Developing the first generally-available openEHR archetypes and templates for physiotherapy: an example of building clinical models and modelling capacity via student-led academic–industrial collaboration.

Jamila Chihab[a], Hildegard Franke[b], Ian McNicoll[b, a], Matthew W. Darlison[a]

a Institute of Health Informatics, University College London (UCL), London, UK
b freshEHR Clinical Informatics Ltd, Kettering, Northamptonshire, UK

Given the clear assertions in published literature that physiotherapy needs, and will benefit from, electronic health records, it was surprising that the international repository for clinical models for the openEHR record architecture (the *Clinical Knowledge Manager* or *CKM* at openehr.org/ckm) made no reference to physiotherapy, and that other published modelling work had not used formalisms that provided for easy re-use. We set out to explore what would be involved in changing this.

Methods

With advice from another domain expert, a guideline for the assessment of ankle sprain by a physiotherapist [2] was selected. The guideline was chosen to be both generic (i.e. not from a specific hospital) and informed by established principles of structured record keeping (the *International Classification of Functioning, Disability and Health*).

Close reading of the guideline text enabled identification, extraction and enumeration of all data items mentioned or implied, and their datatypes. This included the tracing of recording requirements included in the guideline by reference (*e.g.* to particular tests or scoring systems).

The resulting document informed a "pair modelling" (*cf. pair programming*) process in which the student and an industry expert modeller worked side by side to organise the guideline content and build a corresponding openEHR template for ankle sprain assessment backed by existing and, where necessary, new openEHR archetypes.

The template and archetypes were then published on the UK national CKM (clinicalmodels.org.uk) for review, thus also making them available internationally for scrutiny and possible adoption by others.

Results

The *Ankle Sprain - Assessment UCL.v0* template uses 37 archetypes, 18 of which were drawn from the international CKM. The CKM review was largely positive, raising some technical modelling questions and identifying some flaws in the original guideline.

Discussion

Imperfections notwithstanding, the real-world utility of the artefacts produced supports the hypothesis that clinical modelling is a field in which a student domain expert can – with appropriate support – develop sufficient expertise to make credible contributions to a public-facing knowledge resource.

Conclusions

Guideline authors should consider (and perhaps even specify) the consequences of their editorial decisions in relation to the record-keeping required in a multiprofessional, multi-agency service context.

Taking a guideline, which already has some degree of clinical consensus, as a starting point significantly eases the process.

This kind of academic-industry partnership is rewarding for participants and aligns well with research-based education, for example as articulated in UCL's Connected Curriculum [1].

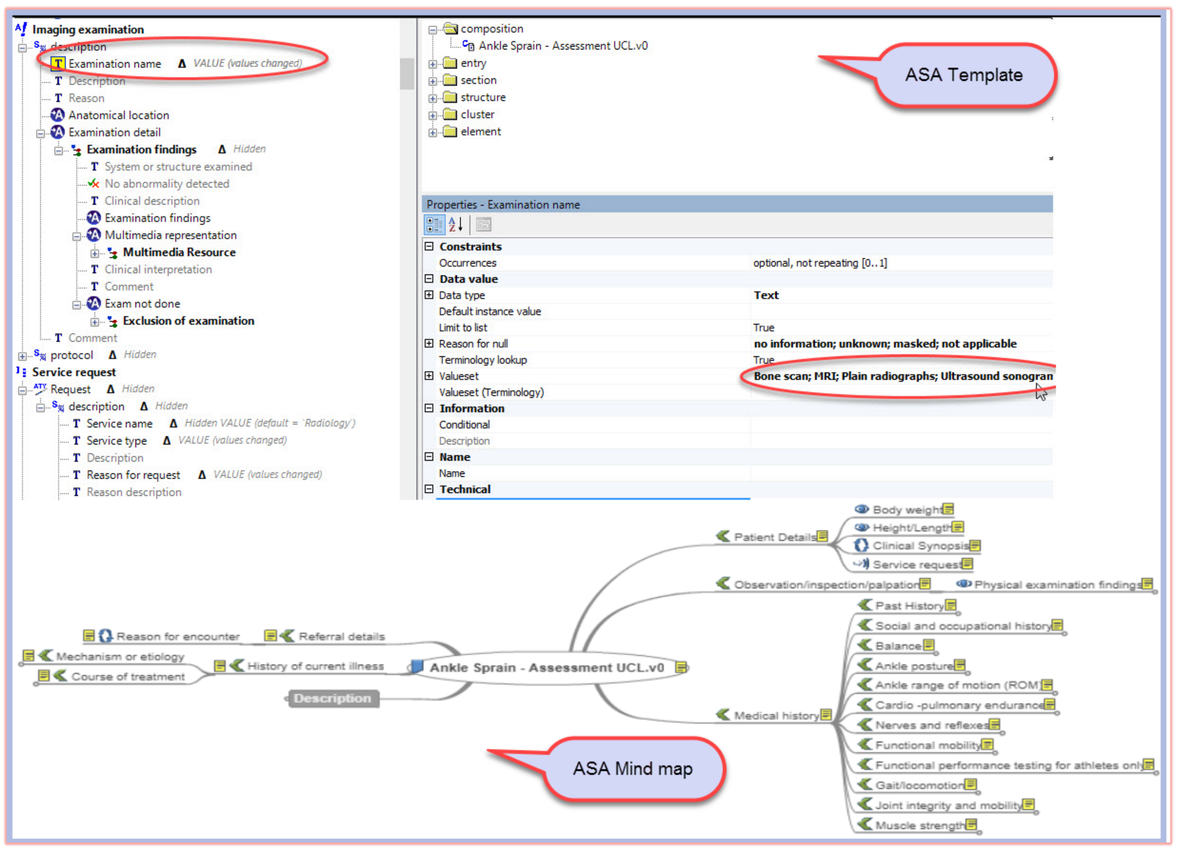

Figure 3: Ankle Sprain Assessment (ASA) template

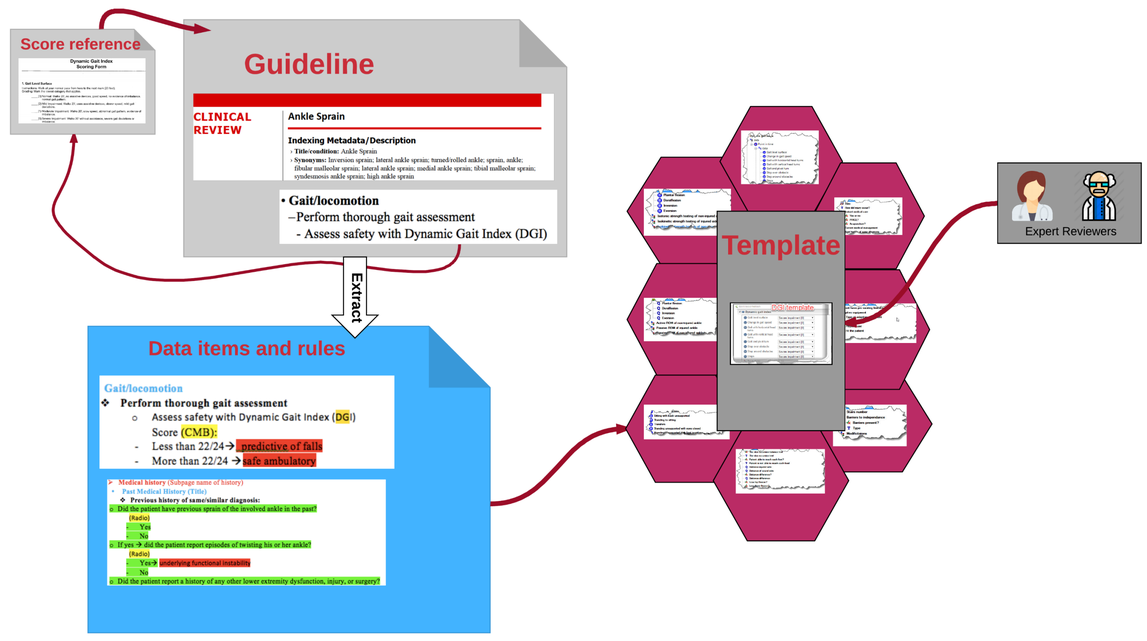

Figure 1: Information flow

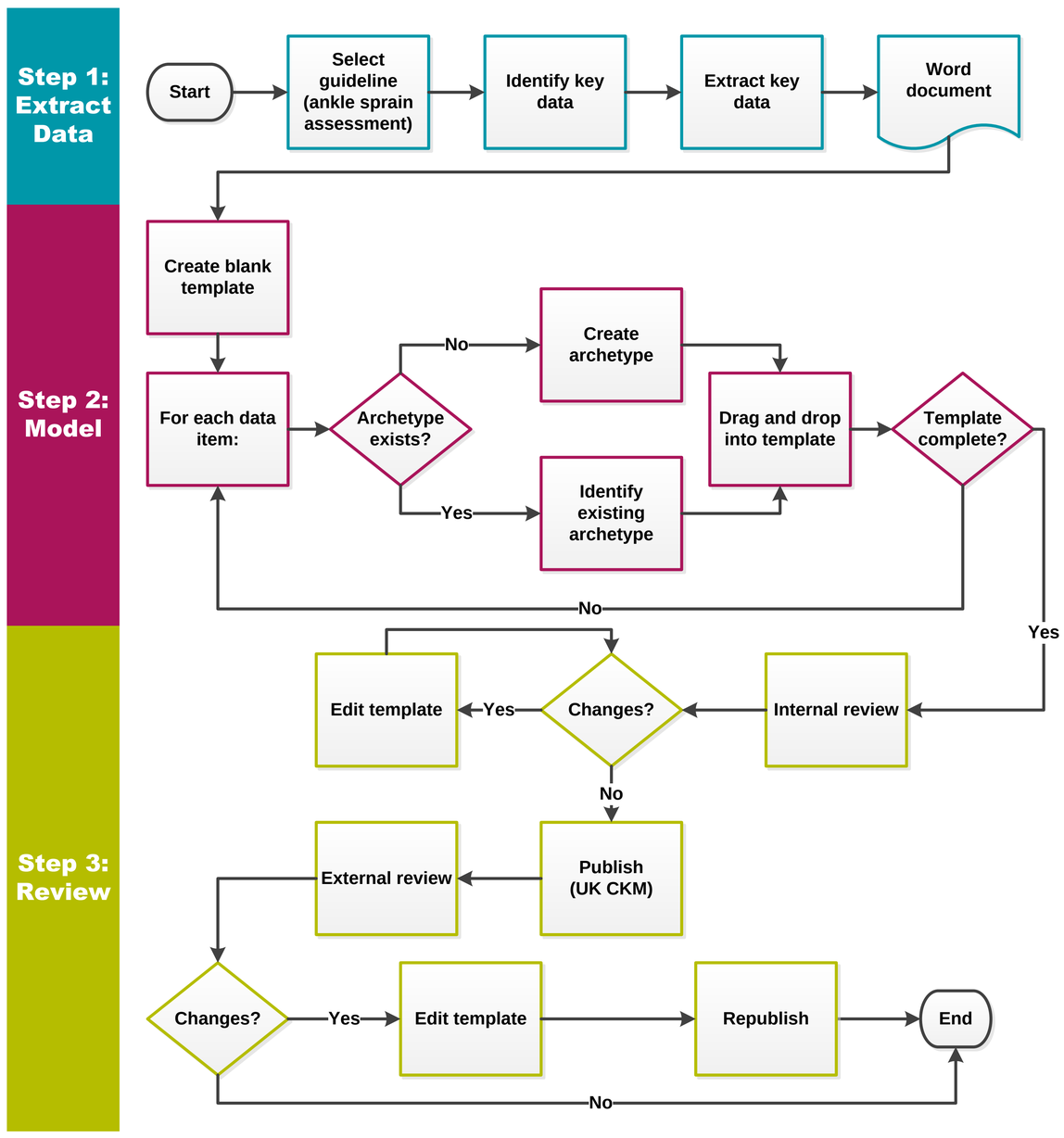

Figure 2: Three-step process of information extraction, modelling and review

Academic-Industry Collaboration

This work was completed in the context of an MSc dissertation in health informatics at UCL, with the support and facilitation of industry partners. UCL is committed to a *connected curriculum*, a component of which is *research-based teaching*, and which aims to engage students in learning activities that have additional dimensions of value.

This particular project was directly enabled by strategic decisions (a) to Include EHR modelling (archetypes) in the health informatics curriculum and (b) to maintain strong links with industry, offering honorary appointments to expert practitioners. Thus a clinically-trained student was able to build on a basic familiarity gained in a taught module and to work with industry practitioners and academic supervision to produce substantive outputs in an area that had not previously been addressed in modelling work. .

This type of project brings with it several advantages which include:

- Students are highly motivated to engage, and may bring with them considerable domain expertise;
- The work has a clear purpose and value in the world beyond academia;
- Industry practitioners have direct input into capacity building and training the next generation.

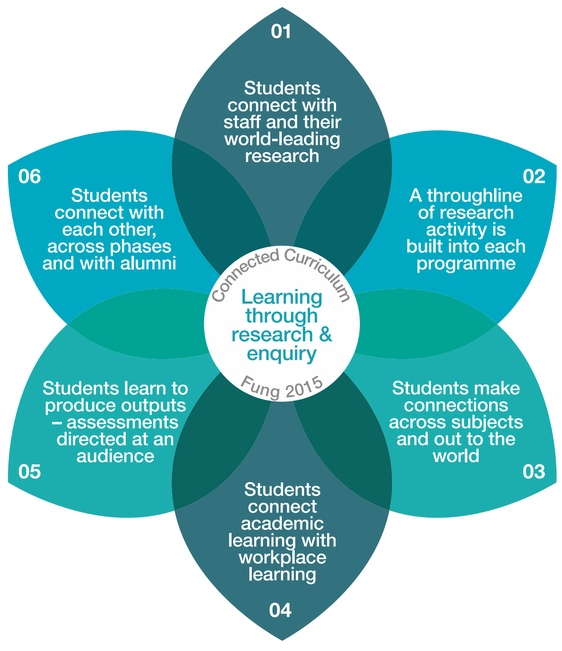

Figure 4: Connected Curriculum

Acknowledgements

We thank Dr Ibtissam Saab for expert advice on guideline selection and all who contributed time and expertise to the review process.

References

[1] D. Fung, *A Connected Curriculum for Higher Education*, London: UCL Press, 2017.

[2] M. Granado and D. Matlick, Clinical Review: Ankle sprain, in: *Rehabilitation Reference Center* Cinahl Information Systems, 2016.

Address for correspondence: Dr Matthew W. Darlison (m.darlison@ucl.ac.uk) UCL Institute of Health Informatics, University College London, Gower Street, London WC1E 6BT, UK

To learn more about taught and research degrees in health informatics at UCL, visit www.ucl.ac.uk/health-informatics/study