

# Ontology-based Retrieval of Software Process Experiences

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## Research Summary

In this paper, we sketch initial ideas on an Internet-based experience base that supports project managers in the development of project plans based on the experience from former projects. The research is based on Basili's and Rombach's idea of the experience factory [Basili 94]. Our work focuses on the development of techniques and tools that support the retrieval of process types and applicable methods from an experience base (EB).

We use an ontology-based approach for indexing experiences in the EB. Ontologies allow to specify concepts with attributes of a specific type. Concepts can be organized in a hierarchy (using the specialization relationship between two concepts). Initially, we use Decker's RDF-based [Lassila 98] ontology formalism that includes a rule language for representing definitions of concepts [Decker 98]. RDF is a framework for annotating resources on the Web. Decker's extensions allow formally representing additional knowledge about the domain and make "light-weight" inferences about it that improve the retrieval results. By using RDF, it is nicely integrated into standard Web technology, e.g. allowing a straight-forward augmentation of web-based Electronic Process Guides [Becker 98]. In addition, a standard query mechanism based on RDF/XML is currently being developed by the W3C. To apply the formalism in a specific domain, the domain ontology needs to be specified. Hence, we are developing three different ontologies for annotating knowledge stored in the experience base:

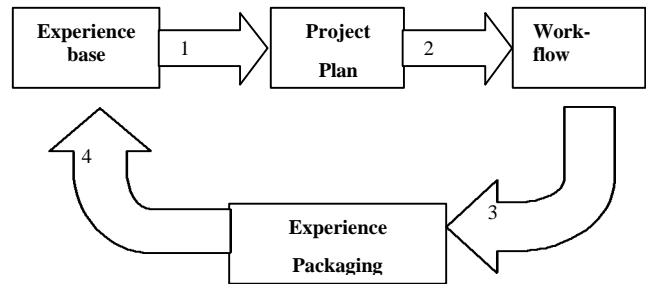
- *Skill ontology*: The skill ontology describes the skills and qualifications required for performing specific task types. Example skills could be "code reading" and "Java programming"
- *Process ontology*: The process ontology allows defining a hierarchical process type structure and alternative process decompositions. For example, it is possible to state that "white box testing" is a subtype of "testing". In addition, it is possible to annotate each process type with required skills and information from the project ontology. The process ontology is based on our MILOS process modelling language [Dellen 97].
- *Project ontology*: The project ontology allows representing information about the project context. Examples are: "Size of the project in person years = 9", "average skill level of employees = experienced", "application domain = real time communication systems", or "Goal for uptime = 99.999%". The project ontology is based on ideas from [Tautz 98].

After defining the ontologies and annotating the contents of the experience base with it, a project manager is able to query the EB for information she needs for planning the current project. For example, a query could be "Find all methods that test a software system of medium size written in Java provided that the time available for testing is 2 weeks". By using the built-in inference capabilities of the ontology

formalism, the system would be able to find process type “black box testing” as well as “white box testing” (because both are subconcepts of testing). The quality models associated with these process types allow effort estimation based on the current code document. As a consequence, “black box testing” will be preferred over “white box testing”, because it meets the two week time limit. Attached to the process type, there are methods that decompose the task into finer grained subtasks. The project manager will then select a method and introduce all subtasks and the corresponding information flow into the current project plan.

### State of Implementation

The work described in this abstract is part of the MILOS framework on software process support for the global enterprise. The primary goal of the MILOS project is to develop methods, techniques, and tools that support the learning cycle in software organizations (see figure on right side). Currently, the system allows interleaving planning and enactment of software projects. It contains a workflow component that routes information (project documents) to appropriate team members. “Useful” project plans (usually developed with MS Project 98) can be feed back into the experience base. Their tasks become process types.



The work described here is part of Step 1 in the figure: The ontology-based retrieval engine will support the project manager in the development of project plans that are effective and follow company guidelines. Pre-defined query templates will be attached to planning tasks (e.g. refining tasks, assigning resources etc.), providing managers on demand with decision proposals based on the contents of the EB.

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