Design Ontology in Context - A Situated Cognition Approach to Conceptual Modelling

Debbie Richards
Department of Computing
School of Information and Communication Sciences
Macquarie University, Sydney,
Australia, 2109
richards@ics.mq.edu.au

Simeon Simoff
Department of Computer Systems,
Faculty of Information Technology
University of Technology, Sydney,
Australia, 2007

Abstract

If we take a situated view of cognition, human thought and action are inextricably connected and affected by the context. It is not just the external environment that will affect the context but that thinking itself modifies further action and context occurs at a conceptual level that exists within a social setting. Thus, a situated view of knowledge necessitates knowledge acquisition techniques which handle change. This is particularly true of design knowledge where the design will change as more experience is gained and the changing model will itself change the perception of a design while designing. The approach described in this paper is based on the view that knowledge is always evolving and the premise that it is not easy to capture or evaluate a conceptual model. The alternative offered is based on the combined use of cases, Ripple-Down Rules (RDR), Formal Concept Analysis (FCA) and the Activity/Space (A/S) ontology. Cases are design episodes and used to motivate the capture of rules in a simple user-driven manner. Cases ground the KBS in the real world and provide the context in which the knowledge applies. Rules are the indexes by which the cases are retrieved. Using FCA we are able to build an abstraction hierarchy of the rules and cases. To facilitate comparison and validation we use A/S design ontology to acquire a consistently organized set of cases. This ontology provides a common structure and shared set of descriptive terms. The ease with which the knowledge is acquired and maintained using RDR, the use of a dynamic design ontology and the automatic generation of conceptual models using FCA allows for the continual evolution of the KBS in keeping with the notion that knowledge is continually evolving and "made-up" to fit the situation.

Keywords: knowledge acquisition, ontology, ripple-down rules, formal concept analysis