NHS SCOTLAND CLINICAL MODELS

PROGRESS REPORT OCTOBER 2013

Document control

Version history

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0.1	26-Oct-2013	Draft for internal review
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1.1	30-Oct-2013	Minor formatting changes
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Issue control

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NHS SCOTLAND CLINICAL MODELS – UPDATE

BACKGROUND

To exchange clinical information in a computable way clinical computing systems need to express, store and exchange clinical data in the same format. In the clinical domain requirements and definitions of clinical concepts can change very quickly and need to be adaptable to new purposes, so a traditional waterfall style of development is often not the most effective way of delivering or managing this requirement.

In Health Informatics the concept of a 'Clinical Archetype' is firmly established. This is a definition (a model) of a clinical 'concept' such as a 'weight', a 'height' or a 'blood pressure' that can be used by a computer system. The archetype contains places to store all the items (elements) of data that are needed to fully define the concept. This may include, for example, a 'clinical term' to describe the concept such as 'Blood Pressure', and places for values or comments. Terms would normally be taken from a standard clinical terminology (Read Codes or SNOMEDCT), whereas values and comments may be numbers or text added by end users.

For example, a computer model of a 'Weight' record would need values for a Date of Measurement, a Description, a Value and Units of Measurement for the value. A record in a computer system could look like:

- **Date:** 14-Oct-2013
- **Description:** 'O/E Weight'
- **Value:** 70.5
- **Units of Measure:** kg

From these archetypes clinical software suppliers can provide 'templates'. Templates use only the elements of archetypes that are needed for the current task, leaving out things that may not be of relevance at that time. For example, a 'blood pressure template' may not use the 'blood pressure archetype' elements of 'cuff size' or 'position', if not required for that particular application. The template author may only want to use 'Systolic' and 'Diastolic' elements to provide a simple form for recording blood pressures. Templates can use elements from different archetypes at the same time, allowing for the provision of complex forms and reports for systems users.

Designing clinical archetypes requires the contribution of clinicians. As the primary end users of archetypes, clinicians need to be confident that they are complete and safe; that they enable accurate and meaningful recording of clinical data in computer systems; and that they support clinical care. In other words: clinical review is essential to make the archetype 'fit for purpose'.

The challenge lies in gathering the clinical requirements in a format that allows rapid and agile development and deployment, and in bringing together clinical users and system developers. The solution we are working with to solve this makes use of a clinical archetype and template editing tool called 'Clinical Knowledge Manager' (CKM).

Clinical Knowledge Manager is an internet based, collaborative tool that provides functionality to design, edit, review and publish clinical archetypes and templates. It can export to XML formats, allowing for rapid deployment. Version tracking and reviewing functions allow for flexibility in adapting to new or changed requirements. Face to face meetings of the reviewers are not normally required. Use of the archetypes in real systems is only ever possible when the communities of reviewers agree that they meet their requirements, and when value in implementation is clear and apparent. By distributing the work of designing clinical models systems suppliers benefit by not having to duplicate work done elsewhere and by achieving agreement on data structures, reducing the need for mapping and re-engineering of their software.

MESSAGING WITH MEDICATION AND ALLERGY RECORDS

To support safer medicines in Scotland there is a requirement to establish computable models of 'Allergy' and 'Medication' records. In this document the term 'model' means a representation of clinical concepts that a computer system can then use to store and exchange the data reliably. In this case the models we use are 'archetypes' and 'templates', as described above.

NHS Scotland has developed a number of different models for representing medications and we have several proprietary clinical systems (such as INPS Vision and EMIS PCS) with their own models for medications. Because all these models are different, systems are not able to reliably exchange data with each other using electronic messages. To solve this we are using CKM to collaboratively design archetypes that will encompass the requirements of all the stakeholders in NHS Scotland. In effect this means designing a single model for medication.

Outputs of this work will:

- Reduce costs for development
- Reduce times for implementation
- Support the clinical requirements
- Support system suppliers requirements
- Reliably exchange structured data across health care systems (inter-operability) thus being a key enabler for the 'Closing the Loop' initiative.
- Support the development of a single medication record for Scotland
- Support patient facing applications
- Support innovation and development of new applications on new platforms
- Reduce medication and prescribing errors when patients transfer between care providers.

The same issues also apply to 'drug allergy' records – again stored in many different ways in different systems. Work on bringing together a common 'drug allergy' record for exchange of data was already well advanced by the GP2GP project in use in England. Providing a model for this was also identified as a priority for NHS Scotland because it can provide significant safety benefits.

Using this method of exchanging data means that the records can be processed by the receiving system. That is: they are computable, rather than just displays of the information. They can therefore be used to automatically populate electronic prescribing systems, enable computerised decision support and reduce or eliminate re-keying, transcribing errors and associate clinical risks.

THE DOSE VERSUS PRODUCT PROBLEM

Fundamental differences in the methods used by prescribers to order medications for patients in community versus hospital settings adds complexity to the ability for medication data to be safely exchanged when it crosses these care boundaries.

In hospital 'in-patient' settings, prescribers order medication by describing a dose to be administered, without direct reference to the actual product used to supply this dose. This is then translated by pharmacists and those administering the medications to an equivalent using actual products. For example, the medication order 'Furosemide 60mg orally at 8 am' would be supplied and administered as 'Furosemide 20mg tablets, take 3 tablets at 8 am.'

In community prescribing prescribers order medication with direct reference to the product.

The consequence of these differences is that to reliably exchange prescribing data across the care boundaries requires the provision of computable 'medication directions', sometimes referred to as 'Dose syntax'. This will reliably allow the translation from a product based order to a dose based one, and visa-versa.

Significant progress on the modelling of this has already been undertaken by dm+d and NHS England. EHealth in NHS Scotland has agreed to support further development of this work to progress it to a practicably implementable state. This is required to deliver key outcomes of 'Closing the Loop'. Review and agreement of the models for Dose Syntax will be supported using CKM and the reviewing processes outlined in this document.

PROGRESS

The CKM service was funded for use by eHealth in late 2012 with a view to establishing the feasibility of using this method to develop clinical models, in particular for medication and allergy records.

Work was undertaken to analyse and review models and recommendations currently available, and to align these to current NHS Scotland models such as those used in SCI products. Invitations to participate were sent to people who had expressed an interest in doing so at the introductory meeting held earlier in 2012.

PROCESS

For each review invitations are sent by e-mail to users who have registered an interest in the archetype. Reviewers can then view the details of the archetype in CKM via a web browser, and comment on each element as well as the general design and intent. Each round of review typically operates for two to four weeks to allow stakeholders time to contribute. Once the review is complete archetype editors need to meet to discuss the responses and actions, affect any changes to the archetype and decide if a further review round is required. Meetings are normally undertaken using web based meeting tools and conference calls rather than in person.

The 'Allergy' archetype was selected for first review as it was already relatively mature with much of the initial development having been undertaken by the GP2GP team in NHS England.

For the 'Allergy' archetype the initial review round was completed on 20th March 2013. A subsequent second review finished on 26th June 2013. Following completion of this second review, and responses by the editors, this archetype was 'published' on 3rd September. This status means that the archetype is acceptable for use in real applications. The decision to publish an archetype is informed by approvals and comments from the reviewers.

The reviewers included 12 clinicians, 8 Health IT professionals and 1 consumer, providing a useful balance between clinical and technical input.

The 'Medication Item' archetype review was initiated on 14th June 2013 and completed 29th July 2013. The function of the 'Medication Item' archetype is to allow the recording of medication products and their associated dosage and administration instructions, in order to support prescribing, administration and dispensing.

The editing team discussed and responded to the first round of review on 4th September 2013. The editors are now considering next steps and reviewing the lessons learned so far.

LESSONS FROM THIS PROCESS

TEAM AND COMMUNITY

There is a significant interest across eHealth communities in contributing to this work.

There needs to be a programme of continued engagement and publicity, supported with training and education, to enable and encourage more individuals and organisations to contribute.

The maintenance of a CKM community of reviewers requires support and feedback to contributors to acknowledge their input.

Contributors require some understanding of the eHealth concepts underlying the process. For example, understanding what is meant by the term 'clinical model' when referring to computer information systems. This is not a high barrier to cross, but should be supported with education, training and peer advice. It is possible for clinicians with little understanding of the underlying methods to meaningfully contribute to development, but feedback is improved where the scope and purpose of the model being designed is clearly understood.

CLINICAL KNOWLEDGE MANAGER

The CKM software works well to support the process of archetype design and review but competent use requires some learning. Anecdotally some interested individuals have found it hard to become engaged with the process because of this barrier. Learning to use CKM would therefore ideally be supported with formal training in the first instance or, where this is not possible, with concise, illustrated guides and documentation.

CKM instances do not need to be constrained to a geographic locale. The CKM instance we are using allows contributions from across the UK. This has the potential, therefore, to provide clinical models able to support cross border interoperability, and reduce the overall burden of model development and implementation.

LEADERSHIP AND PROJECT MANAGEMENT

Using CKM to deliver usable archetypes requires clear leadership and some project management support. Leadership is needed to champion the work, maintain and develop a cohesive community of interest, and to keep stakeholders informed on the purpose, requirements and progress of the development. Project management support is needed to administer, co-ordinate and maintain contacts; to help with software access and configuration; to support new users with educational materials and peer support; to help implementers use the models; and to schedule a timetable of reviews.

Initial funding for CKM supports only the licence for access to the software. The personnel to support the development are either independently funded or doing so as part of other formal roles in NHS Scotland. The initial method of managing the above functions was to delegate them to the core team of editors. In July 2013 we agreed that these roles would be better served by using SCIMP resources, with SCIMP Clinical Lead making this a priority for the SCIMP group. SCIMP has project support resources which are able to administer the project management tasks in the short term and as a key editor with an informatics and clinical background, SCIMP Clinical Lead is well positioned to provide leadership to the project. Because of limited available time and other conflicting priorities this may not be a sustainable solution in the medium term, thus further review of how these requirements are met will be needed in due course.

SCIMP are able to call on the resources of key individuals with extensive experience of clinical modelling to help support the work we are doing in CKM.

RECOMMENDATIONS AND NEXT STEPS

SCIMP would recommend this project is supported for another 12 months in the first instance. SCIMP Clinical Lead will take the lead in progressing the requirements and issues outlined above, in particular:

- Workshop and presentation at SCIMP Conference 5th Nov 2013
- Presentation to CCLG / E-Health Leads 13th Nov 2013
- Engage with SCI Gateway team – meetings scheduled for 4th December, and with the SCI Gateway user Group on 19th Dec.
- Engage with the ePharmacy team. They are already aware of the project and have expressed an interest, but a more formal approach has been made via e-mail.
- Provide other primary care eHealth groups (e.g. SNUG, CAB) with more information and a simpler process for clinical engagement
- Support key individuals in NHS Scotland to subscribe and contribute to the CKM site with individualised invitations and training
- Author and publish simplified introductory material to CKM describing processes for adopting and reviewing relevant archetypes
- Agree a timetable for reviews and intended progress
- Adapt the material presented for review to the available team members. This means presenting clinical templates where possible, as these make more immediate sense in a clinical context than the underlying archetypes.

KEY OUTPUTS

By year end 2014 we expect to have:

- Medication models agreed and published
- Allergy model implemented in at least one key NHS Scotland system
    - Note that the Allergy archetype is already being used successfully in a live clinical system in NHS England in Leeds to support their local care records. This demonstrates the viability of the collaborative approach to development, and the short lifecycle possible from design, development to deployment.
- Medication model implemented in ECS/KIS.
    - This will provide a method for users of ECS to receive structured allergy and medication data. This data can then be incorporated into clinical software. This functionality will support Medication Reconciliation in Ambulatory Care settings and In Patients. This is a key output of 'Closing the Loop'.
    - Using a common medication model will align the medication information received by ECS from GP systems. This will resolve the repeated difficulties encountered in making the medication extracts from EMIS and Vision to ECS provide the same types of prescribing records.
- The instantiation of an archetype to support formal dose / syntax in prescribing.
    - This piece of work is required to manage the automatic translation of medication 'directions' between community (Product based) prescribing and hospital (Dose based) prescribing.
    - This will underpin medications reconciliation tasks as patients cross transitions of care.
    - This work is being developed in conjunction with dm+d & NHS England.

CORE EDITORS

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