

A Hybrid Framework for Representation and Use of Clinical Guidelines

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Background: Clinical Guidelines

Clinical guidelines are a powerful method for improving the quality of medical care¹, while reducing its costs. Most clinical guidelines, however, are text-based and inaccessible to the physicians who most need them; in addition, physicians rarely have the time to decide which guideline best pertains to their patient, and what does applying that guideline to the particular patient entail. Thus, there is an urgent need to automate guideline dissemination and application. There have been multiple efforts to automate guideline-based care. However, converting free-text-based guidelines to a machine-readable format, while supporting both text-based search and retrieval, as well as automated application and quality assessment, is a pressing problem.

Methods: The Hybrid Architecture

To gradually convert clinical guidelines to fully-structured representations, we have developed a **hybrid** representation, implemented within a distributed, Web-based architecture, the Digital electronic Guideline Library, (DeGeL), and set of Web-based software tools, which gravitate a guideline gracefully from text-based, through semi-structured text (labeled by the formal language's semantic tags), to a formal, executable representation (Figure 1). The formal language we use is *Asbru*²; other representations could be used. An *Asbru* specification includes entry, exit, and other *conditions*; control structures, or *body*, *preferences*; expected *effects*, and process and outcome *intentions*. The *DeGel* architecture includes the *Uruz* semantic-indexing and semantic-markup tool (Figure 2);

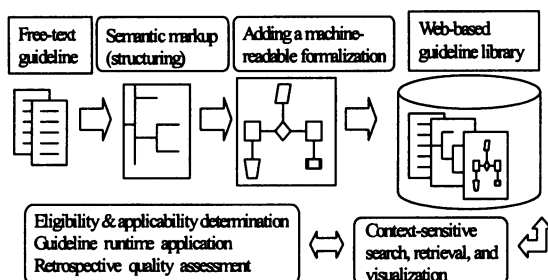


Figure 1: The hybrid-representing process.

the *Vayduria* search, retrieval, and visualization tool; an eligibility determination module; a run-time application module; and a retrospective quality assessment module.

Each guideline is represented at up to three levels: Free text; semi-structured text marked by *Asbru* semantic roles; and an executable *Asbru* representation. *Expert physicians* index and markup text-based guidelines, or create new ones, by dragging text into the appropriate *Asbru* roles (e.g., *entry conditions*), possibly editing it (see Figure 2), resulting in an XML semi-structured representation. *Knowledge engineers* convert the semantically labeled XML elements into executable formal *Asbru*.

Preliminary assessment of the markup and search tools is encouraging; formal evaluation is under way.

Acknowledgments

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References

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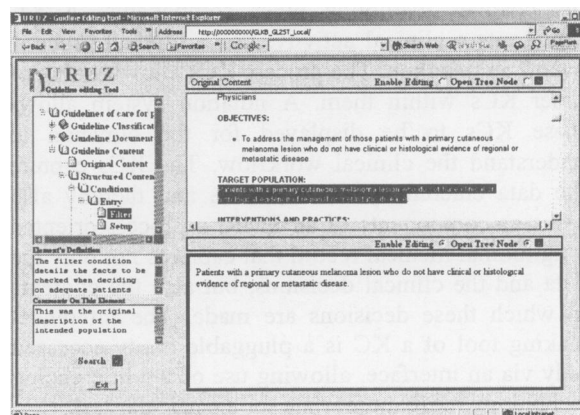


Figure 2: The Uruz guideline semantic-markup interface.