Eric Browne PhD thesis abstract

Eric Browne. *Workflow Modelling of Coordinated Inter-Health-Provider Care Plans*. PhD thesis submitted to the Division of Information Technology, Engineering and the Environment. January 2005. Abstract. (full thesis - PDF[1]).

Workflow in healthcare, particularly for the shared and coordinated management of chronic illnesses, is very difficult to model. It is also difficult to support via current Clinical Information Systems and current information technologies. This dissertation contributes significant enhancements to the current methodologies for designing and implementing Workflow Management Systems (Wf MSs) suitable for healthcare. The contribution comprises three interrelated aspects of workflow system architecture as follows:-

- Firstly, it shifts the emphasis of workflow modelling and enactment to a focus on goals, and the monitoring and facilitation of their achievement.
- Secondly, it introduces the concept of self-modifying workflow in the context of health care planning, whereby explicit tasks in the goal-based care plan are devoted to assessing and modifying downstream workflow.
- Thirdly, this dissertation proposes methodologies for identifying and dealing with tasks which overlap, subsume or interfere with other tasks elsewhere in a given workflow.

The language and methods introduced in goal-based requirements engineering research have been carried into the domain of Wf MSs and adapted by the author as a mechanism for deriving workflow models that can be communicated and enacted by health care providers contributing to the shared care of a patient. A methodology is described, whereby a hierarchical goal-based view for the management of a chronic condition or conditions can be automatically translated into a workflow schema. This workflow schema contains subworkflows corresponding to each goal, together with specfic tasks dedicated to monitoring, and, if necessary,
altering the downstream workflow to optimally achieve each goal target.

For self-modifying workflow, certain tasks in the workflow schema are devoted to modifying the downstream workflow on an instance by instance basis. Such
self-modifying schemas provide the necessary exibility to suit the evolving diagnostic and therapeutic processes encountered in Chronic Disease Management
(CDM), particularly in complex areas requiring significant individualisation. The management of Diabetes Mellitus in a community care setting provides an example
to illustrate this complexity. In order to facilitate self-modification of workflow schemas, this dissertation enunciates a set of valid operations that can be applied to downstream components of a workflow schema. These operations are primarily concerned with turning abstract subworkflows into concrete ones through completion and alteration of template primitives. There are many situations in inter-organisational health care, where, for a given care process, activities might be undertaken in one clinic that overlap with, or repeat activities undertaken elsewhere. This dissertation proposes solutions to situations where duplicated tests and procedures are costly and can have negative health impacts on patients undergoing unnecessary tests and interventions.

The approach builds on the two-tier goal/process representation of healthcare processes and describes an execution model comprising a candidate discovery phase, followed by a component crediting phase. The notions of full vs. partial crediting, and goal-level vs. activity-level crediting are introduced. The role that temporal constraints play in determining candidate components for crediting is also examined.

Aspects of a prototype Workflow Management System (called StreamLine) that the author has built, are

1. http://www.openehr.org/publications/workflow/Eric_Browne_WF_thesis_2005.pdf

described in order to illustrate how the approach of goal-based workflow schema derivation, self-modifying worklow schemas, and activity overlap identication and crediting can provide sufficient flexibility and
focus to substantially improve the management of complex, chronic conditions.

The author's prototype is tested using the current local work practices for treating Non-Insulin Dependent Diabetes Mellitus involving shared care plans based on
Australian guidelines. The dissertation concludes with an assessment of the implications of goalbased, self-modifying, redundancy-reducing workflow models for developers and implementors of Wf MSs as well as for implementors of future Health Information Networks employing such complex workflow solutions.