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THE CLINICAL TERMS VERSION 3
(THE READ CODES)

CONTEXT AND CLINICAL RECORDS

APRIL 2008

Purpose of this document

This document is one of a series that, taken together, describe the contents, structure and function of Clinical Terms Version 3 (The Read Codes).

This introduction is intended to provide information on Clinical Terms Version 3. It is also a guide to the other available documents each of which is updated independently. For this reason, different chapters may have different version numbers.

INFORMATION

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1. Purpose

This document proposes a set of terms and a model for describing uncertainty, the status of actions, attribution of responsibility and headings, previously grouped together as the context of care. The intention is to attract comment from as many people as possible, and the document is therefore aimed at all interested parties, including clinicians, managers and system developers. Knowledge of information handling issues will give the reader an advantage, but technical detail, including a model, is separated into a technical annexe.

2 Status

This document builds on work done by the:

- ‘Context of Care working group’ in 1995/1996 as part of the Clinical Terms Project (CTP) and subsequently. After the initial set of context terms were produced by the group, comment was received from a broad spectrum of clinicians, the terms were tested against clinical material and subsequently set in a usage model. The testing material includes discharge summaries, operation notes, letters and other reports provided by a broad range of clinicians in the CTP. Some changes have been made to the set of terms delivered by the working group as a result of testing, of modelling and of integration with European work.

- Multiprofessional working group for the project 'Headings for Communicating Clinical Information from the personal health record', who have proposed and are evaluating a shared set of headings for use in communications between health care professionals in the UK.

- CEN TC 251, Project team PT 27, responsible for the document 'Domain Term list'. The domain term list was influenced by several European initiatives including the requirements of clinical messaging and medical records (PT 26 and PT 29) and the 'Context of care' and 'headings' work in the UK. PT26, PT 27 and PT 29 are pre-standards.

The major document sources are:

'Using clinical terms with context terms in the clinical record' which followed work by the Context of care group. This paper is superseded by this paper (along with others in the set).

'Towards an information standard for organising clinical communications', produced by the Multiprofessional working group for the project 'Headings for communicating clinical information from the personal health record'. This paper is available from: http://www.sci.port.ac.uk/~headings

Electronic Healthcare Record Communication - Part 2: Domain Termlist. This document is available from http://www.imc.exec.nhs.uk/centc251/wgii.

Field testing of all context work, including the proposed mapping between status terms and heading terms, will be essential before it can be considered as a standard for communicating clinical information.

3 Key

Throughout the document, Context terms are emboldened (e.g. **Family History**), while Clinical Terms (Read terms) appear italicised and emboldened (e.g. ***Appendicitis***).

4 Summary

The Clinical Terms Project delivered a set of clinical terms to support electronic health care record. During the project, clinicians recognised the need for a further set of terms to capture the context in which clinical terms were set.

Subsequently the context of care was defined as containing four groups of terms.

- **Attribution terms** describe who was responsible for or performed actions, who described and recorded clinical histories.

- **Heading terms** are used to organise clinical material so that it is easily assimilated by the reading clinician. Heading terms can be ignored when retrieving information from searches of clinical material.

- **Status terms** describe important facets of meaning, such as presence and absence, uncertainty, the state of actions (e.g. under consideration, planned, done), and the success of actions (successful, unsuccessful). Status terms reflect the meaning found in headings, as well as essential meaning not found in headings, and must be considered when retrieving information in searches of clinical records.

- **Link terms** describe the relationships between clinical statements (Gall stones were the reason that a Cholecystectomy was done; a weight of 71 kg was the outcome of dietary advice).

Headings in the written record often perform the function of both organising terms and status terms. For example the heading term Family history both acts as a focus for placing all **family history** items in one place in the clinical record and adds meaning to clinical terms such as ***Diabetes mellitus*** placed beneath it. A decision was made to distinguish mechanisms for these two functions, because each of these has different requirements.

- Clinical freedom to organise information in the most natural way was considered to be of paramount importance. Although practical experience and education can be expected to lead to a shared policy for organising clinical information, it would be unhelpful to prescribe this.

- Preserving meaning was felt to be equally essential. Context terms often provide extra meaning (E**xcluded -*Asthma*** means something entirely different from **Found *Asthma*; Family history - *Asthma*** is quite different from the patient having asthma).

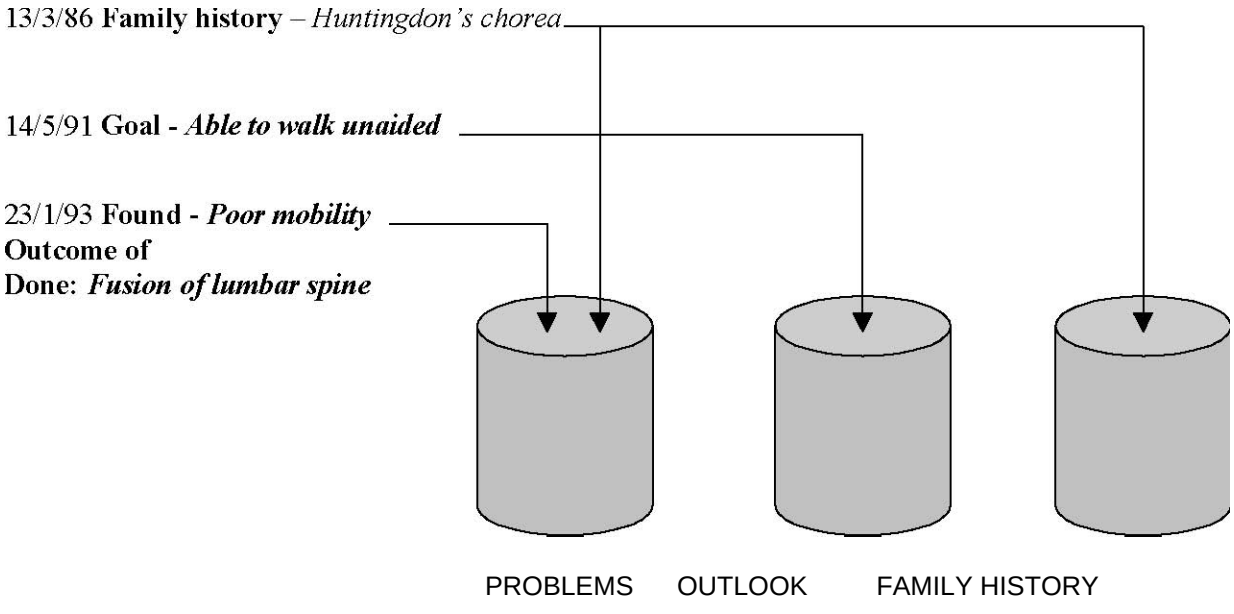
The critical factor is to preserve meaning through searches of electronic material for decision support (e.g. detecting drug interactions), audit and planning care. In this case it was felt that an information model was required to ensure meaning was unambiguous and to control redundancy (where there are two ways of describing a situation, there is less likelihood of retrieving information).

When one term can perform both of these functions (e.g. **Family history** which is a useful organising term as well as providing meaning), it is found both in the list of status terms and in the list of headings.

When entering clinical data, user may prefer to enter clinical terms under headings. Alternatively some systems may be more naturally designed around entering clinical terms along with a status (and no heading). Whichever is the case, both heading terms and status terms are required in a clinical communication. A mapping between heading terms and status terms offers the opportunity for systems to automatically suggest default terms for the other representation, to lighten the data-entry load. The clinical user then only has to modify the suggestions when this is necessary.

Legacy versions of Read Codes often contain context information. For example, ***Asthma [D]*** in Version 2 of the Read Codes means a Diagnosis of Asthma; there is also a term ***ECG not done***. A formal model of context status terms will allow legacy clinical terms to be mapped onto the new context model, providing a resource for smoother migration to Clinical Terms Version 3 (CTV3).

The key distinction between Status terms, Attribution terms and Link terms which define the essential meaning of a clinical phrase and Heading terms which organise clinical material may be summed up in the following 'Bucket diagram'.



Headings (e.g. **Problems, Outlook, Alerts**) act as organisers or buckets for clinical phrases. The meaning of each clinical phrase is fixed by status terms (e.g. **Family history, Goal, Done**), attribution terms and link terms (e.g. **Outcome of**). Clinical phrases can therefore be freely moved between headings without changing the basic meaning of the statement. **FH of *Huntingdon's chorea*** can be placed under **Family history** or **Problems**, without worry of it being confused with the patient having Huntingdon's chorea.

4.1 Key to Symbols used in the Paper

Highlighting is used in the body of the text. The following pattern is used:

Bold **e.g. Found** **(Found)**	Context terms including status terms (e.g. **Done, Found, Successful**), Link terms (e.g. **Outcome of**), attribution terms and heading terms (e.g. **Problems**). Bracketing of context terms implies that they may be omitted in the given context for clarity. For example, under a heading of **Family history** it may be clearer to present ***Diabetes mellitus***, rather than **Family history of *Diabetes mellitus***. Similarly, terms such as **Done** and **Found** are often understood. However, the 'omitted' context terms will always be found in the underlying computerised database.
Bold Italic	Clinical terms (e.g. ***Asthma, Cholecystectomy***) from CTV3 which includes all legacy terms from previous versions of the Read Codes.

5 Introduction

During the Clinical Terms Project, clinical working groups in nursing, the medical specialties and the Professions Allied to Medicine collected terms to describe the disorders, procedures, signs, symptoms, investigations, diets, physiotherapy and skills and abilities which described what was happening to their patients.

All groups expressed a need for a further set of terms, to be shared by different clinical groups, which would allow clinicians to express such things as uncertainty; whether actions were planned, done or not done; and whether information related to a patient or their family. These were grouped under the banner ‘Context of care’.

As a result, a context of care working party, and a smaller working group, were set up to explore issues of context. These included clinicians of a broad scatter of disciplines, as well as informaticians with such skills as modelling.

A set of terms was delivered in the project along with results of initial testing. These were accompanied by a recommendation that guidelines should also be released along with the terms to enable the terms to be shared by users. The multidisciplinary group was concerned that, in the absence of these guidelines (or a ‘model’), the information content of clinical data could be seriously compromised as unconstrained use of the terms could lead to ambiguity and duplicate ways of describing the same clinical phenomenon.

Subsequently, the Primary Care Product Review Panel (an advisory body of clinicians and system developers actively involved in primary care computing) underlined the need to ensure that different systems share not only the same terms but also the same method of using the terms. To ensure that information can be extracted from a mixture of old and new Read Codes, they require that terms from older Read Versions (Version 1 and 2 of the 4-byte and 5-byte Read Codes) which contain context (e.g. ***ECG not done***) be mapped on to the new CTV3 context terms.

This document describes user requirements for ‘context’ terms and analyses the issues surrounding these terms, proposing a set of principles for judging success. The terms are listed and an information model presented.

6 Background

Most information systems embody some kind of context model to ensure the meaning of recorded information is clear. In many clinical information systems, for example, clinical terms for drugs may be chosen in the context of a screen of current medication or drug sensitivities. The context is stored along with the drug and the user must specify both the context and the clinical term in any search across patient records. This information is used to improve patient care - a new drug prescription can be checked against known drug sensitivities and the user informed if a match is found.

But there is more to context than providing meaning. Clinicians have been shown to prefer structured information in written communications [de Bliek90], [Cornwall93], [Jenkins97] as this is easier to digest quickly. Headings provide this organisation function in clinical communications.

Headings figured prominently in work performed as part of the Good European Health Record project [GEHR95] which explored development of a common data structure for electronic healthcare records. This research is continuing in the SYNAPSES project [Grimson96]. One deliverable of GEHR is a formal model of a medical record architecture. Headings are used as ‘organisers’ in the model, but are not allowed to significantly change the meaning of a clinical term. To represent that a patient had a father whose liver was found to weigh 17 kg at post-mortem, the following structure would be used:

Heading: Family history

Collection: Father

Heading: Post-mortem finding

Collection: Liver

Health Record Item: Weight = 17 kg

The proposed system of Headings, Collections and Health Record Items is flexible, but may need firmer guarantees to ensure that clinical information is unambiguous and can be retrieved in searches (e.g. that any redundancy in the representation can be automatically determined). However the focus of the group is on the architecture (e.g. Heading, Collection) rather than the semantic content (e.g. Father, Liver) of the clinical record. The latter was felt to be the domain of clinical terminologies. It will be important to bring both structure and semantic content together before meaningful evaluation can be performed.

Another European project, GALEN, although primarily concerned with representing the semantic content of clinical terms has also been actively exploring context issues. They have represented such concepts as negation, presence and change of clinical findings [Rector94].

Elsewhere in the UK, a multiprofessional working group working for the project ‘Headings for Communicating the Clinical information in the personal healthcare record' [Severs97] established and is evaluating a set of headings for clinicians to share when communicating the patient record. This work is not presented or intended as a model which guarantees the meaning or retrievability of clinical term and headings combinations. Therefore, clinicians are not prescribed which of the shared set of headings must be chosen in each clinical situation. It is assumed that through guidelines, use and education, a shared policy for organising clinical information will evolve. However, over and above serving as a tool for organising clinical records, headings are also seen as expressing a clinical requirement for the kind of information that status terms should be able to retrieve.

Many authors have contributed over the last 30 years to representing plans and actions, though most of this work has been outside medicine. A traditional distinction has been made between actions (e.g. performing a total hip replacement, prescribing a high fibre diet) and descriptions of the state of the world (patient has joint pain, family history of asthma). According to this methodology, actions bring about changes in the state of the world. [Nilsson91]. This distinction has been carried forward into the clinical terms of CTV3, where procedures (including investigations) are separated from clinical findings that describe the state of the world. One motivation behind this stream of work is to simplify the design of healthcare information systems.

7 Scope of Context

So as to provide order in a complex area, context was divided into four topics. IN the table below, underlining denotes the aspect of context in the example being discussed.

ASPECT OF CONTEXT	**DESCRIPTION**
Attribution	Terms describing who was responsible for actions; who described or related events to clinicians. For example (the underlined statements concern attribution): **19/9/98 (Done -) *Cholecystectomy* By** Dr J Hagues Dr A Smithson **Has responsibility** Much of this work is considered part of the 'clinical record' domain rather than the 'terminology' domain and is omitted from this work.
Link terms	Terms typically linking two expressions in the clinical record. They describe how they relate, for example the causes of a patient’s disease, reasons for action and outcomes of actions. For example, **Reason** (underlined) links the operation ***Cholecystectomy*** to the reason for doing it which is the patient’s ***Gall stones*****.** ***(Done) – Cholecystectomy*** **Reason (Found -** ***) Gall stones***
Status terms	There are two kinds of status terms. One Primary status term is associated with each clinical term in a record and captures the most significant context meaning that they must always be considered in a search or in decision support.

Primary status A primary status term (underlined) might describe presence or absence and the uncertainty in a finding; whether an action is done, under consideration, scheduled or not to be done; or whether a clinical description (such as normal blood pressure) is a finding, family history, a goal or something the patient is at risk of.

(Done -) ***Cholecystectomy***

Family history ***- Gall stones***

Secondary status Other (secondary) status terms add important meaning but may be safely omitted in some searches. These may describe the success of an action; whether a finding is stable, improving or worsening; or the significance of a patient's diabetes mellitus (it may be a diagnosis, a problem or part of the patient's past medical history).

(*Found -** ***) Abdominal pain**, Moderate, Improving**

Heading terms **Terms that organise the way information is presented to the user.**

Problem

Gall stones

Note that sometimes a heading may share the same name as another status term (e.g. **Family history**). Mapping tables can manage this duality (see the document 'Relating headings and other context terms').

8 Analysis of User Requirements

During the process of collecting, refining and testing terms that can be used to describe context several key issues became apparent. These are described below, along with the principles which have been developed to provide a consistent solution. The starting points are requirements that stem from looking at how **Headings** are used in the clinical record, after which **Primary** and **Secondary** status terms are introduced as a means of ensuring meaning is safely preserved. Next the relationship between **Link terms** and headings is discussed. Finally **Attribution** issues are briefly introduced.

8.1 What roles do headings play in the written record?

Many clinicians feel that the natural way to solve context problems is to provide a set of record headings. However, close examination of the ways that headings are used in the written record suggested three different roles that headings traditionally play in the clinical record

Headings can provide essential meaning. In the case below, ***Diabetes mellitus*** placed under a heading of **Family history** means something very different to ***Diabetes mellitus*** placed under headings such as **Diagnosis**, **Problems** or **Past history**.

Family history

Diabetes mellitus

Headings can describe the role of a piece of information in a patient's case history. Some headings, while adding useful information to the clinical term, may often be deliberately ignored in searches. For example, a search for all patients with ***Diabetes mellitus*** might disregard whether this information was stored under **Diagnosis**, **Problem** or **Past history**. These headings often indicate the role information is playing in a consultation, for instance whether a finding is a current focus of concern or considered irrelevant to the current problem.

Problem

Diabetes mellitus

Headings can help organise clinical material. Perhaps the most easily identified role of headings is that they allow a mass of information to be grouped in ways that make it easier to find. Paediatricians often organise a child's immunisations under this heading. As this is a common practice, it makes finding the information easier in shared notes.

I**mmunisations**

1/2/95 ***First DTP immunisatio*n**
3/3/95 ***Second DTP and Polio immunisatio*n**
2/4/95 ***Third DTP and Polio immunisatio*n**
7/3/96 ***MMR immunisatio*n**

Each of these roles has different requirements. When essential meaning is provided, strict rules are required to tie the 'heading' to the clinical note so that it is inseparable in searches and reports. But when headings are used as screen organisers, the headings can be safely ignored in searches. Indeed the person doing the search will often not know all of the headings under which the information might have been placed. It is therefore essential that these headings can be ignored. To satisfy such conflicting demands, the following principles were proposed:

Principle (Freedom to organise). Users should be as free to organise clinical information as they see fit, with minimal restrictions on the choice of heading terms that perform this function. Users must be able to reorganise clinical information as new needs dictate. Headings used to organise clinical information may be ignored in searches without loss of meaning.

Principle (Strict modelling of sense). Essential meaning that is added to a clinical term to complete its sense, must be inseparable from the clinical term, and must be retrievable in searches. To achieve this, strict rules and modelling of these terms are required to reduce redundancy (the number of ways of describing the same situation).

Therefore different mechanisms are needed to convey essential meaning and to organise clinical material. The terms used to fix the essential meaning of a clinical expression should be inseparable from the clinical term, should be distinct from 'headings' used to organise clinical material, and should always be considered in searches and reports. **Primary status terms** capture the essential extra meaning that must remain inseparable from the clinical term. The set of these was expanded to include all essential meaning that might be associated with a clinical term.

8.2 Balancing essential labels with a need for completeness

A natural worry that some clinicians have expressed is that it may be important to search for information under a heading. For example in how many cases did I see patients with a **Past history** of ***Asthma*.** This uncovers differences in style between clinicians.

To primary care clinicians, a clinical record is typically a list of important health items, chronologically arranged from the patient's birth. However secondary care clinicians typically organise a clinical record from the perspective a particular point in time (e.g. an admission for an episode of ***Diabetes mellitus***). In this view events which do not relate to the incident causing the episode are listed as **Past medical history**. The first view is more primitive and may be easier to search as to recover patients with ***Diabetes mellitus***, for example, from a hospital view the user has to remember to search under a variety of headings (e.g. **Problem, Diagnosis, Past medical history**).

> **Principle (Distinguishing primary status)**. Temporal markers such as **Past medical history**, should be distinguished from the **Primary status** as they do not convey essential information that must be specified in searches.

However **Past medical history** is more than a temporal label. It may be used to distinguish less relevant history from the History of current illness and clinicians may need to analyse their patient data on the basis of just those patients who had a **Past medical history** of ***Diabetes mellitus***.

Principle (Completeness of status information). Although terms such as Past, Diagnosis and Problem, are not always matched in searches, they nevertheless contain important information that may need to be analysed. Secondary status terms are therefore also required and include terms for describing the role information plays in clinical decision-making (e.g. **Diagnosis, Problem, Alert, Reason for encounter**) and terms that designate the importance of a piece of information from a temporal perspective (e.g. **Former, Current** and **Ongoing**).

8.3 Ensuring Usability

Most of the time clinicians wish to code the presence of disease. However it is sometimes important to code what has been ruled out, and often useful to record provisional information, which is by no means certain.

Analysis showed that a potential problem was conflict between uncertainty and presence. A diagnosis which is coded as **Presence: Present** and **Certainty**: **Possible** may be coded by another clinician as **Presence: Absent** and **Certainty: Possible**. As a result, presence and uncertainty were combined onto a single scale (see below).

A second difficulty is that clinicians feel uncomfortable if forced to choose statuses which are too precise. In the heat of a consultation, it is too much of a restriction to force a clinician to decide whether each symptom or sign was definitely or probably found. Hence the general terms **Found** and **Excluded** were introduced.

> **Found**

Definitely found
Probably found
Possibly found
Excluded
Definitely excluded
Probably excluded

The term **Present** and **Absent** were used initially in place of **Found** and **Excluded** but fit poorly with many observations - and indeed can be ambiguous. Clinicians may however prefer **Present** and **Absent** when qualifying disorders. The pair **Found/Not found** has also been considered.

The notion of **Found** can often be omitted from clinical statements appearing on-screen as its meaning is generally understood (though maintained in the clinical record for searches).

This following might appear on-screen as legal phrases:

***Asthma*a**
Excluded -*Asthma*a
***Quality of life reduce*d**

Two principles were therefore adopted to ensure that meaning was safely recorded.

Principle (Unambiguous meaning). Context terms which cannot be excluded from a computer search should be combined onto a single scale to ensure that every possible combination is meaningful, unambiguous and not redundant. These are referred to as the primary status.

Principle (Faithful representation). Clinicians should not be forced to choose very precise status terms, when they are only happy with a more general statement. Conversely, clinicians should be able to code important detail that may be necessary to distinguish in subsequent computer reports. Other detail can be safely recorded as free text.

Other primary status terms for clinical findings include **Family history, No family history, At risk of**. Primary status terms always precede the clinical term but secondary status terms follow it. For example:

No family history – *Ischaemic heart disease*
Excluded -*Ischaemic heart disease*
At risk of – *Huntingdon's chorea*

8.4 Terms are required to express the status of actions

When clinicians describe the actions they have taken, the prime concern is the current state of the action. They wish to describe that actions are being considered, are planned, done or not done e.g. **(Done-) *Cholecystectomy* or Under consideration-*Cholecystectomy***. The notion of Done, is often best omitted from the screen display if the result is then clearer.

Clinicians also wish to describe the uncertainty of actions. In the first instance, however, it

was felt important to establish the list of action statuses (e.g. **Under consideration, To be done, Not to be done**, etc.) and to omit uncertainty in the state, because this does not seem to be a key item for searches and reports and indeed may increase the complexity of searches with little gain. This is because uncertainty can be derived from action status.

The potential redundancy of recording uncertainty against actions can be illustrated by the following query: “Show all patients who have possibly not had their cholecystectomy done”. This might be addressed by querying for all patients who have **To be done -** ***Cholecystectomy*** in their computerised notes, but not the status **(Done-)** ***Cholecystectomy***. Using this scheme, only what is known for certain about actions should be coded (in this case: **To be done**). Users may wish to add possible states as free text to what is known.

> **Principle (Action status)**. The primary status for actions should be recorded using the known state of play in the planning and acting process.

There are a few cases (typically when recording information from the past) when it may not be known whether a patient had a procedure done. For example a patient who has had a laparotomy for bowel adhesions and it is not known whether an appendicectomy was performed. The status Possibly not done is introduced to cover this case.

8.5 Care must be taken over the scope of primary status terms

Terms for uncertainty (or alternatively for the status of an action e.g. **Done, Organised, Under consideration**) should be used in a standard way to ensure that words such as **Possible** or **Not found** cannot be misconstrued to qualify part of a statement rather than the whole statement. For example, if the term **Excluded** is applied to ***Ostearthritis - Site:Hip, Site:Knee***, then depending on the screen appearance, this might imply that osteoarthritis is absent either at one of or at both of the sites, unless rules are clearly defined.

There was agreement that the safest method is to restrict the recording of detail qualifiers in clinical records to single cardinality to remove possible confusion. In that case, two phrases are required to record osteoarthritis at two sites, each phrase having its own primary status term. An events’ table may look like the following:

Event	Core concept	Site	Primary status
00001	***Osteoarthritis***	***Hip***	**Found**
00001	***Osteoarthritis***	***Knee***	**Found**

> **Principle (Scope)**. The scope of status terms should be precise. When communicating clinical records, 'detail' and 'context' qualifiers should be restricted to single cardinality, within any one expression appearing in the clinical record.

However the cardinality of ***Site*** is still specified as ‘multiple’ in the template file whereas the cardinality of a ***Symmetry*** attribute of a ***Osteoarthritis*** would be single (it can only ever be symmetrical or asymmetrical). Therefore ***Symmetry*** would have to have the same value in both lines if these referred to the same recording of the patient’s osteoarthritis.

8.6 Observations are more complex than disorders

While determining the primary status of disorders (e.g. ***Asthma***) did not prove difficult, findings such as ***Low blood pressure*** were more troublesome.

Findings may be qualitative (e.g. ***Random blood glucose low***) or quantitative (e.g. ***Random blood glucose = 2.5 mmol/L***). The notion of presence does not fit easily with these statements, and may generate ambiguous statements. For example, **Excluded -*Random blood glucose low*** may or may not mean the same as ***Random blood sugar normal*** (or ***raised***).

Rather than being cast as **Found** or **Excluded**, findings typically relate to one of many different scales. For some findings, the scale is high/normal/low, for others positive/negative and others present/absent. In some cases, a series of findings neither maps on to a continuous scale nor an ordinal one. An example is the following series:

> ***Simple partial seizure with motor dysfunction***
> ***Simple partial seizure with somatosensory or special sensory dysfunction***
> ***Simple partial seizure with autonomic dysfunction***
> ***Simple partial seizure with psychic dysfunction***

As the particular way each finding is measured varies so much, the following strategy has been adopted.

> **Principle (Unambiguous clinical findings)**. Qualitative notions such as positive/negative and absent/present should be made clear (unambiguous) in the clinical term (e.g. ***Able to hear, Hearing loss, Knee reflex present, Absent knee reflex, Simple partial seizure with motor dysfunction***).

The primary status term then records only certainty e.g. **Found, Definitely found, Possibly found** and not presence (there is no provision for **Excluded**). Therefore, to say ‘no headache’, the clinical term ***No headache*** must be chosen.

POSSIBLE ON-SCREEN APPEARANCE OF TERM	CLINICAL TERM	PRIMARY STATUS
No headache	***No headache***	**Found**
Possibly found - *Simple partial seizure with motor dysfunction*	***Simple partial seizure with motor dysfunction***	**Possibly found**

The drawback of this approach is that negative findings need to be introduced into the set of clinical terms where these are absent. Examples include: ***No fits, No partial fits, No generalised fits***. The worst case is a general notion such as pain, which is subdivided many different ways (e.g. ***Right iliac fossa pain***). However, it is possible that negatives need only go as far as ***No abdominal pain***. Thereafter, a record of the types of pain that are present is all that a clinician is likely to code, rather than a (complete) list of absences. However, (site) qualifiers may be used to specify greater (site) detail, where this is considered useful.

The advantage of the approach is a twofold increase in clarity. Firstly, ambiguous phrases such as **Excluded -*Not sexually active*** are disallowed. Secondly, search and reporting is

made simpler by making the scales explicit. For example the following series is coherent and can be searched:

Low blood potassium level
Normal potassium level
High potassium level
Equivocal potassium level

However by allowing any of these to be marked as **Excluded**, search is complicated. To search for a normal or high potassium, **Excluded -*Low potassium normal*** would have to be considered (among other Absences).

8.7 Medication

Users usually have a clear idea of what 'core concepts' are. These include disorders, investigations, signs and symptoms, operations and a patient's skills and abilities. They exclude attributes such as ***Site*** and ***Method***, and values such as ***Gallbladder*** and ***Excision***, which are intended only for use as qualifiers. Core terms are typically procedures or findings.

Medication items, though listed as a core concept, really should not be. However, terms such as ***Aspirin 300 mg tablets*** may qualify a procedure such as ***Prescribing*** or ***Dispensing***. Once the action has been described, the terminology for actions can be used (e.g. primary status terms such as D**one, Not done, Under consideration** as well as Attributes such as **Success** and Links such as **Outcome** and **Reason**. A common approach to all actions may prove most natural from a user's perspective.

However there are separate initiatives which are looking at the process of prescribing, and so no further action is being taken currently in this project.

8.8 Link terms

Clinicians have described a set of link terms that they wish to use to relate core concepts in the patient record. These include the **Reason** (for doing, considering or scheduling) an action.

For example, a record might contain **(Done-)** ***Appendicectomy*** and **(Found-)** ***Appendicitis***. If these two are linked by **Reason**, then information is added, but the meaning of the two core concepts has not changed:

> **(Done -)** ***Appendicectomy***
> **Reason**
> **(Found -)** ***Appendicitis***
>
> **Principle (Non-dependent link terms)**. Link terms should only relate two core concepts, which can themselves stand alone in the clinical record. Removing the link term should not affect the meaning of either of the core concepts.

Some compound clinical terms naturally map on to their components and a link term in the CTV3 template file, which holds semantic definitions of concepts. For example, ***Diabetic neuropathy*** could be mapped on to ***Neuropathy* -Associated with*: Diabetes mellitus*.** This would allow natural clinical terms such as ***Diabetic neuropathy*** to be used and yet retrieved with a search such as 'Find all patients with ***Neuropathy* – Associated with: *Metabolic disease'***. Note that ***Metabolic disease*** is an ancestor of ***Diabetic neuropathy*** in the findings hierarchy.

Temporal associations such as **Before, During** are one kind of association that was considered, but eventually omitted in the first pass. As Allen [Allen85] first demonstrated, there are at least 13 relationships between two intervals, each relating the start and end points of two events. These are not simply captured with words. For example, the phrase **Starts before and ends during**. To complicate matters further, there may also be uncertainty in some aspect of the temporal relationship [Kowalski 86]. This relates well to

clinical experience as patients may not be precise when relating the order in which symptoms occur, and clinicians may not wish to spend time recording every aspect of this detail. However, it may be possible to find general agreement over a set of terms, although these would need thorough testing. For example the series: **Finished before the start of, Finished after start of, Occurred during**.

8.9 Link terms may promote events to act as headings

Computerised clinical records often allow clinical entries to be loosely linked together. This acts as a mechanism for organising clinical information under a clinical item. For example:

1997 **Myocardial infarct**
- 1997 **Dyspnoea on exercise**
- 1993 **Angina**
- 1993 **Atenolol 50mg 1 tab a day**
- 1994 **Coronary Artery Bypass Graft x 3**

A link term such as **Associated event** can capture this relationship. For example:

1997 **(Found -)** ***Myocardial infarc*****t**
Associated event
- 1994 **(Done -)** ***Coronary Artery Bypass Graft x*** **3**

Note that this might appear on-screen as:

1997 ***Myocardial infarc*****t**
- 1994 ***Coronary Artery Bypass Graft x*** **3**

In this case, the link term has the extra functionality of allowing clinical records to be grouped or organised under clinical event headers. More specific link terms may be used for each relationship between clinical entries. For example:

1997 (**Found -)** ***Myocardial infarc*****t**
Reason

- 1994 **(Done -) Coronary Artery Bypass Graft x 3**

8.10 The needs of legacy data should be considered.

Many concepts from earlier versions of Read Codes included contextual information (e.g. ***Stiff neck symptom; [D] Abdominal pain, FH: asthma, No FH of cardiovascular disease***). These should be retrievable in response to a query for the simpler CTV3 clinical concepts (***Stiff neck, Abdominal pain, Asthma*****,** ***Cardiovascular disease***) associated with context concepts (**Reported by patient, Diagnosis, Family history**).

> **Principle (Backward compatibility)**. New context terms and models should map on to terms used in previous versions of Read Codes.

8.11 Context and WYSIWYG

Some argue that a complex structure can be used to represent what clinicians say, and that this can be made more natural or simplified at the user interface. However there are professional, medicolegal and duty of care concerns if the representation stored and used as the basis for decision support (e.g. drug interactions, searches) is significantly different from what is presented at the interface (in the computerised record and in picking lists). It is probably better to err on the side of What You See Is What You've Chosen.

> **Principle (Maximum transparency)**. The coded representation should be a faithful as possible to the user's chosen terms. Although it is possible to use a computer representation of the user's terms that is abstracted, the medico-legal status and quality of the record is likely to be enhanced if the user can understand the stored terms and their relationships directly.

However, there are cases when it seems clearer and simpler to take a different approach. Dropping **Done** and **Found** from the screen appearance of clinical terms in some contexts seems to provide a genuine increase in clarity, but whenever the principle of maximum transparency is broken, thorough testing is required. Whatever the case, the user should be able to see and understand the stored clinical and context terms.

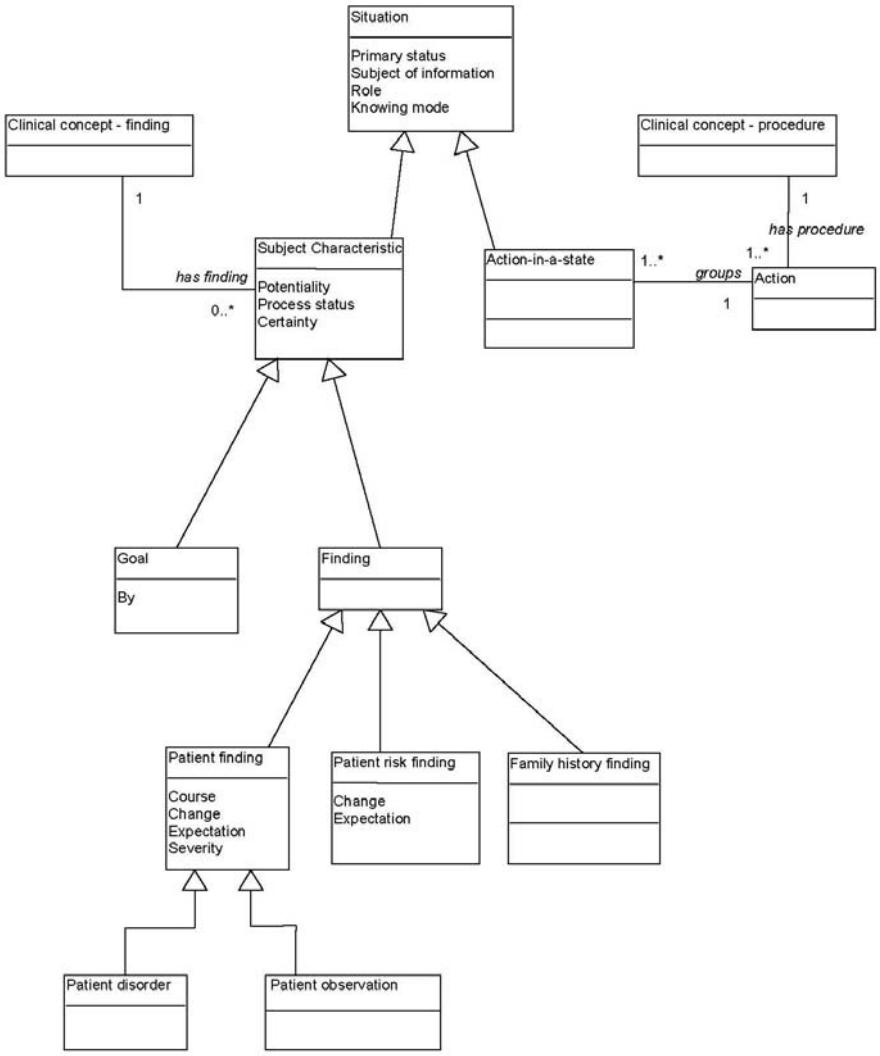
8.12 Attribution

A bare record of the procedures and findings that have been seen, done or planned is insufficient. A history may or may not be reliable depending on who gave it – this may have been at second or third hand for example, especially in the case of children, unconscious or uncommunicative patients. A recording of that history may be made by a more or less experienced clinician. Lastly, the dates and actors responsible for a clinical action need to be recorded for later communication or medicolegal reasons. As audits and searches for improving patient care may need to analyse with respect to these data, they need to be structured.

> **Principle (Attribution)**. Sufficient detail needs to be recorded about the data recording process, information gathering process and delivery of healthcare to ensure that patient data amount to a useful and analysable record. The detail needs to include the dates of events, the date of recording of events, the author of a report and the clinicians taking responsibility for activities and performing those activities.

Much of attribution is usually considered part of the domain of clinical record rather than terminology and omitted from Context of care work. Where terms are important, these are listed as status terms. For example the attribute 'Subject of information' allows users to record who reported a piece of information.

A.1. Major Classes in Context



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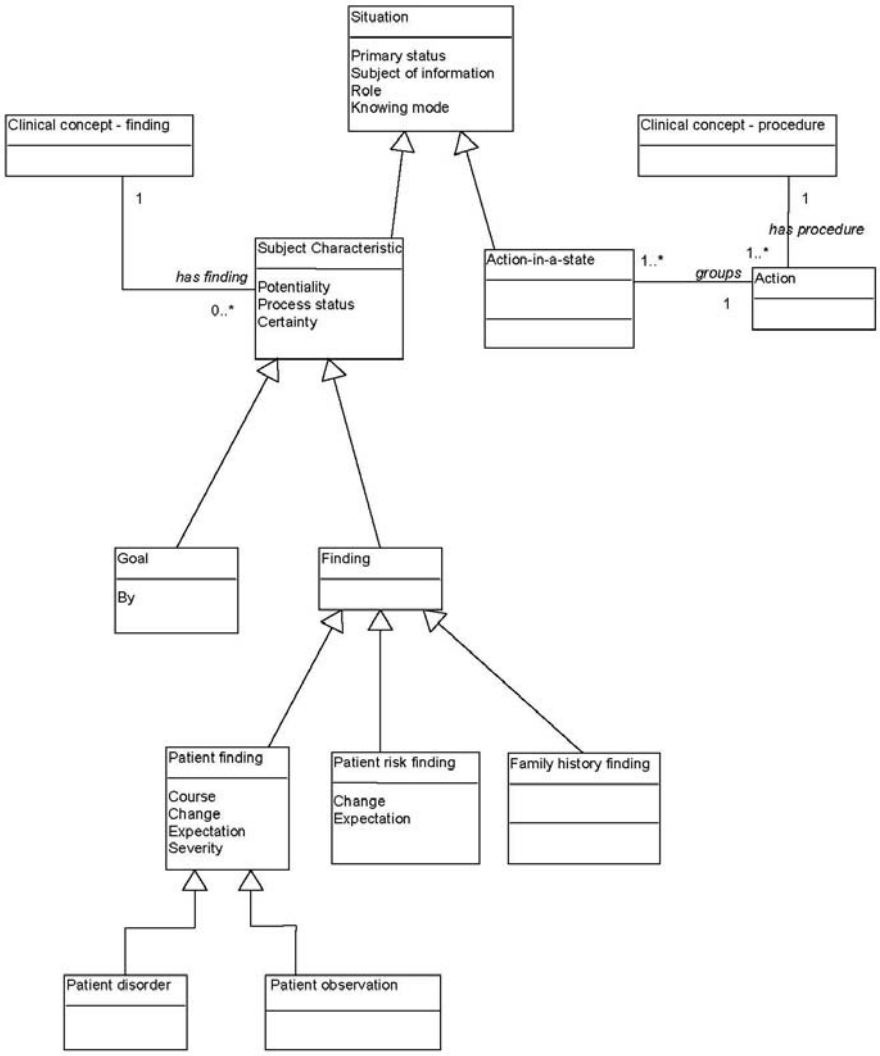
A.1. Major Classes in Context



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A.1.1 Action

An **Action** may change the state of the world (interventions), may uncover knowledge (history taking, examination and investigation) or may be an encounter or contact (domiciliary visit, inpatient admission). An Action represents the performing (or planned performance) of a **Procedure** on an individual at some time. It differs from a **Procedure** (e.g. ***left inguinal hernia repair***) which is an abstract notion, and not tied to any time, place or patient. Procedures are found in terminologies, Actions in the clinical record. If a patient has several left inguinal hernia repairs, then each of these repairs is a separate **Action** which will be considered, then started and eventually deemed as done.

A.1.2 Action-in-a-state

Each **Action-in-a-state** is a type of event, and has a start and finish time. Examples of an action-ina-state are:

Done - *Appendicectom*y
Organised - *Outpatient appointment*.

Each Action-in-a state has one attribute, a Primary status. This indicates the stage of completion of the (planned) action and ranges from **Under consideration** or **Being organised** to **Done** or **Not to be done**.

A.1.3 Clinical concept - finding

A disorder, or other potential clinical finding from history taking, examination and investigation. For example: ***Appendicitis, Low blood sugar, Blood sodium level > 140 mmol/L***. It may be represented by a single Read Code (with term rubric and term identifier) or by an expression of a core concept (Read Code) with one or more qualifiers (all Read Codes).

Patient disorders are associated with clinical concepts from the disorder chapter of CTV3, whereas **Patient observations** and **Goals** are associated clinical concepts from the History and observation chapter of CTV3. Other subclasses of **Subject characteristic** are associated with Read Clinical findings from either chapter.

A.1.4 Clinical concept - procedure

A procedure, described in the abstract, that may improve the health, or knowledge of the health, of the Subject of the record. Includes procedures, regimes and therapies but excludes incidents (which are findings). Examples of procedures include: ***Appendicectomy, Full blood Count, Telephone contact.*** May be represented by a Read Code (with term rubric and term identifier) which may be further qualified by other Read Codes (and term rubrics and term identifiers) in a standard Attribute-Value format.

A.1.5 Family history finding

Any disease, or other finding, which runs in the patient's family. Currently, there is no demand or provision for statements such as Family history of appendicectomy. Correct examples include:

Family history of - *Asthm*a
Possible family history of – *Asthm*a

Attributes
Primary status (inherited)
Role (inherited)
Knowing mode (inherited)
Potentiality (inherited)
Process status (inherited)
Certainty (inherited)

Each **family history finding** may have one primary status. The choices are:

Family history of
Definitely family history of
Probable family history of
Possible Family history of
No Family history of
Definitely no family history of
Probably no family history of

Each **Family history finding** has one Subject of information which is either the default **Family member**, or one of its subclasses (**Father, Mother, Sibling, Son, Daughter**, etc.). This is the family member about whom the information refers.

A.1.6 Finding

A current or past finding that is of relevance to a **Subject**, including disorders, observations, any assessment of risks to the patient and the patient's fears and family history. For example:

Excluded - *Asthm*a

Found -*Loss of voice*
Possibly at risk of - *Carcinoma of lun*g
Family history of – *Asthm*a

Attributes
Primary status (inherited)
Role (inherited)
Knowing mode (inherited)
Potentiality (inherited)
Process status (inherited)
Certainty (inherited)

A.1.7 Goal

A **Goal** is a future state of the **Subject**, that an **Agent** (e.g. Patient, Carer or Health care professional) is trying to achieve. The Goal may be expressed quantitatively or qualitatively. For example:

Goal - *diastolic blood pressure < 90 mmH*g
Goal - *normal diastolic blood pressure*.

Attributes

Primary status (inherited)
Subject of information (inherited)
Role (inherited)
Knowing mode (inherited)
Potentiality
Process status
Certainty
By

The Primary status of a **Goal** is always **Goal**.

The Role of a **Goal** may only be **Reason for encounter**

The Subject of information is currently limited to the **Patient.** However Primary status could be expanded to include other Subjects (e.g. goals of family members).

The Knowing mode, Process status, Certainty of a **Goal** may be any of their respective sets.

The Potentiality of a **Goal** is always **Goal**

Each goal may have one attribute *By*, which takes the value of the date that the goal is to be performed by.

A.1.8 Patient finding

A finding from history-taking, clinical examination, investigation or inference, including disorders, made of the patient. This is an abstract class, not found explicitly in patient records, and not therefore associated with a primary status. Excludes Patient fears, risks and Family history. **Patient findings** are distinguished from the act of observation or investigation, which are **Actions**. Examples of patient findings are:

Excluded -*Asthm*a
Found -*Loss of voic*e

Attributes
Primary status (inherited)
Role (inherited)
Knowing mode (inherited)
Potentiality (inherited)
Process status (inherited)
Certainty (inherited)
Course
Severity
Expectation
Change

The Subject of information of a Patient finding is fixed as being the patient.

Each Patient finding may have one Change recorded against it, to record the way that the finding has been changing over time. Examples include **Is worsening, Stable, Has improved**.

Each patient finding may have one value for a Course attribute, which may describe its

speed of onset or duration. These aspects are combined because clinical expressions may not make this clear. For example, in an accepted clinical phrase such as Acute Leukaemia, it *may* not be clear whether 'acute' refers to the speed of onset or the duration. Examples include **Acute, Acute onset, Transient, Gradual onset**.

Each Patient finding may have one value for the attribute Expectation, which expresses what the clinician feels is the likely outcome of that finding. Allowable values include: **Expected to resolve, Expected to improve, Expected to remain unchanged, Expected to worsen**.

Each patient finding may have one value for Severity. The allowable values are: **Mild, Moderate, Severe.**

A.1.9 Patient disorder

A patient finding which is a disorder (e.g. Asthma, Diabetes mellitus and Anaemia).

Found -*Asthm*a
Probably excluded - *Diabetes mellitu*s

Attributes
Primary status (inherited)
Role (inherited)
Knowing mode (inherited)
Potentiality (inherited)
Process status (inherited)
Certainty (inherited)
Course (inherited)
Severity (inherited)
Expectation (inherited)
Change (inherited)

Primary status may be one of:

Found
Definitely found
Probably found

Possibly found
Excluded
Definitely excluded
Probably excluded

A.1.10 Patient observation

A patient finding which is a finding from history taking, examination or the result of a clinical or laboratory test. These are distinguished from disorders which give rise to observations

Found - *Raised blood glucos*e
Definitely found -*Blood glucose level = 5.4 mmol/*L
Found -*Absent knee reflex*
Found - *No joint pai*n

Attributes
Primary status (inherited)
Role (inherited)
Knowing mode (inherited)
Potentiality (inherited)
Process status (inherited)
Certainty (inherited)
Course (inherited)
Severity (inherited)
Expectation (inherited)
Change (inherited)

Each patient finding has one primary status. The notion of Absence is excluded (as discussed in the documents 'List of Clinical terms to describe context' and 'Background and principles behind the Context of care'). Primary status may be one of:

Found
Definitely found
Probably found
Possibly found

A.1.11 Patient risk finding

A Finding that a patient is at increased risk of developing in the future. For example:

At risk of - *Pregnancy*
Possibly at risk of - *Huntingdon's chorea*

Attributes
Primary status (inherited)
Role (inherited)
Knowing mode (inherited)
Potentiality (inherited)
Process status (inherited)
Certainty (inherited)
Expectation
Change

Each **Patient risk finding** may have one value for **Expectation** and **Change** (as **Patient finding**).

A.1.12 Situation

Something which occurs in time and is thought to be relevant in some way to the health or management of the Subject (patient) in whose health care record it occurs.

Attributes
Primary status
Subject of information
Role
Knowing mode

Each Situation may have only one Primary status. This is a precoordinated term that safely

compiles essential context attributes (and the association **Subject of information**) into a term that may be used safely at the user interface. For example the clinical statement **Definitely no Family history of - *Diabetes mellitus*** consists of the Clinical term ***Diabetes mellitus*** and the Primary status concept **No family history of**. It has the following semantic definition (atoms):

Subject of information**: Family member**
Certainty**: Certain**
Negation**: Negated**
Potentiality**: Actual**

By compiling these notions into a clear clinical phrase, ambiguity is removed and display of the concept on screen as part of a clinical record is less likely to provide misleading information. Therefore the primitive attributes (e.g. Subject of information, Certainty, Negation and Potentiality) are not used directly in the clinical statement (situation). The primary status is designed to precede the clinical concept e.g. **Under consideration -*Cholecystectomy***).

The Subject of information may be further refined (from family member) to any Read Code subclass of **Family member**.

Family history of - *Asthma*, Brother, Sister

Each situation may have one or more roles. This is optional. The role may describe whether the **Situation** describes a diagnosis (in the case of disorders or observations) or a **Problem, Alert** or **Reason for contact** for any Situation. Roles may be used in the clinical statement e.g.

Family history of - *Huntingdon's chorea*, Problem

However, roles are more likely to be used for generating headings, or some other system specific delineation (e.g. a system might asterisk all findings designated a problem by the user).

Problems
Family history of - *Huntingdon's chorea*
Parkinsonism

Each **Subject characteristic** has one Knowing mode. This describes the method by which the information was gained e.g. **observed by health professional** (for examination and test findings), **reported by patient** (for symptoms or history in the past, typically used when there is no written documentation), **reported by professional** (for diagnoses made by healthcare professional), **reported by relative** (often required for children's history).

A.1.13 Subject Characteristic

One kind of **Situation, Subject characteristics**, are descriptive elements of the past and current state, including disorders, history, observations and test results of a **Subject** as well as predictions, concerns and goals for the future. Therefore collectively Subject characteristics represent the clinical state of the Subject. Each Subject characteristic has exactly one **Read Clinical finding** and one **Primary status** (see the subtypes of Subject characteristic). In this sense a Subject characteristic has a similar configuration to an **Action-**

in-a state. Examples of Subject characteristic include:

Excluded -*Asthma*a
Possibly present -*Loss of voice*
Definite family history of – *Asthma*a

Attributes
Primary status (inherited)
Subject of information (inherited)
Role (inherited)
Knowing mode (inherited)
Potentiality
Process status
Certainty

Each **Subject characteristic** has one Potentiality. Examples include **Actual** (in the case of findings), **Goal, At risk of, Predicted**.

Each **Subject characteristic** has one Process status. Each example include **Ongoing, New**.

Each **Subject characteristic** has one Certainty. This may be **Unstated, Certain or Uncertain**.

Associations

A.1.14 Has Procedure

Each Action is associated with one CTV3 procedure.

A.1.15 Has Finding

Each Subject characteristic is associated with one CTV3 clinical finding

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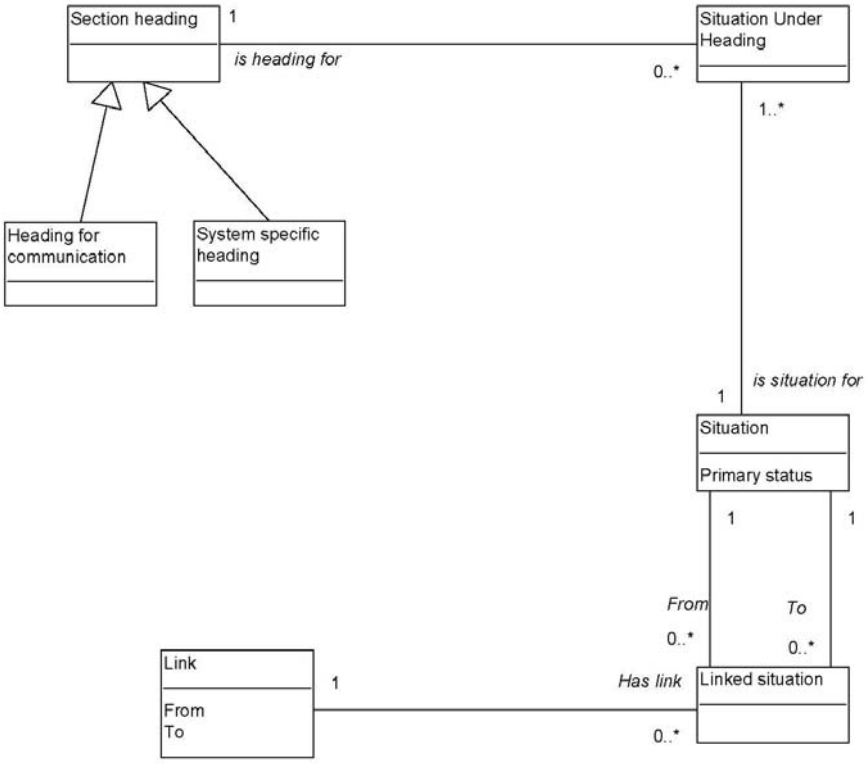
Headings



A.1.16 Heading for communication

A predefined title in an electronic patient record, as defined by the group 'Headings for Communicating the Personal Healthcare Record' which is used for organising clinical information. Examples of proposed headings include: ***Diagnosis, Assessment*** and ***Participation***. The proposed set of headings is currently being evaluated in trials.

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A.1.17 Link

A relationship which may be selected by a users to relate two **Situations**. One of the Situations may then act as a heading for the other (or several others). These user defined groupings may be used alongside **Headings for communication** and **System specific headings**. If clinicians select *Associated* and not one of its more specific subclasses, then no specific kind of association is implied. For example, two findings may be associated without any implication of causality or temporal precedence. This may also help with data in legacy systems where two pieces of clinical data are linked without the link type being specified. The

list of links is expandable, but currently includes:

Reason for action
Outcome of action
Information from encounter
Result of test
Caused by
Associated

A.1.18 Linked situation

A relationship selected by a clinician to relate two **Situations**. One of the Situations may then act as a heading for the other (or several others). These user defined groupings may be used alongside **Headings for communication and System specific headings**.

A.1.19 Section heading

A **Section heading** is a term that organises other information. Though a heading in a written clinical record may play other roles, these are implemented using different mechanisms. For example, the extra meaning provided by a heading such as ***Family history*** is defined in the context model by the **Primary status** (e.g. ***Family history***) of a **Finding** (e.g. ***Diabetes Mellitus***). Where the role that clinical information plays in clinical dialogue is implied by a heading (e.g. ***Diagnosis, Problem***) then this is defined by the **Significance** of the Finding. But terms such as ***Family History*** and ***Diagnosis*** may also appear as a Section heading for organising clinical information in a record or in clinical messages. However, 'Family history' as a section heading, and 'Family history' as a Primary status are different concepts. A mapping between the two helps partially automate the process of inferring one from the other.

A.1.20 Situation under heading

A **Situation** placed under a particular **Section heading** within a **Subject of care's** record.

A.1.21 System specific heading

Non-standard headings introduced by system developers with their users to organise clinical information. Some **System specific headings** may be inferred from data in the clinical record. For example, Read coded operations may be placed automatically under a heading 'Operations'. It should be safe to ignore system headings when running reports as essential meaning is provided by status terms.

Associations

A.1.22 Is heading for

Section headings may organise clinical information (recorded as one or more **Situations**).

A.1.23 Is situation for

A **Situation** may be organised under one or more **Section headings**.

A.1.24 From

Each **Situation** may be linked FROM one or more other **Situations**

A.1.25 To

Each **Situation** may be linked TO by one or more other **Situations**

A.1.26 Has link

Each linked pair of **Situations** has a named **Link**. This may be ***Reason for action, Caused by***, etc. The nature of the link determines which types of situations may be linked. For example, ***Reason for action*** must have an Action as its **From** link.

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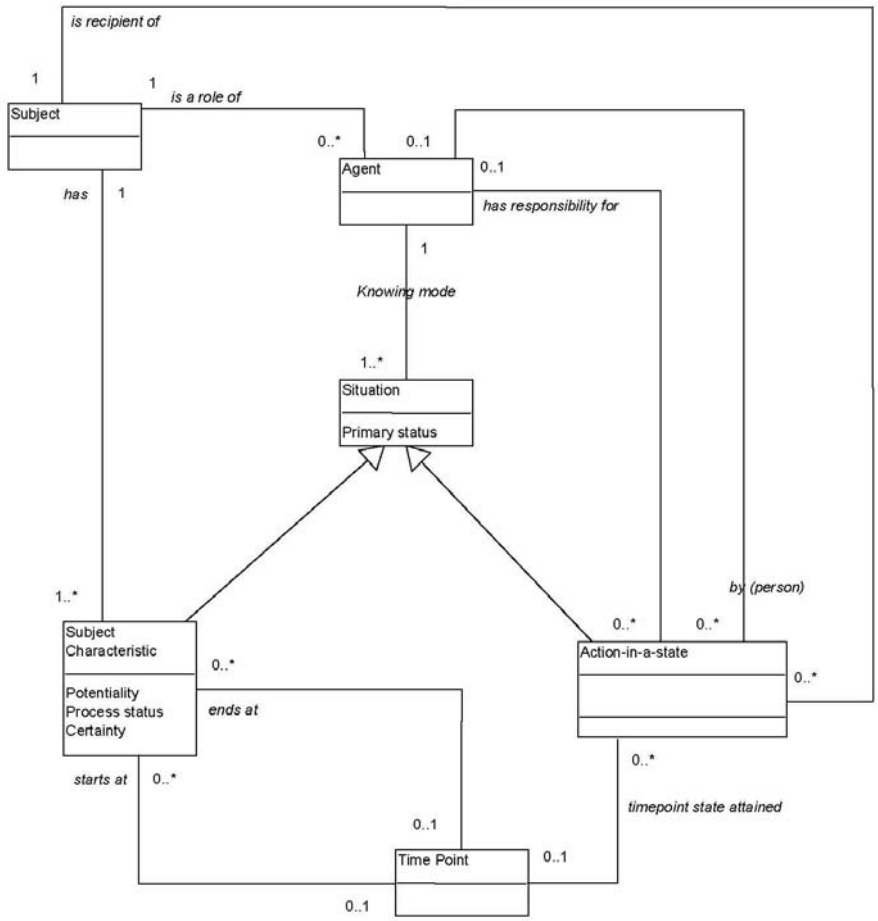
A.2 Attribution



Attribution is included for reference. It is included in other models (e.g. Health Care Model of the Information Authority; CEN PT26 and PT 29). The model is not intended to be complete.

A.2.1 Agent

A person, organisation or other Subject who has the ability to act either unconstrained or with specific authority. Subclasses of **Agent** include patient, nurse, doctor, clinical directorate.

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A.2.2 Subject

A person, population or organisation receiving health care. In the clinical record, the **Subject of care** is the patient, whose record is being described. In other systems, the subject of care may be a piece of tissue or a population of patients.

A.2.3 Time point

A point in time, defined in terms of the second, minute, hour, day, month and year,

depending on the purpose of the system. All **Situations** may be associated with times. **Subject characteristics** hold over a period of time (and therefore have start and end points) whereas an **Action-in-a-state** reaches that **Action state** (e.g. **Under consideration** or **Started** or **Done**) at one particular **Time point**.

Associations

A.2.4 By (person)

An **Agent** brings about the state (e.g. **Under consideration, Done**) of an **Action-in-a-state** (***Cholecystectomy* - Under consideration**) and may therefore be, for example, the person who is considering the action, who planned the action or who did the action.

A.2.5 Ends at

Each **Situation ends at** some point in time, which may or may not be known.

A.2.6 Has

The patient (**Subject of care**) **Has** a collection of **Subject characteristics** which include clinical findings and goals (and also administrative information).

A.2.7 Has responsibility for

An **Agent** is the responsible agent for an **Action-in-a-state**. In a hospital medical team it may be a consultant who is responsible for an **Action** which is done by junior staff.

A.2.8 Is a role of

A **Subject of care** (typically the patient in this setting) may play the role of an **Agent**. Through this relationship, the patient may be a source of knowledge for clinical information, for example.

A.2.9 Is recipient of

A **Subject of care** is the recipient of an **Action**. In the clinical record, the subject of care is the patient being treated. In other words, actions (***Aspirin* - Under consideration*; Cholecystectomy* Done**) are performed on patients.

A.2.10 Knowing mode

An **Agent** (e.g. patient, relative, clinician) is the source of information about a **Situation** (an **Action-in-a state** or a **Subject characteristic**). This corresponds to the method by which the information was gained e.g. **observed by health professional** (for examination and test findings), **reported by patient** (for symptoms or history in the past, typically used when there is no written documentation), **reported by professional** (for diagnoses made by healthcare professional), **reported by relative** (often required for children's history).

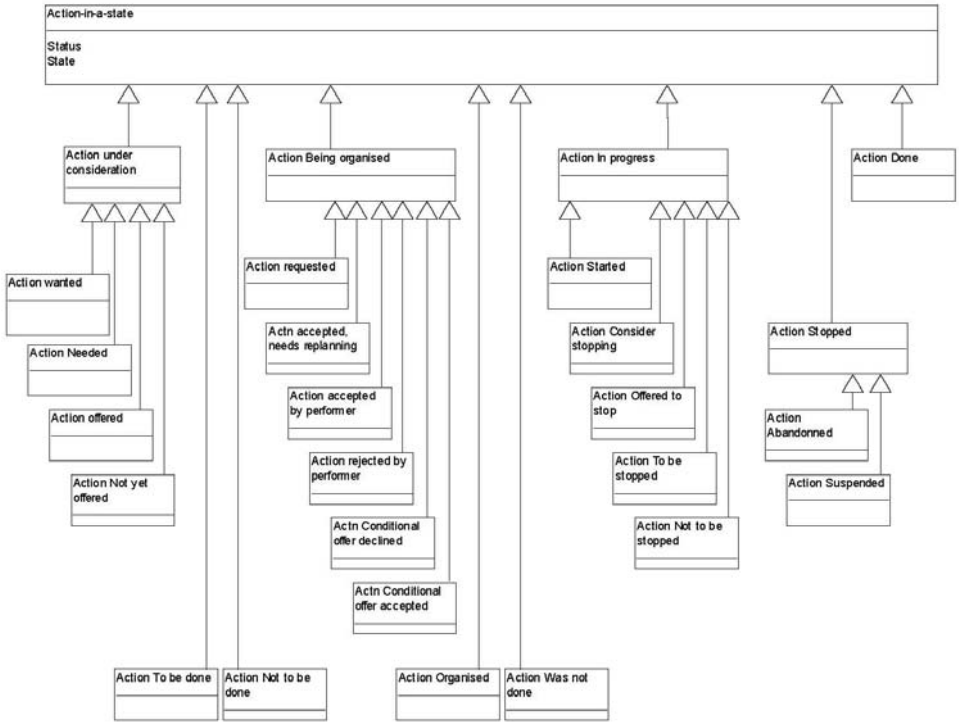
A.2.11 Starts at

Each **Situation** starts at some point in time, which may or may not be known.

A.2.12 Timepoint state attained

The time at which the state of the action (e.g. **Under consideration, Started, Done**) was achieved.

A.3 Types of Action-in-a-state



Note on action-in-a state: Each Action-in-a state has a single primary status which compiles typical state information as found in Order communications systems and decision-making information. It may be useful to distinguish just the state information as part of the semantic definition of the primary status.

Permissible state transitions are described in the next sections.

A.3.1 Action

An **Action-in-a state** with the primary status **Abandoned** (e.g. ***Chemotherapy* – Abandoned**) which is also its state. The status implies that the action has been abandoned for some reason. The reason may be stated using the Reason for action link.

A.3.2 Action Accepted by performer

An **Action-in-a state** with the primary status **Accepted by performer**, which is also its state. The status implies that the action (actually a plan at this stage) has been accepted by the person who will perform it.

A.3.3 Action Accepted, needs replanning

An **Action-in-a state** with the primary status **Accepted, needs replanning** which is also its state. The status implies that the action (more accurately plan or potential action at this stage) has been accepted by the person who will perform it, but will need replanning. This may be because the original schedule is now inconvenient.

A.3.4 Action Being organised

An Action-in-a state with the primary status **Being organised** which is also its state. The status implies that the action (more accurately plan or potential action at this stage) is in the process of being organised.

A.3.5 Action Consider stopping

An **Action-in-a state** with the primary status **Consider stopping**. Its state is **In progress**. The status implies that a decision on whether or not to stop the action is being considered.

A.3.6 Action Done

An **Action-in-a state** with the primary status **Done** which is also its state. The status implies that the action has been done or completed.

A.3.7 Action in progress

An **Action-in-a state** with the primary status **In progress** which is also its state. The status implies that the action has been started, and is in progress, but not yet complete.

A.3.8 Action Not to be done

An **Action-in-a state** with the primary status **Not to be done**, which is also its state. The status implies that a decision has been made not to do the action. The reason may be stated using the Reason for action link.

A.3.9 Action Not to be stopped

An **Action-in-a state** with the primary status **Not to be stopped** which has the state **In progress**. The status implies that the action has been started, when a decision has been made to continue doing it.

A.3.10 Action Not yet offered to patient

An **Action-in-a state** with the primary status **Not yet offered to patient** and the state **Under consideration**. The status implies that the action (more accurately plan or potential action at this stage) is under consideration by health care professionals, but has not (yet) been offered to the patient.

A.3.11 Action Offered to patient

An **Action-in-a state** with the primary status **Offered to patient** and the state **Under consideration**. The status implies that the action (more accurately plan or potential action at this stage) is under consideration by health care professionals, and has been offered to the patient.

A.3.12 Action Offered to stop

An **Action-in-a state** with the primary status **Offered to stop** and the state **In progress**. The status implies that the action has been started, and a decision to stop has been offered to the patient.

A.3.13 Action Organised

An **Action-in-a state** with the primary status **Organised** which is also its state. The status implies that the action (more accurately plan or potential action at this stage) has been organised. A synonym is scheduled.

A.3.14 Action Rejected by performer

An **Action-in-a state** with the primary status **Rejected by performer** which is also its state. The status implies that the action (more accurately plan or potential action at this stage) has been turned down by the person who was to perform it. The owner of the action will therefore need to replan the action.

A.3.15 Action Requested

An **Action-in-a state** with the primary status **Requested** which is also its state. This is a substate of **Being organised**. The status implies that the person responsible for the action has requested of someone who can do the action to go ahead and perform it.

A.3.16 Action Started

An **Action-in-a state** with the primary status **Action started** which is also its state. The status implies that the action (more accurately plan or potential action at this stage) has been started, but has not yet been completed. The reason for starting the action may be stated using the **Reason for action** link.

A.3.17 Action Stopped

An **Action-in-a state** with the primary status **Stopped** which is also its state. The status implies that the action has been stopped, but is not done or completed. A user should ideally choose one of the substates of **Stopped** (**Suspended** or **Abandoned**), but this may not be known. The reason for stopping the action may be stated using the **Reason for action** link.

A.3.18 Action Suspended

An **Action-in-a state** with the primary status **Action suspended** which is also its state. The status implies that the action has been suspended for some reason. The reason may be stated using the **Reason for action** link. There is an intention to consider restarting the action.

A.3.19 Action To be done

An **Action-in-a state** with the primary status **To be done**, which is also its state. The status implies that a decision has been made to go ahead with the action.

A.3.20 Action To be stopped

An **Action-in-a state** with the primary status **To be stopped**, which has the state I**n progress**. The status implies that the action has been started, and a decision has been made to stop it at some point.

A.3.21 Action Under Consideration

An **Action-in-a state** with the status **Under consideration**, which has the same state. The status implies that the action (more accurately plan or potential action at this stage) is being considered, but that no commitment has been made to do it.

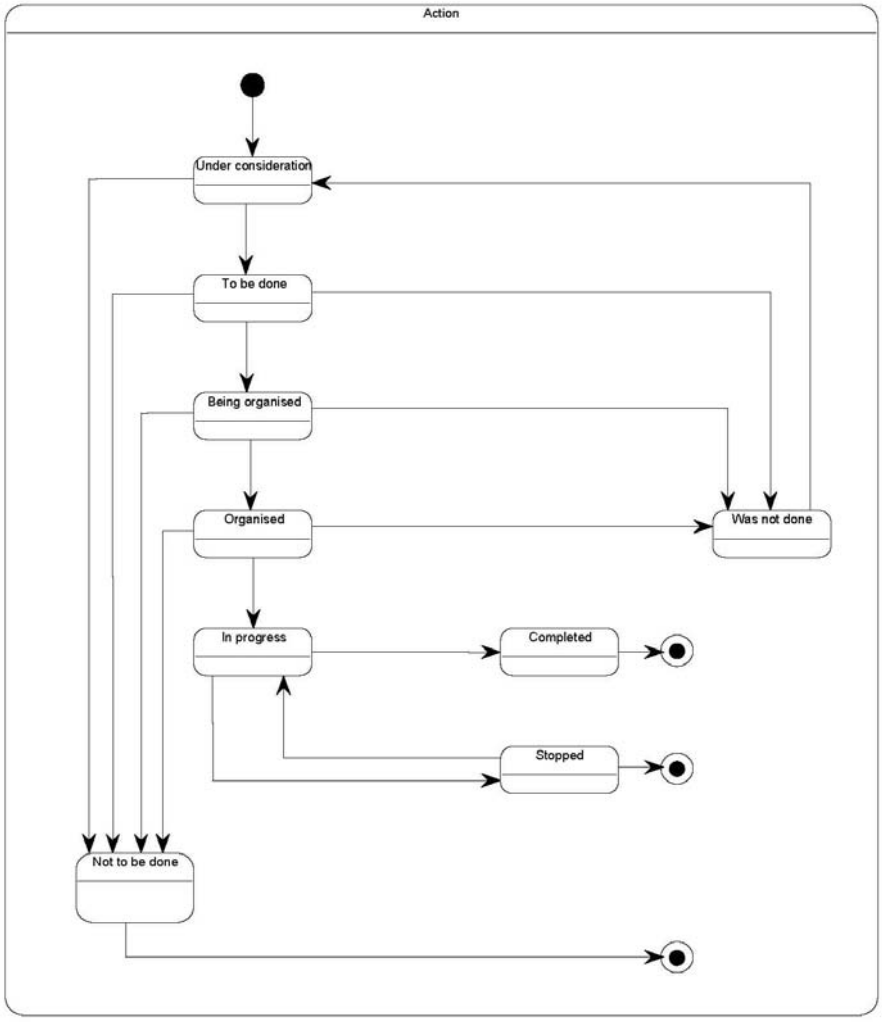
A.3.22 Action Wanted by patient

An **Action-in-a state** with the primary status **Wanted by patient**, which has the state **In progress**. The status implies that the patient would like the action to be done, but that no commitment has (yet) been made by healthcare professionals to go ahead.

A.3.23 Action Was not done

An **Action-in-a state** with the primary status **Was not done** which is also its state. This state has been introduced to describe those actions in which the reason for not doing it has been lost over time. There may have been an intention to do it or a decision may have been made not to do it. The status '**Not done**' was rejected as a better description because it has potentially hidden ambiguity. It may imply to some people that the action was intentionally not done, when this may not have been the case.

A.4 State Diagram for Action



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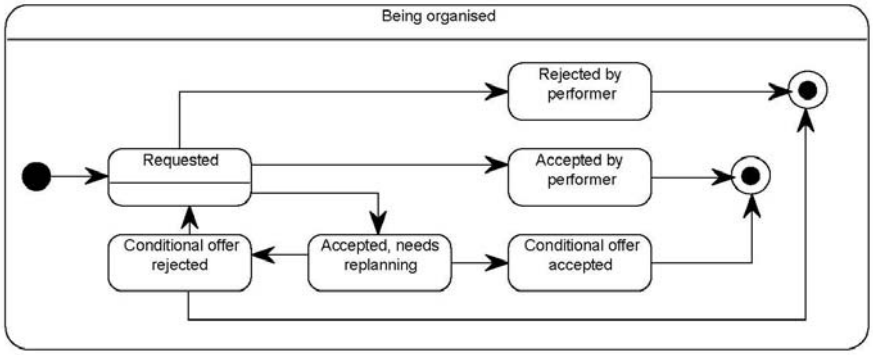
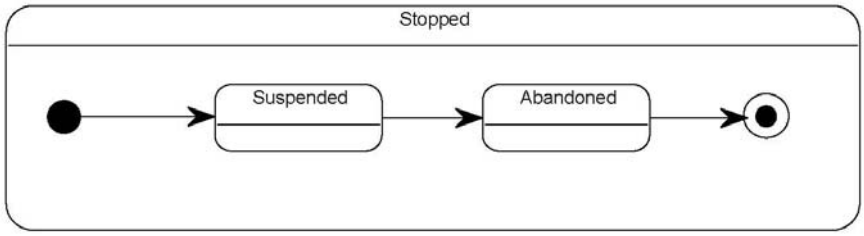
A.5 State Diagram for Substates of Being organised



A.6 State Diagram for Substates of 'Stopped'



Appendix B

References

This list of references is not intended to be exhaustive, but to give a flavour of some of the influences on Context of Care work.

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