guidance: provides guidance in relation to terminology
9 Information for Solution Providers

This section aims to highlight aspects that developers need to take account of when developing their solution.

9.1 Distribution and Release Formats

Depending on the solution provided, a system may need to utilise all of the content within the terminology or just a subset.

As the variety of applications across healthcare is significant, it is not possible for the UKTC to provide a set of database files that meets the requirements of every application. The terminology is therefore distributed as a set of comma delimited data files; it is inevitable that you will need to process these in some way to import the data into the specific tables needed within your application. It should be emphasised that the distribution format is not anticipated to be a suitable data model for any clinical application, but is provided in this way to support pre-processing for upload into applications.

There are currently two release formats available: RF1 (Release Format 1) and RF2 (Release Format 2). RF1 was the first format provided and is the simplest to initially process, but lacks some of the features many would expect in current day solutions; it is scheduled for retirement and is planned to be withdrawn in the UK after the April 2018 release. RF2 is self-defining and contains audit information on changes, for example indicating when concepts were active and when they were made inactive. The UKTC provide a recorded presentation that describes the different release formats and the different files provided within RF2 as well as some tips on processing ("SNOMED CT Recorded Webinar - An Introduction to the release files in Release Format 2 (Technical)").

To comply with the standard, suppliers must use the RF2 format. File specifications are provided in Section 5 of the IHTSDO Technical Implementation Guide.

9.2 Subsets

Subsets can be held within a system using simple files structures, or may use the method within SNOMED CT (known as refsets). Solution providers wishing to use and distribute refsets across implementations should consider having their own namespace. Further details on namespaces are provided in the IHTSDO Technical Implementation Guide in Section 9.5.

Subsets can be developed locally, for example as part of the configuration of a system to provide the procedures undertaken by a particular clinic. Suppliers should decide what level of tool support they provide for the development of subsets.

There are a number of national subsets provided as part of the UK Edition of SNOMED CT. These can be used as a starting point for developing subsets locally or as provided; alternatively system suppliers may wish to develop a standard set of subsets that they offer as a start-point to the organisation deploying the solution.

Subsets can be used to order the results of searches (e.g. anything returned that is in the subset comes towards the top of the search results), or can be used to restrict data entry.

15 https://isd.hscic.gov.uk/trud3/user/guest/group/2/pack/14
(i.e. only data from that subset can be entered). Where the context of a field is clear, for example procedures, using a procedure subset in the system may also be useful.

9.3 Relationships

The release files contain stated relationships (those stated by the terminology authors) and inferred relationships (those determined by the classifier that is part of the terminology authoring tools); systems should include BOTH these relationships which are provided via the relationships file. Further information on stated and inferred view can be found in the IHTSDO Technical Implementation Guide in Section 4.2.1.3.2 Stated and inferred definition views.

9.4 Obtaining SNOMED CT

The data files that constitute the Release are provided twice yearly: 1\textsuperscript{st} April and 1\textsuperscript{st} October. The Release should not be implemented in a live system prior to the published dates, and should be implemented within 2 months of the release date. Specific contracts may have stated requirements in relation to when a release has to be incorporated.

The release files are obtained via the Technology Reference data Update Distribution site (known as TRUD); individuals need to ascertain which type they require (Full, Delta and/or Snapshot) and then register for the appropriate pack. Further details on the file types are provided by the recorded webinar: ‘SNOMED CT Recorded Webinar - An Introduction to the release files in Release Format 2 (Technical)’.

The Release Files are provided under licence; this is free to use for deployment in the UK.

It should be noted that the International Edition of SNOMED CT is published prior to the dates for the UK Edition (31\textsuperscript{st} January and 31\textsuperscript{st} July) but must not be implemented in the UK until the UK release dates of 1\textsuperscript{st} April and 1\textsuperscript{st} October.

9.5 Namespace

SNOMED CT provides a mechanism for suppliers to develop their own concepts, terms, relationships and refsets that are specific to their application but using the SNOMED CT code scheme; this is referred to as having a namespace. However, it should be remembered that such components will be local to the system and even though they use valid SNOMED CT identifiers, will not be able to be actioned in other systems.

Applications for a namespace\textsuperscript{16} need to be made through the IHTSDO. This also provides a mechanism for such codes to be uplifted to the UK Edition or the International Edition without the need to change the concept id. This is useful if there is a requirement for a code before the next release is due. For further information on namespaces see the IHTSDO Technical Implementation Guide.

\textsuperscript{16} http://www.ihtsdo.org/snomed-ct/change-or-add-snomed-ct
9.6 Reporting, data extraction and business rules

The terminology provides features to assist in information retrieval; both the ‘is-a’ relationships and the attribute relationships can be utilised. Applications supporting data reporting, extraction and/or business rules must provide to retrieve/act upon data specified using the is-a relationships; solutions should enable data extraction and/or reporting using the attribute relationships. The codes within SNOMED CT do not hold any meaning and so queries are only possible to enact through the relationships.

Developers may wish to use a ‘transitive closure table’ to aid with queries over the is-a relationships. This will need to be computed locally; this is a large table and the script to produce such a table is provided within the IHTSDO Technical Implementation Guide (TIG). Further information on transitive closure can be found in the TIG in ‘Section 4.2.1.3.2 Stated and inferred definition views’, with details on how to compute the table provided in ‘7.7.5.2.2.1 Generating a transitive closure table’.

9.7 Inactive Content

To meet the needs of electronic systems and the changes to medical knowledge, SNOMED CT provides a mechanism to make content inactive while maintaining a robust audit trail of what the code is, when it was made inactive and in many cases what codes may have replaced this. For more details on inactivation see the UKTC Technical Report: Inactive Content Technical Report 12/02 (PDF, 2.1MB) and the IHTSDO Technical Implementation Guide sections ‘4.1.1.4.1 Component features – History’, 5.5.1.5 Meaning of the active field and ‘5.5.1.6 History Mechanism’. The UKTC provide two products (in a TRUD pack separate from the main release of SNOMED CT): the history substitution table and the UKTC Query table, to help developers manage inactivation; these are accompanied by technical documentation.

9.8 Pre and Post Coordination

Currently within the UK our national requirements for GP solutions are for pre-coordinated concepts only. This will enable systems to migrate from the legacy Read codes to SNOMED CT by replacing a current Read code with a current SNOMED CT code.

Current message specifications are also generally using pre-coordinated content, using a number of fields for what might be a post coordinated expression (for example procedure and laterality required as separate data items).

Suppliers may use post coordinated content within their solution and populate the fields in a message specification by transforming the post coordinated expression.

To facilitate the changeover to SNOMED CT the UKTC have pre-coordinated a number of expressions within SNOMED CT to enable content in the Read codes to be mapped to SNOMED CT. It is planned that as systems mature and users are more proficient in the use of the terminology, the use of post coordination will become more prevalent. Developers should review post coordination approaches and consider how this may impact their system so they have a development roadmap for post coordination, it may be desirable to use aspects of post coordination in data warehouses for improved retrieval.

It should be noted that post coordination can be used to modify a clinical concept as well as to further qualify a concept. For example a procedure concept can be modified with ‘planned’
or a diagnosis can be ‘definitely not present’. Developers should consider how the solution will address these while ensuring that anyone writing a query for a particular disorder does not retrieve those with ‘definitely not present’.

**Note.** Great care should be taken in the application if the ability to modify the meaning of a data item is provided. In SNOMED CT this form of post-coordination is called ‘context modification’; further information is provided in the IHTSDO Technical Implementation Guide in Section 6.2.3.5.6.5 Axis modification.

### 9.9 Maps to SNOMED CT from the Read codes

The Read codes, both Read v2 and CTV3, are now deprecated standards and are on schedule for retirement. Read v2 is now no longer updated (as of April 1st 2016) and the last scheduled release of CTV3 is 1st April 2018. To aid organisations who wish to adopt SNOMED CT in their product instead of the Read codes and have historical data they wish to manage, the UKTC provide mapping tables from Read to SNOMED CT. These are available along with technical documentation to support their use on the TRUD site within the derivative products download area (NHS Data Migration). The document *SNOMED CT in primary care: Recommendations from the sub-group of the Joint GP IT Committee* should also be consulted. Requirements for systems migrating from the use of Read to SNOMED CT are provided on the [GPSoC website](http://systems.hscic.gov.uk/gpsc/snomedct).

### 9.10 Prior versions of SNOMED CT

Antecedent versions of SNOMED include SNOMED II, SNOMED 3, SNOMED 3.5 and SNOMED RT. All these versions are no longer maintained and are out of license for use (other than for historical data) from April 2017. To aid suppliers who wish to migrate their product to SNOMED CT, mapping tables are provided for the antecedent versions to SNOMED CT. These are available from TRUD with the appropriate documentation within the derivative products download area.

### 9.11 Maps to SNOMED CT from PBCL

The Pathology Bounded Code List (PBCL – for details on PBCL see the [NHS Digital webpages](http://systems.hscic.gov.uk/data/uktc/training/recommendsct.pdf)) is defined in terms of the Read codes. As Read codes are now deprecated products, 1:1 bi-directional maps are provided from the Read v2 codes within PBCL to SNOMED CT and for the CTV3 codes within PBCL to SNOMED CT. These are available in the pack: ‘PBCL Read Code to SNOMED Code Translation Table’ within the Derivative Products area of the [UKTC Collections on TRUD](http://systems.hscic.gov.uk/gpsoct/nhsdigitalwebpages). The maps are the same as those provided in the Terminology maps highlighted in Section 9.7, however if your solution only uses PBCL you may find these maps easier to use as they only contain PBCL and not all the Read codes.

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17. [http://systems.hscic.gov.uk/data/uktc/training/recommendsct.pdf](http://systems.hscic.gov.uk/data/uktc/training/recommendsct.pdf)
18. [http://systems.hscic.gov.uk/gpsc/snomedct](http://systems.hscic.gov.uk/gpsc/snomedct)
9.12 Useful Sources for UK information

9.12.1 Implementation Forum

The UKTC run a forum for those involved in the implementation of SNOMED CT. Further details including how to register for this can be found on the UKTC Training and Resources webpage. In addition, the SNOMED community on NHS Networks can be used to ask questions and view additional resources.

9.12.2 Product Distribution Site

The UK Edition of SNOMED CT as well as a number of supporting products such as mapping tables and cross-maps to the classifications are available from the Technology Reference data Update Distribution website known as TRUD. You need to register to download the various products, and subscribe to each pack you require. Emails are sent when a new release is made available. For a description of the various products available see the Release page on the UKTC website.

How to use TRUD can be found in our Quick Guide or Step-by-step Guide to using TRUD.

9.12.3 Code4Health

NHS England has established a community for those developing applications. This provides a useful resource for discussions and advice on terminology.

There are a number of companies who do provide terminology services; these can be found using web searches or by asking this community for advice.

9.12.4 Interoperability Portal

NHS England is currently developing a portal to support those undertaking development and wishing to deliver interoperability as part of their solution. Once this is available there are plans to support those utilising terminology within this community.

9.13 IHTSDO Resources

The IHTSDO provide a number of resources and forums for those involved in development. Specifically these are:

- **A vendor forum**: this is supported using their collaborative platform but also meets virtually and at the IHTSDO Expo. For further information and access to the collaborative platform email info@ihtsdo.org
- **Documentation**: the IHTSDO provide a number of documents to support those undertaking development using terminology.
- **Open Tools Framework**: this is an open source repository containing various tools; for example the IHTSDO browser is available as open source.
- **eLearning**: currently there are three eLearning courses:

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20 http://systems.hscic.gov.uk/data/uktc/training
21 https://isd.hscic.gov.uk/trud3/user/guest/group/2/home
22 http://systems.hscic.gov.uk/data/uktc/snomed/release
23 https://code-4-health.org/
24 http://www.ihtsdo.org/snomed-ct/learn-more
25 http://ihtsdo.github.io/
26 http://www.ihtsdo.org/snomed-ct/learn-more/elearning-overview
A Foundation Course which needs to be successfully completed before applying for either of the other two courses; this is eLearning only.

An Implementation Course: this is a combination of eLearning and on-line workshops. It covers the full breadth of SNOMED CT including illustrating the description logic behind the terminology.

A Content Developers Course for those authoring their own terms or wishing to understand more about content.

9.14 Further Information

Technical information on the terminology is provided in the IHTSDO Technical Implementation Guide. In addition the collaborative site holds a variety of documents and discussions that may be of interest. Contact info@ihtsdo.org for access to the IHTSDO collaborative site or information.standards@hscic.gov.uk for more information on implementation in the UK.

10 Terminology and Classifications

The NHS has a long history of using the classifications ICD-10\(^{28}\) and OPCS-4\(^{29}\) to enable it to monitor the health of the UK population as well as undertaking business processes such as payment. The classifications have evolved to what they are today from as early as the 17\(^{th}\) Century. They were primarily designed to meet requirements when patient records were paper based and a sophisticated approach has been developed to get accurate categorisation of episodes of in-patient and day case care. They were not designed to provide the clinical phrases used by clinical staff for capturing care related information in the EHR at the point of care.

Current classifications are used to categorise a completed episode of care according to predetermined classification codes; the classifications support indirect care related activities such as epidemiology, payment and population monitoring. They do not however provide the vocabulary a clinician wishes to use for recording activity related to the specific care of a patient within the electronic patient record. Terminology and Classifications are therefore designed for very different purposes and thus are structured differently.

It is inevitable there are some similarities between the two as they are both designed to relate to clinically relevant content. However there are fundamental differences, some of which are highlighted below:

- Every code within the classification sits in one chapter and one chapter only; this ensures that an episode of care will only be counted once when reporting. However, in SNOMED CT, a single concept can have multiple hierarchical relationships (parents); this ensures that when searching for patients according to specific criteria all instances are found.
- In the classifications, because these represent areas of interest to monitor populations, the category can incorporate data that is elsewhere within the record, for example there may be a different code for a particular disorder depending on the age of the patient. In SNOMED CT the term for the disorder would be the same for all ages and the age would be held elsewhere in the record.
- A statistical classification must be confined to a limited number of mutually exclusive categories and each category is structured to ensure all instances have been included, for example, to report on all types of skin cancer. This results in codes with descriptions such as NOS (Not Otherwise Specified) and NEC (Not Elsewhere Classified) which have a specific meaning within the classifications; however these would not be used in SNOMED CT in relation to the direct care of the patient as their meaning could change each release.
- Terminologies like SNOMED CT are dynamic and updated frequently (every 6 months) to cope with the changing needs of clinical care as they provide the dictionary for data entry. SNOMED CT has a history mechanism to allow full transparency of any changes. The classifications need to remain stable over time to enable consistent trend reporting. In order to strike a balance with the need to update clinical knowledge updates to the classifications are planned to be every three years (though this may vary if there is a particular requirement).

Some use cases are therefore best suited to classifications and others to terminology; one needs to examine what is required and then decide which is the most appropriate to use (or

\(^{29}\) OPCS Classification of Interventions and Procedures http://systems.hscic.gov.uk/data/clinicalcoding/codingstandards/opcs4
possibly both). **Cross-maps** can also be used to aid the efficient allocation of classifications codes to an episode of care, for example using data captured in SNOMED CT in the discharge letter. Currently there is no intention to change using classifications as part of the hospital payment mechanism (because of the methodology used) although terminology is being considered to refine payment where the costs vary considerable within one HRG. In primary care, elements of payment are already made based on terminology and these will start to use SNOMED CT from 1st April 2018.

### 10.1 Mapping from terminology to classifications

As outlined, terminology is designed to capture the detailed clinical information for the direct care of the patient and it is required to be recorded at a particular moment in time. In secondary care classifications are allocated at the end of an episode of care, based on information abstracted from the medical record. Mapping tables from SNOMED CT to the classifications ICD-10 and OPCS-4 are provided nationally and these can assist deriving the classification codes based on the terminology. These mappings are semi-automated thus allowing consideration of additional information from within the EHR that may need to be considered before the final assignment of classification codes.

These maps are known as **cross-maps** and are provided as a map refset within the RF2 release of the UK Clinical Edition. A number of suppliers provide products that use these maps to help improve the efficiencies of clinical coding; either within their own product or as an additional module that can be integrated into the business processes. Documentation on the structure and use of the cross-maps is provided as part of the release download pack.

### 10.2 ICD-11

ICD-11 is being designed for use in electronic health information systems which contain content captured using terminology. Following a collaborative agreement between the WHO and the IHTSDO, work has been ongoing to ensure harmonisation between ICD-11 and SNOMED CT.

Within the UK we are keeping abreast of the ICD-11 developments. As part of the WHO-FIC collaborating centre network we will be co-ordinating the UK involvement in the field trials of ICD-11; this is a key activity to test the fitness for purpose within the UK of this new classification. Further information can be found on the [NHS Classifications web pages](https://www.england.nhs.uk/nhs-classifications/).
11 Use Cases

SNOMED CT essentially provides the healthcare terminology for use within healthcare systems. This section illustrates some of the scenario’s in which SNOMED CT has been used.

The UKTC provide a number of case studies on their website of successful use of SNOMED CT within different organisations; in addition the IHTSDO provide illustrators of SNOMED CT in Action.

11.1 Summary Care Record

Summary Care Record provides healthcare professionals treating patients in different care settings with fast access to key clinical information. The data is derived from the GP system; however currently GP solutions use one of two different coding schemes: the Read codes, whereas secondary care is more likely to use SNOMED CT. To enable data to be viewed in a consistent manner by healthcare professionals, the data from the respective GP system is mapped to SNOMED CT before it is sent to Summary Care Record (SCR). This also enables anyone using the SCR API to be able to use the national agreed terminology.

11.2 e-Referral System (eRS)

The NHS e-Referral Service (eRS, aka Choose and Book) combines electronic booking with a choice of place, date and time for first hospital or clinic appointments. Patients can choose their initial hospital or clinic appointment; book it in the GP surgery at the point of referral, or later at home on the phone or online.

Searching for the appropriate hospital or clinic can be undertaken by using the clinical terms within SNOMED CT. Each hospital and clinic within eRS identifies from the provided set of SNOMED CT terms which apply to their facility.

The following screen shot from the eRS illustrates the terms in SNOMED CT that have been identified following a search on weight. Selecting the appropriate required intervention will then enable appropriate hospitals and clinics that provide that intervention to be identified according to the criteria set (for example distance, time to referral).

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30 http://systems.hscic.gov.uk/data/uktc/training/casestudies
31 http://www.snomedinaction.org/
11.3 Electronic Patient Records

A major use of terminology is within hospital electronic patient record systems (EPRs). Many of the solutions now available use the SNOMED CT terminology.

The following screen is provided by kind permission from Moorfields Eye Hospital who use SNOMED CT as part of their Open Eyes solution. SNOMED CT is used to capture diagnosis and procedure.
11.4 Guidance and links to knowledge resources

Increasingly clinical guidance indicates the SNOMED CT terms to use in best practice guidelines. For example the NICE interventional procedures guidance and the Medical technologies guidelines indicate the appropriate SNOMED CT terms to use when recording such procedures and devices in the patient records. Further information can be found at: https://www.nice.org.uk/about/what-we-do/our-programmes/nice-guidance/nice-interventional-procedures-guidance/coding-recommendations.

A variety of NHS England guidance, for example in relation to frailty, also indicates the appropriate terms to use when recording information in relation to the guidance.

As SNOMED CT provides a finite set of clinical terms, it is also useful for tagging knowledge resources and some EPR solutions use this to link directly to medical publications.

11.5 Quality Outcomes Framework (QOF)

The Quality and Outcomes Framework (QOF) is a voluntary annual reward and incentive programme for all GP surgeries in England, detailing practice achievement results. It is not about performance management, but resourcing and then rewarding good practice. Currently QOF uses the Read codes but is currently being translated to SNOMED CT. From
1st April 2018 the QOF business rules will be provided in SNOMED CT only; for 16/17 onwards business rules will also be published in SNOMED CT as well as the Read codes.

11.6 Clinical Vocabulary for clinical word-processing applications

SNOMED CT can be used to derive a clinical lexicon that can be used as the dictionary within clinical word processing solutions. A version of the lexicon is also provided as part of the release within the UK Clinical Edition.