

Engaging Clinicians in Clinical Content: Herding Cats or Piece of Cake?

Heather LESLIE ^{a,1}, Sam HEARD ^{a,b}, Sebastian GARDE ^a, Ian MCNICOLL ^a

^a *Ocean Informatics Pty Ltd, Sydney, Australia*

^b *openEHR Foundation, University College London, London, United Kingdom*

Abstract. It is essential that clinicians are able to contribute to the development of clinical content for electronic health records. Clinicians are able to participate meaningfully when the technical focus on the process and the clinical models are reduced or removed. In the openEHR approach – from the original design specification through to the clinical modelling tools – clinicians feature as the primary drivers of clinical content models. As tooling develops and matures to support authoring, reviewing and publishing of openEHR knowledge artefacts, clinicians are increasingly able to be involved – resulting in significant contributions to the development of standardized clinical content models which will support quality of care for their patients.

Keywords. *openEHR*, archetype, template, knowledge, clinical model, clinician

1. Introduction

For reliable and safe implementation of electronic health records (EHRs) it is essential to involve clinicians in authoring and reviewing of clinical content. Experience shows it is often difficult to engage clinicians because of the intrinsic technical focus. Some attribute the problem to the clinicians, describing the difficulty in getting consensus from clinicians akin to ‘herding cats through a waterfall’. However by taking a different approach to EHRs it is becoming evident that clinicians can and will participate actively if we make it easier for the grassroots clinicians to engage with the EHRs and the clinical content models.

The relatively new *openEHR*² approach overturns the traditional EHR development paradigm. *openEHR* design has always assumed that clinical content was a critical priority, of equal importance to the technical aspects, and that its development would be driven by the clinicians themselves. Though the technical architecture remains the domain of the software engineer and the foundation of *openEHR*, it is not generally made visible to the clinicians. Clinicians can and do engage in the clinical content authoring, reviewing and maintenance activities – participating in the development of standardized clinical content models, known as archetypes, that are key contributions to communication and hence quality patient care.

¹ Corresponding Author: Dr Heather Leslie, 214 Victoria Avenue, Chatswood, NSW, 2067, Australia.
Email: heather.leslie@oceaninformatics.com

² *openEHR* Foundation – <http://www.openehr.org/>.

2. Barriers to Clinician Engagement

Two broad barriers have been identified that prevent or limit active engagement of practicing clinicians in EHR content development:

- The process
- The content models

The opportunity for clinician engagement and involvement in shaping their EHRs is greatly increased if these barriers are lowered or removed.

2.1. The Process

Many will agree that, to date, the process of EHR development has not been clinician-focused. In the past, ad hoc EHR development has involved software engineers approaching clinicians, attempting to document the clinical requirements, and then transforming these requirements into a proprietary clinical application – the clinicians effectively playing only a ‘bit part’ in the EHR development. Traditionally, EHR development has been driven by technology requirements and using an engineering process.

In parallel, the shift towards standardized content specifications has been slowly gathering momentum but, until recently, has only taken place within standards organizations such as Health Level 7 (HL7), European Committee for Standardization (CEN) or International Organization for Standardization (ISO). These organizations are not easy for the inexperienced to negotiate and engage, and can require a significant time and monetary commitment to attend meetings and teleconferences, adding to the difficulty in engaging practicing clinicians.

In practice there are relatively few individuals who have the capability and expertise required to cross the very real divide between the technical and clinical domains. The litmus test of a suitable EHR content development process must be the ease with which clinicians can engage and begin to contribute to the development of clinical content, within the constraints of their existing work-life balance.

2.2. The Content Models

Standardized clinical content models are technical specifications, by definition. As their purpose is to be computable, unambiguous and consistently implementable, they are not by nature human-friendly, however it is essential that non-technical clinicians be able to make some sense of a computable representation of clinical content. The challenge to health informaticians is how we can support grassroots clinicians to interact with these inherently technical models.

3. Bridging the Gap between Clinicians and Technicians

What should the health IT domain expect from clinicians? We cannot realistically expect them to invest time, money and effort to become technically competent in order that they can engage with technicians, informaticians, vendors and standards organizations. If we want and need clinicians to engage with the health IT domain then

surely the onus is on the health informatics community to create opportunities and mechanisms to harness clinician contributions, whatever their ability or availability.

4. Clinician Engagement through *openEHR*

The open source *openEHR* architecture specifications, under the auspice of the *openEHR* Foundation, have been developed collaboratively over the past 9 years, and comprise the design specifications for a comprehensive shared EHR. The Foundation is underpinned by an active community of more than 1,500 people from over 85 countries, which draws together interested individuals and organizations to participate in the ongoing development of the *openEHR* specifications – including software engineers, informaticians, academics, terminologists, clinicians and system developers.

The primary purpose of *openEHR* is semantic interoperability of health data – the ability for personal health information to be unambiguously recorded in one system, transported to another system and utilized as though the data had been authored natively within the second system.

4.1. openEHR Design

The unique technical approach utilized by *openEHR* is a two level design paradigm which clearly demarcates between the technical and the clinical content domains – technicians manage the application and clinicians manage the clinical content.

The *openEHR* clinical content models are known as archetypes and templates. Archetypes [1] are the foundation building blocks at the clinical concept level; templates aggregate and constrain the archetypes to create context-specific clinical content for use in direct patient care. In addition, substantial value is gained by the ability to bind external terminologies strategically to archetypes and templates.

As archetypes are not usually ‘hard-wired’ into the application, when clinical information requirements change, clinicians can revise the archetypes to meet the new requirements without impacting or damaging the supporting technical infrastructure. Over time archetypes can be added, modified or withdrawn to suit the clinician-driven requirements in applications.

Is it really achievable to develop archetypes for all clinical content? It is estimated that the number of archetypes required as the foundation for an EHR would be in the order of 2,000 archetypes, with as few as 10 archetypes being enough to create a simple shared emergency summary.

4.2. Clinical Modelling Tools

Current *openEHR* tools for clinical modelling consist of:

- Archetype Editor^{3,4} – enables authoring and editing of archetypes.
- Template Editor⁵ – enables aggregation and constraint of archetypes via templates to support specific clinical use-cases.

³ Linköping University Archetype Editor – <http://www.imt.liu.se/mi/ehr/tools/>.

⁴ Ocean Informatics Archetype Editor – <http://www.oceaninformatics.com/Solutions/ocean-products/Clinical-Modelling/ocean-archetype-editor.html>.

- Terminology Subset builder⁶ – enables authoring of terminology subsets for incorporation into templates, to support specific clinical use-cases.

4.3. Clinical Model Publishing and Governance

As *openEHR* archetypes and templates have been developed, it has become apparent these clinical models require formal publishing and governance support to achieve semantic interoperability [2, 3]. The *openEHR* Foundation released an online archetype repository for community use in April, 2009 – known as the Clinical Knowledge Manager (CKM)⁷. The initial tranche of archetypes within CKM have largely been created for specific projects in the United Kingdom and Australia, and are now offered into CKM as a shared resource.

By combining CKM with the collaborative power of the internet a shared online community has been able to commence working together to define agreed clinical definitions for use in patient care worldwide. As such, non-technical clinicians from all professions and all countries can play a vital role within CKM.

CKM utilizes a digital asset management system to provide model governance and supports the full publishing lifecycle management of *openEHR* archetypes. Future CKM development priorities include governance and lifecycle management of templates, terminology subsets and other non-*openEHR* knowledge artefacts.

As of May 1, 2009, CKM contained 165 archetypes – 2 published; 4 in team review; and 159 in draft status. There were 155 registered users, of whom 60 had volunteered as archetype reviewers and 10 as language translators. To date, review rounds are scheduled for 2 weeks each, and up to 5 review rounds have been required to achieve consensus – however it is yet early days and these trends are only indicative.

5. Clinician Engagement Opportunities within *openEHR*

The clinical modelling tools and the Clinical Knowledge Manager facilitate the involvement of clinicians in different aspects of the clinical models. For some aspects, particularly in CKM, little or no training is required; for others *openEHR* recommends training in order to create archetypes that are of appropriate scope, level of detail and technically sound.

Further research is required, but anecdotally clinicians without technical backgrounds and EHR experience have reported satisfying (and even enjoyable) experiences when reviewing clinical content expressed as archetypes within their domain knowledge, and on reviewing their contribution it has been pleasantly surprising to observe the appropriateness of the comments and the evidence of their expertise.

Details about the opportunities for clinicians to become involved in *openEHR* clinical model development and training required are presented in Table 1.

⁵ Ocean Informatics Template Designer – <http://www.oceaninformatics.com/Solutions/ocean-products/Clinical-Modelling/ocean-template-designer.html>.

⁶ Ocean Informatics Terminology Subset builder – <http://www.oceaninformatics.com/Solutions/ocean-products/Clinical-Modelling/Ocean-Terminology-Subset-builder.html>.

⁷ *openEHR* Clinical Knowledge Manager - <http://www.openehr.org/knowledge>.

Table 1. Opportunities for clinician engagement in the *openEHR* approach

Opportunity	Clinician input requirement	Training requirement
Clinical Modelling Tools		
Archetype authoring	Clinician input is an absolute imperative for clinical archetypes.	3 days intensive training, plus ongoing mentoring
Template authoring	Templates reflect the requirements of a real-life clinical scenario. As such they should be authored by clinicians with direct knowledge of the clinical needs.	0.5–1 day
Terminology subsets	Clinical experience or access to clinical input is crucial to ensure success of this activity. The end result is to have meaningful and contextually appropriate lists available, via archetypes and templates, within the user interface.	3–5 days (includes training in the selected terminology)
Clinical Knowledge Manager		
Archetype adoption	Any registered user can adopt an archetype, contribute to the review and comment on changes.	None
Comment on an archetype	Any registered user can make comments on an archetype e.g., identifying any gaps or errors of clinical content.	None
Formal archetype Review		
• clinical content	Important – the clinical content review requires a broad cross-section of clinician agreement prior to archetype publication	2 days for editors; none for clinicians, although 0.5 day is helpful
• terminology binding	Important – appropriateness of terminology binding requires clinician confirmation	Requires knowledge of terminology
• language translation	Important – appropriateness of translations requires clinician confirmation	None

6. Conclusion

Not all clinicians will need or want to be involved in clinical model development, however, we should be striving to reduce or minimize the barriers to their involvement.

The innovative *openEHR* design approach and supportive modelling tools enable clinicians to be the primary drivers of clinical content models for the first time. Whilst still very new, the online Clinical Knowledge Manager, appears to be supporting non-technical clinicians to contribute actively to clinical content development for EHRs – especially when the process is simplified, made available at the clinician’s convenience, and the very technical aspects of the models are reduced or removed.

Contributions by grassroots clinicians to the development of standardized clinical content models will play a major role in provision of quality care for their patients in the eHealth future. Piece of cake!

References

- [1] Heard, S., Beale, T. (2007) Archetype Principles – http://svn.openehr.org/specification/TRUNK/publishing/architecture/am/archetype_principles.pdf.
- [2] Garde, S. et al. (2005) *openEHR* archetypes in electronic health records: The path to semantic interoperability? In *Proceedings of the 50th Annual Conference of the German Society for Medical Informatics, Biometry and Epidemiology*, <http://www.egms.de/en/meetings/gmds2005/05gmds484.shtml>.
- [3] Garde, S., Knaup, P., Hovenga, E., Heard, S. (2007) Towards semantic interoperability for electronic health records: Domain knowledge governance for *openEHR* archetypes. *Methods of Information in Medicine* 46(3):332–343.