

## Summary

Researchers have been investigating the study of decision tables for more than fifty years. As an important tool to support Information System Management, decision tables have many outstanding advantages, i.e. they are easily learned, readable and understandable by non-technical people. Seeing the advantages, the interest of decision tables has been rising steadily. However, often the definition of concepts, variables and hidden (or meta-) decision rules that underlie remain implicit. When decision tables get larger, ambiguities, content inconsistencies and conceptual reasoning difficulties arise. The situation gets naturally worse when a group of decision makers need to build decision tables in a collaborative environment. Thus, the concept of *Semantic Decision Table* (SDT) is proposed.

SDT provides a means to capture and examine decision makers' concepts, as well as a tool for refining their knowledge and facilitating knowledge sharing in a scalable manner. An SDT is the result of annotating a (set of) decision table(s) (or any well structured decision resources) with (domain) ontologies. It is modeled based on the framework of Developing Ontology-Grounded Methods and Applications (*DOGMA*). We have designed a methodology to assist a decision group to create SDTs. With regard to the technical issues of SDT, Semantic Decision Rule Language (SDRule-L/SDRule-ML) and Decision Commitment Language (DECOL) are designed and implemented to model, store, reason and publish SDT rules.

In order to justify the theoretical part of SDT, we have applied SDT in several interesting applications. One application is to use it as self-organizing and automatically reorganizing decision tables when users' requirements are updated. An algorithm called SOAR (adaptive self-organization and automatic reorganization algorithm) has been developed and evaluated. The other applications show the possibilities of using SDT to monitor processes and present semantically rich decision rules to non-technical persons.